

NEW SIXTH EDITION

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# Handloader's Digest

EDITED BY JOHN T. AMBER

Editor of GUN DIGEST



The World Encyclopedia of Handloading—Pistols and Revolvers, Shotguns and Rifles, Wildcats as well, all comprehensively covered in a wide variety of fully informative articles.



## Anti-Gun Critics Squirm as the Worm Turns

THOSE ANTI-GUN CRITICS who profess to believe so religiously that guns, not criminals, are the root of our crime problem should begin squirming any day now.

Remember when they pointed with such finality across the Atlantic Ocean to England to prove their case? There was the irrefutable evidence.

Britain, with its stringent firearms controls, had virtually no crime problem. It had to be due to the regulation of privately owned firearms. Impose the same restrictions in the United States and our crime problem would be no more.

The situation is beginning to change. Apparently, the same social cancer which has plagued this country in the form of disdain for law and order is spreading across Great Britain.

Armed crime involving the use of rifles, shotguns and handguns is on the rise, despite controls. Shotgun ownership and use have been regulated since January of 1968, rifles and handguns since 1938.

Crimes involving use of shotguns numbered only 53 in 1966. In 1969, they had climbed to 100. The use of rifles and handguns in crime rose from 340 in 1966 to 484 in 1969.

In short, England's crime statistics support two premises the anti-gun fanatics insist on ignoring in their crusade to outlaw firearms in this country.

One is that even in England, it's the maladjusted members of society that commit crimes, not the guns they use. Secondly, the criminally-bent person will obtain and has obtained a gun for his attack on society, despite the fact that guns are either registered or have been confiscated from private ownership.

Take it from Chief Inspector Colin Greenwood of the West Yorkshire Constabulary. After researching the effect of firearms controls, he had this to say in the *London Times*.

"There is no case on record of anyone applying for a firearm certificate to enable him to commit an armed robbery, and there is not one shred of evidence to suggest that the absence of a certificate prevented a single criminal from carrying a gun."

In fact, English criminologists and police officials agree that controls have had little effect in reducing crimes of violence in their country.

So what's the answer? John Farr, a member of Parliament, gets to the root of the problem with the observation that penalties for conviction of a firearms law violation are relatively light in relation to the maximum sentence provided by English law.

All of which makes sense. If the criminal knows he can escape punishment, there's no reason for him to think twice about committing his crime.

Farr says, "When the police do manage to convict somebody, he gets off far too lightly." The British lawmaker has pledged to press for a mandatory minimum sentence.

Some American lawmakers have been trying the same approach. It's time they receive the support they need. ●



# **Handloader's Digest**

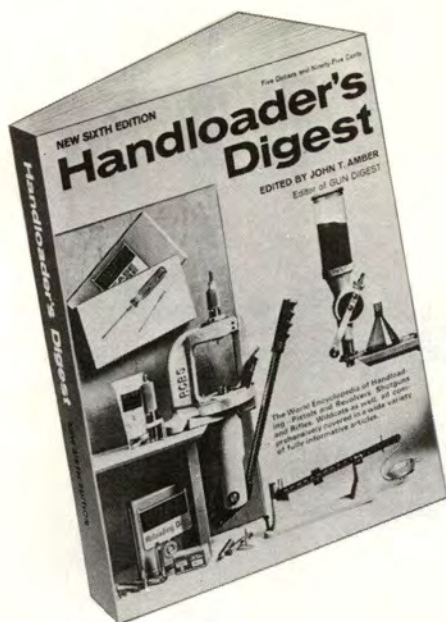
SIXTH EDITION

*Edited by John T. Amber*



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#### OUR COVERS

RCBS's Reloader Special press plus their Ammo-crafter kit appear on our front cover. The back cover illustrates (from left to right) the Size-O-Matic 880B, the Du-O-Matic 375, and the Mult-O-Matic 600 shotshell reloading presses, all by Ponsness-Warren.



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As the author says, perhaps the one-caliber reloader is happier in his ignorance. If he delves deeply into the useful and important—but often obscure—truths revealed here, he'll be a wiser if less blissful man. Not for experts!



# A Handloader's Miscellany

by BOB HAGEL

**M**AYBE THE CASUAL reloader is better off and happier in many ways than the expert. An unusual and controversial statement, but one that is often true. Why? Because many reloaders who are just starting out, and some who have handloaded for years, work with only one cartridge. They probably load only one brand of bullet in one weight, and very likely with only one powder and charge. It follows, of course, that they use these loads in only one rifle, one that will last for many years of hunting.

Their load dope may have been worked up by some friend more knowledgeable in the ways of loads and rifles, or it may have been taken from a reloading manual. In either case it may not be the absolute best load for the rifle it's used in, but as long as it functions properly and puts the annual deer into the freezer, the fellow who loaded it is happy.

But if the guy has more than a passing interest in firearms, it is inevitable that he will eventually buy another rifle chambered for another cartridge. Then the gunbug, perhaps, bites again and he has to have something else. He may trade one for the other, or he may keep them all—which is more often the case—and it is now that reloading really becomes necessary, both for reasons of economy and to find the load that will give him the most from every rifle he owns. He also finds that, to get the most from each rifle and cartridge, he'll need several loads for each.

Now he suddenly realizes that there are problems connected with reloading he never dreamed of. Problems that can and usually do create all kinds of minor—and some major—trouble. He finds that many of the guide lines handed down from black powder days don't

work nearly as well as they sound. If he buys one or another of the several good reloading manuals now available—and bothers to read the sections that precede the actual load tables—some of his problems will be aired and solved. But even then, there are many aspects that aren't covered and, the deeper he gets into reloading, the more the sticky situations arise.

I have no idea how many thousands of rounds I've loaded during the past 40 years or so. Today I often load, chronograph and test for accuracy more rounds in any given week than most reloaders cork up in a year, yet I still run into problems that I didn't know existed. It is with this in mind that this article is written, and with the hope that some of the problems and solutions offered here will be of value to those with less experience.





It's hard to say whether powder or bullets are the most important ingredient mixed into a cartridge, but there is no question that they must be matched to give the best results; the use of either wrong one can cause undesirable and sometimes disastrous results.

### Powder Problems

Let's take a look at powders first. Most reloaders know that slow-burning powders work best behind heavy bullets in big cases with small bores, or, for that matter in medium-capacity cases with heavy bullets of small diameter. They also realize that if light bullets are used in the same case a faster-burning powder is indicated. But sometimes they're not aware of how much trouble they can get into, with certain of those powders, if they are loaded to near maximum behind the wrong bullet weight. Powders of certain burning rates are used with bullets of certain diameters and weights in cases of various capacities for two reasons: First, to give the highest velocity to that weight bullet in that case with acceptable pressure. Second, to give the best accuracy with the bullet used. Of course the most desirable situation is a combination of both.

Normally, when slow powders are used, and the pressure signs indicate near-maximum loads for that bullet weight, the addition of another grain or two of powder does not greatly increase pressure, at least not to dangerous levels. This is *not* always true, however, of the faster-burning powders, for with them an extra grain or so often sky-rockets pressures out of all proportions. This is particularly true when fast powders are used with heavy bul-

lets of small diameter, perhaps for some special reason such as the creation of very accurate but mild loads. It sometimes happens, when using fast powders to develop a high-accuracy load, that the expected performance at the target fails to appear, yet the signs of pressure are still mild. If you are not completely aware of this you can add an extra grain or so and find real trouble. This is especially true of such smaller cases as the high velocity 22s and 6mms.

The type of powder used often plays an important part in touchy loads, too. I have found that, on the whole, ball powders are more likely to be erratic when loaded to high pressure levels than are the extruded powders; and this comment is not necessarily restricted to the faster burning powders. I have had indications that this was happening with most of the Hodgdon and W-W ball powders, even the very slow numbers. One exception seems to be H-870. It has never reacted violently to high pressures in any case or with any bullet weight I have used it with. But then there are few cases that have enough powder capacity, coupled with the right bore diameter, for H-870 to give the highest velocity level.

In general, I think it might be best that the average reloader, if he wants to obtain near-maximum velocity, confine his choice to the stick-type powders. Also, if he's in doubt about the right powder for his bullet weight, that he use a powder on the slow side; it is not as touchy. Hot loads of the more touchy powders often work well if everything else is correct, but a little variation here and there can upset the pressure level and pop

a primer or stick a bolt. A change in bullet design or firing temperature can make the difference. A load that functions perfectly at 50 degrees can blow a primer under a summer sun at 90 degrees with powders that are erratic under high pressure.

### Powder Scales

While we're on powders, let's look at the scales on which they're weighed. We know how important it is—initially and periodically—to check measured charges by weight, but how many realize that 50 grains on one scale may be 49.5 or 50.5 on another? Or that the differences may not be uniform when weighing different charges? With medium or large bullet diameters and case capacities .5-gr. or even 1 grain will not become excessive unless loads were far too hot already, but with the 17-cal. cartridges, for example, and the faster powders, it certainly can.

When weighing charges on any scale it is an excellent idea to tap the large poise or counterbalance (the one on the 5-gr. end of the beam) smartly with a case to make certain it is settled into the bottom of the notch instead of riding on the side, perhaps on a rough spot, to later slide into place and change the charge by one or two grains one way or the other.

If you suspect the accuracy of your scale, give it a test. For how to go about this single task, see "Powder Scale Testing" in the Handloading Review pages, elsewhere in this issue.

### Powder Lot Numbers

One of the most important things about powders, and a fact not generally realized, is the difference in various lot numbers of the same powder. Our older readers will remember the trouble experienced with the first use of 4895 after World War II. A certain charge of one lot would be mild, yet the same charge of another lot—with exact duplication of all other components—would kick a primer. We have been led to believe that this is no longer the case with any powder; that all lots give the same pressures and velocities when all else is the same in the same rifle, at the same temperature, and so on.

Generally speaking, various lots of the same powders do give very nearly the same velocity-pressure levels, but it is not always so. If



charges are held a few grains below maximum the reloader will probably never know the difference, but if a batch of cases are loaded to maximum-usable pressure the same charge, if from another lot of that powder, can be far too hot. This is made vividly clear when the handloader chronographs his loads.

A year or so ago I had worked up loads to top acceptable pressures, in a cartridge I was testing, with a slow-burning powder that is one of the most popular on the market, and one of the most uniform. Right in the middle of things I ran out of powder and had to grab a can from a local hardware store to finish up. It was immediately obvious that this lot was hotter. I wound up cutting all charges by 2 grains, but at that level recorded velocity was about

identical with the former load.

Recently I did a good deal of loading with another brand of slow powder that gives phenomenal velocities in several different cartridges. I had tested some of these loads in a rifle I'd made up for a friend, and I gave him the load dope and the velocity figures, of course. Later, checking the loads on his own chronograph (the same make as mine) he discovered his figures were down around 100 fps from mine. He later brought the rifle back and I loaded and checked velocity again. This time I came within a few fps of his readings. I had changed powder lots but nothing else. This bugged me, so I loaded some ammo for the other two rifles that had chronographed the unusually high velocities earlier, but this time with the new lot of powder. The result was the

same—readings were about as much low with both of these cartridges as they had been with his rifle. I tried going up two grains, but that was as far as I could go; velocity was still below that obtained with the first lot, although I had gained about half of the loss.

The first example I can understand, but not this last one. I've had it happen with other powders also, too many times to believe it is unusual. I won't, however, mention the particular powders because it may look as though I'm pointing the finger at them—which I'm not. These were, in fact, among the most reliable powders I use. The same amount of discrepancy in faster powders could have had dire results. When you're about to use a new lot of powder, drop the old load a couple of grains so you'll be safe with the full-throttle loads.



Left: Method of smoking bullet with common kitchen match to check for seating depth required for that bullet in rifle it will be used in. If bullet is seated well out land marks will appear on smoked surface • Right: With smoked bullet seated too far out, chambered cartridge will show marks of lands • Far right: Measure length of these marks, add 1/16", set bullet-seating stem up that amount by holding lock ring in place and loosening stem and ring until the gap between ring and die top equals that amount, then tighten lock ring. This will give correct seating depth of that bullet in that rifle.



### Bullets Vary

Many reloaders appear to think that all bullets of a certain weight, seated ahead of a given powder charge, will deliver the same pressure-velocity level. This is sometimes true, but often it's not. Bullets vary considerably in their form from one maker to another, and there is quite a difference in both core hardness and jacket hardness between various bullets brands. There is also a decided difference in jacket thickness, and the diameter varies more than is generally realized between bullets of different brands. Five different brands of bullets recently tested in 264 cali-

ber miked from a low of .263" for one brand to .265" for another. It doesn't take much imagination to see what this difference in diameter will do to pressures at high levels. Moral? Get a mike to check bullet diameter.

Bullet shape influences pressures even if diameters are exactly the same, for shape or form alters a bullet's bearing surface. Some bullets have a much longer bearing surface than others. Some carry the bearing surface right out to where the ogive (final taper) becomes apparent. Others have a short bearing surface that tapers gently into the ogive proper. Still

others are built in two-diameter form, with a short full-diameter rear portion and a forward section only large enough to ride the lands from just forward of the case mouth.

These variations in shapes and bearing surfaces not only cause more or less friction, but control seating depths in all except free-bored chambers. This in turn brings about a big difference in pressures. A load that gives normal pressure with the bullet so seated that it does not engage the lands by about 1/16" will show a marked pressure rise when seated to jam tight against the lands.



Another means of determining maximum cartridge over-all length (subject to magazine and ejection requirements) can be done like this: close the action and measure to  $\frac{1}{16}$ " or better the distance from the bolt face to the muzzle. Now open the action and push the bullet being tested into the throat, holding it against the lands by a dowel or stick. Next, measure the bore from muzzle to bullet tip, then subtract this figure from the muzzle to breech face dimension, and the result is your maximum loaded cartridge length. To arrive at optimum over-all cartridge length, with the same bullet—deduct  $\frac{1}{16}$ " from the remainder found. Example: Muzzle to bolt face is  $26\frac{1}{2}$ ". Muzzle to tip of bullet X is  $23\frac{1}{2}$ ". Difference is 3". Subtract  $\frac{1}{16}$ " from 3", leaving  $2\frac{15}{16}$ " optimum loaded length. ED.

It is impossible to know in advance the exact depth to which a particular bullet must be seated to clear the lands of a certain make of rifle without checking it out in that rifle. Doing this, however, is quite simple. Seat a bullet to a little over factory over-all cartridge length—if the magazine will permit—and smoke it liberally from case mouth to well into the ogive with a common kitchen match or a candle. Then chamber it, extract it carefully and check for land marks on the smoked surface. Measure the length of the land marks, add



The equivalent of an added grain or two of powder, resulting from the use of different lots, probably wouldn't prove dangerous with the slow powders used in the 300 Winchester Magnum (at right), but the same difference in the 22-250 case (center), with its faster burning powders, may cause plenty of trouble with maximum loads. In the 17 Remington (left) which does best with faster powders, and because of its small capacity, a grain hooked on the top side of a max load could raise merry old hell.



Many reloaders assume that every bullet of the same weight, regardless of brand or shape will give the same velocity and generate the same pressure in the same case with the same primer, powder and charge. This is not always true because of the differences in diameter and bearing surface, as well as jacket and core hardness. These are all 180-gr. 30-caliber bullets, but besides the differences that meet the eye there are a lot that aren't visible. From left: Nosler, Sierra BT, Hornady, Speer standard spitzer and Speer Magnum.

$\frac{1}{16}$ " and turn the bullet seating stem up that amount.

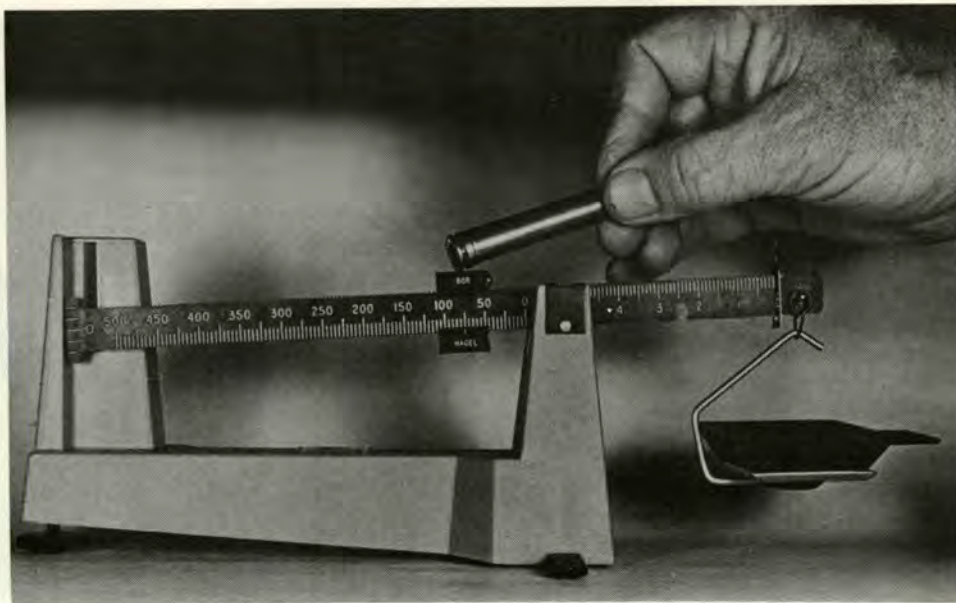
### Free-Bored Chambers

It is generally known that Weatherby rifles are free-bored about  $\frac{3}{4}$ " in most calibers, but it is not as well recognized that some other makes are also free-bored, at least to some degree. This free-boring re-

sults in such cartridges as the 7mm Weatherby being able to digest more powder than the 7mm Remington Magnum, a round that is of almost identical case capacity. The bullet can be seated out farther for one thing, and the long free-bore creates a long bullet jump and reduced pressures for another. Both serve to increase the amount of powder the case will handle, thus giving velocity in excess of that indicated by case capacity.

Schultz & Larsen rifles are also free-bored, if to a lesser extent than Weatherbys, in such calibers as the 7x61 and the 308 Norma Magnum. Few reloaders seem to know that the Savage 110 rifle has a very long throat in at least some calibers. I loaded extensively for three Model 110 Savage rifles in different grades, but all chambered for the 7mm Remington Magnum cartridge. Loads for other makes of rifles were quite mild in all of these 110s, and a check revealed a throat of  $\frac{9}{16}$ " from neck to lands, or about  $\frac{1}{8}$ " longer than is standard for the cartridge in most makes of rifles. If bullets were seated to factory over-all loaded length the charge of most suitable powders could be increased by 2 grains above that used in, say, a Remington rifle, for the same bullet and pressure levels. A full load for the Remington would be fine in the Savage, but reverse this procedure and pressures could get out of hand. The lesson here is not to work up a full power load in a long-





It is a good plan to tap large counterbalance to make certain it is resting in bottom of groove. If counterbalance hangs up on side of notch it can change weight of charge by a grain or two when it drops into place. If it hangs on top, between notches and drops into notch on either side it will change weight of intended charge by 5 grains.

throated rifle and then try to use it in a normal chamber. More—check any new rifle to discover its throat length.

### Case Weight and Necks

Most reloaders with any experience realize that some brands of cases are heavier and have, therefore, slightly less powder capacity than those of another brand in the same caliber. They also know that this difference in capacity will change velocity and pressures to some extent. But they usually take it for granted that this difference in case weight between brands is consistent among all calibers. This is not true. A certain caliber of one brand may run several grains heavier than the same cartridge of another make, but in another caliber the weight difference may reverse, or they may be of the same weight.

It is not generally realized that the various makes of cartridges don't have exactly the same dimensions—especially where brass thickness is concerned. If the case neck is thick on a certain lot or make of case, and your rifle happens to have a tight chamber neck, you are in for trouble in one form or another. First, and least important, accuracy will usually suffer. Second, and highly important, if the bullet is not completely free to move out of the neck when the case fills the chamber on firing, pressure jumps drastically. If your load was already maximum for that rifle it can easily become excessive. Now and then, as you

process your cases, or if you're starting a new batch of cases, stick a bullet into the fired, unsized case neck. If it doesn't enter easily, ream the neck inside or turn the outside to get more expansion.

Another thing that can raise the very devil with accuracy, and also boost pressure, is over-long case necks. Such lengthy necks may crimp on the bullet when they strike the end of the chamber neck. The main reason for this is that some reamers cut a square shoulder where the neck ends and the throat begins in the chamber, while others cut it on an angle. If it is square the mouth of the case will butt solidly against it. This will cause the bolt to come to a sudden stop in closing and, if the neck is much too long it will be impossible to close the bolt. However, if the end of the chamber neck is cut at an angle a too-long case neck will be forced into a crimp on the bullet with very little pressure on the bolt handle. This is when you run into trouble. You may not be aware of the cause of the slightly sticky bolt closure, thinking it is a case that is tight from head to shoulder (headspace on rimless cases).

This type of neck trouble is often encountered when full-length resizing cases and using them in more than one rifle. One of these rifles may have a chamber with a short neck.

### Maximum Pressure

Through most of this article

we've dealt with the things that can give trouble when "maximum pressures" are involved. Just what is this "maximum pressure" we speak of as applied to ammunition intended for hunting or target work? I know that the term, as used here, is often misinterpreted—even by some very knowledgeable gun experts. Maybe we are using the wrong words, but what other term should we give to a load that gives the highest velocity from the rifle it was tested in and one *that* rifle would handle safely under any conditions in which it was likely to be used? It means a load, using the particular components it was worked up with, that is accurate enough for the use it was created for.

No one can guarantee that a given load will not show excessive pressures in another rifle, any more than he can say it will not prove quite mild. But if you chronograph enough like loads at about the same pressure levels you soon find that velocity is usually quite close in all rifles. When one rifle gives much more or less velocity than another, with an identical load, the pressure signs normally tell you why.

Occasionally, if you do enough load testing or load enough full-throttle loads for various cartridges, you'll blow a primer or even stick a bolt. I hope that some of the observations made here will prevent your making these mistakes, or that they'll supply the answers if the problem occurs. ●





# Let's Pattern That

*It's time consuming, tedious, a dull chore, but patterning—done adequately and correctly—is the one and only way you'll ever know whether your handloads are perfect, poor or passable. The author, an old patternmaker, has all the answers.*

AS A HUNTER, Uncle Alex was primarily a shotgunner and a crack contender on anything wearing a pair of wings. He was also a great improvisator when it came to checking out a new gun or an untried load. His usual method was to select a knothole in the hen house wall, pace off the appropriate yardage and let drive. The habitants of that somewhat worse-for-wear building were understandably distressed by these goings on, and there were feathers in the wind on more than one occasion. Aunt Jennifer may have had strong suspicions as to why egg production went into those sudden and drastic declines but if she did, she remained discreetly silent.

That was back in those distant days when a nickel still had tremendous buying power. It would get you half a box of 22 Shorts from the obliging hardware dealer, or a fresh-off-the-press copy of an outdoor magazine. Although I was then hardly dry behind the ears, I was already a voracious reader of such publications, and I recall that the gun writers of those unhurried times were delivering some powerful sermons on the need for determining precisely where and how the trusty old bird gun was shooting. In case you haven't noticed, they're still at it today.

But the millions of printed words, the vast plethora of conscientious and well-intended advice, have served as only a weak catalyst at best. On the whole, very

few shotgunners ever go to the trouble of putting Old Betsy through the patterning routine. Probably not more than one shooter out of a hundred ever makes the attempt; and probably not one out of a thousand does it in a way that produces meaningful results.

As a gun nut who has tested a great many new scatterguns, and as a handloading buff with a consuming interest in seeing how my handiwork measures up, I have fired literally thousands of shotshells at the pattern board. I have yet to feel that any of this time has been wasted.

Perhaps this background will serve to explain why, on occasion, I chew a lot of Roloids—like when listening to some chap who buys his first loading tool on Tuesday and loudly proclaims on Thursday that his home-brewed fodder absolutely surpasses anything the big loading companies have to offer.

There is a good chance, of course, that he has cranked out some top-drawer loads. Yet how does he really know what his loads are doing? He doesn't. Not unless he has invested some time and effort in pattern testing, which, come to find out, he usually hasn't. Like the fellow who takes it for granted that his gun will print patterns that are in perfect agreement with the choke markings on the barrel, or the guy who subscribes to the old myth that a smallbore gun such as the 20 will,

for a given degree of choke, throw a narrow and harder-to-hit-with pattern than the 12, he is simply the victim of his own gullibility.

Basically, and as mentioned earlier, the purpose in pattern testing a shotgun is two-fold. First of all, we want to learn *where* the barrel is placing the shot charge in relation to the point of hold. Is the gun shooting high, low, a wee bit to the right or left, or is it dead-on?

The other and equally important half of the picture is to determine whether the load and shot size we think is right for the range and game size is a compatible choice in *our* particular barrel. Maybe it is, maybe it isn't. The one and only way to learn the true story is to get out there and print some patterns on paper, cardboard or a steel plate. There is no other way to verify our supposition or prove it wrong.

Perhaps the greatest single deterrent to pattern testing is the honest-to-gosh fact that it does consume a lot of time. There is the preparation involved. The shooting itself goes rather slowly and tends, after a while, to border on the boresome. Finally, the evaluation of the results shapes up as a dull and tedious chore.

When checking out a rifle or a pistol for accuracy, you measure the size of the group and you're through. With a shotgun, it's not quite that simple. You've got to count the many individual pellet hits and then figure the average



# Shotgun

by **WALLACE LABISKY**



performance on the basis of several patterns. You will also want to assess such matters as total spread of the shot charge and pellet distribution within the "working" portion of the pattern, all of which makes for quite a project.

## Getting Started

The mechanics of pattern testing also seem to stop some fellows before they get started. I am frequently asked about the materials needed, how many shots should be fired in checking out a barrel or a load, at what distance the shooting should be done, and how to proceed in regard to evaluation of the test. Let's take a detailed look at these various aspects.

The individual who is so situated that he can set up a permanent patterning range might want to consider the steel plate approach. While this method has advantages, it also has its drawbacks. Unless you hammer away at a steel plate with buckshot and rifled slugs, it is practically indestructible and the only cash outlay will be the initial cost of the plate, plus that for a couple of 4x4's and the necessary bolts for erecting and tying the unit together.

A sheet of about 1/8-inch stock, preferably of a hardened type, should last a long time.

But when patterning on a plate, each shot must be immediately evaluated and the results recorded on the spot, because the surface

has to be painted over with a non-drying mixture of white lead and oil before the succeeding shot can be fired. To me, at least, this rates as a disadvantage, as it greatly limits the number of rounds that can be fired in a given period of time. I much prefer to print the patterns on paper, an approach which enables me to run off several 5-shot strings in the time it would take to complete a single string when using a plate. Moreover, I can then evaluate the patterns at my convenience, and I can do it inside, out of the weather.

When combining paper with the permanently-erected frame, there is no need to use a steel plate as backing. A sheet of low-grade plywood will be quite satisfactory; for that matter, if you can rig some other means of holding the paper taut, there is really no need for backing of any kind.

Cardboard, such as that used for large packing cartons, works fine for shotgun patterning, and it handles far more easily in a wind than paper. But it's really an impractical choice inasmuch as rounding up enough pieces of the proper size is more trouble than it's worth.

Incidentally, dimensions of the steel plate should be 48 inches square at the minimum, and 60 inches square would be even better. As for paper, a piece 48 inches square should be regarded as the minimum but, on the other hand, anything much larger than this

becomes too hard to handle.

As with cardboard, constantly scrounging around for sheets of paper of the right size and strength can be a headache. I got around this problem years ago when I began buying 48-inch-wide paper by the roll from a wholesale grocery firm. To my notion, white butcher or freezer paper makes the best choice, as it is far easier to see the pellet hits than when using the usual brown-colored wrapping paper. Paper which is heavily waxed on one surface is not necessary, and will just increase the cost.

The rolls I buy hold around 1,200 linear feet or a little more, which is enough for 300 patterns. Prices will vary depending on where you live, but here in the upper Midwest my last roll cost \$15. If two or three shooters go together on the purchase, nobody gets nicked very deeply.

## A Portable Frame

For a good many years I have used a portable patterning frame that can be quickly dismantled into two pieces and stowed in the trunk of my car. It consists, simply, of a pair of 2x2s that are 6 feet long, and these joined together by cross-pieces of ordinary lath (see fig. 1). The laths also serve to lend some support to the paper, which is helpful in a wind.

With a frame in an upright position, a 24-inch-long pointed stake is driven several inches into the



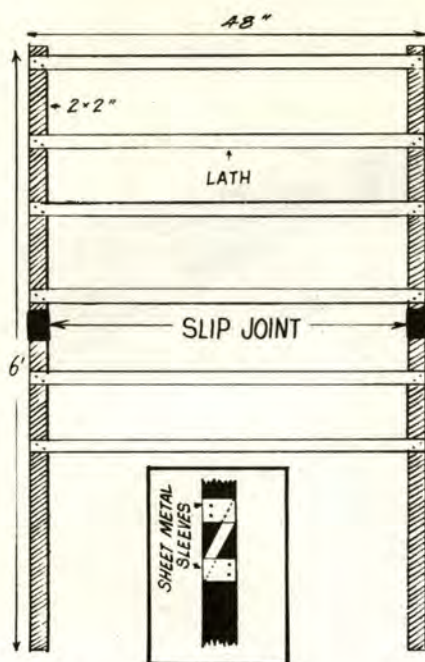


Fig. 1 Sketch shows dimensions and constructional details of a portable patterning frame. Inset shows how sheet metal sleeves are employed to make a slip joint which permits frame to be disassembled into two pieces for transporting in car trunk. Sleeves should be formed and fastened to the wood 2x2" uprights with 2 screws on each side.

ground behind each leg of the frame, and a quick wrap or two around stakes and legs with easily-handled copper wire completes the erection. As such the unit has the stability (with paper in place) to withstand a pretty fair amount of wind. The sheets of paper are held by husky paper clips of the spring-hinge type—4 along the top edge of the paper, 4 along the bottom. To insure adequate gripping power, the clips should be 2½ to 3 inches wide. Cost? About 15 cents apiece at most office supply stores.

The portable patterning frame fits my *modus operandi* better than any other approach. It offers the flexibility needed to cope with weather conditions—namely, wind. By setting up so that I can shoot with the breeze at my back, there is no need for holding either to port or starboard to compensate for the drift of the shot

charge. You might be surprised at how much the pattern will drift in a cross wind, even if it's clocking at only 10 MPH, and particularly if the shot size is smaller than No. 6. If at all possible, it's best to postpone the patterning session if the wind is stronger than 10 MPH, because handling the large sheets of paper then becomes an exasperating task.

If using laths as cross members for the portable frame, they'll have to be replaced with some frequency. Much depends on the shot size used. A session of 25 or 30 patterns with 2s or 4s will usually chew the bejabbers out of lath-weight cross pieces, especially those which catch the core of the pattern. Naturally, they will last much, much longer when the patterning calls for small shot such as 7½s or 8s.

Although the shotgun rates as a relatively short-range firearm, the safety factor should not be lightly dismissed when pattern testing. With the gun on a horizontal level, even large-sized shot pellets do not travel any great distance before dropping to earth; nonetheless, providing for a fully adequate safety margin is still a priority matter. A natural backstop, such as a steep bank or a clump of dense brush, is ideal. Lacking these you will need, at the very least, a few hundred yards of free space beyond your pattern frame. You will want to avoid, of course, any location where the noise of shooting will frighten livestock or disturb the peace and tranquility of the neighborhood in general. We shooters already have all the opposition to guns and hunting that we need, and there is no sense in inviting further wrath and criticism, unjustifiable though it may be.

In the event you are taking the paper approach and the patterning session will involve more than one gun, or perhaps different loads and shot sizes, it's a good idea to mark each sheet of paper for later identification when evaluating the results. This can be done beforehand so as to save time when afield. These "hieroglyphics" can be placed in one of the upper corners of the pattern paper and need include only such really pertinent information as the gun, choke, powder charge, shot load size, and the yardage at which the testing was carried out.

Another means of marking the paper sheets for identification is a rubber stamp, which could be time-saving, too. See the sample illustrated.

## The Aiming Marker

There is one final detail to attend to before the shooting starts. A small black bullseye, or aiming marker, should be attached to the center of the pattern sheet. Without this marker you may encounter a problem—off-centering the shot pattern to the extent that the evaluation will be in jeopardy. Of equal importance is the fact that the marker will enable you to determine whether the barrel is shooting to point of aim.

Speaking of marking, use a fiber-tip pen. Watercolor ink is best, for it doesn't run like the more permanent type. I find it easier to count separately the hits in the 20-inch center, than those in the 5-inch annular area.

Millions of game birds, as well as clay targets, have been missed because barrels do not always deliver the shot charge where the shooter is looking. With some guns a down-along-the-rib sight picture will center the charge for elevation, while with others it may be necessary to see a certain amount of the rib, that is, with the eye a bit higher. With over-under guns the lower barrel will sometimes print a bit lower than the top barrel; and with side-by-side doubles there may be some cross-placement of the patterns. Knowing exactly where *your* gun is printing its pattern in relation to *your* sight picture (that is, the way you cheek the stock), can take a lot of the miseries out of shotgunning.

In line with this matter of pattern registration, it is a good idea to do the shooting from a rest of some kind, with the fore-end hand steadied by sand bags. This method won't eliminate the tendency to flinch, but it will serve to greatly reduce the effects of flinching—namely, a poorly placed pattern. Even if you're an iron-fisted individual who never, never (?) flinches one iota, there is still the inclination to wobble a bit if you stand up on your hind legs while shooting. Here, of course, there is a lot of room for improvising. I often shoot right from the back seat of my car, using a sand bag or two in the open window to "quiet down" the gun.

Getting back to that aiming marker for a final comment, it doesn't necessarily have to be black; any contrasting color will serve. Nor does it have to be overly large; a square or circle of about 3-inch diameter is quite adequate. I regularly use a 2½-inch



GUN/CHOKE	<u>Savage 20 0/H Mod/Full</u>
LOAD	<u>44/4227 1 1/4 x 7 1/2</u>
LOAD PELLET COUNT	<u>431</u>
RANGE	<u>40 yds.</u>
PATTERN DENSITY & PERCENTAGE	
BARREL	<u>4/Mod - 258 - 60 %</u>
BARREL	<u>0/Full - 310 - 72 %</u>

Fig. 4 There certainly wouldn't be any hard and fast rule on this rubber stamp bit for patterning targets. Each shooter could have it made to include the info he feels is necessary.

square cut from the paper backing from photographic roll film. It is attached by means of a dab of rubber cement at each corner, and this permits easy removal of the marker after pattern registration has been noted.

The traditional distance for shot-gun patterning is 40 yards, though 410-bores are usually checked out, variously, at 25 and 30 yards. Choke performance is measured according to the percentage of pellets (based on the total shot load count) which strike inside a 30-inch circle at 40 yards. The standards for the various degrees of choke may vary roughly 5% up or down the scale among the different arms manufacturers, but in general a skeet boring is rated at about 35%, while an improved cylinder barrel is supposed to run on the order of 45% to 50%. The universal standard for a modified choke is 55-60%, and that for a full-choke tube is 70%.

### Distance Selection

If the shotgunner's main concern is to learn whether his particular barrel will perform in accordance with its choke markings, then the 40-yard mark is the proper distance from which to conduct his pattern testing (except as noted above for the 410). It is also a good distance if the goal is a comparison between different barrels bearing the same choke marking, as well as for a comparison between different charge weights and different shot sizes. But there is no hard, fast rule that says we cannot break with tradition.

Knowing what his gun will do at 40 yards is of little practical value to, say, the quail hunter who does

90% of his shooting at 20 yards and the other 10% at 30 yards. His primary purpose will be to find the load which gives him the widest and easiest-to-hit-with pattern at his usual game-killing distance, so the 40-yard story is purely academic.

By the same token, the pattern picture at 20 yards, or even at 40 yards, doesn't mean much to the pass-shooting waterfowler who gets his kicks from busting the tallest of tall webfoots. Of vital concern to this shooter is what his barrel and load are doing out at 60 or 70 yards. Too, if he's wielding a 10-gauge magnum, he may even want to back off to the 80-yard mark when pattern testing. However, 40 yards is a good distance at which to do the preliminary testing with a duck or goose gun. The below-par loads can be weeded out, with only the most promising load checked again at the longer distances.

So the door is really wide open on this matter of distance. While the 40-yard stretch tells the story in regard to choke, and also gives us a pretty good idea of what to expect as the range is either increased or decreased, it does not necessarily tell us precisely what we want to know in respect to specific gunning requirements. Each individual shooter will have to tailor the patterning distance so as to come up with that information which is the most useful to him.

### Number of Shots

There are shooters who seem content to form a conclusion on the basis of firing just a single load for pattern. Although this is better than remaining completely in the

dark, it still rates as an approach fraught with some uncertainty.

Take a given barrel and load and you're not likely to get two patterns that are exactly alike in every respect—not if you shoot from now until doomsday. The law of chance sees to that. In one way or another there will be shot-to-shot variations no matter how carefully and uniformly the shotshells are loaded.

The lone pattern can, of course, give a fair prediction, but the *average performance* is much more revealing. As for my own efforts, I have more or less standardized on a 5-shot string. There are some who say that 10 shots with a given barrel/load combination should be considered as the absolute minimum, while still others place the minimum at 20 shots. All this is fine and dandy if time is no object, but for all practical purposes 5 shots will serve just as well as 10, 20 or even 30. The small difference in average results will not be of any significance.

Once the pattern is on paper, or steel plate, the real work begins—that of evaluating the results. Various systems have been worked out over the years to handle this matter, but all have one thing in common. The evaluation begins with the drawing of a 30-inch circle around that part of the shot pattern which shows the greatest density. Drawing the circle first, before shooting, is a cart-before-the-horse approach, because as we've already seen it's awfully easy to off-center the shot charge.

The usual recommendation for drawing the circle is to use a pencil at the end of a 15-inch string. Another is to cut off a section of yardstick, drill a hole for a screw (pivot point) at the one-inch mark and another hole for the pencil at the 16-inch mark. The latter leaves a lot less room for error, but both methods have really grown a bit antiquated.

### Special Counting Tool

A very simple "tool" which will absolutely rule out error and greatly speed up this chore of running circles, consists of what we can call, for lack of a better name, a *patterning ring*. You can make your own or have the local cabinet shop cut one for you. All that's needed by way of material is a sufficiently large piece of 1/8-inch hardboard (Masonite or similar material). Heavy gauge aluminum can also be used. Carefully inscribe 20- and 30-inch concentric circles on the board (reason for the 20-



inch circle will be discussed presently). By sawing just inside the line for the 30-inch circle and just outside the line for the 20-incher, you will end up with an outside dimension of  $29 \frac{7}{8}$  inches and an inside diameter of  $20 \frac{1}{8}$  inches. (See fig. 2.)

By positioning the ring over the densest part of the pattern and tracing around it with a pencil, you'll have a perfect 30-inch circle, along with a concentric 20-inch center. All very quick easy and precise. A ring of transparent plastic would be even a better choice, and perhaps one of these days some enterprising firm will see the light and market such a product.

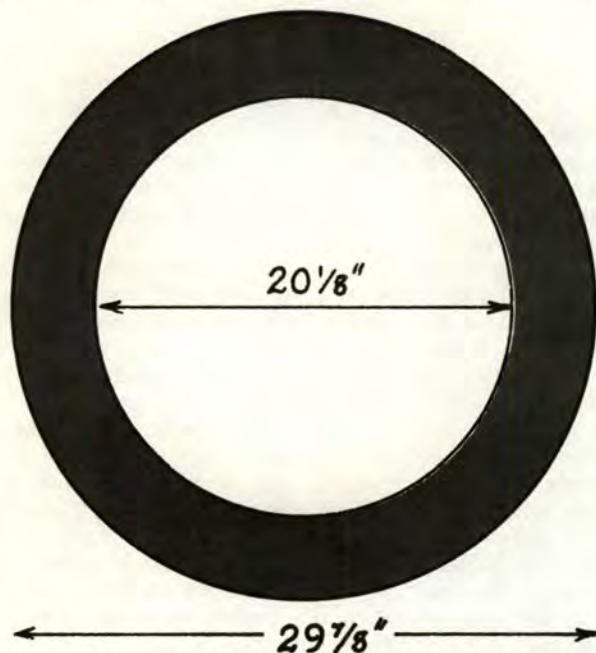


Fig. 2 Patterning ring cut from hardboard, aluminum or clear plastic, should be of about  $\frac{1}{8}$ -inch thickness for better handling. This "tool" makes for speed and precision when drawing circles during pattern evaluation. See text for details.

In theory, at least, the ideal pattern should exhibit, at the desired distance from the muzzle, a width in the air of at least 30 inches so as to facilitate "hitability." In order for all portions of the pattern to be equally effective, it should possess pellet dispersion that is not only balanced but also evenly distributed. In other words, it should be free, or nearly so, of pellet-free patches of a size that would permit the target—be it dove, pheasant or claybird—to get through unscathed. Density and shot size should be compatible with target size and weight so as to maintain a line somewhere between the "underkill" and "overkill" levels. Finally, it must also offer some compromise, because game birds do not always flush at the "perfect" distance.

What we ask for is not always what we get, and this is just as true of shotgun patterns as it is of many other things. But at least through patterning, we do learn how closely we are approaching that ideal spread.

A little elementary arithmetic shows us that the 30-inch circle contains a total of 707 square inches. Since the 20-inch circle comprises 314 square inches, it encompasses nearly half of the total 30-inch area—actually 44%. By counting the pellet hits in the 20-inch portion and comparing them with those striking in the 5-inch annular area, we have a

quick and reliable check on pattern balance. Ideally, the count should break down into a like number for both areas.

Next, combining the two pellet counts and dividing by the total number of pellets contained in the load gives the pattern efficiency (percentage) for that particular distance at which the testing was carried out. Example! One ounce of No. 6 shot contains 225 pellets, and your 30-inch circle count showed 115 hits. Dividing 115 by 225 equals 51.1%, which indicates an improved cylinder choke, one a bit on the tight side for that designation. Some attention should also be given to those pellet hits *outside* the 30-inch circle—specifically, are these hits sufficient in number and placement to add to the effective width of the pattern?

## Pattern Evaluation

This procedure involving 20- and 30-inch concentric circles is a less complicated approach to pattern evaluation than the so-called 16-field target, which is of German origin. With the 16-field method the 30-inch circle is divided into a like number of sections, each being of approximately equal area. This is done by using a smaller inner circle of 15-inch diameter, then quartering the 30-inch circle, and finally by further subdividing the annular area of each quarter into three additional areas. A comparison of the pellet hits contained by each "compartment" tells the story

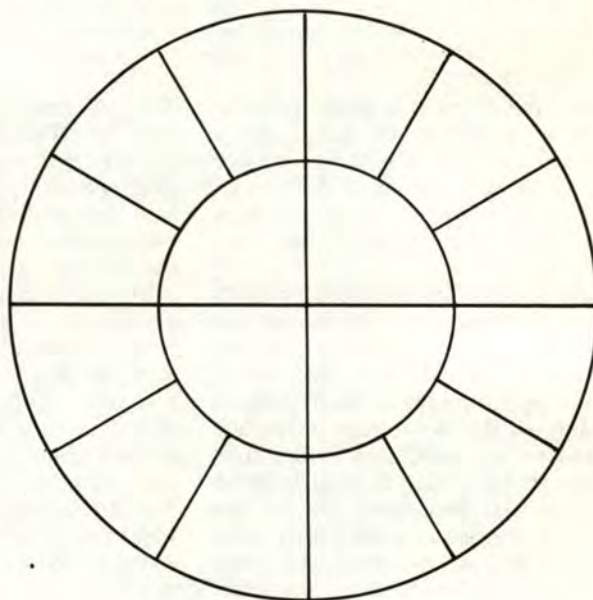


Fig. 5 The 16-field shotgun target. Outer circle is 30" in diameter, inner circle 15". Each target segment is supposed to contain an equal number of square inches. Of German origin, I believe this is called the Berlin-Wannsee target.

in terms of pattern balance and pellet distribution. There is little doubt that the 16-field method constitutes an excellent approach, but it is definitely more time-consuming and not greatly advantageous over the other method which I have described.

Nearly all patterns will show patchiness to a degree, and it is largely a game of numbers. The likelihood of pellet-free patches increases as the shot charge weight is decreased or when the pellet size is increased. Either way, it is simply a matter of there being fewer pellets to fill the pattern area.

How a pattern rates in terms of patchiness depends in large part on the size of the intended target. So when evaluating this aspect there is really no all-inclusive rule to follow. Quite obviously, when as-



sessing the performance characteristics of, say, a quail load, it would be grossly misleading to apply the same standards as used for a goose load.

There is not room here to delve into a discussion of the square inches of target area afforded by all of the many game birds and various waterfowl, and how those vulnerable areas will vary with different angles of flight. But if we take such information and convert it into circles of matching area and use the appropriate size to determine the number of pellet-free patches, then we are squarely on the right road.

As an example, let's say that we are checking out a load for pheasant hunting. Although the pheasant is a relatively large bird, offering in crossing flight a target area of about 25 square inches, the area shrinks to about half that for a cock bird in straightaway flight. In this instance we couldn't go far wrong by adopting a circle of about four-inch diameter as the standard for determining pattern patchiness. For this facet of pattern evaluation, the check should be carried out with complete disregard for any divisions or inner circles within the 30-inch-wide area.

Earlier in this article mention was made of doing preliminary shooting at the traditional 40-yard mark when pattern testing loads intended for extreme-range shooting. In selecting the most promising load for this brand of gunning, what we most definitely *do not* want is a pattern with balanced pellet dispersion. The vote in this case should go to the load which produces the strongest density in the 20-inch core, to the load which would *normally* be rated as having excessive imbalance.

While it is always interesting to see how a load shapes up in terms of average efficiency at 40 yards, the fact that it may produce unusually high percentages for the 30-inch area does not necessarily signify superior performance. Such percentages can be actually misleading, and for the simple reason that those pellets which have registered in the annular area of the 30-inch spread make no contribution to pattern effectiveness in terms of extreme-range shooting. Therefore, where long-range duck and goose loads are concerned, I make it a practice to evaluate strictly on the basis of density in the 20-inch core, and attach little or no importance to other aspects.

PATTERN TEST NO. SV3 DATE 24 JAN '70 TEMP & WIND 32° CALM

GUN SAVAGE M-444 0'4 SERIAL NO. 52522

GAUGE 12 CHAMBERS 2 3/4" CHOKE DESIGN CONICAL-PARALLEL MODIFIED

BARREL LENGTH 26" BORE .722" MUZZLE .703" CHOKE .019"

LOAD 27 GRS. SR-7625 1 1/4 x 7 1/2 MV 1,230 FPS  
8,200 LUP

RANGE (yards) 40 FOULING SHOT ONE

Load	Density 20" Circle	Density 30" Circle	Efficiency 30" Circle	PELLET DISTRIBUTION
1	155	277	64.2 %	SLIGHTLY DENSE C.
2	145	262	60.7	" " "
3	136	247	57.3	" " "
4	152	265	61.4	" " "
5	145	267	61.9	" " "
Average	146	263	61.1 %	
High Pattern	155	277	64.2	
Low Pattern	136	247	57.3	
Variation	19	30	6.9 %	

HANDLOAD DATA: 12 GA 2 3/4" REMARKS: OVER BARREL

FEDERAL PLASTIC FIELD SHOTS AS MARKED.

FED. 209 PRIMER BARREL ALIGNMENT PERFECT

27 SR-7625 IN HORIZONTAL PLANE.

FLITE-MAX No. 4 FOR VERTICAL PLANE,

1 1/4 OZS No. 7 1/2 (Rem. 431) SUPERIMPOSE THE TWO BEADS

6-PT. FOLD CRIMP AND FLAT AIMING MARKER.

(ZERO WAD PRESSURE)

Fig. 3 A mimeographed form such as this one used by the author solves the problem of record keeping. Geared to a 5-shot test, it provides space for handloading data, as well as a dope on bore and choke dimensions.

## Keeping Records

The final phase of pattern testing is to adopt some orderly means for recording what we've learned. Storing away the pattern sheets themselves can easily crowd you out of house and home, and trying to file the information in one's head just won't work. While we can probably recall with ease, even after an interim of 6 months or a year, the average efficiencies for a few favored loads, other important performance characteristics have a way of becoming shrouded in fog—if they can be recalled at all.

Shown here (Fig. 3) is a reproduction of a mimeographed form, of standard letterhead size, which the writer uses. When needed for future reference or for comparison purposes, it provides all the necessary information, including the full

story on bore and choke dimensions, as well as handload data. This record sheet may be unnecessarily detailed for the next fellow's purposes, but for my needs it's just right.

In a way, patterning a shotgun is a lot like going to see the dentist. We know it's the right thing to do, but we procrastinate no end. Yet when we finally make the trip, we're glad that we did, and often we wonder why we waited so long.

The primary questions of *how* the old scattergun shoots and *where* it prints the shot charge is only part of the story. After a few sessions at the pattern board we usually begin to profit in other ways as well. Just as handloading broadens our knowledge of guns and shooting in general, so will patterning broaden our knowledge of handloading.



A black and white photograph of a man in tactical gear, including a cap, sunglasses, and a headset, holding a revolver. The man is looking towards the camera with a serious expression. The revolver is a short-barreled model, likely a Colt Mark III Lawman.

# BETTER and SHORT

**M**ANY MISCONCEPTIONS surround the shooting of short-barreled 357 Magnum revolvers. Not so much controversy is associated with 38 Special snub-nosed handguns, but ballistic principles for the one also affect the other.

The purpose here is not to discuss the qualifications of short-barreled revolvers. Suffice it to say, there are tens of thousands of these snub-nosed handguns in use. While there are merits and demerits to their employment, the concern here will be to examine techniques for getting the most efficient performance from the combination of gun and cartridge.

Short Magnum revolvers are the most maligned regarding the low efficiency of the loads shot in them. To the contrary, we shall demonstrate that nearly 90% of velocity

and better than 75% of energy can be retained in them compared to ballistics for the same loads when shot from 6" barrels. Projectile weight, design, powders and priming have decided effects on performance. Special effect loads also fit into the picture for short-barrel Magnums.

Colt's Small Arms Division has recently marketed a two-inch version of the new Mark III Lawman revolver in 357 caliber. This gun has a round-butt frame and tips the scales at 33 ounces, with an over-all length of 7¼". Its concealability is equal to or better than comparable 2½" Magnum revolvers, and it is hefty where the weight counts. The gun handles and points exceptionally well, having a naturally broad recoil shoulder so that punishment from Magnum loads is well-dis-

tributed in the web of the hand. The Lawman would benefit from a pair of custom combat grips, but the factory stocks and grip shape on this gun are the best I've tried compared to other factory-equipped short Magnums. Several knowledgeable combat shooters who tried the gun were also favorably impressed with their initial trials.

## The Mark III Lawman

The Lawman is well-built, providing substantial mass in the frame members, around the recoil plate, crane, and in the cylinder. This is a durable handgun, well-suited to handle a diet of the hottest 357 loads without strain. This handgun has the Mark III action, which is permanently timed to take abuse and keep on functioning. Internal action parts are



# BALLISTICS

# MAGNUMS

*The mini-barreled magnum revolvers have long been severely criticized for their low-level load performance. That needn't be—with the right prescriptions some 90% of long-barrel velocity and energy can be attained. Here's how you can do it.*

by James D. Mason

Al Nichols, 4-time Southwest Combat Pistol Champion, gives the 2" Mark III Lawman a workout with magnum loads. The round-butt frame configuration is quite well-adapted to point shooting, a common mode of fire for short-barrel handguns.

made from powdered metallurgy which makes them superior in strength, durability, and finish to those found in wrought steel parts used in earlier actions. The DA pull is not perfect, but it is very nearly so just as the gun comes from the box. The Mark III action gives a DA "feel" that helps indicate the point of hammer let-off—especially useful for a close grouping where critical accuracy is a factor. The action is simple and rugged. Main parts are large and substantial, a change from the delicate, vulnerable units often found in revolver mechanisms. The heavy barrel wall is milled to recess the ejector rod, reducing somewhat the hazard of bending the rod.

The Mark III action has no hammer rebound. This saves a number of parts and functions that could

be subject to wear or malfunction. Ignition is obtained by a separate firing pin, mounted in the frame, but the hammer never touches the pin. Striking force is transmitted through a blocking plate that rises between the hammer and the firing pin *only* when the trigger is deliberately pulled. The possibility of accidental discharge is eliminated, and no rebounding hammer is necessary. As one old gun ad slogan declared, "Hammer the hammer" and the gun cannot go off. With all its virtues, the 2-inch barreled Mark III Lawman made an ideal test gun for researching performance of 357 Magnum loads.

Short barrels release the propellant gases at higher pressures and temperatures, compared to longer barrels, at a time before their energy has fully acted on the bul-

let. Because of this, less energy is transferred to the bullet than from identical loads shot in longer barrels. Consequently, muzzle blast and flash are greatly increased from the short barrel, and bullet kinetic energy is down. Thus the cost of short-barreled convenience seems to be ballistic inefficiency, but the ballistic trick is to find the best compromise between power and muzzle blast.

There are a number of alternatives to finding this compromise. One seemingly obvious solution is the use of lightweight bullets and fast-burning powders. The object here is to boot the bullet out of the short barrel using fast-rising pressures and bullets of low sectional density. The theory is fine but accelerations being what they are in the .357" bore, fast-burning pistol powders are simply too fast for even the light 110-gr. bullets. The result is still high pressure and insufficient gas expansion, with relatively slow velocities and lots of muzzle blast.

## Ballistic Facts

Experiments show that those powders that produce maximum velocities from normal 357 barrel lengths will also produce the highest velocities in the stubbies. Using the most effective powders, there will be some sacrifice in velocity and energy and a big increase in muzzle disturbance with short barrels. But these are the ballistic facts of life.

The loads tested in Table I are belly-busters. They represent practical, maximum-usable effective loads for the 357 Magnum cartridge. The powders mentioned have favorable pressure curves for accelerating a variety of bullet weights in the .357" bore. They illustrate the application of loading techniques to match the expansion ratios needed for maximum velocity performance. These loads are *not necessarily* recommended for use in short-barreled handguns, although data was taken from the *Speer Manual #8*, a valuable source of information for the handloader.

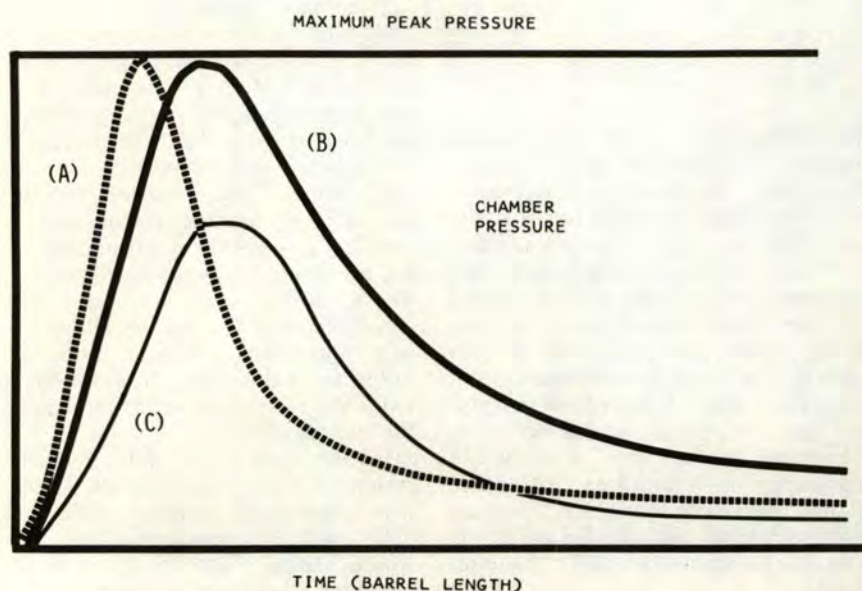
Notice that in all data, velocity retention from the two-inch barrel was somewhere between 85% and 89% of the attained velocity from the 6" tube. Faster-burning pistol powders register higher on a velocity-to-powder weight efficiency scale. Straight-case pistol-cartridge combustion systems are nearly linear functions of the internal dimensions of the bore and chamber.



# BALLISTIC TABLE I

Powder/grs.	6" bbl.		2" bbl.		% retained	
	MV	ME	MV	ME	MV	ME
<b>110-gr. Super Vel JHP</b>						
SR4756/15	1657	673	1442	506	87%	75%
630-P/19.5*	1649	664	1468	527	89	79
N1020/18	1640	657	1427	499	87	76
<b>125-gr. Hornady JHP</b>						
SR4756/14	1612	719	1402	544	87%	76%
N1020/16	1578	693	1341	498	85	72
Unique/10.5	1540	658	1340	498	87	76
630-P/17*	1475	603	1313	478	89	79
<b>140-gr. Speer JHP</b>						
SR4756/13	1408	617	1239	477	88%	77%
AL-7/12.5	1399	609	1231	470	88	77
N1020/15	1385	595	1191	440	86	74
630-P/16*	1378	591	1226	466	89	79
<b>158-gr. Speer swaged RN</b>						
N1020/13	1470	757	1250	548	85%	72%
SR4756/11	1399	687	1203	504	86	73
HS-6/10*	1350	638	1188	496	88	78
AL-7/11	1336	624	1149	463	86	74
<b>160-gr. Speer JSP</b>						
N1020/13.5	1368	666	1218	528	89%	79%
SR4756/11	1350	646	1175	490	87	76
AL-8/13	1290	590	1135	456	88	77
630-P/14*	1287	589	1145	464	89	79

\*Signifies CCI 550 Magnum primers; all others are CCI 500 small pistol. Super Vel 357 Mag cases used for all loads. Test rounds shot in Colt Mk III 6" and 2" handguns. Data taken on Avtron K233 with K101 photoscreens. Energy calculated using Powley tables. MV = muzzle velocity. ME = muzzle energy.



Curve (A) represents the fastest burning pistol powders.

Curve (B) represents magnum shotshell powders that produce maximum velocities within acceptable peak pressures.

Curve (C) represents powders too slow burning for efficient use in straight walled pistol cases.

However, even though faster-burning powders are more efficient, they achieve peak pressures earlier, and do not produce maximum velocities. Slowest-burning pistol powders never generate high pressure peaks, so they don't give optimum velocity either. Powders such as SR4756, N1020, AL-8 and 630-P offer exceptional velocities in the 357 Magnum and 38 Special cases, regardless of barrel length.

In handgun systems using straight walled cases, barrel length is more nearly a function of time rather than efficiency. Since applied pressure multiplied by time equals velocity, a higher mean chamber pressure will produce greater velocity from a given (short?) barrel. In the diagrams of characteristic pressure curves, the technique for gaining maximum velocity is to pick a powder that will generate near maximum peak pressures, but will sustain a gas-pressure propagation rate that is sufficient to replace the expanding volume of the combustion chamber, to some optimum degree, as the bullet travels down the bore. An effective powder will increase mean pressure by a combination of chemical and physical features of the propellant. Shape of the powder granules and burning deterrent coatings that delay combustion are common solutions to adjusting burning rates of powder.

## Three Pressure Curves

In the diagram, we see curve (a) representing characteristics of pistol powders at the fast end of the burning-rate scale. Curve (c) represents powders at the relatively slow end of the scale. Curve (a) powders burn and release energy rapidly before the bullet has a chance to move far down the barrel. These powders are limited to the amount (weight) that can be loaded since peak pressures rise above maximum safe limits before the bullet makes room for expansion. Curve (c) powders simply do not burn fast enough to build up pressure to fill the chamber space created by bullet movement. In essence, these slow powders never effectively release their energy in time to act on the bullet. Indeed, many of these powders blow unburned granules from the muzzle.

Curve (b) shows optimum results. Heat and gas propagation produces a desirable peak pressure but with a more rounded peak and a rather gentle downslope. Since velocity is a function of the area under the



Colt's Mark III Lawman revolver, shown with three Super Vel factory loads, provided an ideal test bed for developing maximum loads in short-barrel 357 guns. This Colt is a quality product; rugged concealable, accurate.



curve (mean pressure X time, for any given time barrel length), curve (b) will always produce the best velocity and energy performance. Also, be aware that curve (b) will produce the most muzzle blast and disturbance, particularly with short barrels. What powders produce these results? Empirically, those powders classed as "Magnum" shotshell propellants, as mentioned above and in Table I.

It was observed that 630-P produced the best retained velocity in the two-inch barrel compared to 6-inch ballistics, running about 89% of the latter data. While this surely reflects well on 630-P as a very flexible, responsive handgun propellant for maximum loads, note that this is one of the few powders in the table using Magnum pistol primers. While not all loads were shot with Magnum primers for comparison, the 125-gr. N1020 loading was reassembled with Magnum priming. The result gave about a 3% rise in 6-inch velocity, but nearly an 8% rise in two-inch velocity. Two-inch velocity rose to 89% of the 6-inch figures with Magnum priming. It appears that priming can have a favorable effect on retained velocities from two-inch Magnum loads.

#### Choice of Primers

However, not all powders or loads will respond this readily to the hot primer. Some powder com-

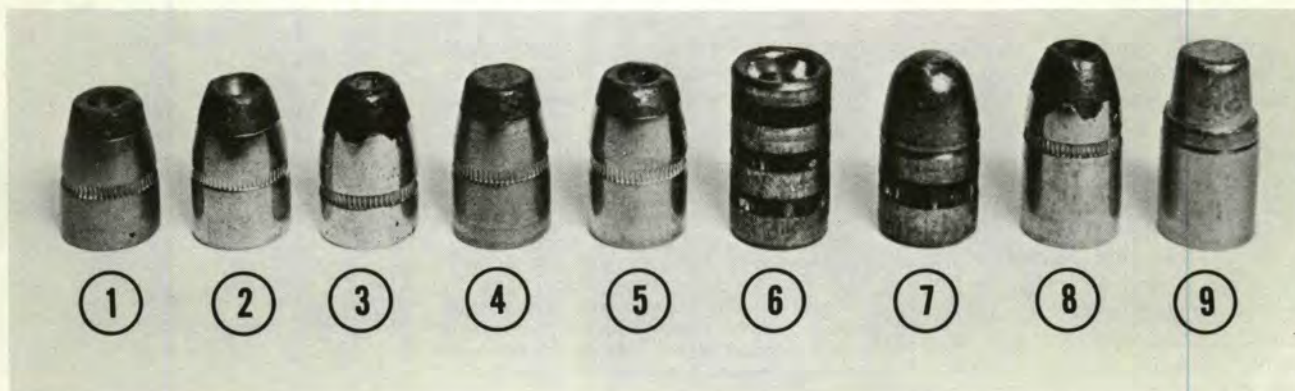
binations will exhibit 10% or more increase in pressure which is probably not dangerous in working maximum loads, but it could be in some individual guns. As a standard precaution, handloaders should *always* reduce powder charges by 10% - 15% before changing from regular to Magnum primers. This will avoid those embarrassing moments when the shooter retrieves the revolver's top strap out of the ceiling, etc.

One explanation of what Magnum priming does is to accelerate the production of gas and release of heat in the powder charge by providing a hotter, longer-lasting ignition. This will increase the pressure propagation rate, allowing peak pressures to be attained some-

what sooner with less burning of the total powder charge. Provided the powder has characteristics similar to those of the "Magnum" shotshell class, the downslope of the pressure curve is even more gentle than it would be with standard primers. All this serves to raise the mean chamber pressure for the load over a given barrel length. While these velocity differences are not great, they are significant; kinetic energy increases by the square of velocity, so stopping power is enhanced, usually, when Magnum priming is used in two-inch Magnum revolver loads. Again, a word of caution; because all powders do not respond ideally, some propellants will increase burning rates dramatically as pressure and

Some of the numerous quality bullets available for the 357 bore. (1) 110-gr. Super Vel JHP; (2) 125-gr. Hornady JHP; (3) Remington 125-gr. SJHP; (4) Super Vel 137-gr. JSP; (5) 140-gr. Speer JHP; (6) Speer 148-gr. swaged HBWC with hollow base up; (7)

Speer swaged 158-gr. RN service bullet; (8) Remington 158-gr. SJHP; (9) Speer 160-gr. JSP. The broad range of bullets available, matched to selected powders, provides a full scale of power choices to the handloader for use in short-barrel magnum loads.







Above—During a 12-round, 15-yard rapid-fire test string, the ammunition-handgun combination grouped consistently. Even full-bore loads group effectively up to about 15 yards. For most shooters, 25 yards and beyond makes it difficult to maintain consistent group size, due to heavy muzzle blast and recoil with full-bore magnum loads in 2" barrel revolvers.

Left—Seating a hollow-base swaged lead wadcutter bullet with the hollow base up produces the ultimate in expansion characteristics. The load given in the text shoots slightly under 800 fps with the Speer 148-gr. bullet. Stopping power is out of proportion to the kinetic energy of the load. Too high a velocity (over about 850 fps) causes disintegration of the bullet and loss of effectiveness. Within optimum velocities, the bullet expands to about twice the caliber size.

heat rises more rapidly due to Magnum priming. The result is increased pressure (possibly to dangerous levels) with only a small increase in energy/velocity output from the system. Generally speaking, the "Magnum" shotshell powders mentioned above respond favorably to Magnum priming. It is best never to assume, however. The prudent handloader will always work up loads from below maximum levels when substituting Magnum caps for standard primers.

So who wants all this power? Any handgun load pushing 500 foot pounds of energy or thereabout is more than adequate for defense purposes. Velocities for all loads listed are more than are needed to assure expansion of soft point or hollow point bullets. Muzzle blast and flash are frightful and disconcerting to any shooters not thoroughly conditioned to their use. Recoil in the heavier loads, while controllable, would be detrimental to multiple-shot strings so far as accuracy is concerned.

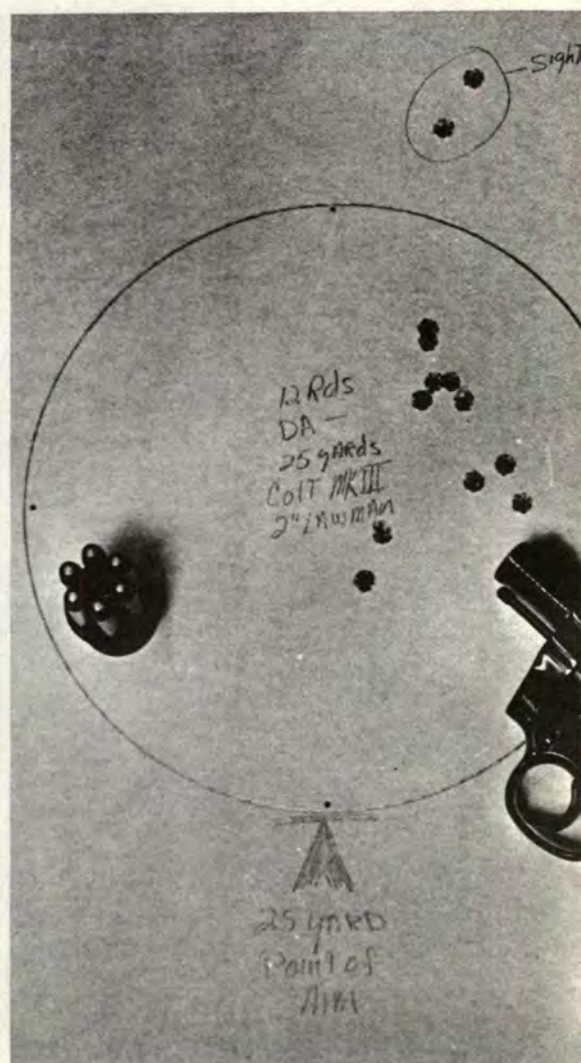
Many will say, "Then why worry about short Magnum handguns? Just take a 38 Special snubnose and be done with it." Why not, indeed? Because the distinct advantage of the short-barrel Magnum revolver is precisely this: it can be loaded efficiently to the same working maximum specifications as longer-barreled 38 Special service revolvers; short-tube 38 Specials can-

not boast this capacity. Adequate defense loads for the short Magnums can be made using the above-mentioned powders that rival performance of heavier loads from 6-inch 38 Special police revolvers. This means shooting at 300-350 foot pounds of energy with corresponding velocities from the gun/bullet combination. Velocity goals for reaching this criterion for each bullet weight in the 357 family follow:

Bullet Weight	Desired Velocity	Energy
110-gr.	1200 fps	351 fp
125	1130	354
140	1060	349
160	995	350

Ballistic Table II gives loads for given bullet weights that will approximate the criterion relating to optimum loads from a short Magnum revolver. From the loads in Table II, notice that ballistic re-

Who says snub-barrel guns are inaccurate? This 12-shot DA string registered well within a 10" circle at 25 yards from the Mark III Lawman test gun. Notice that these moderate-powered loads shot high relative to the point of aim. The gun's factory sights are set to shoot full-power magnum loads. Slower loads have a longer "barrel time," so the revolver rises in recoil slightly more before the bullet departs, causing the center of impact to be higher.





quirements have been lowered so some of the powders from the middle range of burning rates can be used. While the slower-burning powders can be loaded down in most cases, they are not as efficient as a smaller amount of slightly faster-burning powder. Some of the medium burning propellants are also flexible enough to serve well in both maximum as well as optimum combat loads. Unique is one such powder.

In the Table II loads, 7625 works well in place of 4756, Unique in place of Herco, AL-5 or AL-7 in place of AL-8, HS-5 instead of HS-6, etc. Muzzle blast and flash are significantly reduced from the fearsome levels of maximum loads; the gun is easier to control for multiple shots; hits are registered more effectively. The serviceable loads of Table II are adequate for any defensive situations, and put the two-inch Magnum pistol on a

par with some of the best combat loads out of a 6-inch 38 Special revolver.

### Short Barrel Accuracy

Accuracy for short-barreled handguns is a rather practical matter. While no one would choose a snub-nose for target work, these guns are surprisingly accurate in the hands of a reasonably accomplished DA combat shooter. At no time did I have trouble controlling group placement and keeping group size well within a 10-inch circle out to 30 yards, using an unsupported two hand hold. All Table II loads tested would consistently stay on a man-sized target at 50 yards from the prone pistol position, shooting double-action at a deliberate cadence (2-3 seconds per shot). All this is more than adequate for the purposes intended. Although this is better accuracy than the average marksman might expect, it is not

milking the full capacity of the gun. In my experience Colt revolvers have always delivered superior accuracy.

Table I maximum loads showed more erratic accuracy results, particularly from light-bullet ammunition. Concussion from all of these loads was quite distracting; after only a few rounds with this fodder I was noticeable gun-shy. Anticipating the violent discharge, one's attention is taken away from the sight picture and target alignment. Even a disciplined shooter will soon develop an almost imperceptible flinch, enough to seriously expand his group size at 25 yards and beyond. It would take a real masochist to practice enough to acquire top proficiency with these maximum loads.

### Choosing Bullets

Bullet choices for these short-barreled loads are not altogether arbitrary. The 110-gr. bullets work up a lot of steam in short pistol barrels, taking better ballistic advantage of fast pressure peaks than heavier slugs. But the light projectiles lose energy rapidly after leaving the muzzle. Low sectional density combined with hollow-point expanding design and high velocity creates devastating terminal effects at close ranges. Also, lighter bullets move sooner under pressure in the barrel and collect momentum more gradually, distributing the recoil moment over a longer period of time, thus reducing apparent recoil. On the other hand, penetration on auto bodies or at distances beyond 35-40 yards can be marginal, but bullet carrying range and ricochets are also reduced.

The 125-gr. category adds more momentum to terminal ballistic characteristics, and overcomes some of the stopping deficiencies of the 110-gr. group. The 140-gr. design goes a step further and, in my opinion, provides one of the best compromises between the stopping-power factors generated by both velocity and momentum. The 125- and 140-gr. sizes provide a more controlled firing rate because of lower recoil reaction compared to the 160-gr. projectiles. Also, the middleweight projectiles often show more favorable internal ballistic efficiency as regards velocity-to-powder-weight ratios. A good many powders work well with the 140- and 125-gr. bullet weights.

The heavier 158- and 160-gr. projectiles provide the best penetration due to favorable sectional densities.

**BALLISTIC TABLE II**

Powder/grs.	6" bbl.		2" bbl.		% retained	
	MV	ME	MV	ME	MV	ME
<b>110-gr. Super Vel JHP</b>						
AL-7/12.5	1412	486	1214	360	86%	73%
HS-5/9.5*	1425	495	1254	384	88	77
Unique/8.5	1362	452	1185	343	87	76
HS-6/11*	1401	479	1233	371	88	77
<b>125-gr. Hornady JHP</b>						
AL-7/11	1289	461	1109	341	86%	74%
Herco/11*	1309	475	1165	378	89	79
Unique/8.5	1295	468	1129	354	87	76
AL-5/11	1310	476	1140	360	87	76
<b>140-gr. Speer JHP</b>						
N1020/13	1246	480	1059	349	85%	72%
SR4756/11.5	1251	486	1076	360	86	74
AL-8/13	1248	482	1098	374	88	77
HS-6/10*	1218	461	1089	365	89	79
<b>158-gr. Speer swaged RN</b>						
H-110/13*	1181	488	1039	379	88%	78%
AL-5/8.5	1164	476	1013	359	87	76
HS-5/8*	1180	488	1038	378	88	78
Unique/7.5	1177	485	1024	368	89	79
<b>160-gr. Speer JSP</b>						
AL-5/10	1148	467	999	354	87%	76%
AL-7/9.5	1178	493	1013	363	86	74
Herco/9.5*	1182	496	1040	384	88	77
N1020/11.5	1151	469	978	339	85	72

\*Signifies CCI 550 Magnum primers; all others are CCI 500 small pistol. Super Vel 357 Mag cases used for all loads. Test rounds shot in Colt Mk III 6" and 2" handguns. Data taken on Avtron K233 with K101 photoscreens. Energy calculated using Powley tables. MV = muzzle velocity. ME = muzzle energy.



Three Remington #1 buckshot in a Speer shot sleeve, ahead of 10 grains of Unique, add up to a formidable defense load in 2" Magnum revolvers. These special-effect loads, discussed in detail in the text, hold promise for further development.



"Knock down" power generated from momentum is superior when using the Hatcher formula for calculating terminal effectiveness. Many accurate bullet designs are available in this weight. Note, too, that the cast or swaged lead bullets are more efficient due to a low frictional factor compared to gilding metal jackets. Leading is much less of a problem with Table II loads, but using Rice's cleaning and lubricating materials as directed will virtually eliminate metal-fouling problems from lead bullet loads.

The heat and pressure from heavy Magnum loads soften the base of cast or swaged lead bullets. The thin section at the very edge of the base rim partially melts from friction and propellant heat. This action streaks the bore with lead. Depending on the design of the bullet base (radius rim or square), the hardness of the lead alloy, efficiency of bullet lubricant, sizing of the bullet diameter relative to the bore, and the heat-pressure of the load, lead fouling can be a very serious problem for heavy Magnum loads. The use of Rice's XF-10 bore cleaner with compression swabs will usually eliminate lead fouling in just a few applications. Following the use of the cleaner, a brass brush will remove the leading in the form of a fine dust. After the bore is cleaned, the swabbing on of XF-20 liquid bore lube will fill the microscopic pores of the bore metal, facilitating passage of the bullet and effectively discouraging further build-up of lead. A final spray application of XF-15 bore lube will "sweeten" the barrel, further dis-

couraging deposits of metal fouling and providing a durable surface coating that can increase average velocity and improve accuracy in most guns. After two or three applications of Rice's products, every gun on which I have used the stuff ceased lead fouling, even with heavy loads. If any leading does reappear, it can be dispatched readily by repeating the whole routine. But cleaning with a dry patch and reapplications of XF-20 and XF-15 should keep any bore spotless for many thousands of rounds of lead-bullet shooting.

In some tests (unrelated to this article) made with the new Remington 125- and 158-gr. 357 HP bullets, they revealed superior expansion characteristics, compared to other similar designs, particularly in the Table II loads. The greater amount of exposed soft lead in the nose and the scalloped jacket cup design evidently promotes initial deformation and faster mushrooming time upon impact, compared to other bullets tested. Shooters interested in expansion performance will want to experiment with these new Remington bullets.

#### Reverse Hollow Points & Three-Ball Loads

The ultimate in hollow point performance can be had by inverting a Speer swaged lead hollow-base 148-gr. wadcutter bullet, seating it above 4 grains of 700X in a Magnum case, and crimping it in the uppermost lube groove. This load develops 780 fps in a two-inch Magnum. Mushrooming doubles caliber diameter, cutting penetration and increasing shocking effects. This load has stopping pow-

er out of proportion to its kinetic energy.

Another unusual defense load can be made using Speer's new plastic shot cups. Intended for use with light birdshot, these cups make a most interesting experimental defensive load. Loaded with three Remington #1 buckshot (.30" diameter), this becomes a formidable multi-projectile load. Remington shot is specifically recommended because it is the only brand I've used that keeps within the SAAMI manufacturing specifications for buckshot. If the shot is of larger diameter than .30", which is the SAAMI spec for #1 buckshot, it will not fit in the Speer sleeves. Several brands of buckshot, designated as #1 size, were tried, but they all ranged from .312" to .330" diameter. I don't know whether Winchester and Federal buckshot are made to SAAMI specifications, but I assume they are. The hand-loader should be sure that the shot is not over .30" diameter. The following data were gathered during tests of this multi-projectile ammunition.

#### 357 Buckshot Loads\*

Powder/grs.	2" bbl.	4" bbl.
Unique/8	928	
Unique/9	975	
Unique/10	997	1136

\*All loads used 3 Remington #1 buckshot (.30"), fired from Colt Mk III revolvers. Speer shot cups were seated to 1.60" over-all and firmly crimped.

A test range was laid out in increments of 10 feet. Firing proceeded from the closest distance to





With the special buckshot loads it was hard to hit the same point of aim consistently. However, out to 40-50 feet performance was predictable enough to make this an effective defense load. Spread of the pellets enhances the stopping power and greatly magnifies the total terminal effect compared to a single projectile of the same combined weight and energy.

the farthest to determine grouping characteristics and accuracy. All loads were fired from the two-inch Colt Lawman, using the 10-gr. Unique loading given above.

Buckshot Dispersion	
Range	Footprint*
10 ft.	.6-in.
20	.8
30	1.4
40	3.5
50	5.0
60	erratic

\*Nominal spread of three buckshot from the special load. These data excluded the few erratic performers described in text.

Total weight of the capsule and shot is about 125 grains, the .30" balls a nominal 39 grains. The impact of these pellets is roughly equivalent to three simultaneous hits from 22 LR slugs, a formidable blow. While the total kinetic energy amounts to a little over 300 foot pounds at 20 to 30 feet, the total effect of the terminal impact is multiplied by the rather large area ("footprint") over which the energy is distributed. Ballistic estimates of the effectiveness phenomenon range from arithmetic projections (two pellets hitting are *twice* as effective as one) to squared projections (two pellets hitting have *four times* the effectiveness of a single pellet). Regardless of which side of the controversy one accepts, these buckshot pistol loads make formidable defensive ammunition.

### Plastic-Sleeve Problems

There are a number of difficulties

in using the Speer plastic sleeves in these loads. The sleeve compresses the powder charge considerably, and the crimp must be set quite firm to keep the capsule from being forced out of the case. Overall length of the load is just short of cylinder length, so if recoil forces cause inertial creep of the capsule in the loaded rounds, they may stick out of the front of the cylinder and bind on the barrel projection as they rotate into firing position. The capsule material is designed to crack and split away from the shot after leaving the muzzle. Most of the time this works fine, but in about 10-20% of the rounds fired, the splitting action was slow or incomplete in the buckshot loads, causing aerodynamic instability that flipped the buckshot awry. Successive rounds would not position the buckshot to the same point of aim. Out to about 40-50 feet this was not a problem, but beyond this range many shots completely missed a 2x2 foot target. This problem was only experienced with buckshot pellets, since the sleeves function perfectly with the light birdshot for which they were originally designed.

Acceleration rates being what they are, the soft lead pellets got mashed considerably on their trip out of the barrel. The bottom pellet ended up as a nearly flat cylinder, about caliber size, that made a clean wadcutter hole in the target. The middle pellet, somewhat smaller in diameter, made a less clean hole in the paper. The top pellet, fairly unchanged, punched the usual round-nose entry hole with radial break-marks in the paper. Packing the shot with polyethylene

dust, similar to the technique used for commercial buckshot shells, had very little effect and was a lot of trouble.

Perhaps doughnut-shaped plastic separators would overcome the deformation of the shot and improve launching separation of the pellets and sleeve beyond the muzzle. With all their problems, these buckshot loads hold a lot of potential. Advanced experimenters may be interested in working on some of the difficulties; I'm convinced that this would be a most effective defensive load for the revolver, particularly in short-barreled Magnums.

The main problem with getting performance from a short Magnum is handloading to optimum levels. These compact guns, notably Colt's Mark III Lawman with two-inch barrel, can be loaded up to maximum service levels for 6-inch 38 Special revolvers. As such, they provide adequate controllable defense capability considerably superior to the performance expected from 38 Special snubnose handguns.

When the occasion calls for it, the snubby Magnum can shoot maximum loads with up to 90% of the velocity levels of their 6-inch barreled brothers, providing devastating terminal power through a broad range of bullet weights. The cost for this maximum performance is high in terms of muzzle blast and flash, but the stalwart shooter of snubnosed revolvers need not hang his head in shame. After all, who else can be confident that even if he misses his assailant at close range he will at least burn, blind, and deafen him? ●



# Bullet Alignment vs Accuracy

by NORMAN E. JOHNSON

**Does misalignment of the bullet with the case seriously affect accuracy? If bullets and cases are concentric, uniform, how much case-bullet runout can be tolerated? It's a complex picture, but the author says that grouping ability can be predicted, planned and realized.**

SEVERAL YEARS AGO I explored case-neck thickness variations and the effect these had on accuracy. That material appeared in the 1966 edition of GUN DIGEST. Those tests clearly revealed that varying degrees of inaccuracy resulted if neck walls were not reasonably uniform in our handloaded ammunition. We found that variations as great as .008" were present

from one cartridge to another in the same lot. It was further determined, based on such measurements, the degree of inaccuracy we would expect. The table is reprinted here.

I have now designed and built an instrument for testing "bullet alignment" in the loaded cartridge. Sufficient testing with it has been conducted over an extended period,

which proved to my satisfaction that bullet alignment—or misalignment—in the cartridge has a definite effect on accuracy.

We have found that the bullet itself, though it may be perfectly concentric and dimensionally uniform, will not shoot accurately if it is in misalignment with the case axis, or points down the bore at an angle. Accuracy with both jacketed and cast bullets is affected. However, a greater degree of bullet deformation is visible on the softer cast bullet or on shorter bullets in any caliber when the bullet engages the rifle bore.

Several things may contribute to poor bullet alignment. Case neck-wall variations are sure to cause poor alignment. Here we can detect the poor ones and either correct them or discard them.

Our resizing dies may be of poor quality, causing our case necks to be out of true alignment with the case body. If this be the condition, use such dies for hunting loads, not if good accuracy is to be expected. However, even factory-fresh cases may not have necks and bodies in perfect alignment, and such cases must be corrected or discarded.

**Neck Wall Variations & Related Accuracy**

Max. Var.	MOA	Remarks
.00025"	.250- 5.00	Bench rest matches
.0005"	.500- .625	Bench shooting
.0015"	.750-1.00	Varmint rifles
.0025"	1.00 -1.50	Varmint rifles
.008"	2.00 -4.00	Hunting rifles*

\*This accuracy level permits shooting factory cartridges.

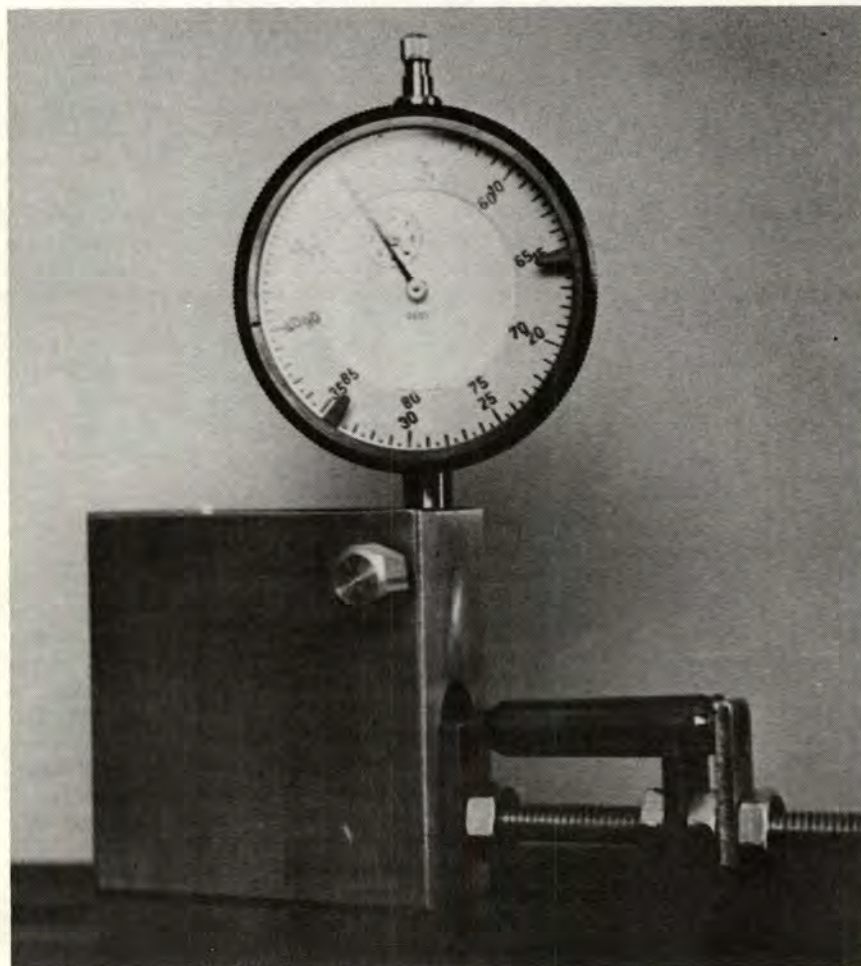
MOA—minute of angle

Brown, Dewey, B-Square, the Fergusons and others make tools for checking case-neck and -body runout.

Our final reloading operation is seating the bullet, and here we often get into trouble. I have had shooters come to me with ammunition they had loaded and I couldn't believe what I saw. The cartridges exhibited so much misalignment that it was easily discernible to the naked eye! Groups went well over 3" when this ammo was fired at

This is the Johnson case-bullet alignment gauge, available from him (Route 1, Box 29A, Plum City, Wisc. 54761) at \$29.50, including the dial indicator, or at \$17.50 without the D.I., either postpaid. His case-neck gauge, for determining neck-wall thickness and runout, is \$30.00 with a D.I., \$19.50 without, postpaid.

The D.I. is usable on either tool.





100 yards. Whether we seat our bullets with a regular press and seating die or by some other more sophisticated method, the job must be done carefully and accurately.

Our degree of proficiency in accurate bullet alignment can easily be verified by a device which measures seated-bullet run-out or bullet out-of-roundness.

### New Tools Designed

The small tool I've designed will accurately measure bullet alignment. Essentially my design consists of two V-blocks, of different heights, which hold the case in true alignment. This unit is mounted on a main block of solid steel.

The adjustable V-blocks will accommodate cartridges from 300 Weatherby down through such cartridges as the 222 Remington. Measurements can be made in seconds at nearly any place on the loaded bullet, from the point to near the base. Measurements can be taken as close as .00025" or less.

Measurements are normally taken with the front V-block supporting the neck of the cartridge while the base of the cartridge is supported by the rear V-block. The loaded cartridge is inserted into the hole in the main block. (Measurements can, however, be taken with the rear V-block supporting the case at any point in its length.) Measurements are then simply read on the dial indicator as the case is rotated with the fingers. My 10-year old son can accurately measure a case in less than 5 seconds.

### Proof of the Tests

Some of the best rifles available were used to determine the degree of inaccuracy we can expect from poor bullet alignment. Several 40X Remingtons were used in 6 different calibers, along with Winchester, Remington, Ruger, Sako and Savage rifles in varmint and target weight.

My normal test procedure was to pit the 10 best rounds against the poorest 10, all segregated with the bullet alignment gauge. These cartridges were selected from a lot of 60 or more in all accuracy tests. Needless to say, I was surprised to find as many poorly-aligned cartridges as I did (in some lots of brass), as I had assumed my bullets were in better alignment with the cases. Right here a prior check with a case-alignment gauge would have revealed the fault(s) of such brass.

In checking the lots of brass which had the highest percentage of runout, it took a careful analysis to discover the cause or causes of the poor bullet alignment. In nearly all instances, though, these causes were detected.

In some instances the bulge we often see on one side of the cartridge after firing, just forward of the base or web, was the cause of poor alignment. This condition often occurs in cartridges fired in certain rifles, particularly where chamber-bore alignment is less than perfect.

### Bulged Cases

In my experience this bulge is more likely to occur where maximum high pressure loads are used,



The Plum City Case-Neck Gauge.

particularly where even the slightest chamber misalignment is present. However, such bulging has been present, on the first firing, in certain rifles of known high quality rifles which had been double checked with an accurate bore chamber cast and found to be true.

In one customer's rifle the bolt face was not square with the chambered cartridge base. His cases, bulged after firing, chambered very hard on the second loading unless they just happened to enter the chamber exactly as they had when first fired.

Probably the most common cause

of poor bullet alignment comes about through our bullet seating operation. Most of us use regular seating dies to seat our bullets, but some of the poorer quality dies won't give our bullets a true start into the case mouth. Or our shellholder may not be in true alignment with our reloading tool ram. It may have dirt or grit under it, or it may be just plain poor quality.

When our bullet begins seating it may buckle or cock slightly until the case neck, perhaps, straightens it. In some such short-neck cases as the 243 Winchester, it may never get straight.

Here's an old trick that will help produce better bullet alignment: As you feel the bullet start into the case, perhaps down  $\frac{1}{8}$ " or so, drop the ram and rotate your cartridge in the shellholder a half-turn or so. This tends to correct or partially even out any alignment differences as we seat the bullet the remainder of the way.

I've now discarded two seating dies which, I discovered, were doing a very inferior job. Better replacement dies gave me much improved bullet alignment. Top quality tools pay off!

### Tolerances Defined

Where bullet runout alone, checked with a bullet spinner, is from .0001" to .0003" we don't have much cause for alarm in our bench shooting. That is, the bullet "only" as taken with a bullet spinner, not loaded-cartridge bullet-case alignment.

In our selection of bullets for varmint or other hunting purposes, we can tolerate more runout.

Here's a rule of thumb which is applicable to most hunting cartridges: Varmint rifles should use bullets with a runout of .0003" to .0005" or less. Standard hunting rifles, particularly those of 30 caliber or over, can use bullets with a runout of .0005", or possibly up to .00075", and still be reasonably assured of fairly reliable accuracy.

Any bullet runout *per se* will, of course, contribute to the misalignment of our bullet in the case.

Now, assuming we're using bullets and cases of acceptable concentricity, we can predict the amount of inaccuracy we will, with fair consistency, get through poor bullet alignment.

Based on my tests, the following figures will be a good guide: Where bullet alignment is .002" off-center, you can normally expect MOA groups or under in any good rifle.



Where ½-MOA or less accuracy is expected, it is best to stay within .001" runout, taken any one place on the bullet in the loaded cartridge.

It is not uncommon to find cartridges loaded by the inexperienced with misalignment of .007" to .012". You can bet such loads won't put 5 shots inside 2½" at 100 yards, and be pretty safe in winning your bet.

In varmint rifles .003" case-bullet runout can normally be tolerated, and you'll still get your share of crows at 250 to 300 yards. If you want accuracy closer than that, cut it down by .001".

In standard weight hunting rifles .005" to .006" is acceptable. Cast bullets can often be more difficult to seat, and we see more evidence of bullet shaving as a result of too tight a bullet fit. We must make corrections here or our accuracy will never improve. A larger expander plug will usually do the trick.

### Check List

I've covered the points that follow elsewhere in this article, but

I would like to sum them up here for added emphasis. These are the things to do before loading your cases and testing them in my new Bullet Alignment tool:

A—Check runout of your bullets before seating them in your cases, using a suitable device. Obviously, excessive bullet runout will give erroneous readings in my gauge. Except for benchrest shooting, bullet runout of .0001" or slightly more is acceptable. With bullets for hunting rifles a runout of .0004" to .0005" is OK.

B—Select the cases you will use for best-accuracy results in two ways. 1) Check neck-wall runout, using my table for tolerances, and discard those not meeting your standard or correct them by outside neck turning or reaming. 2) Check outside case-body and neck diameter for reasonable uniformity, and also for concentricity or angling of the neck with the case body axis. Sometimes resizing dies (and certain chambers) cause this condition of offset or angled necks. Again it should be obvious that such asymmetrical cases must be

put aside. Use them for hunting loads and try to determine what created that or those conditions of the case.

The knowledgeable handloader-rifleman must be constantly watchful for weak links in his reloading chain. Accuracy doesn't happen by accident. ●

(Bob Hart — Nescopeck, PA 18635—makes a Bullet Indicator that is precision-made and works very well indeed. It handles flat base and boat-tail bullets from 22 to 30 caliber, detecting run-out via a dial indicator [supplied] reading to one-ten thousandth [.0001"]. It's \$52.95 complete, and a finished walnut box for its protection is \$7 extra.

Tools for measuring case runout or eccentricities are made by Brown Precision Co., 5869 Indian Ave., San Jose, CA 95123, the Fergusons, 27 W. Chestnut, Farmingdale, NY 11735 and B-Square Co., Box 11281, Ft. Worth, TX 76110.)

## Barrel Life

Come spring, many varmint hunters and benchresters begin fretting about their pet rifles. They're torn between wanting to shoot bullets fast, and their fear of wearing out favorite rifle barrels.

The danger is most acute in smaller caliber cartridges with large powder capacities—such hot little numbers as the 220 Swift, 22-250, 225, 243 and related wildcats. Serious barrel wear in such calibers isn't caused as much by actual passage of the bullet as by intensely hot powder gases that may reach 6,000°F.

Such gases can literally burn away barrel steel just in front of the chamber's throat. The metal grows rough, eroded, and develops tiny surface cracks that resemble sun-dried gumbo mud. When a rifle bore is badly eroded in the critical first inch ahead of the chamber, the bullet must jump across that inch before it engages the rifling and begins to spin. It smashes into

the rifling with great force while still gathering speed, and accuracy suffers even though the rest of the rifle's bore is in good condition.

Barrel erosion increases with temperature and pressure. The incandescent powder gases have relatively little effect on cold barrel steel. But in rapid fire, as barrel heat rises, so does barrel erosion. Winchester-Western researchers have ruined a 243 barrel with as few as 1,100 shots. They "burn it to a barrel" when they fire once every 10 seconds or faster, and after 30 rounds of this abuse the barrel will cause steam if immersed in water. By comparison, firing the rifle every 30 seconds or so—with the bolt opened so that air can flow through the bore between shots—is very mild treatment.

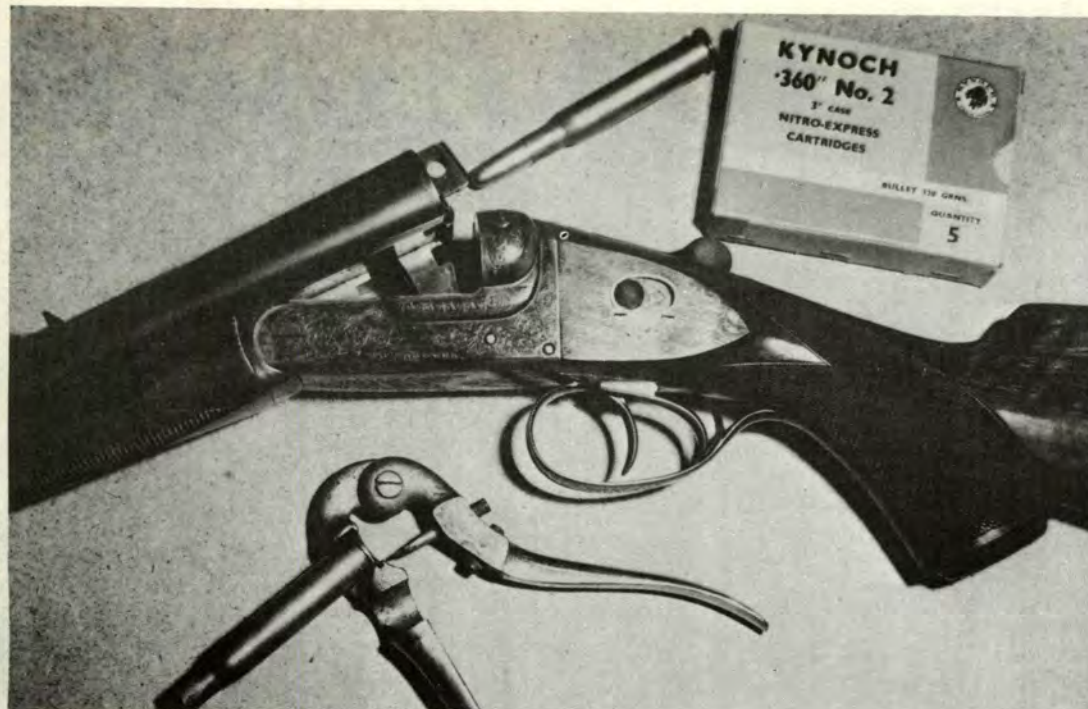
During heavy testing, Winchester-Western engineers begin looking for accuracy falloff in a 243 ab about 1,600 rounds. In normal firing the barrel will last much

longer than that. Accuracy in a 243 may be acceptable at 3,000 rounds and beyond—possibly up to 5,000 rounds.

The 22-250 and 225 are comparable to the 243 in terms of barrel endurance. The little 222 has considerably longer barrel life than any of them, while the 220 Swift is inclined to be less long-lived than its sister calibers. Yet Harvey Donaldson, writing in the *Handloader Magazine* last winter, told of his 35-year-old 220 Swift that "has accounted for several thousand woodchucks" and could still print a 5-shot, 100-yard group that measured under an inch.

The life of a high-intensity rifle barrel can be stretched with a little tender, loving care. If you reload, use something less than maximum charges. Shoot deliberately on the range, giving the barrel time to cool between shots. After shooting, carefully clean the bore from the breech and coat the clean bore with a thin film of good oil.





Best quality Greener double rifle for the 360 No. 2 Nitro Express cartridge, with loaded round; an empty case is about to be de-capped. A fine example of the quality English big game rifles which are still to be found on the second-hand market (at increasingly fancy prices).

# Solving Problems in English

by KEN WATERS

**British rifles are reaching these shores in ever increasing numbers—Single shots, doubles and bolt action magazine rifles.**

**Because many of the old cartridges are in short supply or gone forever, shooting these interesting rifles can be a major problem. The author gives here his solutions in getting some dozen rifles off the wall, from the 242 Vickers to the 450 Nitro Express.**

**B**ECAUSE THE average American sportsman is unfamiliar with English rifles and cartridges, many of which seem to be appearing with increasing frequency in our second-hand gunshops, a need for better understanding of these quality imports, together with their problems of ammunition supply, has become essential.

For the big game hunter who would like to read about the performance of these storied English calibers in the game fields, I can recommend no better or more explicit source than the late John Taylor's book, *African Rifles and Cartridges*. Although Taylor discusses the hunting of African game, differentiation is made between non-dangerous soft skin, dangerous soft skin, and dangerous big thick-skinned game, enabling an American hunter-rifleman of reasonable experi-

ence to equate our own species with similar trophies of the Dark Continent.

Major Sir Gerald Burrard in his book, *Notes on Sporting Rifles*, has likewise contributed to our enlightenment, if in less detail. For amateur ballisticians, reloaders and hobbyists, nothing equals Frank Barnes' excellent publication, *Cartridges of the World*, and George Nonte's book, *Cartridge Conversions*.

All riflemen who would have a better understanding of English rifles and cartridges should read these books, and to those who have, I can here add only further background and details; they've all done a great job. I refer particularly to the origins of English rifle types, and the home fabrication of suitable ammunition to be fired in them, my own specialty being the



reloading of metallic cartridges.

It can be fairly assumed, I think, that many of my readers are familiar with the development of the American hunting rifle, but for the others, here's some background. From the single barrel muzzle-loading flintlock smoothbore of 200 years ago, we progressed to rifled arms with percussion cap ignition during the first half of the 19th century. These improvements brought with them greater range, finer accuracy and increased reliability during foul weather.

They were still front-loading pieces and still single shots, however, but the third quarter of that century witnessed numerous attempts to develop practical breechloaders. American mechanical inventive genius sought a solution to the problem of firing more than one shot from a single barrel by the development of a repeating mechanism that would feed cartridges from a magazine. Such a system had, of necessity, to wait upon the development of successful self-contained cartridges.

A multiplicity of efforts, spurred on by the impetus of our Civil War, finally achieved these goals, at least to some degree, and by the mid-1860s we had our Henry and Spencer metallic cartridge repeating rifles. These were of limited powers, though, and hunters of large or dangerous game continued to use the big single shot rifles well into the last quarter of the 19th century. Not until the appearance of the 1876 and 1886 Winchesters, the 1881 Marlin, and a few lesser-known large lever action repeaters, did we in this country have repeating rifles which were suitable for taking the largest game on this continent.

### English Rifle Development

English rifle development provides a strikingly different contrast. Starting from the same point with arms that were practically identical, our Anglo-Saxon cousins concentrated on acquiring the means for firing a second shot without worrying about subsequent rounds. A second shot was made possible simply by providing a second barrel, and for this there was no need to wait upon the creation of improved means of ignition, rifling, breechloading, mechanical systems or even fixed cartridges.

Thus, we find the English using double barrel muzzle-loading smoothbores and rifles on large



game as early as the 1830s. In fact, flintlock double rifles in 12 gauge, at least, were made even earlier. These arms proved so effective in their large-bore versions as to produce considerable resistance to the introduction of breechloaders. This seeming reluctance to acknowledge progress has often mistakenly been attributed to an inherent conservatism of the British peoples—an indictment that fails of substantiation in the light of facts.

The truth of the matter is that English arms intended for hunting big game were being used throughout the far-flung reaches of the Empire—places where cartridges had to be transported for thousands of miles, and where an empty breechloader was just so much worthless iron. A muzzleloader, on the other hand, could be made to fire as long as powder and scrap lead were available. Even caps could be improvised, if necessary. Also, and quite as important, the

De- and re-capping cases with Berdan primers can be easy with the proper tool. The tool shown is an old one, no longer made, and is usable only for large rimmed cases. There is today a very real need among handloaders for such a tool, with provision for adjustments to permit adapting to different size and types of case heads. The angle at which the de-capping wedge pin is set is especially critical.

earliest breechloaders were generally not considered strong enough to stand up under the very heavy charges then in use by hunters of large and dangerous game.

### Early Systems

Eventually the transition to breechloading was begun, however, using many different systems, among which the French Lefauchaux pinfire cartridge system appears to have dominated the field for 20 years or so, from about 1840. Those first successful European self-con-



tained cartridges, with their rigidly projecting ignition pin, were obviously oriented to single- and double-barrel guns. They could hardly have been adapted to the magazine of a mechanical repeater.

So the emphasis remained on the double gun, shotgun or rifle, as the best means of getting that second shot. By the 1850s and 60s these sturdy pieces, with their heavy black powder loads, had proved such efficient killers of large and dangerous game that it is small wonder they were continued (although in strengthened and improved form) following the introduction of centerfire cartridges.

Many American firearms publications, in discussing the English doubles, have stressed the extra reliability given by their two entirely separate sets of lockwork, and this is of course true. But almost invariably they go on to compare the rapidity of fire possible with a double to that of a repeater. This, in my opinion, is not—or rather *was not*—a valid comparison since, in the years during which the big doubles were establishing their reputation, there *were* no repeaters. The choice then was solely between double and single!

Wealthy British sportsmen traveling to Africa or India almost always chose to carry along a pair of expensive double rifles, while less affluent hunters had to be content with one of the various reliable and powerful but far less costly English single shots. Not until the military adoption of the bolt action rifle did repeating rifles begin to find favor in the Empire, and then it was primarily the army officer assigned to overseas duty who made the break with tradition.

When it is realized that, previous to the appearance of the Model 1895 Winchester in 1904 with its powerful .405 cartridge, African-bound American sportsmen didn't have a suitable repeating rifle available, it is clear that the English double rifle had no competition from repeaters of any type. I think it is important to clear up this common misunderstanding, in further support of which I'll risk the somewhat arbitrary statement that prior to the introduction of Westley Richards' 425 Magnum in 1909, the 404 Jeffery in 1910, the 416 Rigby of 1911, and the great 375 H&H Magnum in 1912, repeating rifles in calibers commensurate with the big doubles were just not to be had.

While I'm at it I'd like to shoot down still another misconception. A

couple of paragraphs back I mentioned the English practice of buying rifles in matching pairs. Because this was done by men who could afford it, the practice has often been erroneously taken to represent a status symbol. Americans generally have failed to understand the Britisher's true reasons for doing this. Let me assure you, he was not being pretentious when he ordered two rifles exactly alike from the same maker!

With competent gunsmiths months away by steamer, a second rifle using the same parts and firing the same cartridges was the best assurance a hunter could have of continued operation should one of them be damaged, fail for whatever reason or be lost. The other rifle, too, was as familiar to him as the other.

Further, he could have his gun-bearer carry the second rifle, loaded and ready, offering the additional safeguard of two more shots should they be needed to meet a deadly charge.

### Cartridge Scarcity

By any standards, those were truly great rifles—the singles as well as the doubles—and American sportsmen and collectors are finally beginning to appreciate their worth. Unfortunately, however, there is a severe problem that plagues those of us who would put them to use. I refer to the limited and, in some instances, the non-availability of suitable ammunition. These are the "Problems in English" our title refers to and, depending upon the cartridges needed, can range from fairly simple to downright tough to solve.

Like us, the English gunmakers introduced numerous new cartridges from about 1875 to about 1925. Many of these were closely similar lookalikes but *not* interchangeable, and there were, too, the "Proprietary" cartridges, made for the rifles of a single gunmaking firm only. Fortunately they also had families of cartridges; that is, a series of different calibers based on a single basic case necked down in varying degrees.

From the American shooter's standpoint, though, the greater problem with English rifle cartridges concerns those cases too large to form from any American brass. All were Berdan primed—most often with mercuric and/or corrosive primers, which didn't help prolong case life (or bore life either), and rim thickness was oft-

en much less than that of potentially useful U.S. cases, thereby creating a headspace problem.

All this brought about a general dependence on imported cartridges or cases, and the proper Berdan primers to go with them. Hence the decision of Imperial Chemical Industries (ICI), or Kynoch, to phase out numerous calibers over the past 15 years has constituted a major blow to owners of English rifles.

To complicate matters further the English played their own game of caliber confusion, using barrel groove and bullet diameters of odd (to us, anyway) dimensions. Many of these bullets are not made in the U.S., and even moulds for cast bullets must often be made on special order—and at special prices.

Adding to this bewilderment, the actual bullet diameter called for by a certain cartridge may be quite different from the number used in the caliber designation. For instance, the 318 Westley Richards uses a bullet measuring .330" in diameter, while the 425 by the same firm takes .435" slugs. It's almost as bad as our own system!

Obviously, to cover the entire field of English cartridges with suggested solutions to these many problems would entail a project far beyond the scope of a single article, even with the space the *HANDLOADER'S DIGEST* allows. I decided, therefore, to select those cartridges which have forced me to seek answers, and to give you the benefit of my experiences. I hope it will be of help to those having rifles of like calibers, while the owners of those cartridges not discussed may profit from a knowledge of procedures and component adaptability. Some of the better loads I've used in these rifles are listed in the accompanying table.

### The 242 Vickers

Also known as the 242 Rimless Nitro Express, Frank Barnes tells us that this cartridge was introduced in 1923, but is no longer listed. Jack Brickell (Oregon Ammunition Service) does not include it in his list of modern imported English rounds.

Having a fine Vickers sporter in this caliber, built around an Oberndorf Mauser action, I wanted to shoot it. Accordingly I bought a few specimen Kynoch factory cartridges from Jim Tillinghast, who seems to have at least a few of just about everything at his Marlow, New Hampshire, shop.

A pair of these original rounds



were then fired in my rifle to form them to this individual chamber. The empty cases were next shipped off to Fred Huntington of RCBS, who used them to make me a set of form, trim and loading dies that are virtually perfection! With a light lubrication of the brass they will, in one pass, size down a 30-06 case and hold it for trimming and filing to 2.38" length, after which it needs only to be chambered and run through the regular sizing and seating dies, just as a standard American cartridge would be. I now have a limitless supply of fresh American brass for reloading, cases that take our far handier Boxer primers.

However, despite winning the first battle, we hadn't yet won the war. The 242 Vickers—contrary to the assurance of the dealer who sold me the rifle—doesn't accept our standard 6mm or .243" bullets. It requires .249" projectiles—midway between the 243 and 257.

Professional bulletmakers unanimously warned me against trying to swage down .257" bullets, advising instead that I either "bump-up" 243s or get dies for swaging my own jacketed bullets. In this endeavor Wayne Schwartz, the helpful Haslett, Michigan, gunsmith, proved most cooperative, coming up with a set of Ted Smith's dies for swaging 95- to 100-gr. hollow-point .249" bullets from 6mm jackets and lead core wire.

With these dies, I find I can either make my own bullets which, incidentally, have shot into 1½" using open iron sights, or I can bump-up .243" hollow-point factory bullets to .249", using only the final bullet forming die for this.

The 242 Vickers, no longer an unshootable wall hanger, is now an entirely practicable, quality hunting rifle.

### The 280 Ross

Unfortunately the story I have to tell of this better-known cartridge hasn't yet reached any such happy ending. This magnum-size rimless case, but without a belt, falls into a class I consider the most needed and yet most conspicuously absent amongst current American cartridge cases—the large diameter rimless.

With a base diameter of .534", the 280 Ross is too big to permit the unqualified use of 300 H&H brass, even if the full belt is allowed to remain. Cases so formed (and trimmed to 2.615") will chamber, but when fired with any

charge even approaching a full load they bulge dangerously, immediately forward of the belt. While uncertain as to just how dangerous this practice actually is, I don't care to recommend it to others nor to pursue it any further myself.

I have, accordingly, started to use Kynoch 280 cases in my Jeffery Mauser-action sporter. I decap them hydraulically, do resizing in a die minus its decapping pin, and re-prime with Berdan caps. I'd like to use American or other brass taking Boxer primers, but so far haven't located any that offer a reasonably close fit. .024" is just too much base expansion to be safe in my book!

Here also, bullets of the correct size can be a problem, as the 280 Ross calls for .287" diameter rather than the usual American 7mm or .284" size. Luckily I located a fair supply of the now-discontinued Speer .287" 160-gr. spitzers. Without these I'd have to import the proper size bullets or buy dies for bumping-up .284s.

### The 375/303 Axite

A little known rimmed or "flanged" cartridge, said to have been introduced about 1906, I have a Westley Richards magazine rifle on a Mauser action taking this long slim round.

Looking like an elongated 303 British, that 2.22" case is too short for reforming, as there is no neck left once the 303 is fire-formed to the 375/303's 2.47" chamber. The "375" part of this caliber designation does *not*, of course, refer to the 375 H&H Magnum with which we are familiar, nor to its bullet diameter, but simply to the fact that it is descended from the original 375 Flanged Nitro Express, necked down to 303 caliber. Jim Tillinghast was again able to come up with a pair of these old cartridges for samples.

George Nonte, in *Cartridge Conversions*, explains how to make cases for the 375/303 from 9.3x74R brass, but I was unable to do this in a manner which seemed practicable. The 9.3x74R case is too much larger in its base diameter to permit swaging down to size, necessitating *turning down* (and thus weakening) cases in their vital stress area.

Here's my best procedure, so far. I take 30-40 Krag cases, which have a length of 2.31", and reduce their rim diameter (by turning in a lathe) to .505". Rim *thickness* is next reduced to .037" by removing brass from the front or forward face

only—NEVER from the base! They will now enter the rifle's chamber.

With necks sized to hold .312" or .313" bullets, these altered cases are primed, loaded and then fire-formed. They're now 2.30" long, with the shoulder moved forward, and a neck that is only some 5/32" long. This is just barely sufficient to hold bullets properly, but I have found, from actual use, that they work satisfactorily unless given overly rough treatment. Case length is .17" too short, but this can be compensated for by seating bullets well out of the case. With this cartridge, neck length is the critical factor.

Bullets for the 375/303 are the same standard .312" size used by the 303 British, (or .313" in worn bores), so there is no problem in this respect.

### The 318 Express

Another Westley Richards cartridge—really the 1910 successor to the 375/303—this once-popular round looks for all the world like a 30-06 loaded with 220-gr. round-nose bullets. That it can be formed from 30-06 cases in another set of RCBS dies, and thereafter trimmed to 2.38" case length, is one of the 318's happier features.

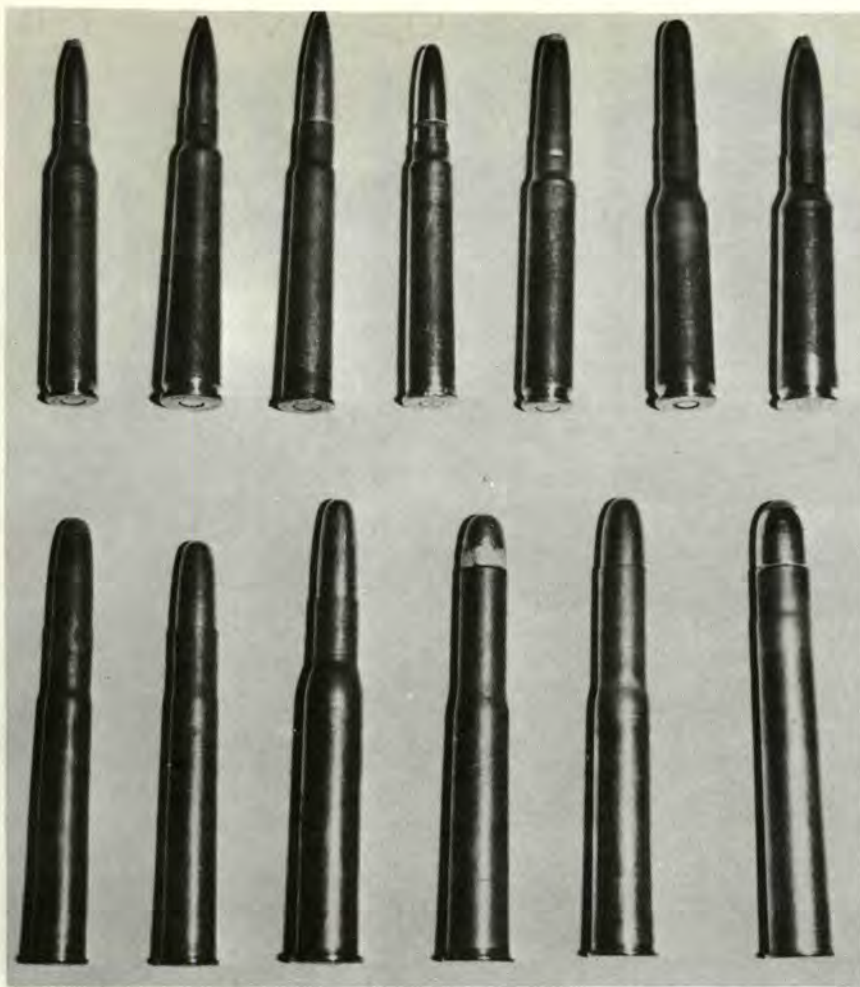
Very little change in case shape occurs on firing, unless you have one of the special Westley Richards rifles with their patented "Square-Shoulder" chamber, in which event the case that emerges after fire-forming will have the sharpest shoulder you've ever seen. I have Westley Richards rifles for both standard and square-shoulder versions of the 318, and like them both as powerful, useful cartridges handling either 180- or 250-gr. bullets.

The rub with this round is in the bullet, which measures .330". So once again we have a bastard-size bullet requirement falling squarely between the .323" of an 8mm Mauser and the .338" dimension of bullets for the 338 Winchester Magnum.

To date I have been getting away with using some discontinued (unfortunately) 200-gr. Speer .333" bullets, my rifles having bores sufficiently worn to permit this. However, I intend to get a bullet swaging die that will bump-up .323" bullets to .330".

Velocities with this cartridge and full-power loads are too high for cast bullets, besides which no bullet moulds are listed in this caliber. Eventually, though, I may have a





A cartridge line-up for shooters interested in English cartridges. Top, from left: 242 Vickers, the famous 280 Ross, the seldom-seen 375/303 Axite, a reloaded round for the 375/303 formed from 30-40 Krag brass, 318 Nitro Express, 333 Jeffery Rimless and a 333 reload formed from 348 Winchester empties with Barnes .333" bullet. Bottom, from left: 400/350 Nitro Express, the highly similar 400/360, 360 No. 2 Nitro, one of the old 450/400-3¼" Black Powder Expresses with paper-patched bullet, the later 450/400-3¼" Nitro Express with metal-cased (jacketed) bullet, and a 450-3¼" Express cartridge.

special mould made up to cast the long, deadly 250-gr. slugs of hardened lead. The 318, with 250-gr. bullets at 2400 fps, will equal if not surpass the 30-06's killing power on really big game.

### The 333 Rimless Nitro Express

This is the Jeffery cartridge, introduced around 1911, that is noted for its deep penetration. Once you see its 300-gr. .333" bullets turned out by the old Barnes Bullet Co. (now the Colorado Custom Bullet Co.), you'll understand why it bores

so deeply into game.

That bullet, a full 1.6" long with copper-tube jacket either .032" or .049" thick, is a lethal projectile for sure! Even the 250-gr. .333" slug made by the Colorado company measures 1.425" long. Both have shown minimal expansion or deformation in sand, and should be capable of shooting clear through any animal on the North American continent.

These Colorado Custom bullets don't come cheap, but they're well made and are the only jacketed .333" bullets currently made in this country (to the best of my knowledge). The only alternative would be to import bullets from England, which I'm quite sure would prove equally costly, if not more so.

Now for the big job—forming 333 Jeffery rimless cases. I use 348 Winchester brass, first lathe turning-off the rims, then cutting an extractor groove and leaving rims only .542" in diameter, which I thin down to about .060". It is then necessary to turn the base of the cases so that at no point are they larger than .544" in diameter.

This last is the most questionable part of the whole procedure, as I

particularly dislike thinning cases in the critical base area. However, Winchester Super-Speed cases thus turned have generally withstood three or more firings with reasonably heavy loads before cracks started showing up. I've been unable to discover any better method of forming these cases.

The final step is to neck cases down to hold .333" bullets and, if new, un-fired brass is used, no further sizing has been needed. Cases are left full-length, and even then they're some .18" short; but, as we did with the 375/303, bullets can be seated out to give close to the same over-all cartridge length as the original Kynoch 333 loaded rounds.

So far I've had no trouble with this system, other than the need to watch cases closely after each firing, and the necessary acceptance of a rather short case life. To put a fine Magnum Mauser Jeffery rifle back in shooting order, though, makes it all seem worthwhile.

### The 400/360 and 400/350 Nitro Express

I once owned a double hammer rifle by Evans (from Purdeys) in 400/360 caliber, and this one is relatively easy to get shooting. A supply of Norma unprimed empty 9.3x74R brass, taking American Boxer-type primers, plus a quantity of 286-gr. Norma 9.3mm (.365") bullets, and a set of RCBS dies are all that is needed.

Trim cases to 2.73" length, lubricate lightly and run up into the full-length resizing die. Correct bullet diameter for this cartridge is listed as .367", but you'll be using .365" bullets, so when ordering the dies I suggest specifying that the inside neck expander button be furnished for .365" bullets so cases will be sure to hold bullet friction tight.

That's about it, except for the usual chamfering of case mouths after trimming and fire-forming. You may find that your particular rifle has a groove diameter of anywhere from .365" to .367", as they're known to vary some. If its .365" you're in luck; .366" isn't bad, but .367" bores probably won't be as accurate because of the under-size bullets. This is the 400/360 Purdey cartridge I've been talking about. There is another 400/360 identified as the Westley Richards cartridge, and these two are *not* interchangeable.

I've never owned one of the 400/350 rifles, but they're quite





like the 400/360, taking the same 9.3x74R cases trimmed to 2.75" and full-length sized in the proper dies. This cartridge should be even more satisfactory than the 400/360, because it takes standard .357" diameter bullets. Thus all components are available on the American market. Either cartridge is well suited to hunting American big game in timber.

#### The 360 No.2 Express

An especially fine cartridge of medium bore for double rifles, its expected life span was cut short by the appearance of the 375 H&H Magnum.

The 360's large rimmed case is no longer available and can't be formed from any American brass, but the still-listed 450/400-3" Nitro cases can be sized down in RCBS dies, taking care to first remove the central decapping pin from its stem since these are all pocketed for Berdan primers. There's no choice here but to use Berdan primers, for which a suitable and reliable tool is sorely needed.

In my Greener double rifle taking this cartridge, I use Norma

286-gr. 9.3mm (.365") bullets with perfect satisfaction, my groove diameter measuring only .3645". Even though regulated for 320-gr. bullets, the 286-gr. Normas shoot with quite acceptable accuracy. No. 172 Berdan primers are obtainable from Oregon Ammunition Service, Box 19341, Portland, Ore. 97219.

#### The 375 Flanged Nitro Express (2½")

This old rimmed cartridge for single and double-barrel rifles, as well as early Mannlicher-Steyr bolt actions, is not to be confused with the later and much larger 375 Flanged Magnum.

At one time, I had a magazine rifle by Stephen Grant on the old 1899 Steyr action, and used to make ammo for it by trimming 405 Winchester cases to 2.50" length and full-length sizing them in RCBS dies. Nowadays, however, with the supply of 405 cases dried up, 9.3x74R Norma brass can be used after sizing, trimming to length and swaging-down the base section until formed cases will enter the rifle's chamber without resistance. An easier method, but one

An English "magazine rifle" by Vickers for their 242 Vickers Nitro Express cartridge, having been "regulated" for 100-gr. .249" bullets with 37 grains of Cordite. Cases are made from 30-06 empties. Ranged above the rifle are (left to right): A 242 Vickers factory-loaded cartridge, one of the author's reloads with reformed '06 case, a standard 30-06 round for comparison, and two empties—the first a standard '06 and the second a fire-formed 242 ready for re-loading. Below the rifle is the set of RCBS dies which so neatly perform the transition.

which will result in cases that are some .18" short, is simply to fire-form 30-40 Krag cartridges in the 375 Flanged chamber.

Nice part of this cartridge is that it takes standard 270-gr. .375" bullets, thereby simplifying things considerably.

#### The 450/400-2½" B.P.E.

Years ago I cobbled up ammunition in this caliber for a nice little Alex Henry single shot with right-side hammer. I recall that I used to thin the rims of 348 Winchester



# Table of Loads For English Rifles

Cartridge	Bullet	Charge	Powder	Primer	Case Used
242 Vickers	95 Swaged JHP	44.0	H4831	CCI 250M	30-06
	100 Swaged JHP	42.0	4350	CCI 250M	30-06
280 Ross	160 Speer SP	60.0	H4831	CCI 250M	USC 280Ross
	160 Speer SP	57.0	N205	B	Ky. 280Ross
375/303 Axite	175 Speer .313"	36.0	3031	CCI 200	30-40Krag
	175 Speer .313"	37.5	3031	Win. 120	30-40Krag
318 Nitro Exp.	200 JSP	41.2	H4895	West. 8½	30-06
	250 JSP	50.0	4350	CCI 250M	30-06
333 Rimless NE	250 Barnes SP	59.0	H4831	CCI 250M	348 Win.
	250 Barnes SP	50.0	Re21	West. 8½	348 Win.
	300 Barnes SP	48.0	Re21	West. 8½	348 Win.
400/350 NE	300 Barnes SP	47.0	4350	CCI 250M	9.3x74R
400/360 Purdey	286 Norma SP	47.5	4350	CCI 250M	9.3x74R
	286 Norma SP	43.0	HiVe12	Rem. 9½	9.3x74R
	286 Norma SP	44.0	Her. 102	Rem. 9½	9.3x74R
360 No. 2 Exp.	286 Norma SP	49.0	3031	B	Ky. 360 No. 2
375 Flanged NE	270 Win. SP	40.0	3031	Win. 120	405 Win.
450/400-2¾"	260 Cast lead	35.0	3031	Win. 120	348 Win.
450/400-3¼" BPE	260 Cast lead	42.0	Re7	B	Ky. 450/400-3¼"
	260 CCC SP	46.0	Re11	B	Ky. 450/400-3¼"
450-3¼" BPE	330 Cast HP	47.5	3031	B	Ky. 450-3¼"
	330 Horn. HP	50.0	3031	B	Ky. 450-3¼"
	350 Hert. RN	53.0	3031	B	Ky. 450-3¼"

Abbreviations: JHP = jacketed hollow point. 250M = magnum primer.  
 JSP = jacketed soft point. USC = U.S. Cartridge Co.  
 Ky = Kynoch. Her. = Herter's. B = Berdan.  
 Re = RelodeR (a powder now discontinued).

cases (removing brass from the front side only), then full-length re-size and fire-form. The case which resulted was 1/10" short, but seating bullets farther out took care of that and I wasn't dependent on any imported components.

With a muzzle velocity considerably under 2000 fps, I was able to use 260-gr. plain base cast bullets sized .406"-.407", from a mould originally intended for the 40-65 and 40-82 Winchesters. This can still be done to produce darn fine deer loads at short range.

## The 450/400-3¼" B.P.E.

Taking the same bullets as the preceding 2¾" case, new empty unprimed Kynoch rimmed cases using the No. 172 Berdan primer are still available from Oregon Ammunition Service. There is simply no alternative, much as we'd like to use Boxer-type primers.

During the years when the Connecticut Cartridge Co. was making bullets for old American calibers, I used to load their 260-gr. .406" jacketed soft points, with large ex-

posed lead noses, in a 450/400 Purdey hammerless double rifle, but with that source of supply closed off, dependence must be placed on hard cast 260-gr. slugs from Lyman mould #403169, and sized .406"-.407". If not driven too fast, these will do a job on anything up to and including moose.

## The 450-3¼ Express (Black Powder & Nitro)

Among large bore second-hand English rifles found in American gun stores, I doubt if there is a more commonly seen caliber than the 450-3¼" Straight. Double rifles of black powder vintage and the more massive nitro expresses, along with Farquharson and other styles of big English single shot rifles, are always turning up in this caliber.

In one way that is a fortunate happenstance, as all take standard American .458" diameter bullets, although of differing weights. The older black powder rifles were generally regulated for 270- to 365-gr. bullets, and for these American 300- and 350-gr. jacketed soft points

and half-jackets are just about ideal.

The 450-3¼" Nitro Expresses were originally loaded with 480-gr. jacketed bullets, and these can be duplicated fairly closely with U.S. 500-gr. bullets intended for the 458 Winchester Magnum. It would also be worth trying a few 405-gr. jacketed soft points to see how they group.

As with the 450-400 in 3" and 3¼", new empty 450-3¼" Kynoch cases, pocketed for Berdan primers and imported by Oregon Ammo Service, are your best, if not the only, source of brass supply.

In general, I think most shooters who have ever used one or more of these fine old English rifles will agree with me that the quality of their manufacture and finish, and the high degree of pleasure to be derived from firing them, whether in the field or at targets, makes it virtually mandatory that they be kept shooting.

I'll feel well rewarded if my notes and experiments prove helpful to others in realizing this objective.



# HANDLOADING TODAY

## —tools, accessories, components

Many new products for the reloader have appeared over the past year or so. Here's how they stack up.

by JOHN T. AMBER

### Ohaus Loading Equipment

The biggest news in the handloading world for 1972-1973 has to be Ohaus, a long-time maker of weighing scales for laboratory and industrial uses. Except for loading tools or presses—which they'll probably be offering a year or less hence—the brand-new Ohaus line includes virtually every product the average reloader needs. True, they are not showing such esoteric items as bullet spinners or case-neck cutting tools, but there is so much else that we're going to be hard pressed to find space in this department for all of them.

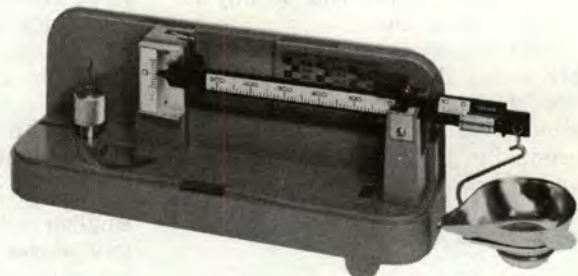
As many of our readers know, Ohaus has been making an excellent line of powder scales for some years. Some of these have been marketed under the Ohaus name (the Models 304 and 314, both of over 3100-gr. capacity), with others made for and sold by Lyman—the D-5 and M-5 types. (Lyman, by the way, no longer offers these Ohaus-made scales, but offers instead their D-7 model, described elsewhere in these pages.)

The Ohaus 5-0-5 Reloading Scale, the first to use magnetic damping, and probably the most popular scale available, is now improved for better visibility of calibration and easier adjustment. Instead of the former 2-poise system, there are now 3; the increments at left of the self-aligning, agate-bearing beam are calibrated in 10-gr. divisions, while the two poises at right adjust from 0.10- to 1 grain and from 1- to 10 grains. The advantage is an important one—all beam notches can be cut wider and deeper, thereby helping materially the avoidance of error via accidental—or mis-read—shifting of the poises,

and the potential dangers such movement might involve. The new Ohaus 5-0-5 is \$17.50, only \$1 over its older counterpart, the now-discontinued Lyman-Ohaus D-5.

Newest design among Ohaus popular-priced scales is their Model 510 with, I believe, a truly unique adjustability, at least in production

scales—this is a rotating micrometer-type poise that turns in adjustment, the range running from 0.1-gr. to 10 grains. A positive locking system holds the adjustment. While the 510 scale has the standard Ohaus features—magnetic damping, hardened steel knife edges and agate bearings, 510-gr. capacity and

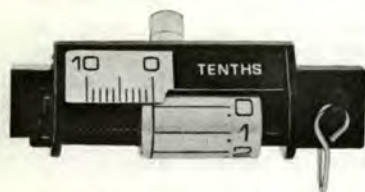


Three new Ohaus powder scales. Top—5-0-5 has 3-poise system, 5-1-0 (middle) and 10-10 have Micrometer Poise and approach-to-weight features. See text for details.



0.1-gr. sensitivity—it offers other worthwhile things as well. An enlarged leg has been included with the heavy die-cast base for greater stability, and the pan is held in a bracket arrangement to prevent its tipping if a bullet, for example, is placed off center in it. Ohaus calls this new scale construction the "Approach to Weight" system, the user being "alerted to beam movement before the pointer reaches the zero scale." Price, \$19.50.

Top-priced Ohaus scale—aside from their Models 303 and 314—is the 1010. Identical to the 510 in all important aspects, including the new micrometer poise system, this version offers 1010-gr. capacity by



Ohaus Micro Poise on 5-10 and 10-10 scales.

means of a furnished 500-gr. auxiliary weight, and the base designed to hold the beam elements for storage or when the scale is carried. A dust proof cover is furnished at no extra cost, which is \$19.50. The 1010 also has enhanced stability of both body and pan.

All of these Ohaus scales carry a table converting ounces into grains, a handy reference for the shotshell loader checking shot charges, while the 1000-plus grains capacity of the Model 1010 allows weighing of cases, some loaded rounds, and so on.

With that many powder scales Ohaus ought to have a powder measure, too—and they do. It is quite different from any other measure in design, in that the new Du-O-Measure's rotating drum carries two metering cavities, not one, and both are fully adjustable. The small cavity (clearly marked "S") has a capacity of 0.5- to 15 grains, and it's intended for handgun charges, of course. The "L" marked rifle cavity has a range of adjustments from 15- to 100 grains. Either cavity is quickly made operative by the removal and re-insertion of a single stopscrew, and both adjustment systems may be critically set and recorded by means of carefully calibrated scales engraved on the arms.

The closely-fitted drum is chrome-plated for smooth, trouble-free operation. The sharp-edged cavities should cut through the coarser



Ohaus single-cavity mould and their Universal Handles. These fit Ohaus 1-, 2, and 4-cavity moulds, and Lyman blocks as well.



Ohaus Loading Block



Approach-to-weight details of the Ohaus 5-10 and 10-10 scales.



Ohaus M7200 Du-O-Powder measure (see text for details) and the M7250 stand for it.

powders easily, with more uniform charges resulting. A quick-dump arrangement lets powder be drained fast. While a reliable scale must be used to check charges thrown from any powder measure, especially when full or maximum-usable charges are used, Ohaus provide a handy wall chart for the rough approximation of charges, in both rifle and handgun powders, thrown by the Du-O-Measure cavities, small or large. The powder reservoir holds a pound of powder, its brown plastic, low-profile form having a spout for easier emptying. With two drop tubes and a steel mounting bracket, the new scale sells for \$31.95.

I was particularly pleased that Ohaus furnishes an Instruction leaflet for the Du-O-Measure, an 8-page, fully illustrated pamphlet that thoroughly explains the operation and care of their new powder measure. A pleasant and gratifying surprise.

Ohaus has entered the cast bullet field in a big way, some 68 different moulds being now available in rifle and handgun types, not to mention 19 round ball moulds in sizes from .311" to .662". Most are made in 4- and 2-cavity style as well as single-cavity. Nose punches are available also, designed for use with lubricating-sizers of Lyman, Saeco or other make.

Tungsten carbide cherries are used to cut the precision cavities in the Pearlitic malleable iron blocks—which are carefully well-vented. The alignment pins are hardened, as are the sprue cutters. Sprue holes are ground to a sharp knife edge to assure flat-based bullets and effortless sprue cutting. One universal handle size fits all Ohaus mould blocks, the handles long enough for cool operation.

Packaging of the Ohaus mould blocks has obviously had intelligent attention—bold block lettering on a white panel carries full information on the mould within. Caliber, weight, nose and base type, code number, suggested sizing diameter, top punch style and its part number, plus whether a single- or double-cavity mould, all this data is there, besides a clear photograph of the cast bullet the mould makes.

Again, as with the Ohaus Du-O-Measure, a fully informative and illustrated booklet of 8 pages comes with each mould, its title "Guide to Better Bullet Making." Mention is made of the additional casting equipment needed—lead pot, dipper, fluxing material, and so on—





Ohaus bullet mould boxes carry full information on the blocks within.

the techniques of preparing and managing a bullet alloy, how to go about casting good bullets, and several examples of what not to do. An excellent idea, these comprehensive manuals—it should be emulated.

Lead bullet shooters will, I'm sure, welcome this new Ohaus line of well-built moulds. Until their

advent only a few people have offered bullet moulds in recent years, and some of those not easy to obtain in a reasonable time.

I've only one minor criticism to offer on the Ohaus moulds—I believe the sprue cutters should have been made a bit thicker. I've had no trouble at all with the two blocks I've used (45 ACP and 30/170 gr. GC), I freely admit, but in rough service I'm wondering if an angled belt with the mallet wouldn't bend the cutter.

Ohaus 1-cavity mould blocks are \$10 for plain or gas check base types; \$14 for hollow base designs (H.P. styles are not so far offered); two-cavity blocks, plain base or GC only, are \$13.50. Handles only (these fit either type) are \$4.95.

Ohaus also has casting accessories—a bail-handle, flat-bottom cast iron melting pot, with pouring and tilt lips, holding about 10 lbs., is \$2.50. A dipper or ladle, long-han-

dled for coolness, has an oval pouring spout exactly contoured to match Ohaus mould sprue cutters. Its open top picks up a sizeable quantity of molten mix, too. The price is \$2, which is also the price of a 4-compartment ingot mould. A sturdy hardwood mallet, expressly designed and lathe-turned to bang sprue cutters efficiently, is \$2.49.

We'll now touch lightly on the rest of the Ohaus product array for handloaders. An alloy-steel based powder trickler, made for good stability, is \$3.50, a crush-proof plastic powder funnel, designed to accept all metallic cases, is \$1, while a flip-over loading block, made of unbreakable plastic, has 80 holes on one side, 40 on the other, cost \$1.69. Though Ohaus calls this an all-caliber block, I'd consider the smallest holes much too shallow for good stability with anything but 222-based cases. These fit pretty snugly.

#### 44 and 357 Auto Mag

As this is being written, late in 1971, deliveries of the 44 Auto Mag pistol (made by Auto Mag, Box 2468, Pasadena, CA 91105) have started, but load data from the factory is still scanty. Up to 18 grains of Norma 1020 has been suggested, but better information may be ready as you read this. Eagle Products (1520 Adelia Ave., South El Monte, CA 91733) make the loading and forming dies, plus the reamer required, for altering 30-06 or 308 cases (or like head-size

brass) to the 44 or 357 Auto Mag configuration, but the company has said that ready-to-load brass will be made available.

The 357 Auto Mag, a recent development, is a bottle-necked cartridge looking much like the 30 Mauser, or the 44-357 Bain & Davis. If 44 Auto Mag cases are on hand, the 357 AM is easily made—just swage down in the 357 AM die. Barrels for the 357 AM are being offered by the company, and they interchange readily with the 44 AM barrels.

Both Auto Mag calibers will be made in Mexico, we understand, but so far at least only as empty

cases. Live ammo, it's been reported, will come along later.

#### Blondeau Slugs

Michael's Antiques (Box 233, Copiague, N.Y. 11726) can now supply Balle Blondeau slugs. These are the French-made solid steel slugs that gave the good results reported in Larry Sterett's article in our 1969/23rd edition.

Of modified diabolo shape, these cannot harm the bore in any way because of the soft lead bearing areas covering the circumference of each end. Boxes of 10 slugs (12, 16 or 20 gauge) will retail at \$3.10, with full loading data included.

#### B-Square Co.

Dan Bechtel, owner-operator of this outfit in Texas (P.O. Box 11281, Ft. Worth 76109), showed me his latest chronograph recently. Crystal-controlled, of course for high accuracy, the Model 71 has nickel-cad batteries, a built-in battery charger and it's automatic—just plug in and shoot, no turn-switches to read. The read-out numbers are at the top, easy to see and jot down. When you're through with it, plug it into the 110V line and it charges overnight—nor is there any danger of overcharging. Any standard screens can be used with the M71, but it comes complete—screens, holders, cables, brackets and instructions, all for \$149.95.

Dan also had other good items

B-Square Bullet Gauge



for the shooter or gunsmith. His T-C scope Mount Base fits the Thompson/Center pistol, uses Weaver Tip-Off rings, sells for \$5.20 postpaid. Despite the low price, it looked good. Ever have trouble

with Redfield and Weaver scope screws? Dan has a T-handle wrench for these, each \$4.20 PP, and each fitting the screws exactly. Dan's Screw Holder accepts 6x48 and 8x40 scope base screws, holds them



firmly for power grinding when you need to shorten one. Also \$4.20 PP.

Getting into the higher money area now, there are 3 B-Square tools for the precision rifleman. Their Cartridge/Bullet Spinner is the best-designed of these I've seen. Rather than rotating the loaded round on a center holding the bullet, with the case supported by rollers, etc., this tool has two ground round bars on which the case rides, the neck and the bullet floating freely. The dial indicator included (.0005") quickly detects neck or bullet runout. The "center" type of spinner can't do that if there is any eccentricity in the bullet—and there often is, unless the bullets have already been spun separately and the duds discarded. \$35.95 PP.

The B-Square Case Neck Thick-

B-Square Case Neck-Wall Thickness gauge.



ness gauge is different, too. The case, pushed into a holed piece of round stock, is firmly held against a ground arbor by two spring-loaded "pushers." Runout of the neck wall is read from a .0005" D.I. \$38.95 PP. B-Square's Bullet Spinner Gauge, the body a well-ma-

chined steel piece, holds precision-coned centers, fully adjustable to check runout anywhere on the bullet. The D.I. furnished is a jeweled type, reading to .0001". \$45.95 PP.

B-Square offers many other useful items, especially for the gunsmith — write.

### Bill Ballard

That seems a likely name for a man making the stuff he does, and we're glad to welcome another craftsman to these pages. His numerous products are intended for those who shoot the older firearms, especially the old single shot rifles.

The Long Range Vernier-scale tang sight illustrated nearly duplicates the scarce originals exactly, the one shown intended for the Peabody-Martini, and selling at \$40. He can and will make the same basic sight for other rifles—Sharps, Ballard, et al—the price varying a bit. These Vernier sights are nicely made indeed; full color-hardened (except leaf spring) and the elevation rod is double-threaded to speed changes from one range to another. Our sample showed fine construction.

Ballard hand makes the brass cases illustrated, those shown only a few of the calibers and types offered. The Burnside (A) is \$1.50; the Maynard, 50-50 and 35-30 calibers in the 1866 type (B and F) are 75¢ each; the 50-110 (C) is \$1 and the 45-3¼" (D) is \$1.50. The small case (E)

is a reformed 25-20 SS, these 40¢ each. There's a reduction if cases are ordered in lots of 10 or 20 pieces.

Bullet swages take a cast lead bullet or slug, without grease grooves, the user then hammering the plunger to produce a smooth, well-formed bullet, of a quality and dimensional tolerance a mould cannot make. Swages were a standard item in the kit of those shooting target-grade muzzleloaders, the "slug" rifles, as they're called today. Ballard's swages are made a bit differently, but they work excellently, and he's sold lots of them at \$20. The base interchanges, so further calibers are \$15. These Ballard swages are held to plus-or-minus .0005", indicating tight control and good workmanship.

Ballard has been making a close

copy of the old Lyman paper-patch cylindrical bullet mould for some time, selling at \$22.50 complete for one caliber. Such moulds cast a smooth bullet, variable in length and weight, to be used in the swage described. Almost any caliber is available, the bullets all being round nosed and flat based. Recently Ballard has begun making 2-piece smooth-bullet mould blocks, meant for use in Lyman handles. These produce a flat-pointed, hollow-base bullet, also adjustable for length, cost \$25.

Ballard makes a Pope-style re- and decapper at \$15, the case heads and pins interchangeable, most calibers available. His breech bullet seaters (2 styles) are about \$7.50, and he has straight-line bullet seaters at \$10.



Ballard Swage Set (left) and some of his handmade cases, other items.





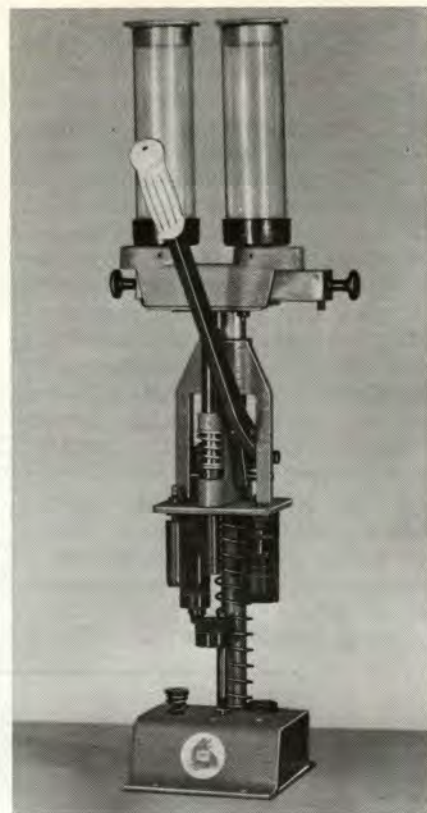
## Bair Loading Tools

Bair Co. (Box 4407, Lincoln, Nebr. 68504), producers of an extensive range of shotshell and metallic case loading tools, have some new products for this edition.

The Bair Cat is a low-cost single stage press for shotshell loading. High and low brass cases, of all kinds, are efficiently handled, according to Bair, with a minimum of effort. Complete for one gauge, \$44.95.

Also new is the Bair 600 APF, an automatic primer feeder for the 600 Polar Bair progressive-type shotshell loader, on which press it is now standard. Ordered separately, the 600 APF is \$7.50, and it's usable on older Bair models, the 360 and 600.

The Honey Bair shotshell press (for details see our catalog pages) is now offered with an optional Auto Primer Feed at extra cost—\$84.50 against \$67.50 for the tool without the APF accessory. An APF kit is also available (19.50) to convert earlier Honey Bair models 405-110 or 405-210.



Glacier Bair (left) and new Bair Cat.

## Bonanza Sports Mfg.

As most of our readers know, Bonanza makes a wide range of handloaders' needs. These tools and accessories have been described here previously, of course, and I've been using a number of them for some time. Their Co-Ax press, a heavy-duty tool that features snap-in and snap-out die changing, plus a shell-holding system that opens and closes automatically on virtually all calibers without adjustment, is an old favorite at my bench. Incidentally, it's offered now in a special deal—the \$68.45 Co-Ax plus a set of \$15 dies (your choice) at \$78.95, a nice saving.

But Bonanza has several new products for handloaders, so let's see what these are. Besides, older Bonanza items will be found in our catalog pages, of course.

Newest Bonanza product is the Model M Powder Scale, a magnetically damped type with a 505-gr. capacity with numerous advanced-design elements. Guaranteed accurate to  $\frac{1}{10}$ -gr., and sensitive to  $\frac{1}{20}$ -gr., the V-bearings are of genuine agate, diamond-lapped. The glare-proofed black beam carries clear white calibrations, the hardened knife-edge pivots ground in a straight line. The



end plates are glass hard, virtually friction free. The right-hand poise is of stainless steel, non-magnetic, while the poise locator on the left-hand is also stainless steel. The radiused poise locator insures precise and uniform position of the poise, an excellent feature. Instead of the indicator end of the beam carrying a zero mark and the frame the usually-found several divisions, the Bonanza M scale system is just the opposite. This novel design lets the user's eye watch the single frame mark, not the oscillating pointer; a restful and faster system. Furthermore, the frame face and pointer face are in the same vertical plane, eliminating parallax in reading—getting the eye level with the

pointer isn't required with the Bonanza M.

The heart of the Model M scale is the truly straight line grinding of the pivot knife edges. They are *straight* over their full lengths, with no possibility of their binding as they turn on the agate bearings.

The Bonanza M scale is quite light, the main body and the beam made of tough, high-impact plastics, but its 3-point mounting—the rear base points are 4" apart—offers good stability. A level surface is not a necessity with the Model M because there is no side thrust friction in the pivots. Use the rotating third leg to bring the scale to zero.





The scale pan is square, usable by right- or left-handers, and it replaces exactly in the same position on its hanging base.

My sample Bonanza M scale was quickly assembled and zero balanced—even with the pointer end  $\frac{1}{4}$ -inch higher than the other, the rotating leg brought the scale to balance. Accuracy and sensitivity were excellent. Using class O metric weights, readings to 100 grains were

on the button; from there to a full ounce, readings ran a couple of tenth-grains light, negligible at those levels. The pointer showed perceptible movement with a 3-milligram weight, or slightly less than  $\frac{1}{20}$ th grain.

Bonanza's Bulls-Eye Pistol Powder Measure was specially designed for handgunners' reloading and Hercules Bullseye powder. It's fast and accurate, the metering of charges handled by a brass rotor drilled for a fixed charge. Rotors are available in 2.5, 2.7, 3, 3.5, 4, 4.5, 5.3 and 8.4 grains, any one of these sizes furnished with the measure at \$14.95. Extra rotors are \$1.50 each or a blank rotor, with a small pilot hole, can be had at the same cost. The ample-sized hopper, of red transparent plastic, has a lid that can be used as a primer turner.

Assembly of the new Bonanza measure was a moment's work, and the rotors are readily exchanged as well. Component parts



Bullseye Measure (above) and Big Red Trickler.

are well made and well finished—the body matte blued. Bonanza suggest using the measure by positioning it, hand held, over a loading block holding primed cases; a 180° rotation of the rotor dumps the charge. The relatively broad base permits standing the measure on any flat surface. However, a mounting bracket is included for bench use. Our sample worked smoothly and uniformly, but be sure to check the metered charge initially on a good powder scale—powder can vary from lot to lot, and the operator's style of handling can also have a bearing.

An excellent measure of its type, and one we feel sure will be welcomed by handloaders of handgun ammo.

Bonanza's third new product is their Big Red Powder Trickler—and it's one of the best of these we've seen. First, it's tall enough to let the trickle tube stand well above the pan of the average powder scale. Some don't. Then, for optimum stability, the broad base can be removed from the hopper section, and the base filled with shot or whatever. Finally, the powder reservoir is narrow and of small capacity, with the trickle tube lying low in it. Thus only a minimum amount of powder is needed to get the trickler working, yet the total height of the reservoir is such that an ample supply of powder can be held, when and if. Made of heavy duty red plastic, the Bonanza trickler is \$3.25.

### C-H Tool & Die

At long last an idea I had some 10 years ago has become a reality. I'm referring to the new C-H Pro-Hex rifle cartridge die sets (\$16.95), and their use of a tungsten-carbide expander button or ball. No more need to inside-lube the case neck, a tedious and rarely satisfactory chore, because really adequate oiling or whatever meant the necessity for removal of same. Effort will be lessened, too, and I wouldn't be much surprised if case-neck elongation is lessened to some degree. The carbide button isn't going to wear down, either, and it's part of a new expander unit that carries a heavy-duty decapping pin for use on crimped-in primers.

Made entirely in the C-H shop, the Pro-Hex dies are hand polished and lapped; double locking rings permit finger-tightening of the dies in the press, but a set screw in the upper ring may be turned down for additional tightening if desired.

Latest C-H Champion heavy-duty loading press has compound leverage, massive frame.







C-H Pro-Hex Die Set, with tungsten carbide expander ball.

The hexagon form of the die body also allows an open end or crescent wrench to be used on them rather than pliers.

Carbide Expander balls are available separately as well, these threaded 8x32 for 6.5mm and under, or 10x32 for 270 and bigger, thus usable in such other die bodies as RCBS, et al; these are \$5.50. For the RCBS expander unit a complete rod, including the carbide ball, is offered at \$6.50.

The latest—and sturdiest—C-H press is their Champion, an O-type that weighs 26 pounds. A large-diameter (1.185") ram is used, giving some 16 square inches of bearing surface, and an equal-size hole is in the tool top. A 3/4-14 bushing

is supplied, but with the bushing removed, bullet-making dies can be used as well. \$69.50 less dies. (We understand that the compounded-leverage system used on the Champion press is based on Fred Huntington's U.S. patent No. 2,847,895.)

C-H has a new bullet swaging die, one that will make 3/4-jacketed handgun bullets in any heavy-duty press. As most of us know, home swaging of 1/2-jacketed bullets has pretty well disappeared. Leading, at the higher velocities one expected, was an all-too-common experience, nor was accuracy as good as it ought to have been. If these new C-H dies will produce bullets that look and act like Super-Vel's, for example, we can well expect a resurgence of interest in homemade handgun bullets with gilding metal envelopes.

In addition to their No. 301 Case Trimmer—a good tool at a moderate \$13.50—complete with one hardened case holder—C-H has a new model this year, the No. 325C. Heavier and sturdier, the new type uses standard shell holders, not steel sleeves, to hold and position the case. The cutter head carries a tungsten carbide blade for a lifetime of use, and a cam-type

locking device assures uniform trimming of every case mouth. Subsequent burring, inside and out, of the trimmed necks, is not necessary. The No. 325 Super Case Trimmer, complete with one shell holder and one pilot (your choice) is \$24.95. Extra pilots are \$1 each, extra shell holders are \$2.50 a piece.

C-H will have two brand new items soon, perhaps as you read this. One is a sensitive, low-leverage primer seater of lever type, an eccentric-cut cam assuring, I'm told, positive seating. The price, about \$22, will include auto primer feed tubes (one large, one small), but not a shell holder. Equally new—we haven't seen either of these tools—is a cannelluring machine of all-steel construction, adjustable for location and depth of the grooving. Cannellures produced will, we understand, equal or better factory cannellures on jacketed handgun bullets. \$14.95.

C-H has a bunch of other new and/or interesting stuff for the handloader—powder funnels and drippers, a burring tool with tungsten carbide cutting surfaces for years of service (\$4.95), plus others.

## C'Arco

The long-awaited Master Series Ransom Rest has finally arrived, and a well-made device it appears to be on all counts. Handsomely finished, this latest Ransom rest for precision testing of a handgun's grouping ability—or the same quality in ammunition—is a sturdy, 7-lb. machine. While the base section is essentially the same as the earlier Ransom Rest (now discontinued), which absorbs recoil via special friction discs and a heavy spring, the Rocker Assembly is new and different. Instead of mounting the auto pistols (which type of handgun the old rest was limited to) on an internal support, inside the magazine housing, the new rocker grasps the gun — auto or revolver — in individually-fitted mounting blocks, or "grip inserts" as C'Arco calls them. These metal paired blocks, lined with a semi-soft rubberlike material, clamp onto the grip frame of the gun; this gun-clamp assembly is then held tightly against a base unit metal wall. In this construction, the handgun may be fired from a loaded magazine or cylinder, a decided improvement in more convenient and faster operation.

The new C'Arco Master Series



New Ransom Master Series Rest for handgun testing (left), with holding unit (above right) and semi-soft insert pieces.

rest is \$112.50, including one set of grip inserts, these last now ready for the 45 Colt (or like frame 38s), the models 41 and 52 S&W autos, the military High Standard 22 auto and the S&W K-38 revolver. Other grip inserts (Browning 9mm, Luger, Ruger 22 auto, et al) are in the works. They're all priced at \$12.95

a pair.

The Rocker Assembly, usable on the earlier Ransom rest, sells for \$67.50, without any grip inserts.

Our sample rest, unfortunately, reached us too late for a fair trial in this frigid February weather, but watch for a report in the 27th ed. of GUN DIGEST.



## Economy Chronograph

Chronograph Specialists (Box 5005, Santa Ana, Ca. 92704) are bucking the rising current of ever-increasing prices, and that's no small achievement today. Nor are they merely holding a previous price; they're less expensive!

The price of their Model 200-6P, a unit that offers a crystal-controlled, transistorized and integrated circuit, is now down to \$34.95. That's right, less than \$35, and that includes 100 screens (\$7.50 per 100 separately), screen holders and cables, instructions and a velocity chart.

The 200-6P is of the binary type, which in this instance means rotating a switch lever through 3 segments to obtain a reading following a recorded shot. Four flashlight batteries are used, making for easy portability and use anywhere—though 110 VAC operation is feasible and allowed for in the design. Screens may be quickly checked via a switch at the instrument before firing. Complete data and sample screens for the asking.



New low-cost crystal chronograph, the Model 200-6P.

## New Half-Jacket Dies

Clymer Mfg. Co., long-time makers of quality chambering reamers, headspace gauges and other shop tools for the gunsmith, are now producing swaging dies for forming half-jacket bullets. A well-made lead-wire cutter (\$14.95) is also offered, and extra bullet-nose punches to fit their new swages are \$4.75 each. The bullet swaging dies, made in 30, 38, 44 and 45 calibers, sell for \$18.95 each.

These new Clymer dies are truly precision made, the finish inside and out faultless, the machining first class. Heat treated and hardened to 52-55 Rockwell, the interiors are honed to 4-6 micro inches, which is mighty smooth.

Threaded  $\frac{1}{8}$ -14 for use in any loading press of good power, there's a flange or rim on the base of the nose punches that lock into the press shell-holder. The die is adjustable for any bullet weight, and nose punches can be had in various styles—conical, round nose, wad cutter and SWC.

I've received Clymer swage dies in two calibers—38 and 45—and I was surprised at the ease with which bullets could be made. I've used other swage dies in years past, and none that I recall of this type made bullets with so little effort. The ultra smoothness of the Clymer dies must make the differ-



or forward to eliminate leading in the bore.

However, so far I've not been able to locate any  $\frac{3}{4}$ -jackets, so I can't tell you just how the new Clymer dies perform with those. On the other hand, the several score  $\frac{1}{2}$ -jacket .357" bullets I've made are beautiful and they've shot as well or better than any others of like style I've used in the past—aside from some leading, which I'd expected. My Clymer bullets average 157 grains, after final adjustment, the lead dead soft, of course. Using 13.4 grains of Norma 1020, with CCI regular primers, I got

Left—Clymer Bullet Die Set.  
Below—Clymer Lead Wire Cutter.



ence. Bleed off of excess lead is through a hole in the end (not the side) of the Clymer nose punches, so it should be possible, I think, to use  $\frac{3}{4}$ -jackets as well, letting the bullet ogive be covered high enough up

good accuracy from a 6 $\frac{1}{2}$ " barreled S&W Magnum for about 20 shots, from a 2-hand rest. First groups kept within a couple of inches at 25 yards. But then I began to get some leading near the muzzle and accuracy fell off.



## John Dewey Gun Co.

Dewey has a new version of his excellent Bullet Spinner (no longer available as such), one that measures concentricity of both bullets and cases in the one tool. Including a .0001" dial indicator unit, \$89.

For those who make their own bullets, and particularly for those who do so with an RCBS A-2 or Rockchucker press, Dewey offers a Bullet Ejection Assembly that's quite different, as our picture shows. It does a first class job, of course, but unlike some other ejectors it leaves ample room for working, and it isn't hard to adjust. Pretty much custom made, the new ejector costs \$30.

His benchrest quality Neck Sizing Die is the drive-in type, serving also as a primer decapper. The decap rod is included at the low price, but as these are custom made, four fired cases must be sent with the order. These cases should be of the style being shot, that is, reamed or neck-turned if that's your method. \$10.00 for this NS Die, (plus \$1.00 postage) or \$30.00 postpaid for it and a matching Straight Line Seater. The latter is \$19.00 separately, plus \$1.00 shipping cost. Calibers available—17 on up.

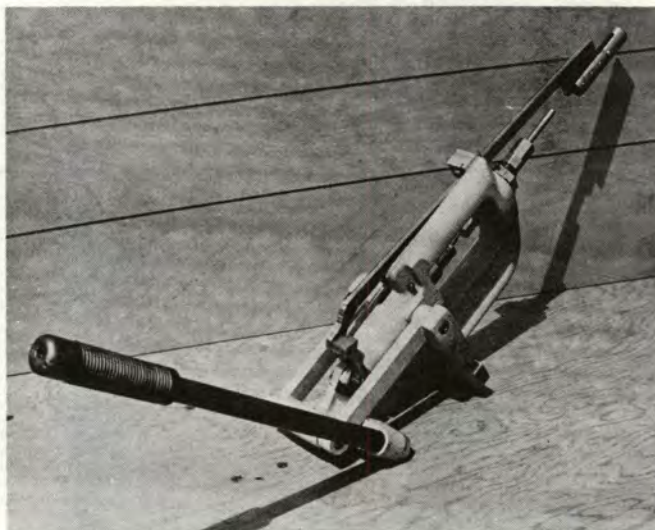
The latest Dewey tool for precision shooters is Dewey's Neck Turner, a small, portable unit that does a first class job of shaving case necks to a uniform wall thickness. A long-life tungsten carbide cutter, fully adjustable, does a smooth job quickly. Price, \$19.75, with an adjustable case holder at \$3.00. Extra spindles are \$3.50. Fired cases, several of them, should also be sent to Dewey when the Neck Turner is ordered.

John is back in production on several other items, notably his Cleaning Rod Guide for bolt action rifles (\$8 to \$9), a tool that's truly a "bore saver," especially in the throat section.

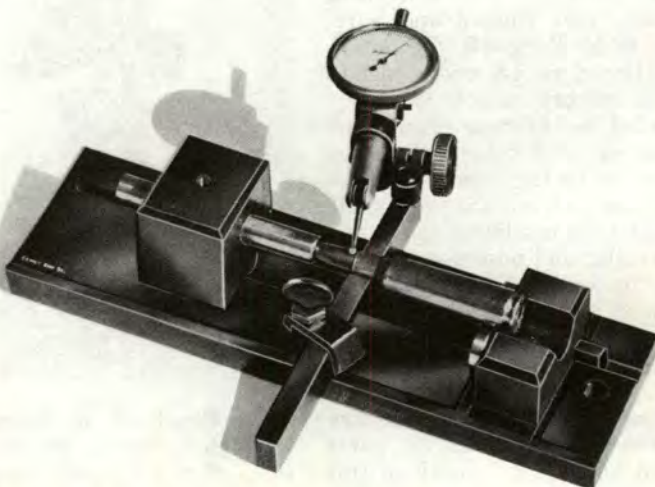
J. D. also sent me other 17-cal. tools—a mandrel for use with his Outside Neck Turning tool, a Straight Line Bullet Seater and another 17-cal. cleaning rod (with brass brush and Belding & Mull-type tip for holding patches). The Dewey 17-cal. rods, of course, are usable in bores up to 6mm/243, and at the quoted price (6.00, including a jag tip, plus \$2.50 for packing and shipping) a strong plastic case is furnished, an excellent container for rod storage or transport.



JD's Straight Line Bullet Seater, Neck Turner (with case holder) and Neck Sizer with decapper/knockout pin.



JD's Bullet Ejection Assembly, made for the RCBS A-2 or Rock Chucker presses.



JD's Cartridge & Bullet Spinner.



## Alignment Gauges

Norman E. Johnson, operator of the Plum City Ballistics Range (Rt. 1, Box 29A, Plum City, Wis. 54761) now offers a companion tool to his earlier Case Neck Gauge, which checks neck-wall thickness and sells for \$30.50 postpaid, including a dial indicator, or at \$19.50 without the D. I.

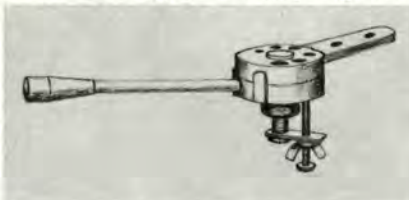
His latest tool is another D. I. type, this one for determining bullet runout in the loaded cartridge. With the D. I. it is \$29.50, without \$17.50. The same D. I. can be used with either gauge.

See Johnson's article, elsewhere in this edition, on the use of such gauges in predicting—and attaining—accurate shooting levels.

## Coats Core Cutter

This lead-wire cutter offers a choice of 6 apertures, each precisely drilled and reamed to close tolerances, their diameters gauged to accept the lead wire sizes commonly used for home-swaged bullets. Length and weight of cores is readily adjustable for each of the 6 holes, and tension of the two cutting faces is also adjustable.

The welding of the stop lugs and



the mounting arm isn't as neatly done as some might like, but the Coats cutter works well. Cutting lead wire can be more uniformly done if the wire in use is a snug fit in the cutter hole, and the 6 holes in this unit offer that facility—which gives it an advantage over cutters with only one or two openings.

## Shotshell Marking Tool

Design & Development Co., 1002 N. 64th St., Omaha, Nebr. 68132, has reduced its line. Only the Mark 1000 Shotshell marker is now offered, price \$14.95, but this device will mark or stamp all shotshell cases from 10- to 28 gauge. Their WP-3 wad marker is not available.

## Echo Products

E. C. Herkner (long known for Echo scope mounts as well as quality loading tools) has announced a new trade policy, one that is dramatically reflected by his latest prices! Echo presses, dies, etc., will be sold only directly from the Herkner plant (Box 3007, Boise, Ida. 83703) to the buyer—no dealers now—and *all items* are shipped prepaid. Herkner, I believe, is the only manufacturer in this field selling the consumer directly.

Certainly the proof is in the pricing! The Echo "Champ" model press now can be bought for \$18.75 (including one shell holder, priming arm and primer catcher), whereas the same tool was \$27.25 a couple of years ago. A good press it is, too, with excellent features—hardened links, pins and solid steel toggle blocks; short or long stroke (for bullet swaging, case forming, etc.), and a lifetime guarantee to the original buyer. The "Champ" is the only loading tool now offered.

Echo die sets are now almost half of their old prices (7.25 against \$13.50), a notable and gratifying step in the light of today's ever-increasing inflation and higher prices. Echo 3-die handgun sets and 2-die rifle sets sell at this low \$7.25 price, and the 3-die pistol set can be easily functioned to use in 2-die or 4-die setups as well. All are  $\frac{1}{4}$ -14 thread, of course, and usable in many other presses.

Echo dies, note, are guaranteed, via their special construction, to have exactly concentric, on-axis holes top and bottom. That makes for better reloads, of course—no off-axis case necks, no eccentricities in case bodies. Also all interior die



Echo Shell Extractors

parts can be removed from the top; this permits, for example, removing an expander rod/button assembly that you don't want to disturb, and replacing it with another for experimental purposes, say. Echo dies are polished before and after heat treatment for best possible finish. They're never chrome-plated.

Echo rifle dies are offered in a broad caliber range, including many popular wildcats; in 3-die sets for such calibers as 30 carbine, 444 Marlin and several others; as neck sizers only in nearly 30 calibers, and in small-base types for use with some lever action and auto rifle chambers.

Echo shell holders are of screw-on type, made in some 35 sizes but handling about twice that many calibers. The Echo "Champ" ram and these shell holders are carefully mated and "qualified," which means that *any* Echo shell holder

will be facing front whenever it's screwed home—not with the opening off to one side or another. A small spanner wrench is furnished to hold the shell holders down tightly, and to effect their removal.

Other Echo items for the reloader/shooter are made—a Tie Bar for the "Champ" press, designed to add rigidity for bullet swaging; a Stuck Case Remover, a Primer Catcher, an Auto Primer Feed, etc.

Echo, as far as I know, is the only firm making a very wide range of Broken Shell Extractors, these for use in the rifle's chamber, not for die use. Made for rimmed, rimless and belted cases, they're \$3.50 each—which is mighty cheap insurance against having the situation occur on a hunting trip—remote as the occurrence of a broken case may be.

Write for the new Echo No. 721 Catalog; there's no charge.



Echo Die Set



## The Fergusons

In addition to the cartridge spinner and the recapping tools shown here—both very well made—this firm makes a case neck-turning tool at \$20; a bullet spinner that sells for \$50 including a .0001" dial indicator (\$25 minus the D. I.), and a small arbor press, rack-and-pinion type, at \$45. The latter tool serves well for straight-line bullet seating, and for pushing cases into neck-size dies and then driving 'em out.

The Combo-Chek offers, for the first time, a tool to test bullet run-out and case concentricity in one compact unit. Including a dial indicator of .0001" type, the new instrument is \$65.

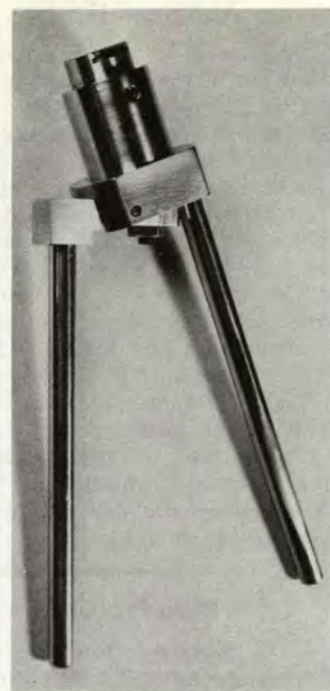
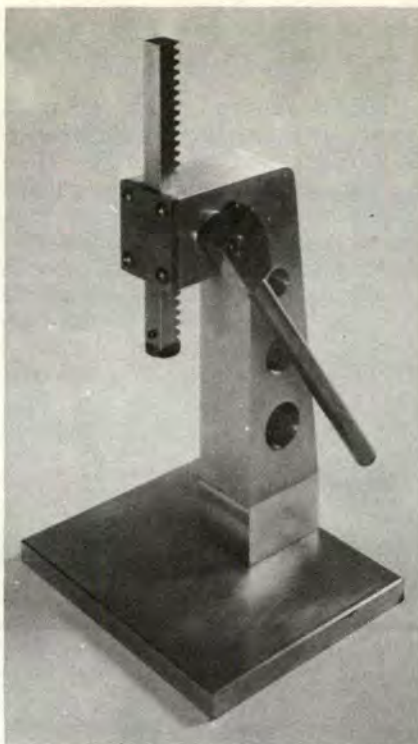
The Fergusons also make up a Neck Sizing unit, the type usable at the bench via a mallet or arbor press, and in which the used primer is ejected as the sized case is pushed out. A special virtue of the Ferguson N. S. dies is this: cases fired in one's rifle need not be sent in because Ferguson will supply "custom sized buttons" to let the customer size his case necks to one or another dimension. These special buttons (\$3.50 each) are used with the Neck Sizing unit, which sells for \$21. All that Ferguson needs is the outside dimension of the "new case" perhaps neck-turned for a smaller OP—thus saving the cost of another \$21 die unit.

All Ferguson tools are precision ground, lapped and polished where called for, and they all carry a lifetime guarantee to the original owner, barring abuse or obvious neglect. Even so, they'll be repaired at no cost!

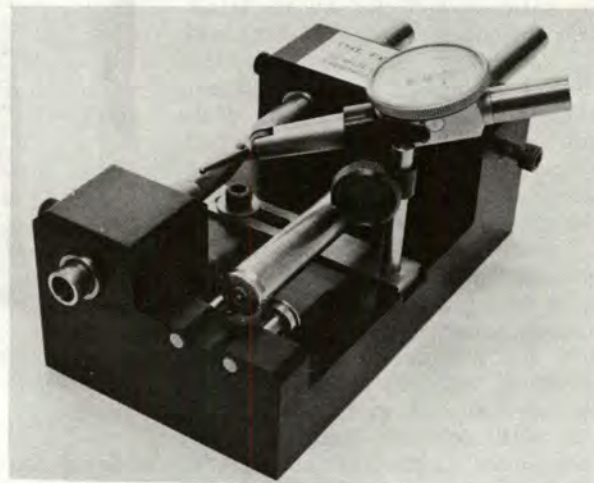
## Hollywood Loading Tools

Whitney Sales Inc. (Box 875, Reseda, Ca. 91335) has acquired the inventory of the old Hollywood Reloading Tool company. James C. Whitney, president, recently informed us that his organization intends to supply eventually the full line of Hollywood tools, which will include the Progressive and Automatic presses. At this time Whitney is delivering the Hollywood Senior and Senior Turret tools at the prices prevailing for several years—\$75 and \$99.50. These prices include, as formerly also, bushings and tie-down rods (for bullet swaging use). The Senior Turret, fully tooled to load one shotshell gauge, is \$199.50, again the old cost.

All of the numerous Hollywood



Top left — The Fergusons Arbor Press, next to it their low-leverage primer tool. Below, the latest Ferguson device for precision shooters, the Combo-Chek. See text.



accessory items are available as well—powder and shot measures, lead-wire cutters, die sets, bullet swaging die, etc.

Mr. Whitney said that it would be his firm's policy "to preserve the tradition of this (Hollywood) fine equipment and be of service to shooters and reloaders," and that he intends "to offer quality, improved service and satisfaction." We hope that is the case, for Hollywood tools in the past were justly known for excellent workmanship and high reliability. We've often written about Hollywood tools, so we won't detail them here—besides, a fully descriptive brochure, with prices, can be had from Whitney Sales for the asking, and our own catalog pages show the major Hollywood products and accessories.



## Forster-Appelt

Forster-Appelt, makers of an extensive line of precision products for the handloader, the shooter in general and the gunsmith, have just announced a line of headspace gauges for *rimmed* cartridges, each with a pilot for easy use. This type, made in 219 Zipper, 22 RF, 25-35, 30-30, 30-40, belted magnums (except 378 Weatherby) and 303 British, are \$4.95 each for Go, No-Go and Field types. Button type headspace gauges for the 218 Bee, 22 Hornet, 22 Savage H.P., 32 Win. Special and 38-55, also made in Go, No-Go and Field dimensions, are \$3.75 each.

Handloaders of high intensity cartridges, particularly users of some belted-head calibers, will find the F-A Neck Reamers useful in removing brass from necks grown thick, made in virtually any caliber (17 to 458, in 19 sizes, including 239.). They're \$5.50 each.

Write for the latest F-A catalog. It's full of stuff for the handloader, among the others mentioned above.

## Arbor Press

Gene's Gun Shop (3602 Hill Ave., Snyder, Tex. 79549) still offers an all-steel unit (no castings) that sells for \$35. Maximum opening between ram and table is 5½ inches, but larger opening presses can be had at \$5 extra. These tools are made to order pretty much, so allow some 30 days for delivery.



F-A Rimmed Headspace Gauge and Neck Reamer



F-A Bullet Extractor

## R. W. Hart & Son

Bob Hart—well-known to the bench rest clan—introduced an excellent rifle rest last year, which we commented on in GD 26, and favorably. Now he's offering several new tools for the precision handloader-shooter—first there's a straight-line bullet seater, adjustable for depth, of course, that is available in 222 Rem., 222 Rem. Mag., 6x47, 6mm Rem., 25-06 and 308. Price, \$18. Next, a drive-in/drive-out neck sizing die in the same calibers (the knock-out rod decaps the case at the same time) at \$35. The rawhide mallet to do the driving is \$2.25. Last, a compact, short-lever sensitive primer seater that handles large and small caps, via an adaptor, that is \$42.50. We haven't tried any of these items, but we do know Bob's quality—he can't do a bad job! Send order to Robert W. Hart & Son, 401 Montgomery St., Nescopeck, PA. 18635.

## LLF Swage Dies

The LLF Die Shop has made for some years an excellent set of dies for swaging jacketed rifle bullets. These have been described in this department in the past, and they're shown in our catalog pages also. Prices are up a bit, inevitably, but still moderate for the quality and

purpose—the complete die set is now \$52.50. Extra die bodies—a convenience that eliminates re-adjustment when only one body is available—are \$8, and other additional parts of the die set can be supplied.

Recently LLF added die sets to the line for making handgun bullets. These ¾-14 dies are offered in Auto Ejection type at \$35 or \$39 (solid point or HP, respectively) and in non-ejecting form for \$32.50 and \$36.50, as above. Full information will be gladly supplied by LLF.

## Multiple Shell Catcher

Here a device that catches those fired shotshells before they hit the ground—and you know the ground rules at some trap and Skeet clubs! Made for Remington Models 1100, 1148 and 58, and usable on all gauges, the Lexon plastic box—hinged for ready removal of spent cases—will receive and hold *two* cases.

Quite light, the Shell Catcher doesn't affect gun balance, and it's readily attached without drilling or otherwise altering the gun. They're fully guaranteed, and may be returned for replacement if troubles occur. \$12.95 is the price, and if your dealer doesn't have them, write to the I&I Co., 709 12th St., Altoona, PA 16602.



Gene's Arbor Press



Bob Hart's tools for bench shooters—straightline bullet seater, neck die, priming device, etc.



## Lachmiller Loading Tools

This old time firm is back in business now, following a disastrous fire that destroyed their plant complete some time ago. Jim Bell, though, spent the recovery time to good advantage, developing and perfecting new items that hand-loaders are sure to welcome, I think. These are now ready, too, so your favorite dealer ought to have 'em.

A new shotshell press, the L1000, is new for 1972. Unlike the LEC Super Jet tool, the L1000 has a slide bar with quick-change bushings for powder and shot. All operations are keyed to a positive stop, and a shell-base reconditioner is standard. There's a self-aligning crimp starter (6- or 8-point), the twin reservoirs are easily emptied, and the powder/shot charges and wads are all inserted without moving the case.

The LEC Super Jet offers the same general features as the L1000, but has powder and shot measures, fully adjustable within wide limits. Both tools are available in 12, 16, 20 and 28 gauge, either at \$69.95 complete. Change-over tools cost \$22.50 a set.

Another new product is their Lube-A-Matic, a lubricating-sizing tool that features automatic feeding of the grease. This is achieved by means of a handle attachment that advances the lube screw a controlled amount with each up-and-down movement of the operating handle. Knurled finger-tip adjusting screws control sizing depth of bullets, and an ejection tool is supplied for removing dies.

Lube-A-Matic dies are of improved design, too. A grease retaining ring inside the die stores and holds the lube, thus letting the bullet grooves fill more rapidly, and



New LEC L-1000 Press

LEC Lube-A-Matic



the dies are so made that lead shaving can't happen. Lube dies are offered in 25 diameters, from 243 to 457, and top punches in good variety—36 of them. Lachmiller lube dies and punches may also be used in Lyman Lubri-Sizers, in fact the punches carry Lyman code numbers. \$24.95 for the Lube-A-Matic, \$6 each for dies (including inside plunger), and \$2.25 each for top punches.

Lachmiller continues to produce the excellent bullet moulds introduced in 1969—6 rifle styles in 243 through 30 caliber, 12 handgun sizes and types, 9mm to 45, and 3 round ball moulds—.375", .451" and .454", usable with the so-called 36 and 44 caplock revolvers. Vent-ed across the faces and the top surface as well for easier, trouble-free casting, these machined steel moulds (not made of cast iron) feature a pressure washer that keeps the sprue cutter tight and flat, and extra long handles for cool comfort during an otherwise hot job. Double-cavity moulds are \$17.50 with handles, \$13 without; 3-cavity moulds are \$19.50, \$15 sans handles.

Other products for the reloader-shooter in the Lachmiller line (now a division of Penguin Industries, Box 97, Parkesburg, Pa. 19365) are a lead pot at \$2.50, a high-capacity ladle at \$2, a Powder Dribbler at \$3.50, and a heavy, sturdy tripod-base rifle rest at \$19.95. The bag platform measures 5" wide by 3 1/4" deep, rises to 8 1/4" from a low of 5 1/4". Threaded pins in each leg permit quick leveling and a non-slip grip on the bench. Leather rest bags are available in 3 styles—2 front and one rear—are priced rather high, it seems to me, at \$4.20, \$9.75 and \$11.75! I don't suppose they're made of crocodile hide?

## Hulme Auto Case Feeder

The Mark III and IIIA devices, detailed in our catalog section, are designed for a simple and fast installation on Star (and the like Phelps) tools of recent manufacture. I imagine that the first accessory the Star tool owner buys is one of the Hulme feeders, and I'm equally sure that he's glad that he did. They're all that they promise to be.

In a short time, maybe within a couple of months or so, John A. Hulme will be offering another



feeder for the Star and Phelps tools, this time one that feeds bullets automatically to the primed and powder-loaded cases as they progress to that stage. Held in a magazine, each bullet as fed will be held in the case until the seating die finishes the round. No drilling or tapping of the tools will be needed, and the installation is completed in minutes.

We haven't examined one of these yet, and prices have not been set, but I haven't any doubt that it will be a reliable and worthwhile addition to Star or Phelps machines, including our own 38 Special Star.



## Lee Custom Eng.

Richard Lee's rapidly growing young organization has already spun off a new group, Lee Precision Mfg. Co. Between the two of them, they've produced so many interesting and useful articles for the handloader that it's hard to know where to begin—or where to stop!

The best known Lee tool—and I imagine still a best seller for them—is their Lee Loader, a simple, low-cost set of tools for the shot-shell man with a bit of time on his hands. Which is simply to say that the Lee Loader (10, 12, 16, 20, 28 and 410, but be sure to indicate chamber length when ordering) lacks speed compared to some bench presses. But it gets there, and it does a good job as well; at \$9.95 still, despite everything, there is no better value.

Lee, though, has improvements planned for the veteran Lee shot-shell tool. The new Deluxe Lee Loader will include a full length wad starter, 6- and 8-point crimpers and a full set of measures, with all this for only \$2 more—or \$11.95 for the new outfit.

The same-price Lee Loader for metallic cartridges isn't all that new, either, but the old price yet holds at \$9.95, and its mention here affords a good opportunity to comment on the wide range of accessories Lee has developed in the meantime for the tool—there's a Primer Pocket Cleaner (both sizes, .175" and .210"), a pocketable one-hand priming Tool, a Base-Decapper for crimped-in primers, a Case Spinner for motorized trimming of case necks, chamfering or pocket cleaning, and more.

The latest Lee products include a Bullet Mould that shows design features found on no others—the blocks are of aluminum, which means they'll heat up faster, and lead won't stick to them, either. They're fully vented, too, and the

sprue cutter holds its adjustment indefinitely. The Lee Bullet Mould is offered in a good selection of bullet types and weights, for handguns only so far—from 32s through 38/357 and 41/44s to 45 ACP and Long Colt. By the time this is in print Lee may have moulds for rifles and black powder arms—they're definitely on the way. Price? A low \$8.98, handles included!

To augment the new bullet moulds, Lee has a Lubricating and Resizer Kit, at \$5.98, that includes a pan for holding the lube, a lube

cutting out tool, a resizer with its mating punch, and 2 oz. of grease. A 4-lb. lead pot and a lead ladle are \$1.48 each.

The Lee Target Model Loader has been mentioned before, but it should be noted that this special outfit differs in important aspects from the standard Lee Loader. The big item is the combination straight-line bullet seater and inside reamer. The latter tool leaves case mouths of uniform wall thickness (to within a few ten-thousandths), which means that neck tension and bullet pull is also uniform—and there's no argument that sustained uniformity in all phases of handloading is the open secret of enhanced accuracy. The straight-line seater, of course, does just what the name implies, so there's no angled or cocked bullet entering the rifle's chamber. In addition, the Lee Target Model Loader contains other tools for precision loading—the case trimmer assures cases all of the same length (uniformity again) and of minimum length as well. An undetected over-long case in the chamber can impair accuracy and create dangerous pressures, too. Other pieces not found in the standard Lee Loader include a mouth chamfering tool (inside and out), a primer pocket cleaner and Lee's portable recapper. In short, a complete, self-contained set for producing target-class cartridges, all for \$24.95.

Lee's very latest tool is a spring-loaded Automatic Primer Pocket Cleaner. A fast push on the handle drives a spiraled rod, its end squared to clean the pocket as it rotates under thrust—our picture will convey the operating principle better! It works well enough, no question of that, but I find it unnecessarily complicated, bulky and expensive. They're \$1.98 each, while Lee's own, all-steel pocket cleaners are only 49¢ a copy. I prefer the latter.



Lee Target Loader



Lee Shotshell Loader



Lee Handgun Rest



Lee Bullet Mould



Lee Lube Kit





## New Lyman Products

The old Middlefield firm (now a part of the Leisure Group) has several new and interesting items for the handloader/shooter this year, and all were seen and examined at the 1972 NSGA show in Chicago.

Lyman's new \$17.50 powder scale, the Model D-7, shows a number of advantages over some other makes and types. The main casting is quite heavy, making for better stability and decreased vibration. The capacity is high—505 grains—with the graduations white on black for high, mistake-free visibility and setting. The knife edges and bearings are made of tungsten carbide—a notably hard material—for extra long life and sustained sensitivity, hence increased accuracy as well. Magnetically damped for faster reading, the D-7 is guaranteed to give 1/10-gr. plus-or-minus accuracy. A new type of beam lifter, actuated by a handy button, eliminates wear and tear on the bearings when the scale is not in use. The D-7 scale pan, with a good form of tapered spout for easier pouring, is positively positioned every time, a last assurance of enhanced—and constant—uniformity, which is the open secret of good handloads.

Lyman's Universal Trimmer (for all metallic cases) has proved to be a sturdy, well-designed case trimmer, one that not only works smoothly and efficiently, but rapidly. It uses a rotating collet system, unique in this field, that firmly grasps and holds any and all cases from the 17 Remington to the 458 Magnum. Pilots are available in 25 sizes (90¢ each), and those are the only extras needed. Length adjustment is critically controlled via two

knurled rings (one coarse, the other fine), and the cutter shaft runs in an oil-impregnated bronze bearing. Pilots and cutter heads are of tool steel, fully hardened; the cutters are replaceable, but they should last for years.

The bench-type Universal Trimmer, one pilot included, is \$22.

Another version, designed for drill press operation where quantity trimming is desired, is \$14, including a pilot of your choice.

The last new Lyman item is the least item—though they're mighty useful gadgets—a Powder Dribbler, at \$3, that is made with a wide (2½") non-tipping base.

## Primer Pocket Cleaner

There are several devices available for scouring primer pockets, and all of them capable of doing a good job. While the cleaner we'll describe here isn't wholly unique (Herter and Kuharsky offer somewhat similar wire-brush tools) it is the lowest-cost cleaner we've seen—\$1 for two, one for small pockets, the other for .210" holes. Each

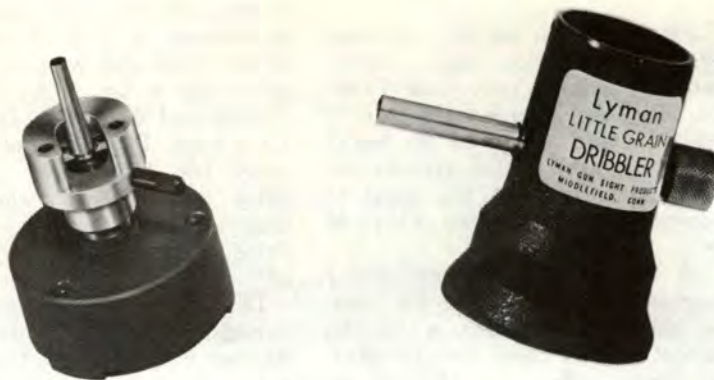


comprises a 3" piece of cabled wire, encased in a plastic sleeve. Usable in the hand or chucked in a ¼" drill, as the wire brush wears away the plastic can be trimmed off several times for extra long life—certainly 3 or 4 times longer than the short sizes available. J. T. Loos, Box 41, Pomfret, Conn. 06258, is the maker.

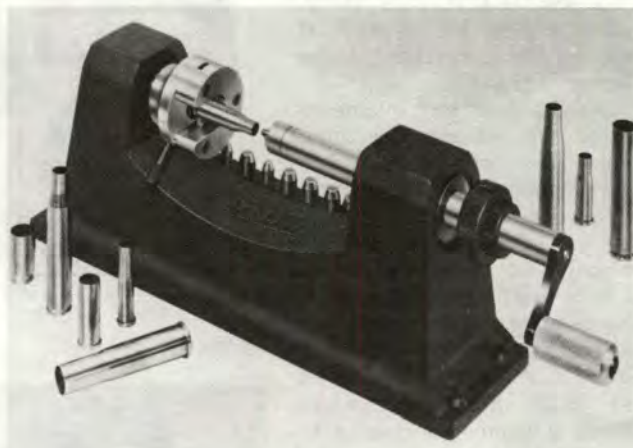
## Techsonics Chronograph

Micro Sight Co. (242 Harbor Blvd., Belmont, CA 94002) are now the exclusive national distributor for the low-priced Model 65 chronograph made by Techsonics. This all-transistor, battery operated instrument is of the direct reading

type, designed for use with kitchen foil or foil strips, and it's compact and quite portable. Furnished with cables and screen holders, it is priced at \$69.95.



Lyman's Universal Trimmer (below) is also available in a drill press type.





## Mayville (MEC)

There's probably no shotshell loading tool line that approaches MEC in the popular-priced segment of the market. We've described and pictured most if not all of the several MEC presses at one time or other, so we won't go into them here. Their 600Jr. (\$72) and 700 Versamec (\$82.50) continue to be best sellers in single stage tools, while their 650 and Super 600 (\$143, either one) are top choices among shotgunners who want a progressive or multi-station reloader. Both can also be ordered with the MEC Hydraulic Unit for power operation, in which case the price is \$396, again for either one. The Super 600 differs from the 600 only in not having MEC's Auto-Cycle charge bar sequencer.

Two new accessory items are now offered by MEC. One is a screw-adjustable charge bar, made in all but 410, that quickly permits reducing the standard charge by 11% to 18%, depending on the diameter of the powder cavity. A similar adjustment screw can be provided for the shot cavity also, giving a maximum weight reduction of some 11%.



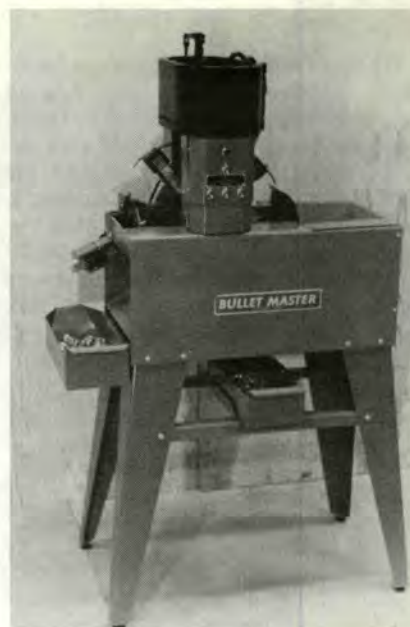
MEC's new Primer Feed

The latest MEC item is a Primer Feed attachment, usable only on the 600 Jr. and 700 Versamec presses. Made in 12, 16, 20, 28 and 410, the quickly-installed unit sells for \$15.95 complete. Repriming punches in the gauges listed are \$3.50 each. Operation is simple—with the filled priming tube in position, and with the handle depressed to the resize/deprime position and held there, a push-pull operation of the Primer Feed knob deposits a primer in the seating position.

## Magma Engineering Co.

I don't suppose we have many readers looking for a \$1495.00 machine for casting lead bullets in quantity, either in a manual or automated mode, but there is one—the Bullet Master Model 2400 Mk 2, shipping weight 222 lbs.

Magma Eng. Co. (Box 881, Chandler, Ariz. 85224), makers of the new machine, offer a 4-page brochure on the Bullet Master, so all we'll note here is basics: 2000 or more bullets can be cast in one hour, using modified SAECO (or other moulds) in any small arms caliber. Moulds can be interchanged in 10 minutes, and the melt flow is readily adjustable. The lead pot holds 100 pounds, and the working setup can be operated for about an hour with minimum attention.



## Case-Gard 50

These new 50-round ammo boxes by MTM Molded Products (P.O. Box 14092, Dayton, O. 45414) are easily the best I've seen. Made of a heavy-gauge polypropylene, the integral hinge (same material) is guaranteed for 1,000,000 openings or 5 years—whichever comes first, I guess. There is a clever latch that snaps closed when the lid is pushed down, yet opens instantly, and the cartridges won't lose their position even if the box is turned upside-down.

There are 5 sizes/heights offered now, against 3 last year—the PS3 for 38 Special and like size cases, and the PL4, meant for 41 to 44 Magnum and 45 Auto. For rifle cartridges of small size (222 Rem. and similar) there's the RS-50; for 22-250 through 35 Rem., ask for the RM50, and for all the big stuff you'll want the RL50. \$1.25 each in the handgun types, \$1.95 for the others.

MTM's Adapto Powder Funnel is truly unique—it has 4 interchangeable tubes, each one providing an exact fit for its case or range of cases. This No. AF5 all-caliber funnel is \$1.89, and there's another, the UFI, of conventional type, at 75¢.

The new Case-Gard No. 150 Loading Tray, of sturdy plastic, has 100 holes on one side—50 each for large and small rifle cases, foreign or U.S. The other side has 50 holes for such cases as the 9mm Luger and 45 Auto. 7.62 Russ., 45-70 and 30-40 are not accommodated. The AF5 is \$1.89.



Above—Case Gard 50





### Jim's Powder Baffles

These useful and proven-performance devices—essentially angled metal pieces that having a controlling effect on the “head,” of powder in a measure—are now made for a very long list of powder measures, old and new, shotshell or metallic ammo type. They're \$1.50 each, from your dealer first, or write to Normington & Co., Box 156, Rathdrum, Ida. 83858.



Jim's Baffles

### Precision Accuracy Tool

C. C. Seitz, well-known benchrest shooter, has a small arbor press (5"x6" base of steel, 9" high, 4 1/4" clearance between ram and base) that operates via the usual rack-and-pinion arrangement. Nicely finished, the press offers controlled, smooth manipulation of straight-line sizing and seating dies. Order from the Pendleton Gunshop, 1200 S.W. Hailey Ave., Pendleton, Ore. 97801.

### Handloader's Record Book

This 4 1/2"x7" looseleaf book, covered in durable vinyl, will help keep your test group records straight and, later on, it will tell you what you did last week—or last year. Complete with a supply of record sheets and stiff dividers, they're \$3.95 each. Extra sets of sheets are \$1 or two sets for \$1.65. Five extra dividers are 65¢, 10 for \$1.

Write to Personal Firearms Record Book Co., Box 201, Park Ridge, Ill. 60068 for a product leaflet. They handle Ammo Labels for cartridges boxes, Hot Spot Dots (fluorescent orange-red of 1" size for preparing your own high-visibility targets), other record books, these for firearms, etc.

### Targ-Dots & Labels

Peterson's Labels (Box 186, Redding Ridge, Conn. 06876), are the makers of the popular fluorescent-red circular Targ-Dots (offered in 5 sizes from 1/2" to 3") and Ammo Box Reloading Labels. The labels come in two sizes, both with ample room to record load data—size B labels are 1"x2", come in rolls of 250 at \$2.50, 500 for \$4.25, or 1000-labels for \$7. Size C, 2"x2 1/2", rolled for typewriter feeding, are 200 for \$4 or 450 for \$5.50. Both are self-sticking to plastic, cardboard or metallic boxes.

I've used Peterson's labels for years. I find jotting down load data a much worthwhile job, especially for those boxes of ammo that are being put on the shelf for some future use.

Now Peterson has a new Targ-Dot, also fluorescent-red, but cut in 2" squares at \$4 for 150. New also are black or white 1" target pasters, 200 to a box at \$1.50 each, either color.

### Phelps Turret Reloader

This handgun cartridge loading tool is essentially the same machine as the Star press, described elsewhere in this section, so we won't elaborate on the Phelps tool. However, there are some differences—the Standard Phelps, made for 38 Special loading only, is now \$252.50, up from a previous \$217.50, but includes a tungsten carbide sizing die. The Phelps DeLuxe type, calibers 38 Special or 45 Auto, also with a TC die, is \$287.50 today (early 1972), old cost \$248. An Automatic Shell Turning Plate (not offered on the Star) is \$37.50, and Phelps furnishes its own Case Feeder, as an option, at \$39.50. Extra heads, fully tooled and supplied with T-C dies, are \$97.50, these available in many handgun calibers, but usable only with the Phelps DeLuxe tool.

The Phelps Lubricator-Sizer (again quite like the Star tool of similar purpose) is now \$55, includ-

Pacific  
T-C  
Buttons



### Carbide Neck Buttons

Pacific Tool Co. (Box 4495, Lincoln, Nebr. 68504) has begun manufacture of highly precise case neck expander units—made to fit Pacific Durachrome or RCBS dies—which now use tungsten carbide expander buttons. Made in calibers from 22 to 30, Pacific guarantees the TC element for life against dimensional wear. These TC expander balls will permit near-effortless case-neck expansion, with inside neck lubing unnecessary. Quantity loaders are sure to appreciate the new TC unit, and the price is not excessive—\$5.50 for either type.

Pacific, of course, continues to offer a complete line of tools and accessories for shotshell and metallic case reloading. Their catalog is free.

ing one die and a die puller. Extra dies are \$7, top punches are \$2, and sample bullets should be forwarded to Phelps when ordering these latter items.

I've never used Phelps tools, but their reputation is good indeed, and many of them are in the hands of such quantity-loading organizations as police departments, military units, et al.



Phelps Lub-Sizer



### Optimum Sighting-In Distance

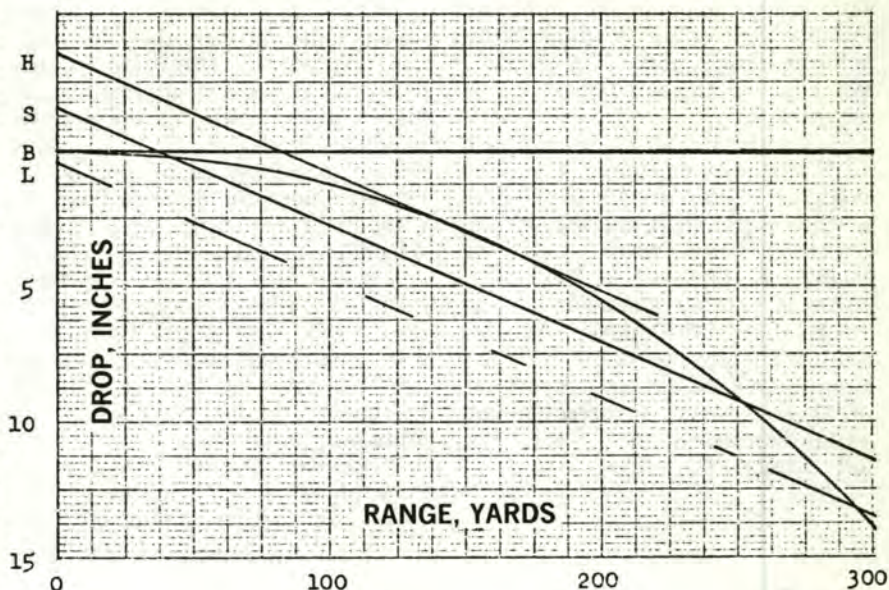
Here is an easy way to get a graphical solution to the problem of knowing where to set the rifle zero for maximum range with a given allowable error. Suppose we know the drop below the bore line from calculation, or from the Hornady Tables, or by using the Speer Calculator. We also have a scope mounted 1.5" above the bore and decide that we do not want the bullet to be more than 2" above or below the sight line. What is the maximum range we can use, what is the zero distance and where is the bullet at 100 yards?

First draw in the drop curve below a horizontal bore line from B. Mark the height-of-sight-distance above the bore at S (1.5 inches up). Next mark the allowable error above the sight line at H (2 inches above S) and the same distance under the sight line at L (2 inches below S; or 0.5 inches below B).

Draw a straight line from point H to across the high point of the curve so the line is tangent to the curve. Draw a line parallel to this tangent line from point S to intersect the curve twice; this is the line of sight. Finally draw a line paral-

lel to both lines from point L until it intersects the curve. This intersection is the useful maximum range, the far intersection of the sight line with the curve is at the zero distance and the height of the curve at 100 yards above the sight

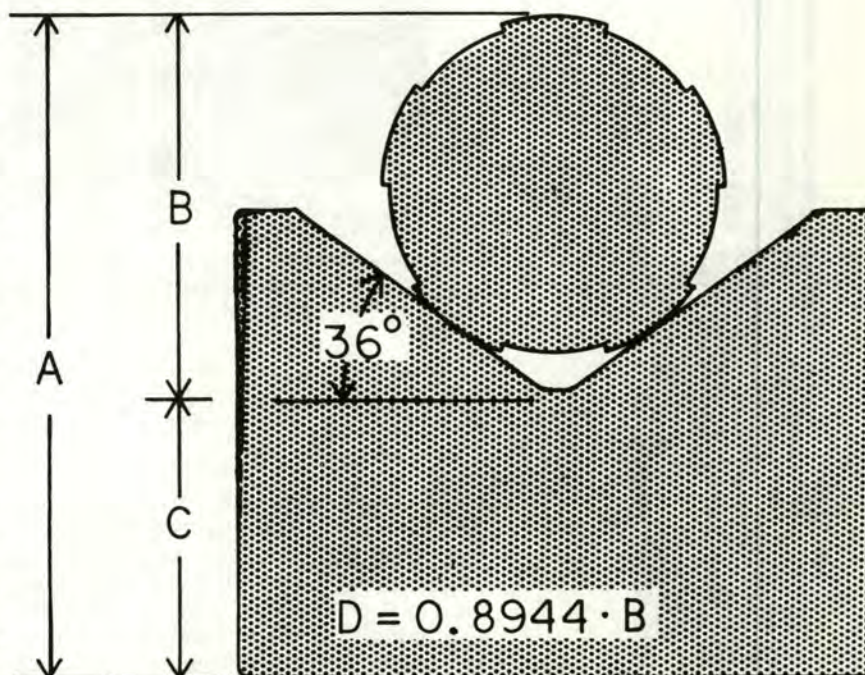
line is the impact above aim at that range. In this example the numbers are 295 maximum, 255 zero and 1.5 inches. This calculation has also been programmed for large electronic computers. Homer S. Powley



### Measuring 5-Groove Barrels

Smith and Wesson handguns, many British and foreign guns and other occasional custom guns are made with five grooves and lands. Sometimes chambering reamers are made with five flutes to avoid chattering. In most cases the ordinary micrometer is not capable of accurately measuring them or slugs and casts from barrels. "Tri-mikes" are available for an odd number of points such as 3, 5 or 7. However, they are special and cost about five times as much as ordinarily.

Lead slugs shoved through barrels or casts made of the inside of barrels using chamber-cast metals may be easily measured in the V-block shown above. Make the block about 1/2" wide, 3/8" deep and about 3/4" in length. Dimension C should be carefully determined and then stamped on the block. To find this, place in the V a carefully measured round, such as a short section of drill rod. The diameter of the round is multiplied by 1.1180 to find dimension B for this setup. Use an ordinary micrometer to find A. A



minus B is the required fixed dimension C for this block.

The diameter of any other round is found by measuring A and subtracting C to find B. As indicated in the drawing, multiplying B by

0.8944 gives the required diameter. The drawing shows a measurement for groove diameter but the bore diameter is also easily found by turning the slug in the block. Homer S. Powley



### Ponsness-Warren, Inc.

Bob Bell, in this issue, reports in detail on the operation and care of the truly excellent P-W Size-O-Matic and Du-O-Matic shotshell loaders, so we'll hold our comments here to two new P-W products.

S.T.O.S. is a grease-type lubricant specially formulated for use as a metallic-case lube in resizing, but with properties to make it highly suitable for oiling loading tools, firearms hinge pins, and so on—wherever a pressure-type lube is required.

Made without acids or silicones, S.T.O.S. is a clear compound, tacky enough to cling strongly to friction-bearing surfaces. It cannot, we understand, harm wood, metal or plastics. A 4-oz. jar is \$2.95.

One is another shotshell loading press, the Mult-O-Matic. At this writing I know no more, but perhaps there'll be time to report for this before we go to press. If not, write Ponsness-Warren, Inc., for full details and prices.



New P-W Mult-O-Matic 600

### Potter Engineering Co.

Virtually all remaining Potter loading equipment is described and priced in our catalog pages, but if the brochure just received from Potter reflects the current situation the firm is no longer marketing a line of loading presses.

#### Powley Computers, Tables

Homer S. Powley—to whom we're indebted for the drawings and data shown elsewhere in this book—offers several interesting and highly useful items to the serious handloader-rifleman. His best known and most used item is the Powley Computer for Handloaders, a sliding-type chart that makes selection of a powder, its charge and resultant velocity an easy task, sells for \$4.50. A companion slide chart, the Powley psi Calculator, does just what that title implies, and it is intended for use with the Powley Computer. \$3 each, both units are offered at \$7.

Write to Marian Powley, 19 Sugarplum Rd., Levittown, Pa. 19056, for further details of these and other ballistic products.



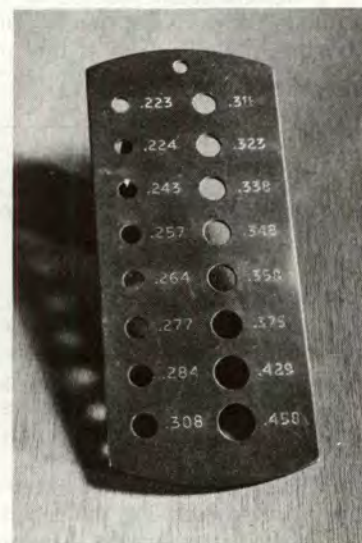
Ponsness-Warren's new grease-type lube for use on loading press pressure points and for sizing metallic cases.

### Bullet Gauge

A couple of years ago I received a mixed bag of bullets and that's the right term. Some 6-7 calibers were in the lot—all mixed together, and nearly 2000 of them! The cartons had broken up from rough handling or something.

I wish I'd had then the gadget I'm looking at now. This potential time-saver is a sturdy (.062" thick) piece of stainless steel of just about the same shape and size of a Starrett Drill Gauge, nor does the similarity end there. However, instead of twist drill hole sizes, the new Reynolds gauge offers 16 precision-made holes for checking bullet diameters—223, 224, 243, 257, 264, 277, 284, 308, 311, 323, 338, 348, 358, 375, 429 and 458.

B. T. Reynolds, 835-B Arcadia Ave., Arcadia, Calif. 91006, sells this useful and well-made device for \$4.75, but his supply is limited.



### Redding

Redding-Hunter recently announced the Model 23 Self-Indexing Star Crimp starter, made for 12, 16 and 20 gauge in 6 and 8 point type; in 6 point only for 28 and 410. The impact-extruded head, rotating on steel ball bearings, is specially hardened for a lifetime of use, say the makers. How its self-indexing is done isn't described—there is no external feeler visible in the picture—and it is not known whether the M23 unit is usable on shotshell loaders other than Redding's.





## RCBS

While Fred Huntington hasn't announced any major products for 1971-72, there are several new items for the handloader of metallic ammunition—especially for the 17-caliber shooters.

Foremost among all of these is a sensitive, low-leverage priming tool that offers smooth, uniform seating of primers. With this new "Precisioneered" tool, the primer can be felt going home into the primer pocket, which means that a loosened or over-tight pocket can be readily detected. In addition, the pockets can be easily checked before seating the primer.

An auto primer feed is also supplied with the RCBS Priming Tool, but if the reloader already has RCBS Auto Primer Feed Tubes and RCBS Shell Holders, he can get the new Priming Tool for \$21.95, including both large and small Primer Rod assemblies, plus the Auto Primer Arm. For \$3 more he gets the Primer Feed Tubes. RCBS shell holders are still \$2.40 each.

Now that Remington 17 caliber rifles and ammo are readily available, RCBS will doubtless see a splurge in sales for their 17-caliber equipment—which they've had for some little time, for Fred wasn't to be caught napping on the mighty midget!

The 17-caliber tools include a Funnel (\$2.40), a Case Neck Brush (60¢), a Drop Tube (\$3) for the RCBS Uniflow Powder Measure, and a Burring Tool at \$3.60. RCBS has, of course, loading dies for the Remington 17, as well as die sets for many older wildcat 17s.

Other new RCBS items are: Plastic-cased lube pads, the foam pads removable for cleaning, cost \$3, and plastic handles (\$1) for their case neck brushes—the latter at 45¢ for all calibers but 17. These new handles also take the RCBS Primer Pocket Cleaner Blade (which handles large or small pockets) at \$2.40.

RCBS again has some money saving combination offers on presses. The Jr Press, which is an

excellent choice for the beginning handloader, comes with Shell Holder, Primer Arm (for small and large primers), Primer Catcher, a set (2) of RCBS dies and a sizing lube at \$43.50, a \$48 value. The Rock Chucker press, a heavy-duty O-frame with the RCBS patented compound leverage system, may be ordered with the same tooling above for \$64.50, a \$69 value.

Both of these RCBS loading tools, even at their regular prices, offer top value, but if you may want to form cases or swage bullets, buy the Rock Chucker. That patented linkage makes the chores easy. I've used RCBS presses for many years, starting with Fred Huntington's early Model A, and if I could only have one loading tool

... The third "package deal" from RCBS is the Ammo-Crafter, an outfit that combines everything the loader needs in one handy container. There's a Powder Scale, Powder Measure, a Case Lube Kit (pad, handled brush, lube), Powder Funnel and Burring Tool, plus the \$1 RCBS Reloading Guide, for free, and all for \$49.50 versus a regular price of \$53.25.

RCBS has a big 1972-73 catalog available for the asking, and the *RCBS Reloading Guide* has been revised and updated, the price still \$1 postpaid.

Another RCBS publication, *Handloading Rifle and Pistol Ammunition*, a work of love by John (the Beard) Jobson of *Sports Afield*, is a 10-page booklet that shows graphically how to begin home loading. Fred will be glad to send you a copy, and it's a valuable work for the novice.



RCBS products, from left below—A2 press, Ammo-crafter Kit, JR press. Above, Lube Pad and reversible primer pocket cleaner.





## SAECO



SAECO continues its top quality line of tools and accessories for the handloader, and their price range shows, happily, little or no change for 1972—electric lead pots (now available for 220 V also), the Match-Precision loading tool and its Stubby Dies; their most excellent lubricator-sizer and powder measure, their top-quality line of bullet moulds, etc. As Saeco says, their products are made for the "serious handloader," and you can believe it—witness the item to be described next!

A strong, well-trained thumbnail was an important adjunct to handloaders back when I started refilling cases with cast lead bullets. That was in the years when many of us—if not most—scrounged for lead, adding to the pot whatever we could find—battery plates, lead dug out of backstops. Some bullets were shot as many as 6 times and more—we couldn't afford to buy lead, at least I couldn't. Tin? A good source was toothpaste tubes.

This year there's a gadget that removes all the guess work. Saeco—justly-famous for the excellent quality of its numerous items for the reloader—offers a lead hardness tester that is at once unique and useful. About 6 inches long, the Saeco Tester measures the penetration (or indenting) of *your* bullet by applying a known force to it, then reading the relative hardness of the bullet from a vernier scale. Readings of 0 to 1 indicate pure or near-pure lead, 3-4 equals to 1-to-10 alloy, while a 6-7 readout shows linotype-metal hardness.

At \$28.50 this useful item won't sell like ice cream cones on the Zambezi, but it could save the lead bullet man money (using scrap lead, adding hardeners as indicated) and give him more uniform—thereby more accurate—bullets. Perhaps best of all, the Saeco Tester will allow small hardness variations experimentally—up or down the scale—trials heretofore difficult to achieve.

## Powder Scale Testing

Modern reloading scales are highly accurate, surprisingly so in view of their low-to-moderate cost, but if you suspect yours—perhaps because of its age or hard use—there's an easy way to check it out. Buy a set of grain weights, one that includes sizes from 1 oz. down to less than 1 grain. These are—or were not long ago—available from Ohaus and Webster at nominal cost, a few dollars or so.

Get a B class (or better) grade weight set, which are precise enough for the purpose, and keep them clean and protected.

If you discover that your scale is off a bit after carefully setting it to zero and in balance, try this: if it is reading on the light side, cut small pieces of tape (paper, plastic, etc.) and paste one or more, as needed, to the underside of the pan or the pan holder until the

beam balances with one of your test weights in the pan and the poise(s) set to match the weight.

If your scale reads a little heavy (with a 10-gr. weight in the pan and the poise is hanging at 10 grains on your scale, the beam points will drop below zero by a few graduations), use a small drill, say a No. 30 or so, to remove a tiny amount of metal from the pan or its carrier. Do this by easy stages, of course, and as before keep the test weight in the pan and the poise in matching position.

These schemes won't work well, of course, if the imbalance of your scale varies from one test weight to another, but that seldom happens. If it does, you're on your own—send it back to its maker, paying shipping costs both ways, plus the service charge, if any, or get a new one.

## SAS Products

Ted Smith got his material to us rather late, so this will be a brief review. Write to him on any items of interest, and he'll supply full information. The prices indicated here are the correct ones for February, 1972. Because our catalog pages are already set up, we *may* not be able to make any price changes there.

Ted's big item is his Bullet Swage Die set, made for use with handgun and rifle jackets. Complete and ready to go, these sets sell for \$14.50 in handgun type, or \$34.50 for rifle dies. SAS jackets, made in all popular sizes from 22 to 30, at \$13.50 to \$18.50 per thousand, and in 38 or 44-45 in ¾-length type, are \$4-\$5 for 250.

Because these SAS bullet dies are pretty much a special order deal, give Ted Smith full information on your particular needs or dimensions, and he'll furnish jackets trimmed to your specs, etc.

The SAS Mity-Mite bullet swaging press (it won't reload cases) has automatic ejection of finished bullets, free-floating, self-aligning punches. Price of the M-M press, \$85, includes a set of \$34.50 rifle dies in any caliber. What the M-M press might cost if you already have SAS dies I don't know.

The SAS Canneluring Tool, usable for grooving cases as well as bullets—putting a groove into such auto pistol cases as the 45 ACP will prevent bullet setback under recoil—is \$12.50.

Latest SAS product is a compact straight-line, sensitive primer seater with unusual features. The shell holder is a universal type, handling all popular metallic cases, and the priming unit may be detached from its bench-mounting base and taken afield. \$12.50, and it handles large and small primers. The all-case shell holder is \$6 alone.

Other SAS tools include the Little Dropper, now with a broad base for better stability (\$1.25); a Bullet Puller handling any 4 calibers (your choice) at \$5.95; TS Bore Compound, a mild abrasive for removing bullet jacket smears and powder fouling (\$1.25/2 oz.), and a new Dip Type lube for cast bullets—which we mean to try—at \$2.50, quantity not given.



SAS Portable Primer Seater



## Reloading Manual for Advanced Handloaders

A new manual that isn't a manual, really, but a series of data booklets—a new idea that makes sense.

A new type of "reloading" manual will be available from Elk Mountain Shooter's Supply in the near future. It begins by claiming to contain more loading data than all other manuals combined, and then, using a completely unique format, demonstrates that this may well be the case. The use of the term "Advanced Handloaders" in the title is not just a gimmick. To go much beyond the currently available data a more technical approach is certainly required; while this may be a strain for the beginner to follow it should be a refreshing challenge to the more advanced practitioner.

First, it isn't really a manual but a series of manuals—one for each cartridge. The authors point out that one probably ought to know at least what cartridge he's planning to load, before he qualifies as even a beginner; besides the volume of data precludes covering more than one or two cartridges in a book of convenient size. The 30-06 is the first of the series, and data are now being gathered on the 243, 308, 270 and 300 Win. Mag.

Second, the data presentation is graphical instead of tabular. The immediate impact on thumbing through the book is to dispel all illusions that there are simple relationships in this

hobby that anyone can master in a few weeks. I don't suppose even the authors realize all the ramifications of the data. In fact they don't consider it a reloading manual at all, but rather a data source book.

Third, both velocity and maximum peak pressure data are presented for all pressures from 20,000 psi to 60,000 psi\*. There is a discussion of how the curves were derived which, at the very least, indicates to the non-technical reader that there is more to it than just using a French curve to "eyeball" a line through a bunch of data points. The data in the book were gathered from a number of different rifle barrels, and the authors have attempted to give some basis for estimating what variations the shooting public might expect for any given load.

Fourth, the range of data is appalling. Bullet weights for the 30-06 range from 50 to 300 grains. We are aware that Elk Mountain does make a 300-gr. 30-caliber bullet and that Norma has a 77-gr. entry (32 ACP), but we are unaware at the moment of a 30-caliber 50-grain bullet—perhaps Elk Moun-

tain has something more under wraps. At any rate it seems odd to see loading data for a 30-06 with velocities of well over 4,000 fps.

The data for the 150-gr. bullet include *every* available powder distributed by DuPont, Herter's, Alcan, Winchester, Hodgdon and Norma; over 60 in all. In other bullet weights the complete spectrum is not presented but it is not likely that anyone will be disappointed if he doesn't find a page for Bullseye with 300-gr. bullets or 4831 with 50-grainers.

There is even a section with the same kinds of data for dual powder loads. The explanation indicated that the powders are not mixed but rather sequenced in the case. Only combinations which completely fill the case are used, so that when the bullet is seated no mixing can occur. Within normal pressure limits there is some advantage to dual powders, but perhaps not enough to justify the extra effort.

We did note that there are no data for black powder or lead bullets—well, everyone's got to cut corners someplace. All in all there's a tremendous lot of information available for \$6.95. It's scheduled for release this summer ('72). See your dealer or order direct from Elk Mountain at 2020 Road 44, Pasco, Wash. 99301

\*The authors use an absolute pressure system but the more common crusher values are also noted.

### Sanderson's

Robert Sanderson's firm, located in Portage, Wisc. (724 W. Edgewater St. 53901), has long specialized in "fine arms and accessories for the discriminating shooter," but that means, essentially, the shotgunner, and many of the products supplied are imported, with some emphasis on unusual gauges, case length, etc. I don't think we can explain Sanderson's approach better than to print here a portion of a recent letter he sent to us:

"We are interested in expanding the capabilities of the shotgun reloader, and in keeping some of the find old gauges going that may have been discontinued in the U.S. Metallic cartridges seem to proliferate but it is just too much trouble to keep, for example, the 24 ga. in production. We offer sizing dies

and roll crimping heads in 24 and 32 ga., and we offer roll crimper heads in 410, 28, 20, 16, 12, 10 and, occasionally, in 14 ga. and 8 ga. as these items arrive. Upon receipt of a stamped, self-addressed envelope, we will send a sheet on the reloading of the 2" 12 bore, which is a fine lightweight gun. We have in

the past provided empty cases of European manufacture in 24 and 32 ga. and in 3½" 12 ga. and, pending a settling down of the U.S. dollar exchange rates, foreign inflation costs, and U.S. import surtaxes, (we) hope to have some supplies for the autumn of 1972 as well as wads for 8, 10, 24 and 32 ga., etc.

Sanderson shotshell crimper heads, a 28-gauge at left, the other in 8 bore.





## Shoffstall Universal Shell Holders

While the basic design of this useful and well-made tool has not been changed, improvements have been made and its usability extended. It is now offered with 5 different shank sizes, permitting its use on virtually any loading press of bench type—Lyman, C-H, Texan, Redding, RCBS, Pacific, Hollywood and others.

Made to hold any metallic case, of whatever base type, from the 22 Hornet to the 458 Magnum, the Universal Shell Holder is just that—a touch of the short lever cams open the 3 radiussed jaws, the case is inserted and spring pressure closes the jaws. Quality and precision construction are an essential part of Shoffstall tools, so you can buy this handy and reliable device, at \$15, with confidence. I've used one for several years, with never a problem.

The same small all-case shell holder is used by Shoffstall in a short-lever, sensitive primer seater, furnished with two spill-free primer magazines, one each for large and small primers. These are of brass for non-sparking safety. The mounting base, compact yet broad enough for operation without bolting down (which is also provided for), is instantly usable—no changing of shell holders or looking around for one that, often enough, can't be found. The Universal Primer Seater is \$30.

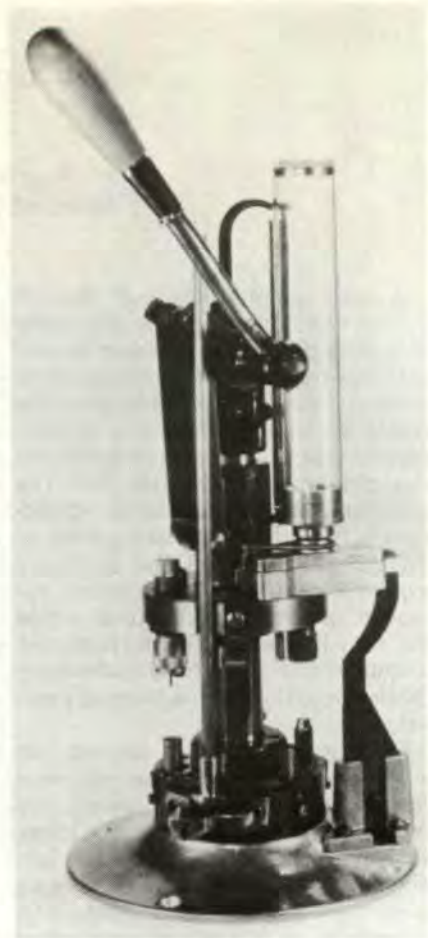


Shoffstall's Universal

## Star Tools

Star Progressive and Universal Progressive presses for fast handgun cartridge reloading, are up in price now, as is the Star Lubricator and Sizer—\$270, \$310 and \$57.50, in the same order. With tungsten carbide sizing dies, add \$10 to these figures for the loading tools. Other Star prices are raised as well, but for those who want a time-tested, high-production loading tool for pistol or revolver cartridges, this is the prime choice—as it has been for 40 years. Star products are sold on an unconditional money-back guarantee, and they've been sold to numerous federal, state and municipal buyers.

With the addition of the Hulme Case Feeder system—approved by Star—the production rate is made even faster. The Star L&S tool, easily the best of its kind, works about 3 times as fast as others, and does an excellent job to boot. See our catalog pages for details of the Star tools.



Star Progressive Tool



Sundtek M1500

### Sundtek

Sundtek (Box 744, Springfield, Ore. 97477) is making two new chronographs, one of them quite sophisticated in design yet moderately priced for what it offers—a direct readout in feet per second. Five numeral-display tubes are used, the velocities on the standard Model 1500 measurable from 775 to 9999 fps. A low-cost option (\$25) permits readouts from 77.5 to 999.9 fps. Time readings may also be taken, optionally, by flipping a switch. Accuracy is at least one foot second at 5000 fps, the time base (normal) being 10 million pulses per second. The "10 and 1" option operates at 1 MHz (1 million cycles). 10-foot screen spacing is required, though other separations may be had at extra cost. Operation is 117 VAC as cataloged, but a 6 VDC

option may be arranged for. The Model 1500 is compatible with any mechanical and most electronic screens, but again older photo-eye screens and microphone trigger systems can be adapted. Base price of the Sundtek 1500 is \$875; 100 paper screens, holders and coaxial cables (which prevent false readings) are \$25. The instrument is compact and light—3.5"x9" wide x 8" deep, weight 6 lbs.

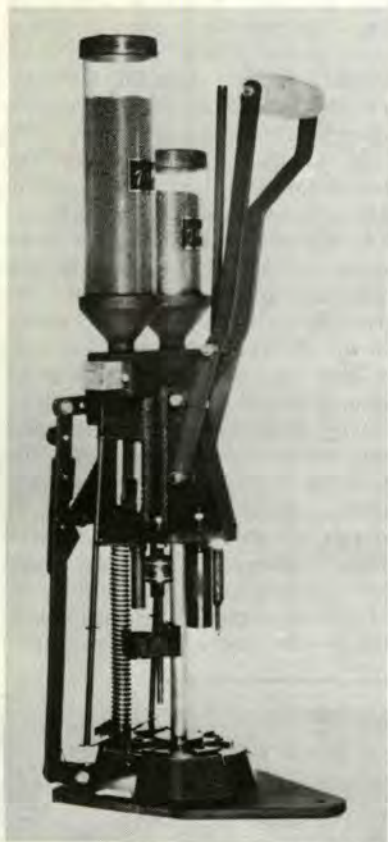
The Sundtek Model 150 is exactly the same as the 1500 except that time readings only are presented (also to 5 places), and the same optional aspects are available. Operation is by 117 VAC or 6 VDC as furnished (a car or other rechargeable battery is suggested) at the \$450 price, which includes screen holders, 100 paper screens, coaxial cables, time-velocity tables and instructions. Dimensions are the same, the weight one-half lb. less. All of the foregoing data is taken from factory literature.

I tested the M150 Sundtek at Creedmoor Farm with plastic and paper screens, with no problems of any kind arising. Unfortunately, time didn't permit obtaining and using the Sundtek adaptor device for my photo-eye screens, but that's in the works.



## Texan Reloaders

The S.T. also has other good aspects—double columns for rigidity, a self-aligning crimp starter, a self-lowering wad guide, big capacity tip-over hoppers for easy emptying, etc. At \$179.95 for 12, 16 or 20 gauge (\$5 more in 28 or 410) the S.T.—which I've tried and found very good indeed—is a "best buy."



New Texan ST Shotshell Tool

Texan's latest shotshell tool, introduced at the NSGA show in February, 1972, is the S.T., an automatic-indexing progressive machine that has several important new features. Primers, powder and shot are dropped automatically when there's a shell in its station, but they are *not* dropped when the station is empty. These things make the new S.T. virtually goof-proof, yet if some sort of hangup does occur, shells can be removed at all stations. An excellent bit of engineering, and it's all done by cams.

Texan has recently introduced two new shotshell reloaders, one at a very attractive price. Called the Texan LT (or Little Texan) it was designed with the casual reloader,

the novice or hunter in mind. Despite its low cost (\$39.95 in 12, 16 or 20 gauge) it offers full length sizing, self-aligning crimp starter, a tapered final crimp and twin steel columns for good rigidity. Interchangeable powder and shot bushings are used, no charge bar changing needed, and high or low brass, high or low base cases are handled without adjustment. The wad guide fingers never need replacement, and the primer seating system won't cup shell heads. If the LT is wanted in 28 or 410, the price is \$5 higher, or \$44.95, and conversion kits are available, too.

The other new Texan shotshell loader is the Model FW, a sample of which we've been using for several months with every satisfaction. The test FW came to us in 20 gauge, its production intended in the main for use in the new Browning Super Light over-under. While the FW does all of the basic jobs mentioned in connection with the Texan LT, it is a sturdier, heavier press, and has features the low-price LT lacks—all component parts are fully machined castings, for example; a new wad ram eliminates any possibility of wad pull-out, while the FW wad guide automatically lowers and raises for

fast and easy insertion of the wads. Certainly it is a fast, smoothly-functioning loader, and we've now put through it some 2000 loads without a bobble.

Because of the better performance of the sizing die developed for the FW press, Texan now offers a kit for converting their DP-I and DP-II loaders to the FW system. These kits, with clear instructions for their use, sell for \$6.98.

The Texan FW, in 12, 16 or 20 gauge, with 6- or 8-point crimper, is \$74.95; add \$5 for 28 or 410, a 6-point crimper included. Conversion kits are available also.

The Texan heavy-duty, progressive-shotshell loader, the M-II-A, continues to be a favored tool for fast production. Including an Auto Primer Feed, Shell Ejector Cam, Shell Catcher and 8-point Crimp Starter, the price is \$249.50; stripped, the tool costs \$199.50. These prices are for tools in 12, 16 or 20 gauge; add \$5 for 28 or 410.

Texan also makes a full range of metallic-case presses—a 7-station turret (\$99.50 complete), a 3-station type at \$69.95, and two C-form tools; the 256 Double C at \$29.95, the economy model 156 at \$24.50. Numerous accessories, too. Ask for their catalog.

## L. E. Wilson

While Wilson does not, as far as I can learn, have any new products to report on, I think it is again time to let our readers learn something about them. Informed hand-loaders, of course, have relied on Wilson tools for years, but if you're not familiar with them, write for their literature and, more importantly, read it! Then, if you're loading any factory belted cases, by all means order the \$10 Wilson Adjustable Case Gauge in your caliber. With its proper use in checking your cases, fired in *your* rifle, you'll be able to set your size die exactly to the position required for long case life and safe loads. You will avoid case-body stretching, potential or actual case-head separations, and your reloads will be fully reliable and more accurate. This gauge also checks case over-all length, warning you when to trim them down. Wilson calls this belted-case gauge a "must," and I fully agree.

Their case gauge for non-belted cases does everything the type described above does, while the Wilson Chamber Type (straight line) bullet seaters support the case fully

during bullet seating, insuring correct alignment with the case axis. That helps achieve accurate shooting, as everyone knows—benchrest competition shooters invariably use straight-line seaters.

All Wilson tools are superbly made and finished; they're so well done that I'm surprised, every time I look at one, that such quality can be had for the nominal prices they cost. Send for the Wilson tool list.







### Amron Ammo

A new—yet old—name for a line of handgun cartridges intended for the law enforcement field. Established in 1955, Amron has produced military ammo and components in the many millions, but this is their initial venture into commercial cartridges. Whether Amron (a division of Gulf-Western Industries), will offer the cartridges to be described here for civilian use is problematical at the moment, but it seems likely, in that components—primed/unprimed cases/bullets—will be made available.

The Amron ammo line includes 38 Special, 357, 9mm, 45 ACP, 30 carbine, 308 and 30-06. Except in the rifle calibers, standard and high-vel loads are available in all but 45 ACP, and a variety of bullet forms are offered.

### Colorado Custom Bullets

Colorado Custom Bullets offer the famous Barnes Copper Tube bullets in a very wide range of calibers and weights (see our catalog section for the complete—save-four—list) that include such rare items as 404 Jeffrey 400-gr., 465 Nitro 500-gr. and 505 Gibbs 700-gr. bullets.

New bullets now ready, but not on their printed list, include 348-220-gr., a 33 WCF/200-gr. and the 38-55/255-gr., all with .032" cannelured jackets. A new 458 bullet of 400 grains is also new, this one with their heaviest jacket, .049" thick in the sidewalls.

CCB will also, without extra charge, cannelure any bullets on their list and they also tell us that deliveries of standard bullets are being made within 24 hours; special orders may take 10 days.

CCB is experimenting with the bonding of bullet cores to the jackets, and such bullets will be marketed in the near future if the tests bear out their expectations.

### Bitterroot Bullet Co.

Production rate for Bill Steiger's excellent Bonded Core bullets has improved greatly, with all of the various calibers now available for reasonably fast shipment. However, don't be impatient if your order suffers a short delay—those potent big game bullets are not quickly made, and Steigers may be temporarily out of one caliber or another. Six calibers are available now—270 in 130 and 150; 7mm in 140, 160 and 175; 30 (.308") in 165, 180 and 200; 338 in 200, 225 and 250; 358 in 250, 275 and 300, and 375 in 275, 300 and 325, all grain weights. Prices run from \$6.00 to \$9 for 20 bullets (that's right, 20, not 50), but BBC bullets are something extra special. Ask for the BBC brochure and you'll see why.



Retained weight of these two BBC 300-gr. 375 bullets is 295 and 297 grains!

### Cumberland Arms

Cumberland Arms (1222 Oak Dr., Manchester, Tenn. 37355) offer a

### Du Pont Handloader's Guide

The 1971-1972 issue of this invaluable booklet is now ready—yours for the asking at your dealer or from the company—and it's well worth having. The proper selection and use of Du Pont powders has been revised and updated, while the shotshell loading data—14½ pages of it, no less—has been completely revised, with as many different types and makes of shotshells included as could be managed. All popular gauges are covered, including 10s and 28s, but most emphasis is on 12, of course.

The handgun section now shows 9mm Luger loads, and there's been a re-evaluation and revision of 38 Special loads.

Most popular calibers—and some not so popular—are shown in the rifle section, from the 22 Hornet to the 458 Win. Mag., but this division has not been revised, nor is there any 17 Remington load data.

Bound into the new Du Pont booklet is a valuable pamphlet, *Properties and Storage of Smokeless*

good mixed service to handloaders and shooters who don't. Cast bullets in handgun and rifle types; several specialty custom-loaded cartridges (6.5 Carcano, et al) and they're prepared to make cases for many obsolete calibers. In the works are various jacketed bullets and other items. Write for their Price Sheet.

### Canadian Notes

Our north-of-the border readers may now turn to a new organization for their needs in reloading tools, components, and firearms generally, we've just learned. Amm-O-Mart, Ltd. (P.O. Box 66, Hawkesbury, Ontario) have taken over the mail-order business of Xelex, Ltd. A-O-M is also the exclusive distributor for Star handguns, Italian-made replica arms, and others.

XL Munitions, Ltd., at the same location as A-O-M, has bought the bullet-making equipment of the Curry Bullet Company. Curry bullets will now be made in Canada, but how soon the full line will be available is not known at this time.

Curry bullets are accurate and good; we've used them over the last several years in most of the calibers they make—from 22 through 8mm including all the popular calibers in between—and their performances were in Class A. Let's hope that XL continues to produce the same good quality.



*Powder.* Every handloader should read this material and be guided by it, for observing its precepts will help him avoid problems and troubles. Get a copy.



## Elk Mountain Alaskan Bullets

Originally introduced a while back in 30 caliber, these highly unusual, probably unique, bullets are now offered in 6mm (.243") as well. What makes 'em so different? Well, how about a 300-gr. bullet no longer than a conventional 220-gr.? Or a 6mm bullet of 156 grains that's almost as long as the 105-gr. 243? The sectional density (SD) of these two—the only bullets Elk Mountain makes, so far—is an amazing .450 for the 300-gr. 30-caliber and .370 for the 6mm. Ballistic coefficient (C figure) is also high indeed—.470 for both bullets, according to Lynn Godfrey, president of Elk Mountain Shooters Supply (2020 Road 44, Pasco, Wash. 99301).

What's the secret? Tungsten, a metal with nearly double the specific gravity of lead. Alaskan bullets have a cylindrical tungsten core, lying in the rear of the jacketed, round-nose Alaskan bullets, the forepart filled with lead. Tungsten is extremely hard and virtually undeformable, thus these Alaskan bullets show remarkable penetrations, yet at the same time, by virtue of the soft front section, upset or expanded Alaskan bullets are intended, as must be obvious, for hunting truly big game of the softer-skinned varieties, dangerous species or not—were it not for legal restrictions in Africa on certain calibers, these Elk Mountain bullets should perform well on the heavier antelope, Cape buffalo, even on elephant with correct placement.

The first published report I've seen on their performance on game was Bob Hagel's account in *The Rifle* magazine for March-April 1972. Using a 300 Winchester Magnum and 70/Norma 205, he shot a quartering-away bull elk at some 100 yards; total bullet travel in the animal was about 3 feet, the entrance wound channel about 3 inches or so for the first foot of penetration, then through the ribs (on both sides) and the lungs. No recovery—as Hagel wrote, the 300-gr. bullet may still be going! Bob's results with the 156-gr. 6mm Alaskan bullet sounds even better—a biggish black bear and a small mule deer buck were killed at about 200 and 100 yards. Again penetration was total in quartering shots.

While tungsten is not a cheap metal, you'll still, perhaps, be a bit surprised at the retail price of Alaskan bullets—\$4.80 for the 6mms, \$5.50 for the 300s, these for boxes of five (5)! Interested? Ask for their load dope/ballistics leaflet.

## Federal Cartridge

Here's a rundown on what's new from Federal for 1972-73, now in its 50th year of production.

A transparent weatherproof plastic box contains 100 Federal Hi-Power 22 cartridges, Long Rifle or Long Rifle Hollow Point. The box, made of sturdy Cyclocac for resistance to breakage, has a sliding cover that permits dispensing 5 or more cartridges at a time.

A 3¼ dram, 1½-oz. target load to meet the requirements of the International Shooting Union for 1973. The new rules will eliminate nicked shot and reduce the shot load weight to 1½ ozs. Federal's new shell Code F125 has the famous Champion wad, and extra hard lead shot in sizes 7½, 8 and 9 in a plastic hull.

Their 12 gauge Champion target loads are now available in No. 8½ shot, a new size for 16-yard trap. Buckshot loads are now offered in 12 Gauge 2¾" Magnum #1 Buck, with 20 pellets, or with #4 Buck, 34 pellets.

They've added another rifle cartridge, the 44 Remington Magnum with 240-gr. hollow point bullet.

For handloading, Federal will have 12 gauge "Pushin' Cushions," their one-piece wad for a variety of 1½- and 1¼-oz. loads in Federal and other hulls. Code 12S1, these will be available June 1, 1972.

## Lage Shotshell Wads

Farmer Bros. Mfg. Co. (Eldora, Ia. 50627) are the makers of this "universal" plastic shot cup, the chief ingredient of which is their Compensating Inner Cushion.

Designed essentially for target loads, and made only in 12 gauge so far, the Lage wad will handle shot wads up to 1¼ ozs. in all standard plastic or paper trap cases, and with the use of various powders. Depending on the case used—high or low base—and the amount of shot and powder, the legs of the red-colored plastic insert collapse to one degree or another, thus compensating automatically to give the reloader the correct distance from the top of the shot load to the end of the case. This should be about 7/16", according to the makers and, with the wad ram properly adjusted, that distance results, without excessive pressure on the powder. Final crimping is fully satisfactory, Farmer Bros. say, nor will the crimp open up after loading.

The ribbed form of the outer cup, plus its gas-sealing lower groove, is said to reduce bore friction and, in conjunction with the legged insert,

decrease pressures via a cushioned start up the barrel. Less shot deformation, better pattern and less felt recoil are claimed.

Our sample supply of these new Lage wads reached us too late for lengthy trials that would be needed to assess the claims about reduced recoil and pressure or enhanced velocity. However, two 25-round boxes were loaded with the Lage wads, using high-and-low-base plastic cases (R-P and W-W), and all with the same charges—1½ ozs. of shot ahead of 20 grains of Green Dot powder. These loads, deliberately mixed up, were fired in a Remington Model 1100 and an Ithaca Model 51, both autoloaders, and all shot fine, no bloopers. A brief test, certainly, but we were lucky to get it in! We're hopeful of presenting a lengthier test in the 27th edition of GUN DIGEST. Lage wads cost \$9.95 per thousand.



Lage Universal shotshell wad comes with Compensating Inner Cushion insert. Latter collapses to different degrees with variations in shot, powder charge, case type. From left: Cutaway shown red plastic inner wad in factory condition. Center sees partial collapse, right view shows insert almost fully squeezed down.

## Hercules Powder

I imagine that most of our readers have already learned that Hercules ceased manufacture, late in 1971, of their RelodeR line of propellant powders—Numbers 7, 11 and 21 are no more, sad to say, for they were highly useful powders. Hercules cited economic reasons for their decision, contending that the RelodeR brand hadn't sold well enough to justify its continuance. My own feeling is that Hercules didn't give the line enough time to become popular.

For shotshell loaders Hercules has a new and interesting device, a sort of circular slide rule in effect. Rotating the inner wheel until a pointer lies within a selected brand and type of shell case reveals the charge weight of powder for a choice of pellet weights, while another segment of the



wheel indicates the wad selected. Some 5 to 9 makes and types of plastic wads are shown for each shell case type.

One side of this new Handloading Data Guide is devoted to Red Dot powder, the other to Green Dot. Twelve gauge only loads are found on the Red Dot side, but 12- and 20-gauge cases and loads are covered for Green Dot. I think this Hercules tool will sell well at its \$1 nominal price. Its quick convenience in finding, with only a moment's effort, exactly what plastic wad to use in your cases, with your shot load, for either Red Dot or Green Dot, virtually guarantees its popularity.

Hercules' new Handloading Data Guide offers a fast and accurate selection of Red Dot and Green Dot load combinations.



### Hodgdon Powder Co.

No, Bruce Hodgdon didn't invent or discover 4831 powder (did he?), but it's amounted to about the same thing. More of it, for the past 25 years or so, has been used than any other single powder, certainly, for magnum case reloading. I suspect that 4831 has out sold several other popular powders combined, and I know positively that it's the *only* powder a lot of guys use, whether they're loading magnum cases or not!

Well, Hodgdon has come a long way since, and at this time he offers 10 different smokeless powders; 4 of them for shotshell/hand-

gun loading, the rest for rifle use. Most recently, Hodgdon began importing from Scotland a cleaner-burning, more uniformly-grain sized black powder, made by the famous old firm of Curtis & Harvey. Available in Fg, FFg and FFFg, the new Hodgdon-C&H black powder sells for \$2.50 for a 16-ounce canister.

Hodgdon has two other products for black powder shooters that are new this year—Spit Ball and Spit Patch, both designed to ease the often-hard task of loading and cleaning cap and ball revolvers and rifles. More shots without full cleaning and final easier clean-up

are the big advantages, but both are said to prevent rusting and to improve accuracy.

Hodgdon offers numerous other good products for the shooter-hunter, too many for this space. Ask for their catalog—it's free.



### Hornady

Hornady now makes about twice as many handgun bullets as he did a while back. Recent additions, all jacketed, include a 38-cal. 110-gr. HP, a 41-cal. 210-gr. HP, a 44-cal. 200-gr. HP and a 45-cal. 185-gr. intended for 45 ACP use. New lead bullets are 38s—a 148-gr. wadcutter with hollow base, and a 158-gr. RN type.

We have been shooting Hornady's 250-gr. HP for the 45 Long Colt, announced last year, and it's a dandy, grouping 5 shots in 4½" from a Colt Single Action at 50 yards, and expanding up to half-again its original diameter when used with full power loads.

I was especially glad also to see the new 44 Magnum 200-gr. HP which, while labeled a handgun bullet, will, I predict, find much use in the popular 44 carbines. Folks who don't care for the strenuous bucking a 44 Mag sixgun produces with regular ammo are bound to

appreciate the lessened recoil of this lighter slug. Hornady's loading data for this bullet indicates that muzzle speeds up to 1400 fps can be realized from a 7½" revolver barrel with 23.5 grains of 2400.

Early in 1972 Hornady announced two new rifle bullets, both intended for long range varmint shooting. Both show Hornady's seant-ogive shape and inner-grooved jackets for high ballistic performance and maximum expansion, even 'way out there. The 110-gr. 270 HP and the 120-gr. 7mm HP, loaded to 3400-3500 foot seconds respectively, retain 2136 and 2231 fps at 500 yards, good figures indeed, as are their remaining energy numbers as well—1114 and 1327 ft. lbs. at the same distance. Both bullets should perform very well on varmints and lighter game at the longer distances.

Riflemen can't help but like the beautifully streamlined Hornady 25-cal. 120-gr. HP bullet produced with the 25-06 and other big case 25s in mind.



Above, Hornady 7mm 120-gr. HP and 110-gr. 270 HP. Below, 25-cal. 120-gr. HP.



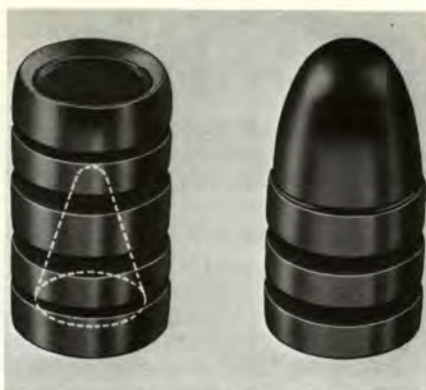


## Hornady-Pacific

Bulletmaker Joyce Hornady now owns Pacific Gunsight of Lincoln, Neb. Hornady noted that "Precision bullets for reloading and precision equipment to reload them with are a natural combination. It has always been our goal to provide the shooting fraternity with the very best product we are capable of producing. We intend to continue the same high quality in our reloading tools and accessories that we have maintained in Hornady bullets."

Hornady is the nation's largest independent producer of bullets for handloading. More than 86 different types are produced in the firm's Grand Island plant.

Hornady has a Data Sheet that will interest 17-cal. shooters. Good load data, using a half-dozen pow-



Two Hornady 38 Special lead bullets—left, 148-gr. HB wadcutter, and 158-gr. RN standard.

ders and the Hornady 25-gr. bullet, is given for muzzle velocities from 3500 to 4100 fps, and ballistic data for those same velocities to 500 yards—which might strain a 17-cal. rifle a trifle! Write for this 17-cal. table and for Hornady's Bullets for Handloading List—no charge.

## Markell Ammo

Markell Precision Cast Bullets (4115 Judah St., San Francisco, CA. 94122) has been a large-scale producer of top-quality lead bullets for many years, particularly handgun bullets in a wide variety of calibers and bullet weights. I've shot many hundreds of them during various test projects we've published, and thousands of Markell bullets have been used by a number of our contributors. These are excellent bullets, with no short cuts in their manufacture. In fact, the quality of Markell bullets recently received is better, if anything, than it was years ago.

Now Markell is making fixed metallic-case cartridges, at this time in handgun calibers only. Three types were delivered to us, and it's good looking ammo. The new gold and red cartons—carrying 60 rounds each, not the usual 50—are imprinted "Markell Super Accuracy," which we've tested and

not found wanting. The cartridges are held separately in a styrofoam block, a touch that handloaders will welcome. The brass (non-plated) cases are headstamped MARKELL—38 SPECIAL—new cases, of course.

His 148-gr. wadcutters, of course, are competition loads, their muzzle velocity 770 fps. One type (No. 03801) is for use in cylinder 38s, the other, with flush seated bullets (No. 03802) is designed for auto pistol use. They're accurate, all right—a California Highway Patrolman recently shot 1497x1500 in a combat match, including targets 50 yards away.

Markell's special police load (No. 03806) is of moderately high speed—160-gr. Keith type semi-WC at 1020 fps, which Markell says is thoroughly safe in any 38 Special, including 2" guns. These have penetrated 1/4" steel plates, car doors, etc., in many tests.



Markell's new 60-round handgun ammo pack.

## Zinc Bases

N. E. House (Middletown Road, E. Hampton, CT 06424) continues to make and supply the zinc bases for handgun cast bullets made originally by Lakeville Arms, now defunct. Made in 3 calibers—38-357, 44 and 45, they're priced at \$3.75 for the 38-357, \$4.25 for the 44 or 45 sizes, these prices for a thousand each.

## Miller Trading Co.

Located at 20 S. Front St., Wilmington, N.C. 28401, Gerald Miller is a general gunsmith (FFL 56-27) who also supplies a good range of sized and lubed lead bullets for rifles and handguns. These range from 243 to 457, plain base or gas check, and at prices from \$6 per 500 to \$14, all shipments in these quantities prepaid, insured, and packed in wooden boxes. Round balls are also offered in 3 calibers—31 (.323"), 36 (.375") and 44 (.452"), these 60¢ per pound. Miller's price list is free.

## Meyer Shotgun Slugs

These hollow point rifled slugs, now made in 12, 16 and 20 gauge, are packed in boxes of 50 at \$4.85 list. Instructions for loading are included. Meyer slugs can be had from Hodgdon, Badger Shooters' Supply, Gopher Shooters' supply and Ed Hart. See our Directory pages for addresses and zip numbers.

## Mirror Lube

Mirror Lube (American Specialty Lubricants, P.O. Box 4275, Long Beach, CA 90804), is a cast bullet grease that is stable at high and low temperatures and has a "no limit" shelf life. It's use is said to "... eliminate gun barrel residues (which should include lead)," and to "... greatly extend die life ..."

The company is developing a new bullet lube called "Molly-Lube," which we assume may contain some amount of MoS<sub>2</sub>, or molybdenum disulphide. This is not ready at the moment, but it should be along soon.

## Pattern Perfect Wads

Kush Plastics (Box 366, Palatine, Ill. 60067) offers this new plastic shotshell wad. It's said to provide



a "longer gas seal area and center point thrust," but we haven't seen any, nor do I know what they look like, no adequate picture having appeared here.

### Nosler Bullets

We've heard recurrent rumors that there'd be some new Nosler bullets appearing before long, but on questioning a company man on this point, we got a firm noncommittal answer! Well, these "we can't confirm or deny" replies hardly serve to squelch any grapevine reports, so keep your eyes on the ads.

In any event, for those who've not used the famed Nosler bullets in the field, let nobody tell you that there's any other game bullet quite like the Nosler Partition type. Its performance record has been outstanding for many years, its controlled expansion and high retained-weight qualities making it a deadly projectile. Many big game hunters won't use any others, whether in North America, Africa or Asia.

### Remington

Late in 1971 Remington introduced three more handgun cartridges, and it's confidently assumed that the components, including the new bullets—new ones—will be offered to handloaders as well.

First of these is a 95-gr. loading in 38 Special, the round and its charge designed especially for use in short-barreled (2"-2½") revolvers. The new semi-jacketed HP leaves the short barrel at 985 fps. This increased muzzle velocity gives the rapid expansion now considered desirable in police use. (However, for longer-barreled revolvers, Remington suggests the continued use of their 125- and 158-gr. HPs.)

Next is a 38 Special carrying a new 158-gr. semi-wadcutter bullet, useful as a dual-purpose cartridge—target or service.

Last on the new list is a high speed 357 Magnum loading, its 125-gr. semi-jacketed HP moving at a truly fast clip—1675 fps at the muzzle, though from an 8½" barrel, true. Even so, this should make a first class hunting load, for at a full 50 yards it's still going strong—1420 fps and 560 ft. lbs. of energy. At 100 yards, 1215 and 410, but that's a long handgun distance, despite what you may have heard.

### RWS Anvil Primers

Stoeger is now the exclusive distributor in the U.S. for anvil type RWS primers—the kind that all American made cases can take, metallic or shotshell. Many RWS calibers, too, now accept anvil-type primers.

RWS primers are, of course, non-corrosive, non-mercuric and also non-erosive. They're offered in all sizes—small and large handgun, small and large rifle, plus a 209S type for shotshells with .240" diameter pockets. They're excellent primers, as well, in uniformity of ignition and other performance aspects—we've used thousands—of—them with complete satisfaction. Prices to consumers and dealers—are very attractive.



### Remco Shot Caps

Originally made for handloading use, these encapsulated-in-plastic shot cylinders are now available in complete cartridges. Only in 38 Special at this time, but other calibers are on the way. Size 9 shot is standard in these 38s—as it is in other ready-for-loading Shot Caps—but 6s and 7½s can be furnished on special order.

Shot Caps for reloading are available in 38 Special, 357 and 44 Magnum, 45 Colt and 45 Auto. 50 Shot Caps are \$4.95 to \$5.95 for the bigger calibers; loaded 38 Specials cost \$4.95 for 25. Full data on loading Shot Caps will be gladly furnished by Remco, and a dealer plan is offered. Each box of Shot Caps contains complete loading information also.



Remington handgun bullets recently introduced. Top row, from left—115-gr. JHP and 124-gr. metal-cased in 9mm; 125-gr. semi-jacketed HP in .357" diameter. Below, from left—125-gr. SJHP in .357", 158-gr. SJH .357" and a 240-gr. SJHP for 44 (.430") magnums.

Shooters of the Remington 17, using BDL 700 rifles, have all reported (I know of no exception to date) excellent accuracy with factory ammo and off-the-shelf rifles. Average 5-shot groups of one inch or less are common under good conditions—which means that there had better not be much wind! My own sessions with the 17 Rem. produced just about those figures at 100 yards, with Remington ammo. I haven't got room here to list the various handloads I tried, but my best results—and all at 3900 fps, give or take 50 feet—were with 18.4 of 4198 or 20.8 of RelodeR 11. Both shot well under an inch several times, usually with Hornady's 25-gr. bullets, these from his current production.

Our own chronographing (and that of others also) failed a full 4020 fps with the factory 25-gr. loads, some 3945 being closer to a general average. However, that isn't a great difference—and

Remington's new shot shell, the RSP, has one-piece plastic base wad-body construction, offers long reloading life.







From left—17,223, 6mm and 25-06 Remingtons.

handloading can close the gap easily enough—and past performance of almost all earlier 17s has been better, if accuracy is your goal, at MV levels on the order of 3850-3950.

The Remington seminar in late 1971 revealed a bunch of interesting things to the assembled writers and editors—new firearms, of course, among them a handsome little 22 rimfire rifle, looking much like a reduced-scale version of their M700 BDL bolt rifles, and a deluxe, engraved version of the M870 pump shotgun, a truly handsome piece.

Most serious benchrest shooters make their own bullets or buy them from some custom maker. Such bullets, obviously, aren't available to the average shooter ordinarily—the custom bulletmaker has no great output, and the cost of such bullets is fairly steep. The benchrest shooter who rolls his own has trouble enough finding time for his own needs, much less selling any. Remington proposes to change this situation, at least as far as 22 bullets are concerned.

At the seminar Remington's Mike Walker showed us a new 52-gr. HP bullet of .224" diameter, one that will be, he said, comparable in performance to the best handmade 22 bullets available. These new match bullets will be made to tolerances not heretofore obtainable with commercially made production bullets, we were told, and it begins to look as though Remington is right!

In their own tests, using benchrest rifles, the new bullets gave an over-all average of 0.24" extreme spread at 100 yards. In several Remington 40XB-BR rifles with their 20x scopes mounted, the new bullets averaged, note, as small as

0.16" for 15 shots, not just 5!

All of us were given 200 of the new bullets to take home and try, but I've had no time to do that, nor has the weather been cooperative, at zero or so recently. However, in the March-April issue of *The Rifle*, (which magazine, and its sister publication, *The Handloader*, I recommend highly), Dave Wolfe reported on his tests of the new Remington 22 bullet favorably and at some length. He found them comparable in weight and dimensional uniformity to some Speer and Sierra match bullets (though a small lot, hardly comprehensive test, as he noted), but more importantly, he found they'd shoot well enough to be competitive in match shooting. In rough conditions at a Casa Grande (Arizona) match, Dave took 3d place at 100 yards in the Light Varmint class, while at the 200-yard stage, his groups were tight enough to win him the 200-yard aggregate with a 0.4073 MOA, and to take the grand aggregate (with 0.4545 MOA). Dave's wife, Phyllis, shooting the same rifle and load (a sleeved Remington action with an A&M 222 barrel, shooting 20.2/Rel 7 and the new Remington bullets), won two of the 200-yard matches at the same shoot. Then, on January 9th, in the first registered

shoot at the Casa Grande range, Mrs. Wolfe won both the 200-yard aggregate and the grand aggregate with Remington's new bullet and the same load and rifle. Her G.A. score was 0.4262 MOA. That's a pretty good testimonial to the Remington match bullet.

Among the centerfire rifle cartridges, Remington has two new offerings for 1972. One is a 100-gr. "Core-Lokt" bullet for the 25-06 cartridge, initial velocity 3300 fps, and intended for flat, long-range shooting on such game as antelope and whitetail deer.

The other new load is a 90-gr. pointed SP in the 6mm Remington case, but with 120 fps more than the older 90-gr. load for the 244 cartridge (a nice boost), which it supplants. So 244 rifle owners now have a choice of 80- or 90-gr. loads, while the 6mm rifle user can shoot these last two or a 100-gr. load as well. The 100-gr. bullet may not stabilize in some 244 rifles, note, because of the slower twist that many of them have.

Remington has a new shotshell, the RXP for claybird busters, and even a new shot size—8½! Remington research shows, we were told, that this new size has ample velocity and energy for dusting clays, but off-

#### Downrange Ballistics for the 25-06 Remington\*

##### 100-gr. Pointed Soft Point "Core-Lokt" Bullet

Range (yards)	Velocity (ft.-sec.)	Energy (ft.-lbs.)	Trajectory**
0	3300	2420	—
100	2960	1940	+1.5"
200	2640	1550	0
300	2350	1230	-6.6"
400	2080	960	-19.4"
500	1830	740	-40.4"

\*From 26" test barrel, 1 in 10" twist.

\*\*Iron sight height of 0.9", rifle zeroed-in at 200 yards.

#### Downrange Ballistics for the 6mm Remington\*

##### 90-Gr. Pointed Soft Point Bullet

(Interchangeable with 244 Remington)

Range (yards)	Velocity (ft.-sec.)	Energy (ft.-lbs.)	Trajectory**
0	3320	2200	—
100	2980	1770	+1.5"
200	2670	1420	0
300	2380	1130	-6.4"
400	2110	890	-19.0"
500	1860	690	-39.3"

\*From 26" test barrel.

\*\*Iron sight height of 0.9", rifle zeroed-in at 200 yards.



ers 80 more pellets per load than do 8s, and 140 more than 7½s carry. However—coppering the new bet to a degree—Remington will also make the RXP shells with 7½, 8 and 9 shot, and all four sizes will be the hardest shot they've ever made.

Remington has taken special pains with the design and construction of the RXP cartridges. The plastic shell body and the base are integral, the base forged to impart dimensional stability and a lessened need for resizing. This makes the RXP a tough and highly reloadable case. Its primer pocket, also newly designed, gives a superior gas seal, reducing gas leakage or primer setback.

Remington wisely held onto the good features of their target loads—the better venko crimp, which produces a better looking re-crimp on reloading, and stays crimped; their "Power-Piston" wad and 97\* primer. These RXP loads will be on the shelves early in 1972, and so will the components used in them.



To aid handloaders wanting to use the new RXP target cases and related components, among others—the same as the factory employs—there's a new 12-page booklet available, the title *Remington's Tips on Better Reloading*. I think this is a first for Remington, as I can't recall any earlier such brochure issuing from Bridgeport. Loads are listed for 12, 20, 28 and 410, with such powders as 700-X, Red Dot, SR-7625, etc., and all are target-type. All wads are of Remington make, clearly indicated as to code number. Understandably, the booklet stresses "Matched Performance" through the use of Remington components, and there's no doubt at all that excellent reloads will result if the reader does just that.

See your dealer for a special plan Remington offers until June 30, 1972 on RXP-12 wads. Fill in the form he'll supply, add \$1 and four (4) RXP box tops, then mail to Bridgeport. You'll soon receive 250 RXP plastic wads and a copy of the booklet just described.

### New Remington Rounds Since 1950 16—count 'em—16

Introduction of the 17 Remington centerfire cartridge is the latest in a long line of metallic cartridges developed by Remington Arms Company, Inc., over the past twenty-one years.

The total makes for an impressive list, with everything from varmint to North America's biggest game covered. Remington's goal has been, basically, to meet three primary objectives:

To give American hunters a wider range of calibers and ballistic

performance for use on the great variety of game and hunting conditions existing in North America.

To improve the performance aspects of sporting cartridges available to American shooters via the development and introduction of new calibers.

To offer high performance ammunition and sporting arms, shooting equipment that is readily accessible at retail outlets throughout the country.

Here's the list of new calibers introduced by Remington since 1950. Even if these were the only ones in existence, the American rifleman/hunter would still be

superbly equipped for all possible hunting situations available to him.

1950 222 Remington  
1955 244 Remington  
1955 44 Remington Magnum  
1957 280 Remington  
1958 222 Remington Magnum  
1961 22 Remington "Jet" Magnum  
1962 7mm Remington Magnum  
1963 221 Remington "Fire Ball"  
1963 6mm Remington  
1964 223 Remington  
1965 22-250 Remington  
1965 350 Remington Magnum  
1966 6.5mm Remington Magnum  
1970 25-06 Remington  
1970 5mm Remington Rimfire Magnum  
1971 17 Remington



REMINGTON CALIBERS INTRODUCED SINCE 1950—From l. to r.: 5mm Rem. R.F. Mag., 44 Rem. Mag., 22 Rem. "Jet" Mag., 221 Rem. "Fire Ball," 17 Rem., 222 Rem., 223 Rem., 222 Rem. Mag., 22-250 Rem., 244 Rem., 6mm Rem., 25-06 Rem., 6.5mm Rem. Mag., 280 Rem., 7mm Rem. Mag., 350 Rem. Mag.



Of these cartridges, only a few have failed to make the grade. The 280 cartridge, an excellent one in its own right, and beautifully accurate in most Remington rifles made for it, was soon overshadowed by the more versatile 7mm Rem. Magnum. The 244, victim of its own bullet weight choice and the slower twist of the rifle chambered for it, is seen in the 6mm Rem., an identical envelope. The 22 Rem. Jet and the 221 "Fireball" are fading fast.

### Remington Handgun Ammo

Bridgeport didn't forget the handgunner either. For 1971 three new handgun loads were an-

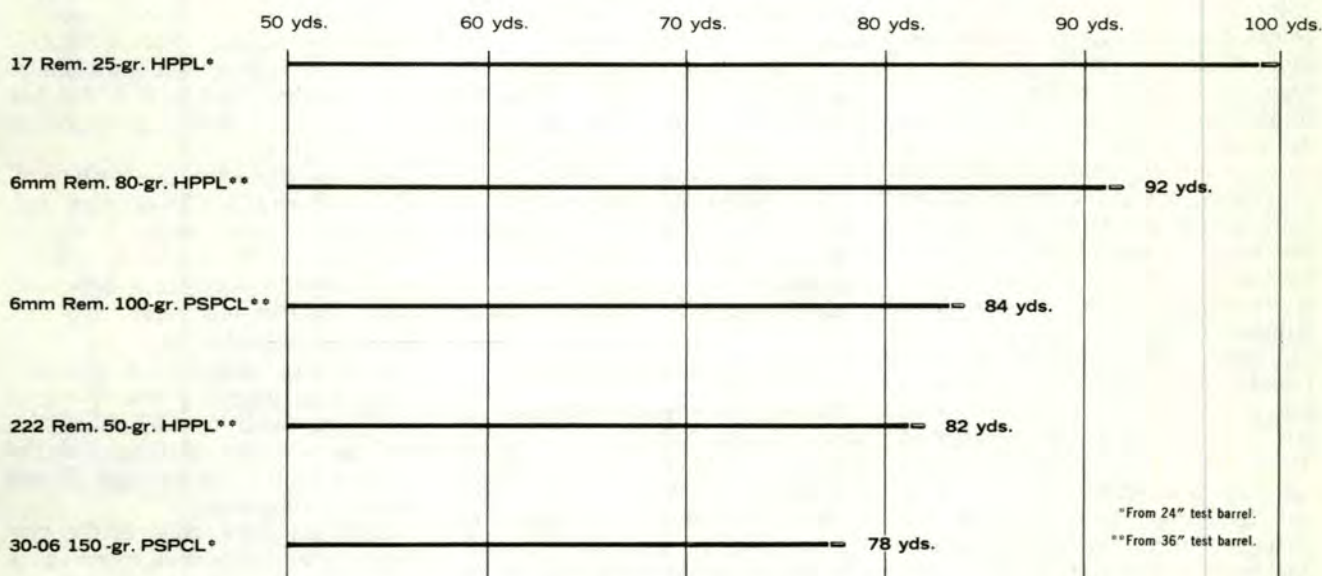
### Remington's 17 Caliber

It had to happen, and it was almost a sure bet that Remington would introduce it—a commercial 17-cal. cartridge. In the 1950-1970 period 15 new cartridges, not counting the 444 Marlin, were introduced by one firm—Remington Arms Co., Inc. For 1971 the same firm brought out the 17 Remington. The new cartridge is unlike any of the 17-cal. wildcats currently existing, but it is possible that 17/222 rifles could be rechambered for the 17. Made by necking down the 223 Remington, the new 17 has the same case length, case diameter, and shoulder angle of the original 223 caliber. However, the shoulder

on the 17 Remington has been moved back .087" to improve accuracy, it's said.

The new 17 is loaded with a 25-gr. HP "Power-Lokt" bullet of .1725" diameter. Muzzle velocity out of a 24" barrel is listed at 4020 fps, making it the fastest factory-loaded round in current production. Sighted at 200 yards the drop at 300 yards is only 6.3", very close to the 6mm Remington for flatness. The new 17 will be available only in the Model 700 BDL at first. The 24" barrel has a twist of 1 turn in 9 inches, so factory ballistics should be realistic. The 17s have shown increased popularity the past few years, so the new 17 Remington should sell well.

### COMPARATIVE TRAVEL OF 17 REMINGTON WITH OTHER HIGH VELOCITY CARTRIDGES OVER THE SAME TIME IN FLIGHT



nounced, the result of continued 38 Special development. These new loads include the 9mm Parabellum (Luger) with a 115-gr. jacketed HP bullet, muzzle velocity 1160 fps from a 4" test barrel; a 158-gr. semi-jacketed HP 357 Magnum loaded to a muzzle velocity of 1550 fps (8¾" test barrel) and a 240-gr. semi-jacketed HP for the 44 Remington Magnum, loaded to 1470 from a 6½" test barrel. These new loads—the bullets will be available for re-loading—provide increased versatility for these calibers, making them suitable for use on small game, providing the handgunner is skillful enough to make use of their potential.

### Sailer's Exotic Ammo

How badly do you need some 275 H&H cartridges, or a batch of 8x72R rounds? Maybe you've got a 40-90 Sharps you want to shoot, the one with the bottle-neck chamber? Anthony F. Sailer (P.O. Box L, Owen, Wisc. 54460) not only has these few but many more—far too many to list here, but his list shows 99 different centerfires offered, including several current cartridges in custom loading, plus a few obsolete rimfires and black powder-loaded 12 bore cases, these with No. 6 shot. Yet this is only a partial list, Sailer notes, and he's prepared to make cartridges in

virtually any caliber on special order.

Most calibers listed are made from new brass, smokeless powder and jacketed bullets are used in the majority (black powder can be substituted on request) and minimum quantities are 20 rounds for rifle calibers, 50 for handguns. Factory ballistics are duplicated. Here are some price samples: 22 Savage Hi-Power, \$6; 33 Winchester, \$8; 9.3x72R, \$10, and 45-100 Sharps, \$13.50. Available only through your dealer, unfortunately, but this is an excellent source for obsolete calibers, foreign and domestic, plus custom loading of current calibers at competitive prices.





Sierra 30-cal. BT Hunting Bullet

## Sierra

An especially newsworthy development has been the expansion of Sierra's line (now a part of the Leisure Group) into the field of handgun bullets.

New calibers include 9mm, 38, 41, 44 and 45. First to appear was a quartet of 38s—110-gr. JHP, 125-gr. JHP, 125-gr. JSP and 158-gr. JSP. Sierra calls their hollow points "hollow cavity" bullets because the hollow inside (behind the nose, that is) is wider than the frontal opening. This leaves the walls thin at the nose, producing an even more prompt and vigorous expansion than a traditional hollow point design gives. Another HP, of the same unusual form, has been now added to the 38s—a 150-gr., which should make an excellent hunting bullet.

A pair of 9mm bullets of traditional truncated-cone form but with the new hollow cavity feature in 90- and 115-gr. weights, followed. These .355" diameter slugs can be used in loading for the 380 Auto and 38 Super, as well as all the various 9mm Parabellum/Lugers. Jackets turned in at the nose prevent their lead cores from contacting the ramps or breech faces of auto pistols, thereby forestalling a most common cause of jams. Velocities possible with the 90-gr. are getting up into the magnum range.

41 Magnum fans will welcome two more new bullets—one in "standard" 210-gr. weight, the other a fast-moving 170-gr. These have likewise been given the full-jacketed hollow cavity treatment, hence should stand hard driving without fouling.

For the 45 shooter, there is a .452" slug of 185 grains intended for the 45 ACP; another of so far unspecified but heavier weight is scheduled to follow, probably available by the time you read these lines.

The final pair, in 44 caliber for

both rifles and revolvers, measure .429" and come in weights of 180- and 240 grains. These two have the same hollow cavity design, but have been given a crimping groove and jackets are not turned over the nose edge. No opportunity to test them yet, but common sense tells me they'll be extremely deadly bullets.

Sierra hasn't neglected rifle projectiles either. There are, for instance, exciting new 6.5 and 7mm boat-tails that have already begun to set accuracy records. Beautiful just to look at, the 168-gr. 7mm Matchking (.284") and the 140-gr. 6.5mm Matchking, both hollow points, feature a long bearing shank which, together with the boat-tail bases, serve to provide maximum accuracy over long ranges. The 6.5 has an especially graceful ogive contour, but I'm betting on the 7mm to continue carrying off the honors as it's already done in three target competitions.

There is, too, a new 30-cal. .308" hunting bullet, a 165-gr. HPBT designed to minimize air drag and flatten trajectory over long ranges. This is an optimum weight in 30-caliber, balancing good weight with high velocity, and Sierra has added the fine accuracy so vital to a successful long range bullet. It should be a prime choice for either

308, 300 Savage or 30-06.

A cannellured .308" hunting bullet, this one a round-nosed SP of 150 grains, adds a 10th bullet in this caliber to the Sierra line.

In 22s, Sierra has a new 52-gr. HPBT bench-rest bullet (.224"), that set a new record—a .138" group of 10 shots at 100 yards. I'm not entirely sure why this little bullet has a boat-tail, but certainly they'll be easier to start in case necks, and why argue with success? If they'll do that well for the pros, they'll also work well in our varmint rifles.

Last, but decidedly not least, are a pair of sparkling new 25s (.257") in 90- and 120- gr. weights, both hollow point boat-tails like the others. Sierra says they were designed especially for the 25-06, but I'll be trying them in a 257 Roberts and a 257 Improved as well, as I imagine plenty of other shooters will. The 90-gr. number should also adapt well to the 250 Savage.

Sierra's latest Bullet Board, framed in real walnut, now shows their handgun bullets also. \$15 list price at your dealer or write to Sierra Bullets.

As a parting shot, this writer still wishes Sierra would produce bullets larger than 8mm. Plenty of 338, 350 and 375 owners would like to be able to use Sierra bullets in their favorite big bores.

## Sierra Loading Manual

By the time you read this the new *Sierra Bullets Reloading Manual* should be generally available. The new work is easily one of the most comprehensive manuals of its type, and we recommend it highly. In addition to excellent coverage of the reloading process and how to go about it, there are English-metric and decimal-fraction tables, burning-rate and Boxer primer charts, sectional density tables, etc., plus extensive load tables, from the 22 Hornet to the 8mm Mauser in rifle cartridges, and handgun load tables from the 9mm Parabellum to the 45 ACP and Long Colt. Few wildcat rifle cartridges are included, but virtually everything else is, including such recent calibers as the 25-06. It is, however, the ballistics section and the ballistic tables that seem to me outstanding. The chapter on Exterior Ballistics is particularly valuable, the presentation clearly and simply written, the step-by-step examples of how to use the ballistic tables readily understood and easy to put into practice.

I've got a few minor criticisms,

but they're matters of omission more than anything else. None of the pictures—a few of which are too dark—carry captions, and I'm puzzled by the one on page 26, and what it represents.

Each load-table page in the new Sierra manual carries a well-done dimensional diagram of the cartridge, with accompanying data on the test firearm used, barrel length





and twist, the components and bullet diameter. These pages are nicely laid out, with ample white space, and I'd like to have seen a line giving case capacity in each instance.

Trajectory figures, out to 1000 yards for long range competition and hunting calibers, were both calculated and field checked via actual firings.

Price of the new manual in standard form is \$4.85, but a limited and numbered 1st Edition (2000)

copies specially bound and signed by Bob Hayden, Sierra's operations manager, will be \$15 each.

I wondered about this \$15 deluxe edition, and how the big tab would be justified, but no more! Rather than having the loose-leaf, 3-ring-binder form of the regular issue, the special version comes in extra sturdy and heavily textured cloth covers, the pages bound in normal or glued fashion, and without the separator tabs of the standard format. It's the cover, though,

that knocks your eye out—imagine a gleaming sheet of gold, deeply embossed in a scrolled and floral pattern except for a large vertical oval in the center. Inside that oval, also in relief, is a coonskin-capped hunter, his fowling piece a muzzleloader, his pointer dog at the alert. A nostalgic touch, and I'm glad to add this strikingly-bound book to my library.

The Sierra manual has 352 text pages, plus 34 blank pages for notes, and is of 5½"x8" page size.

## Speer

Speer caused a sizeable stir with their 70-gr. semi-spitzer .224" bullet, intended to make deer and antelope rifles out of the larger 22 centerfires.

Speer stipulated that muzzle velocity be kept above 3000 fps when using this bullet in barrels having a 14" rifling twist, in order to maintain stability in flight. Overly-long ranges should consequently be avoided so velocity stays high. Accuracy has been good, especially in the 22/250, and the 70-gr. bullet at 3400 fps shows nearly 1800 foot pounds at 100 yards, not at all bad.

Another interesting new bullet is Speer's 30-cal. 180-gr. Magnum SP. This bullet is like a spitzer with its pointed lead tip cut off. I assume this has been done to keep the bullet from expanding too quickly at magnum velocities.

In 38-caliber Speer has a 158-gr. RN lead (.358") bullet for the old "standard" velocities; a new 158-gr. JSP of the same shape with just the right amount of lead exposed for good expansion without barrel leading; a 140-gr. JHP that looks like a combination of round nose and flat point, but with its hollow point and medium weight is one of the dandiest compromises between velocity and weight.

Most recently, samples of Speer's newest 110-gr. JHP and 158-gr. JFN have arrived for testing. The 110-gr. will answer current demands for a lightweight 38 Special bullet at magnum velocities, while the big flatnose is most likely intended to satisfy those shooters who prefer that shape to the blunt round nose.

Finally, there is the pair of 44-cal. jacketed bullets—one a 240-gr. flat nose with rounded ogive, the other a 200-gr. HP. Both are listed as "Magnums," but I simply had to try the lighter one in a favorite 44-40 Winchester 1892.

Somewhat oversize (.429") for many 44-40 bores, it will do well in others (better slug and measure your bore first); weight is exactly right for the 44-40, and that hollow point should augment killing power, especially since 44-40 velocity from carbines and rifles is higher than the hottest 44 Magnum revolver loads. Accuracy has been fine.

## Speer 38-357 Shotshells

It's taken a while, and many combinations of materials and forms were tried, but now the Speer plastic shot cartridges for handguns—plus the empty capsules—are available.

Dave Andrews, Speer ballistician, suggests using No. 9 shot in loading the empty capsules, which hold about 103 grains or 135 pellets. No. 7½ or 8 can be used, but both reduce the pellet count, and should not be used. The standard Speer load of chilled 9s throws about 96% into a 16" circle at 15 feet from a 6" barrel, with muzzle velocity 1140 fps. Shorter barrels? OK, but less MV and more open patterns—a 2" barrel gives good, even patterns at 10 feet, Dave said, and the No. 9 shot is adequate for snakes, rats, et al.

Load data is printed on the capsule/base wad package—5.0/7625 and 6.0/Unique, maximum charges in the 38 Special case. There is no advantage in using 357 cases and heavier charges of powder, because poor patterns will result.

Most recently Speer made available a companion bullet to the 224"/70-gr., the newest one a 228"/71-gr., which users of the 22 Savage cartridge will welcome. I wonder how many there are?

Speer also has a new 8mm bullet, this one a 225-gr. SP of .323" diameter, which should offer excellent heavy brush-timber performance in the 8mm-06 or 8mm belted

magnums. Two new handgun bullets for 1972 also—a 9mm of 100 grains in HP form, and a 45 revolver bullet (.452"), their 225-gr. Magnum H.P.

The Speer .451"/200-gr. SP, for 45 ACP use, has been changed for better expansion characteristics—it will be a jacketed HP for '72.

Speer has a new .257" bullet also, this a 100-gr. hollow point designed for varmints in rifles of the 25-06 class. The big open point means an explosive blowup on the smaller game, and accuracy is said to be superb—first trials by Speer averaging well under a half-inch for 5 shots at 100 yards. Sectional density is .216, ballistic coefficient .328, cost is \$5.35 per hundred.

I gave the new 100-gr. HP a brief 100-yard trial in a standard barrel Remington 700 BDL, using Speer's mid-power load for 4350 of 53 grains first, with Remington's 9½ primers. Cases had been twice fired, then partially sized. Velocity average for 5 shots—at 15 feet—was 3190, with easy extraction, no signs of pressure. Going to 54 grains, all else the same, showed 3280 average, and there we stopped. Accuracy was good but not excellent—two groups with the 53/4350, 5 shots, went into .89" and 1.05", while the grain-higher load



New Speer handgun shot cartridges, loaded with 135 No. 9s at 1140 fps. The empty capsules are available to the handloader as well.



Speer 357/158, 451/200 and 22/70 bullets



tightened these figures slightly—.78" and .73". I had the feeling that a bit more powder, say a half- to 1 grain, maybe even a little more, would have tightened things up.

Speer has several new load data sheets available for the asking—though a stamped envelope, with your name and address on it, would be helpful. One of these is on the 17-223, another on the 17 Remington (both using the 25-gr. Hornady bullet), a third covers the 44 Special and Speer's new 200-gr. jacketed HP bullet. The last data sheet is on the 44 Magnum, using the same 200-gr. JHP.

### Winchester

Winchester has unveiled a new bullet design called PEP, standing for Power Expanding Point. Initially these 25-cal. hollow points, without a cannelure and looking quite unlike other Winchester bullets, come in 90- and 120-gr. weights. Intended for the 25-06, they'll also be available in factory ammunition. Everybody's climbing aboard this 25-06 bandwagon.

### 3-D Company, Inc.

We number many law enforcement agencies and their members among our readers, so the reporting here of ammunition available only to such agencies—not individuals—is, we feel, in order.

Bob Deitemeyer, well known to handloaders for years as the owner-operator of Pacific loading tools, is the head of 3-D, manufacturers of 38 Special cartridges only. No other calibers are offered, at least thus far, but the brochure I'm looking at lists 23 order numbers in 11 bullet types (110-gr. jacketed HPs through 158-gr. flat-nose lead bullets), these offered in a variety of packaging. New ammo, as well as reloaded cartridges and remanufactured rounds, (in 48-gr. wadcutters type only) are supplied at attractive prices. 3-D target ammo, using new 3-D brass cases and match grade 148-gr. bullets, is \$59 per 1000 (20 boxes of 50). This

ammo is guaranteed by 3-D to be as accurate as any made, with 50-yard performance assured. A new Police Practice ammo, loaded in the customer's cases or remanufactured in once fired cases, sells for \$26 and \$46 per M. Police service quality cartridges are supplied in new 3-D nickered cases, and all bullets used are made by

Hornady. 3-D will mail complete information on request to 6020 Colfax, Lincoln, Nebr. 68507.

3-D's new plant is an ultra-modern one, its facilities having been greatly enlarged recently. Sales are made to the consumer directly from the factory—no middlemen—and as of now some 2 million rounds a month are being sold.

### Testing Systems, Inc.

TSI (2826 Mt. Carmel Ave., Glenside, Pa. 19038) makes a variety of products for shooters—notably their TSI-300 One-Step Gun Care, of which more in a moment—but of chief interest for these pages is TSI-400, termed by the company an "instantaneous ammo brass cleaner." Non-staining, non-flammable, and easy on the hands, TSI-400 won't pollute, either—it's 100% biodegradable! No brushing or rubbing is needed, we're told; the stuff works on contact. Just dip in and lift out.

TSI 300 is a synthetic compound that contains no petroleum distillates, silicone, graphite, wax, MOS<sub>2</sub> or carbon tet. Because of its ability to penetrate steel surfaces and leave a microscopic, non-oily film thereon, rusting is prevented and lubricating qualities are imparted. It is also said to improve the blue and wood finishes, loosen frozen metal parts,

and to work at temperatures down to 90° below zero.

Broad claims, certainly, for both of these TSI products. We'll try to check them out, hopefully in time to add to this report.



### Whitney Shotshells

A new firm, Whitney Cartridge Co. (P.O. Box 608, Cortez, Colo. 81321) is marketing a novel plastic shotshell, in fully loaded form or as components. They're *all-plastic*, too, including the screw-off heads! That's the basic idea—the tubes and the plastic shot sleeves are shot once and discarded, but the base or head sections are retained—and these heads are said to offer 25-40 or more firings. The tubes are colored a brilliant orange shade for easier finding in the grass or brush.

Fully loaded Whitney cartridges (12 gauge only so far) will be about \$2.75 a box of 25. Shoot these up, save the heads, and buy the Whitney loaded tubes (\$1.85 for 25) or 25 tubes plus wads at less than \$14 for 500 of each. Bases are about \$2.50 for 100, wads only are 500 for \$3.50 or so.

Whitney had a series of tests conducted by the H.P. White Labs, these for patterning essentially, though proof rounds were fired as well. Surprisingly tight patterns



Whitney shotshell components and a finished round. Cutaway shows construction of shell body.

were made with some of the loads (up to 95% and more), and at pressures and velocities comparable with conventional loads.

Write to Whitney for further data, current prices, etc.



# A Rare Case

*A rare instance indeed, and happily so for all of us who shoot high intensity cartridges. Here—for the first time as far as we know—is a detailed and fully-investigated study of a virtually unknown condition found in cartridge brass. Do these internal case cracks affect your shooting safety, the safety of your handloads? Perhaps not, but you be the judge.*

by **DICK CEREMSAK**

**V**ERY FEW shooters, fortunately, ever experience a mishap which has the potential to damage a gun seriously and/or maim the person involved. On rare occasions, though, it does happen. The split second which elapses between letoff and recoil is possessed of mighty events which culminate in the bullet's free flight. The bullet in a modern high power rifle is accelerated from zero to perhaps 3,000 feet per second (fps) during its travel through a 22- or 24-inch barrel. Tremendous pressure must be applied to the bullet's base to accomplish this, but all goes well so long as that pressure is safely contained.

The cartridge case plays no small part in helping to contain or restrict the searing hot, ultra high pressure propellant gas so necessary to the bullet's acceleration. Unless it is sufficiently sound,

strong and elastic it cannot properly perform its vital sealing or obturating function. A split here, a soft area there, and "That's all she wrote," even with a proper load. It's hard to predict exactly what will happen with a faulty case, but one thing is sure; it won't do the rifle or shooter any good.

Some time ago, during a "shop" conversation, I was made aware of three or four reported incidents in which one particular brand of military surplus 30-06 ammo was thought to be responsible for as many rifles being damaged.

Understandably concerned, I volunteered to examine one of the blown cases and try to learn the mishap's cause.

Before long I had the blown case in my possession, along with several of its mates. This particular

merchandise, allegedly fired as factory-loaded rounds, was manufactured in 1954 by Kynoch (Imperial Chemical Industries, Ltd.) of Great Britain. The cases, all headstamped K 54, and sold as military surplus, were visually examined and separated into two groups. The cases in one group showed a perceptible bulge, just forward of the web area, which is characteristic of a loose chamber or an undersized case. The bulge in the second-group cases was barely visible and appeared quite normal. The foregoing suggests that two different rifles were used, as reported, to fire the ammo. The burst case shown in fig. 1 (contained in the second group mentioned above) suggests a failure caused by excessive pressure; but this may be taking just too much for granted, too soon. After all,





Fig. 1 Burst Kynoch case shows rupture (R), and belt (L) formed in the firing.

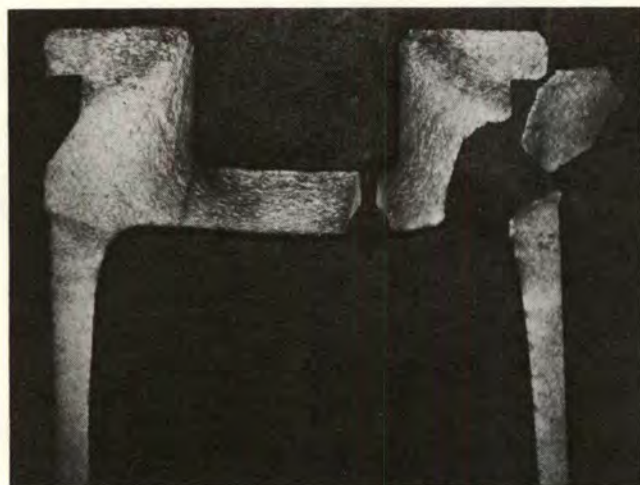


Fig. 2 Dark areas contain greatest amounts of cold work.



Fig. 3 Note contrast between structure at lower left and rest of area.



Fig. 4 Amplifies structure at rupture face seen in fig 3. Magnification 600x.

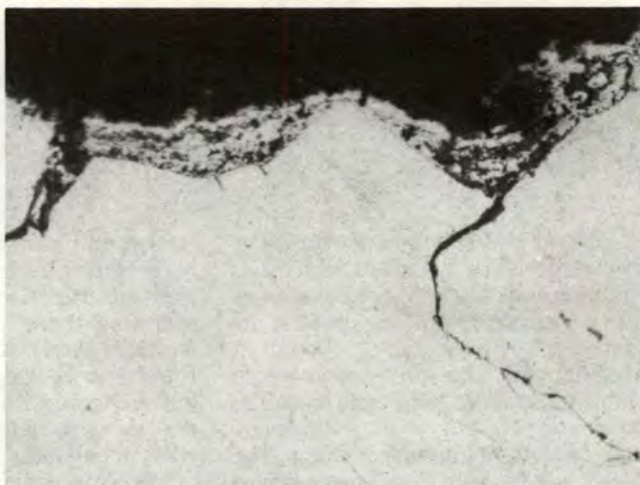


Fig. 5 Lacework area at top of picture displays incipient melting evidence. Magnification 400x.

other causes are within the realm of possibility.

A careful visual examination of the cartridge case was then made at magnifications up to 30x. The failure, as shown, was confined to the extractor groove and the area immediately forward of it. That portion of the case head which did not actually separate or rupture

was bulged to form a Holland & Holland type belt, also shown in fig. 1. The front face of this belt was bevelled to about the angle of the conical breech face found on Springfield '03 barrels. The fracture appeared ductile and the area was blackened, as might be expected, by the hot escaping propellant gas. This is clearly not a failure of the

head separation type.

Nothing of particular mechanical significance was noted in the primer pocket area, odd as it may seem. In the event of excessive pressure, one would normally expect to see some manifestation thereof in the form of blackening or "smoking" and a very much flattened primer showing bolt face toolmarks along





Fig. 8 Radius crack (light band just above flashhole) in "good" Kynoch case.

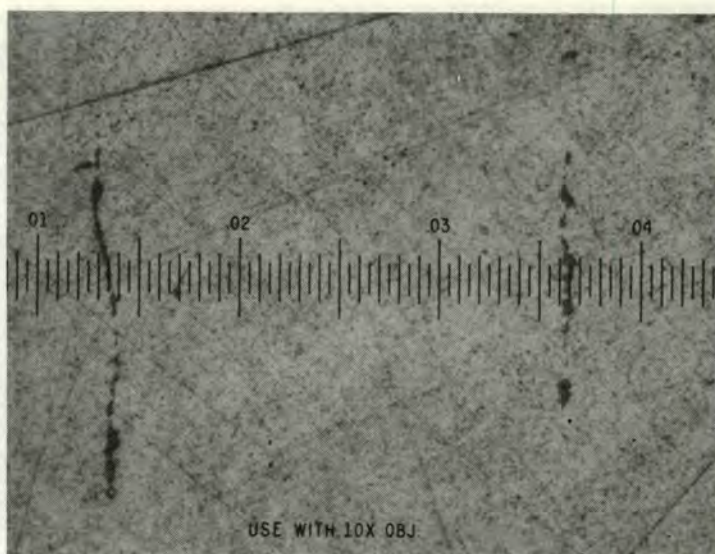


Fig. 9 Two of several inclusions found in blown Kynoch case.

with a firing pin crater. No such indications are present here, as can be clearly seen in Fig. 1. This seemingly contradictory piece of information will be filed away for future reference. It will ultimately fit the picture very nicely. As an aside, it was noted that the colored waterproofing lacquer normally used by arsenals and commercial loading companies around the primer, was present here. Both case and primer were stained purple, indicating that the round was probably fired as loaded at the Kynoch works. It is very unlikely that a handloader would have applied this sealant.

Dimensional measurements are frequently helpful in explaining problems of an engineering nature, especially in instances where close tolerances are involved, such as here. First, a "best effort" sort of check was made by optically matching the ruptured case with a chamber cast from a 1903 Springfield rifle at 50X magnification. The chamber cast was poured extra full in the good '03 chamber so that it contained the barrel's breech face contour as well as the chamber proper. The distance between the cast breech face and the shoulder was measured. This was compared to the distance between the front belt face and shoulder of the blown case. The dimensions are almost identical. No suggestion of excessive headspace here. Extractor

groove, base and neck diameters as well as over-all length were checked and found to be within specified limits. At this point all other cases in this second group, except one, were measured and found to be OK. The otherwise sound case had an undersized extractor groove diameter.

Primer pocket diameter was the last and perhaps the most significant dimension to be checked. After removing several of the 0.2170-inch diameter Berdan primers, the measured pockets ranged from 0.2170- to 0.2179-inch. This clearly suggests normal pressure levels in all cases including the ruptured one, which measured 0.2175-inch. If excessive pressure had been the sole cause of the violent burst shown in Fig. 1 I would expect the primer pocket to measure in excess of 0.2185-inch and be blackened or "smoked." It was not.

Having exhausted all reasonable nondestructive testing approaches, metallurgical laboratory procedures were then used to find a plausible reason for this case failure. Unfortunately, once evidence of this sort is destroyed by testing, there is no way to bring it back for another look. The approach to our remaining series of tests and examinations was therefore undertaken in a conservative manner so as to glean a maximum of information no matter how insignificant it might at first seem.

The type of metallurgical examination we wish to perform here must be done under a microscope. In order to see the kinds of details we are interested in, the metal must first be ground and wet polished so that a flat, mirrorlike surface is developed for viewing under the microscope.

The ruptured case was cut into two parts and the head portion, about 0.75-inch, was imbedded in Bakelite. The Bakelite serves as a means of rigidly holding the metal specimen while it is being ground and polished. Every time the grinding and polishing cycle is repeated, a new plane of the metal's interior is exposed for examination and analysis. Several planes or crosssections of the ruptured case were examined in this manner. The results proved both interesting and enlightening.

First of all, the rupture appears to have started in the radius between the case wall and web. Why here specifically? We shall see in due time. Fig. 2 exhibits one of the examination planes after it has been etched. The dark regions are areas of greatest cold work. Note that the unruptured side of the case shows the belt we mentioned before, and it also shows the shear plane along which the metal moved in order to form that belt. The plane terminates in the wall-web radius. That portion of the case which is aft of the belt face was





Fig. 6 Cracks in internal radius of blown case, just behind "belt." Magnification 300x.



Fig. 7 Radius crack in "good" Kynoch case. Magnification 400x.

unsupported by the barrel, and the shear plane represents the line of least apparent resistance. Other regions of relatively heavy cold work, resulting from manufacturing operations, can be seen around the primer pocket and flash hole as well as the arc-like band which extends from the primer pocket periphery to the extractor groove. One curious feature seen here is the lack of a pronounced primer pocket crimp. Every Kynoch case exhibited this condition. Apparently the factory gave these a rather timid nudge.

By increasing the magnification a bit, we observe a curious condition at the rupture face. Fig. 3 shows two highly contrasting structures. The lower left corner of this picture contains a cold-worked structure, as expected, while right next to it we find an area of extremely fine grains. Fig. 4 amplifies the over-all condition at a magnification of 600x and reveals an extremely fine-grained, annealed structure at the rupture face. This structure is one which is characteristically soft ... *real soft*. We've found the answer. The brass in this narrow area was soft and weak, therefore it gave way when subjected to high pressure during propellant ignition. This sounds good, and on some other occasion it might even be true, but not here as events will show. Let's look a little further for an explanation of this observation. It deserves

one. Consider the area in which this fine grain is found. The head portion of a cartridge case is normally cold worked to a high hardness, by design, because this is the only way normal 70-30 cartridge brass can be made strong. Heat treatment won't do it. Add to this the additional amount of cold work or, as we say, plastic flow, which took place during the shear failure and we have a material which has been worked to an extreme degree at the failure site. Metallurgists know that material in this condition will anneal quite easily. The greater the amount of cold work present, the less temperature and time are required to soften and recrystallize it. There is little doubt that annealing has occurred here as evidenced by the presence of the fine undistorted grains.

Just how do we go about annealing this material so that we have two very narrow, soft areas which appear along the fracture faces? At the factory by accident? I doubt it very much. The most reasonable answer seems to lie in the extremely high temperature of the propellant gas which passed over the highly cold-worked surfaces the instant *after* fracture occurred.

The time it took for the gas to pass over the area was obviously extremely short, but the temperature of that gas was far in excess of the brass' melting point. It is entirely reasonable to expect that temperatures high enough to an-

neal or even melt the brass can be reached if a sufficient volume of very hot gas passes over a given area, such as the fracture surface, in a short time. I'm sure several readers have, for example, soldered copper water pipe fittings. The longer the propane torch flame is played on the fitting, the hotter the fitting becomes. Finally, it's hot enough to melt the solder and secure the joint. Other observations which support the above opinion include:

1. Only areas adjacent to the rupture faces contained fine grained material.

2. Fig. 5 shows evidence of incipient melting of the brass along the rupture faces (the lacework along the upper edge).

What does all this mean? Simply that the soft areas we found did not cause the failure; rather, they became soft as a result of the annealing which occurred during the failure incident. The culprit hasn't been found yet, but we're getting close.

Prior to doing any further work, hardness surveys were made on the failed case and on several others of Kynoch and domestic manufacture. The results, shown in Table 1, were obtained by using the Rockwell 15T Superficial Scale and subsequently converting them to Rockwell B. If there is something wrong with the Kynoch case's hardness, I can't see it in



these data. On the contrary, it seems to be right in with the proverbial pack. As a matter of fact, it's as good as any of them. By now, we're pretty well convinced that soft brass did not cause or contribute to the failure.

### Case Web Cracks Revealed

Further examination of the blown case's microstructure revealed a rather surprising condition in the internal radius between the case wall and web. Cracks. Some were very, very shallow while others were unmistakable. The specimen was reground and polished several times, and each new plane contained cracks of varying depth and length, such as those shown in fig. 6. About this time I decided to take a hard look at some of the Kynoch brass that did not fail. Fig. 7 shows the result quite graphically, and again the crack is located in the web-wall radius as seen in fig. 8 (bright band just above flash hole). Fig. 9 contains non-metallic inclusions, several more of which were found to this extent only in Kynoch brass. These serve to further weaken the case. The scale, graduated in half-thousandths of an inch (0.0005"), is superimposed to give the reader an idea of their size. Either of these conditions by itself has the potential to seriously weaken a case. In combination, the total effect becomes more significant.

After discovering this little surprise, I wondered how things might be on this side of the Atlantic, and if perhaps the cracks I saw were caused by firing. Several different military cases were cut open and examined at 20X magnification and I found that Uncle Sam's production matched John Bull's. Fig. 10 shows the radius crack, typical, found in an unfired 7.62mm NATO round produced in 1966 at the Lake City Ordnance Plant. Fig. 11 presents the same condition found in cases made at Twin Cities in 1954, the only difference being that this round is 30-06. Perhaps the cracks are extremely shallow, I thought.

Their depth is displayed in fig. 12. At this point I wondered what commercial brass would look like and began to examine various brands and calibers, ranging from 243 Winchester to 444 Marlin, and varying in age from current stock to those about 8 years old. The cracks were found to persist in varying degrees and extents. One

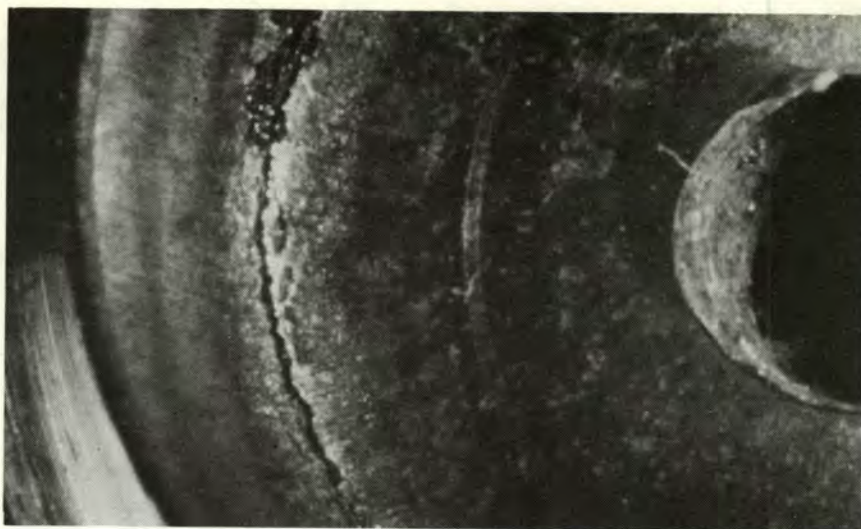


Fig. 10 Crack found in LC 1966 brass, caliber 7.62 NATO.

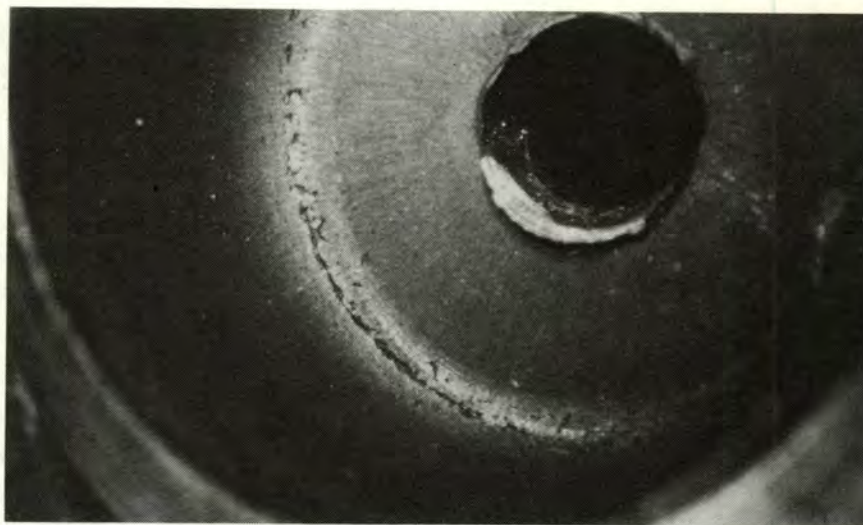


Fig. 11 Crack in Twin Cities 1964 brass, cal. 30-06.

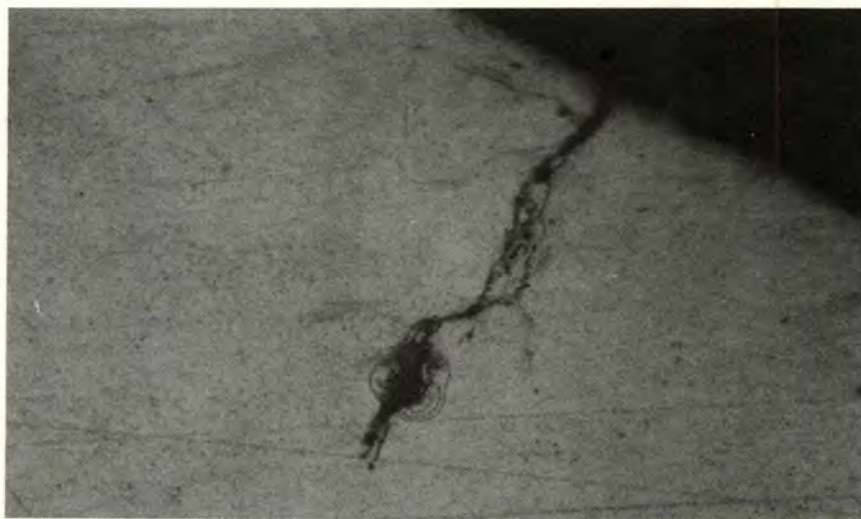


Fig. 12 Radius cracks in Twin Cities 1964 cases, cal. 30-06. Magnification 500x.



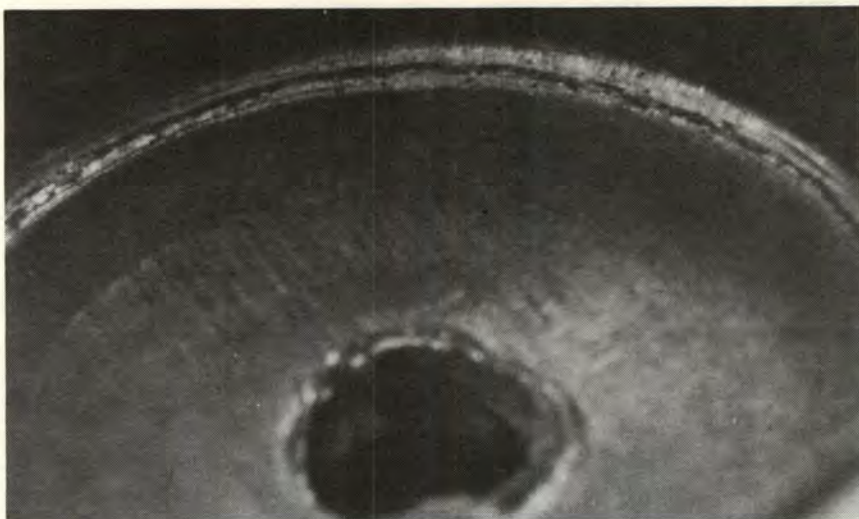


Fig. 13 Note light band containing crack in WRA 45-70 Gov't brass.



Fig. 14 Surface "splits" on web of Norma belted magnum cylindrical case.



Fig. 15 Splits and cracks, Norma 7x57mm case.

such defect, found in WRA 45-70 Gov't. hulls, is shown in fig. 13. This particular case, taken from a box of unprimed brass, is about 8 years old. Figs. 14 and 15 depict Norma cases which contain two conditions. The "Special" cylindrical case (fig. 14) is used for forming belted wildcat magnum cases, and has a surface split condition on the web. These splits appear as shallow pit-like ruptures and I believe they result from excessive compressive stress applied to the alloy's surface during forming operations. The case shown in fig. 15 contains both the splits and a radius crack. Norma wasn't the only brand found to contain this split defect.

To conclude this work, several 30-06 National Match cases manufactured during 1957 and 1958 were sectioned and examined. The 1957 lot proved to be of mixed quality, with some cases showing varying degrees of cracking, while others appeared to be perfectly sound. Only the 1958 lot was completely free of this defect. Further observations disclosed one significant difference between these two lots: the internal radius was noticeably larger in the 1958 samples. Cerro alloy casts of the head sections of several cases were made and the web-wall radii were optically measured. The results are shown in Table 2. The data suggest that a decreased radius is more often associated with cracking. The smaller the radius, the more prominent the crack is likely to be. This is not an uncommon or new occurrence in metal forming. When metal is stretched, as it is during a forming operation, the most ductile alloy will tear if that stretch is not distributed over a large enough area. Too small a radius on a punch serves to concentrate or highly localize the stretch and thereby exceed the alloy's ductility limit in that area. Tearing or cracking results unless a sufficient number of intermediate annealing operations are performed.

What does all this mean to the handloader who naturally expects to use his cases more than a few times? What is the magnum fancier thinking at this point? Just how significant are these findings? Quite frankly, a look at Table 3 will show that this sort of case defect has been with us for a very long time, indicating that the inherent danger is probably very slight. The data for Table 3 were compiled from randomly selected samples taken from various brands and lots



of ammo dating back to 1907. The fact that the crack condition was so common among so many small random samples does in itself suggest that millions of shooters have been using brass just like this for years and years. As noted earlier, very few of us have experienced case failure so that the risk must be quite low. To illustrate this point, I personally have handloaded and fired several 358 Ackley Long Magnum rounds both during field shooting and chronograph sessions. If ever there was a hot load fired, it's this one. I guarantee you'll know you've fired a handful after squeezing off 87 grains of IMR 4350 behind a 250-gr., 35-caliber bullet. This particular pill leaves the muzzle at a measured 3,000 fps and is just looking for a barn to tear down. Reasonably reliable means have been used to calculate the resulting 67,000 psi maximum chamber pressure developed by the above load. A proof load this may be, and a good case we do need, however a peek at one of these cases divulged the presence of (you guessed it) a crack. How deep is it? I haven't looked yet. Figs. 16 and 17 show the loaded round and the crack respectively. If ever a case's strength was taxed, it happened here. No case failure though.

How can I advise the handloader in view of these findings? Should he become alarmed? The answer is definitely NO. Quality Control personnel are constantly inspecting the products of a manufacturing operation, such as this, to ferret out defects. I don't know of *any* product line which is absolutely defect free. Inspection data are continually being evaluated and used to guide subsequent product design and processing. A sufficient amount of such data serves as the basis for a quality confidence level and the establishment of a sound quality control sampling plan. This plan allows the manufacturer to sustain high product quality at an acceptable cost. Truly dangerous defects are eliminated or, to say it another way, nearly 100% of the shipped product is of good quality. While the author has never seen the information contained in this article mentioned in any publically offered journal, the condition may be well known in the cartridge industry. I don't know. I have asked several men connected with cartridge manufacture about the cracking described here, but only two acknowledged its existence. Both men said rather positively that the cracks do not spread or grow as a result of repeated firing,

and which comment seems to fit in with our previous theory concerning minimum risk. One of these two gentlemen mentioned that he has seen the type of case failure shown here but that its occurrence is quite rare, and it can generally be traced to faulty brass sheet stock.

If ingots are not processed properly at the mill, prior to rolling,

oxidized surfaces can be rolled into the resulting product. The sheet product will be laminated and the entrapped oxide layers would represent planes of weakness which shouldn't, but can, escape detection during in-process and final inspections. Obviously, this could well have happened to the Kynoch product.

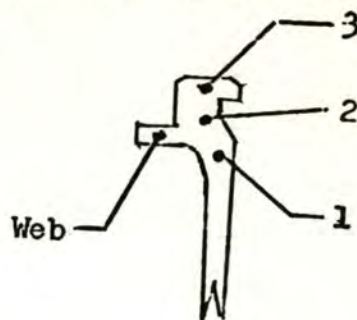


Table 1

#### Case Hardness Survey

Make	1	2	3	Web
Kynoch 54 (ruptured)	88-89	89	89	90
Kynoch 54	89	90	89	89
TW 54	83-85	84	83	85-86
RA 53	84	90	87	90-91
WRA 56	86	87	89-90	90-92
DWM (commercial)	84-85	88-89	89	88-89

Notes: All hardness taken using Rockwell Superficial 15T Scale, then converted to Rockwell "B" Scale.

Column headings denote areas tested as shown in sketch above.

Table 2

#### Relationship Between Radius Size and Cracking Tendency\*

Case	Radius (in.)	Crack
LC-66 (7.62 NATO)	0.058	Continuous
	0.049	Continuous
WRA (45-70 Gov't.)	0.025	Continuous
	0.028	Continuous
	0.033	Continuous
	0.032	Continuous
FA (30-40)	0.030	Continuous
	0.041	Discontinuous
Norma (7x57 Mauser)	0.045	No Crack
	0.042	Discontinuous
National Match 1957 (30-06)	0.038	Discontinuous
	0.044	No Crack
	0.044	No Crack
	0.044	No Crack
Win. Super Speed (270 Win.)	0.064	No Crack
	0.066	No Crack
National Match 1958 (30-06)	0.085	No Crack
	0.086	No Crack

\*The LC-66 appear to be an exception to the trend shown above. 0.040" I-0.50" I radius seems to be the "crack, no-crack" transition area.



**Table 3**  
**Visual Crack Inspection**

Headstamp	Cartridge	Radius Crack	Surface Split	Remarks
FA 3-07	30-40	Yes	No	Unfired round
FA 3-07	30-40	Yes	No	Unfired round
RA 28	30-06	Yes	No	Unfired round
RA 53	30-06	Yes	No	Unfired round
TW 54	30-06	Yes	No	Unfired round
TW 54	30-06	Yes	No	Unfired round
LC 66	7.62 NATO	Yes	Yes	Unfired round
LC 66	7.62 NATO	Yes	Yes	Unfired round
LC6 67	30 Carbine	No	Yes	Unfired round
RG 7-53	303 British	No	Yes	Unfired round
Match 57	30-06	Yes	No	Once fired brass
Match 57	30-06	Yes	No	Once fired brass
Match 57	30-06	No	No	Once fired brass
Match 57	30-06	No	No	Once fired brass
Match 58	30-06	No	No	Once fired brass
Match 58	30-06	No	No	Once fired brass
Match 58	30-06	No	No	Once fired brass
Match 58	30-06	No	No	Once fired brass

#### Foreign Commercial Rounds

DWM K-Z	7x57mm	Yes	No	Unfired round
DWM K-X	9.3x74R	No	Yes	New brass
RWS	8x57IR	Yes	Yes	Unfired brass
NORMA	"Special"	Yes	Yes	New brass
NORMA	7x57mm	No	Yes	New brass
NORMA	7x57mm	Yes	Yes	New brass
Kynoch	9.3x62mm	Yes	Yes	Unfired round

#### Domestic Commercial Rounds

Win. SX	243 Win.	Yes	Yes	New brass
Win. SX	243 Win.	Yes	Yes	New brass
Win. SS	270 Win.	No	No	New brass
Win. SS	270 Win.	Yes	No	New brass
Win. SS	30-06	Yes	No	Unfired round
Win. SS	30-06	Yes	No	Unfired round
Win. SS	375 H&H	Yes	No	New brass
Win. SX	375 H&H	No	No	New brass
WRA	45-70 Gov't	Yes	Yes	New brass
WRA	45-70 Gov't	Yes	Yes	New brass
R-P	6mm Rem.	No	Yes	New brass
R-P	6mm Rem.	No	Yes	New brass
R-P	444 Marlin	Yes	Yes	New brass

Notes: Cracks are continuous in some cases; in others they are discontinuous, resembling a dotted line. The extent of the radius cracks varies from perhaps 30% of the circumference to a full 360 degrees.

"Surface Splits" a very shallow ruptures, generally found on the web, and are open rather than thin, crack-like indications.

Let's summarize results of this investigation:

1. The radius cracks were not caused by firing.

2. Factory loaded rounds contained cracks of varying depth and length.

3. New primed and unprimed factory brass was cracked.

4. At this point, age does not appear to be a factor. Brass manufactured recently contains the same crack condition as products made nearly 70 years ago.

5. Although not mentioned before, the propellants found in all disassembled rounds, regardless of age, appeared to be in good condition. None of the usual signs of deterioration were noted.

What can be said of the Kynoch failure at this point? We can say that possibly one unusually large internal case crack, in combination with non-metallic inclusions of equally unusual size, were contributory, if not primary, causes of failure. The evidence certainly does not point to soft brass or an abnormally high chamber pressure. Remember, if chamber pressure had been really high and consistent with this type of failure, the primer and primer pocket would have shown unmistakable evidence of it. Lack of conformity to dimensional specs can also be ruled out as we have seen by previous measurements.

What is the significance of this article? I think this work has brought forth a number of noteworthy points:

1. We see here a failure which is fortunately rare in both nature and frequency.

2. A technically sound cause of the failure has been suggested.

3. The "soft brass" theory can be discounted as a failure cause.

4. Certain earlier case failures of this type may have been erroneously attributed to soft brass.

5. Although most cartridge cases probably contain cracks in the web-wall radius, decades of experience suggest that they do not grow during use, and that they represent a low risk condition. They certainly aren't desirable but, for now, we're stuck with them.

6. Finally, information such as this is generally difficult to obtain and when it becomes available, it serves to significantly increase the shooter's familiarity with the most important handloading component he uses.

7. **DON YOUR SHOOTING GLASSES BEFORE YOU SQUEEZE!** ●



**"Chuck" Chuklhed is one of those unconventional handloaders who is confident he can transcend established methods. Let us observe how he progresses. As we open, he is about to concoct his own secret booster to enhance data propellants.**



"Boy, wait 'til those clowns at the range see me chronograph these Superduper loads. They'll never believe it. They think 4000 fps is fast?"



"Eureka! At last, my super-cartridge, my 8,000 fps brain child. None of my retarded pals can say they have a cartridge like *this*."



"...Ha! I'll show 'em 8000! *Blasto* is my big secret, and *this* is the baby that gives it that intangible tang..."



"Doesn't want to go in, huh? Well, everyone says tight headspace is good, so I'll just help this along a bit and when it's chambered I'll

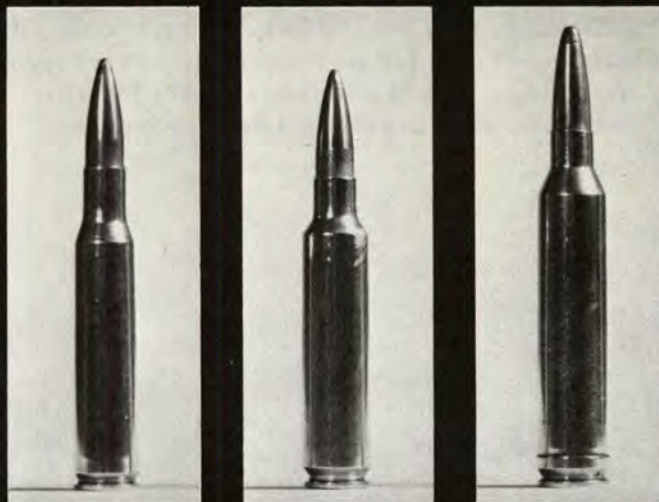


"...an important ingredient of my revolutionary, moon-age secret formula is exactly 17 drops of this. It gives the mixture zest."



"close the bolt, step to the window, take a crack at that ol' oak tree in my back pasture, and..."





Three 7mm cartridges. From left—the 7x57mm, the 284 Winchester and the 7mm Remington Magnum.

**The author, a rifleman-hunter  
for more years than he'd like to admit, examines the merits  
of the various sevens, big and little — and finds none of them wanting.**

## **Reflections on the 7mm Calibers — but with none on the 270!**

**by R. F. CHATFIELD-TAYLOR**

**Q**UITE FREQUENTLY I get letters asking whether the writer should buy a 270 Winchester or a 280 Remington, a 284 Winchester or a 7x57 Mauser. These days, of course, there is great interest in the various 7mm magnums, principally the Remington version. Some 90% of my big game has been killed with one of these calibers, and in the past two or three years I've spent a lot of money having various loads for these calibers measured for both pressure and velocity. For these reasons I feel competent to offer certain suggestions regarding these loads.

To begin with, any of the 5 cartridges will kill anything on earth, assuming that the proper bullets are put into the proper place. As most informed riflemen know, "Karamojo" Bell killed over a thousand elephant with the smallest of the lot, the 7mm Maus-

er. He used solids and he aimed for the brain. He usually got himself in such a position that the broadside shot was offered. This presents a brain area of about 8 inches long by four deep, a large enough target for any rifleman. Old friend Werner von Alvensleben, a director of Mocambique Safarilandia, told me he'd killed well over a thousand Cape buffalo over the years with the 6.5 Mannlicher-Schoenauer, and that he considers himself somewhat over-gunned with a 7x57. Recently, when I asked him what firearms to bring for a general hunt in Portuguese East Africa, he replied:

"Bring your 458 and your 7x57 and leave the rest home. You will probably never use the 458 but it'll make you happier to have it until I show you what you can do with the 7mm. You'll soon be making

one-shot kills on buffalo with it."

It is presumptuous, indeed, for a comparative tyro such as I am to question the word of a man who has killed over a thousand buffalo. I am sure Werner can do it and I am sure Mr. Bell did it, too. But the average man? Under all conditions? I should certainly not recommend that any old body try to shoot buffalo with a 7mm of any variety, much less the smallest of the lot.

The largest animal I've killed with a 7mm was an Alaskan brown bear—a 7mm Remington Magnum made up on a Mauser action and 22" Douglas barrel with 1 to 9½" twist. The load was 68-4831-175 Nosler, the range about 300 yards. The first shot lowered his front quarters. The second lowered him all over and a third was unnecessary. He never moved out of his tracks. The Nosler



bullet performed perfectly, as usual, and was found under the skin on the far side, properly mushroomed and weighing 128.5 grains. It had gone through both shoulders. We assumed it had been the killing bullet, and probably the first shot. Ralph Young, Jack and Eleanor O'Connor, saw this shot, taken on Baranof Island in June of 1963.

The smallest animal I've taken was a steinbok. I shot this little antelope in Kenya in 1954 with a 270, the load 59-4831-150 Speer, which chronographed in my rifle at

### My Three Sevens

In the past two or three years I have been using three 7mm rifles, a 7x57, a bolt action 284 and the 7mm magnum referred to above. The 7x57 has accounted for three pronghorn antelope, one black bear and two deer. The 284 has killed one caribou, one Dall ram, one grizzly and one elk. The 7mm magnum killed the brownie on the only trip on which I have taken it. In the 7x57 I've used 45.5-4320-140 Noslers exclusively, and all



The author collected this grizzly in the Yukon, range about 100 yards, his rifle a Griffin & Howe in 284 Winchester on the Model 700 Remington action. His handload consisted of 58-4350-140-gr. Nosler bullet.

fractionally over 3000 fps.

There have been many in between. Just about everybody, including Jack O'Connor, agree that the 270 continues to be one of our very finest calibers for most game. I've taken most of my game with a 270 including much of my African plains game. Of some 40 head killed with the 270 I have only had to shoot more than once on two occasions. The first time was at a Grevy zebra and the second time at an oryx beisa, both in Kenya in the Northern Frontier District. My first shot at the zebra hit him in the right rear leg since he was running and I did not lead him nearly enough. My first shot at the oryx hit him well aft for the same reason. These failures, therefore, were in no sense the fault of the rifle. A 600 Nitro Express would not have done any better.

game mentioned were killed with one shot. In the 284 I have used 58-4350-140 Noslers. The elk required a finisher because the first shot was too far back again. This load dropped a 500-lb. grizzly in the Yukon as though the Empire State Building had fallen on him.

From these experiences I must conclude that a properly loaded 7mm rifle is adequate for most of the thin-skinned game in the world, assuming it to be hunted in more or less open country. For dangerous or non-dangerous game in heavy timber, where raking shots might be required and bullet placement problematical, I'd like a rifle of larger bore, and one throwing heavier bullets.

Which 7mm do we choose, then, and what about the 270? A tough question, friends, and one that might have given Einstein the me-

grims. There are those who feel that it doesn't make any difference. I know of three experienced hunters who did an African safari a year or so ago. One took a 7x57, one a 280 Improved, the third a 7mm Remington Magnum. Game up to and including greater kudu and sable antelope were killed with all three rifles, most with one shot. Their comment was that maybe the animals took one or two steps more after being hit with the 7x57 than with the magnum.

Last fall I hunted in Wyoming. For three or four months before going out there I lay awake nights trying to make up my mind between a 7x57, a 270 and a 284. I finally adopted a different yardstick—instead of making my choice on the basis of power I decided to choose that rifle which had held its zero the best over a period of time. I'll continue to use this criterion as far as these three rifles are concerned.

There are, however, certain advantages for each of these calibers. I very much doubt that the game would know the difference but the hunter might. The 7x57 is the smallest of the lot and has, in rifles of near-equal weight and form, the least recoil. A maximum handload with 140-gr. bullets will produce a bit over 3000 fps, hence about 2800 ft. lbs. of muzzle energy. With a 270 I can get 3200 fps with 130-grainers for 2960 ft. lbs. and 3000 fps with 150-gr. bullets for an even 3000 ft. lbs. With my 284 bolt gun I can get 3150 fps with 140-gr. Noslers and 3090 ft. lbs.

### The 7mm Magnums

Now we get to something which a lot of people are unaware of. The 7mm Magnums with such light bullets as the 140-grainers, and with currently available canister powders do not, at comparable pressure levels, greatly exceed what may be done with either the 280 or the 284 Winchester.

I have before me two pressure and velocity tests of the 7mm Remington cartridge. In both cases 26" barrels were used. Remington's Bridgeport laboratory gave me the following averages:

69-4831-160 Nosler	3098 fps	52,340 psi
69-4350-140 Nosler	3383 fps	59,200 psi
72-4831-140 Nosler	3290 fps	53,580 psi

The H. P. White Laboratory (using the same 7mm R. M. loads) gave, among others:

72-4831-140 Nosler	3328 fps	54,000 psi
72-4831-140 Nosler	3339 fps	55,300 psi



H. P. White also supplied the following figures for a 284, using a 26" pressure barrel:

58-4350-140	Nosler	3090 fps	46,760 psi
57-4350-160	Nosler	2950 fps	49,840 psi
60-4350-120	Sierra	3263 fps	44,520 psi
59-4350-140	Nosler	3235 fps	56,880 psi

It will be seen from these figures that the big case does, of course, do a little better at comparable pressure levels but not very much; and it takes about 10 to 12 grains more powder to do about the same job.

The big 7mm case comes into its own with 175-gr. bullets. Remington is now making a 175-gr. spitzer, which should be a lulu for very large stuff at very long range. This

which must be considered in this comparison. Magnum brass is very tough, indeed, and pressures are being used day in and day out which would have terrified the riflemen of yesteryears. In my Mauser 7mm magnum I actually set the bolt back before running into any case difficulties. H. P. White recorded one pressure of 62,000 psi with 69-4350-140 Nosler. I went to 72 grains of this same powder before I got a half-thousandth (0.0005") enlargement on the case rim and, even then, I had no extraction problem. This was in my particular rifle. *That same load might atomize somebody else's rifle and I am certainly not recommending it to*

mentioned in previous articles, range is a very important factor. I suggest that each hunter establish an energy that he feels is acceptable for the game to be hunted. If a 7x57 provides this figure at 100 yards, the 280 and 284 will offer it a bit farther out, and the 7mm magnum a bit farther, still.

The 7x57 offers the possibility of a very light rifle of moderate recoil. It does not provide the variety of factory loads that the others do, but handloading can be resorted to, in which case there is no difference.

### The Smaller Sevens

The 280 Remington is, in my



The author's three 7mm rifles, all custom made by Griffin and Howe. Top, a 7x57mm on a Model 70 action. Middle, a 284 Winchester built on a Remington Model 700 action. Bottom, a 98 Mauser action, caliber 7mm Remington Magnum. Simple, elegant, workmanlike rifles.

bullet can be driven at 3000 fps in a 22" barrel, and this velocity will be relatively well maintained because of the excellent ballistic coefficient of this long, well-shaped bullet.

Figures from ballistic laboratories are puzzling at times. Working with an Avtron chronograph and my own rifles, the difference between the 284 and the 7mm Remington Magnum using 140-gr. bullets and comparable pressure levels, is much less than is indicated above.

Now, there is one other thing

*anybody.* I mention this as an indication of the immense strength of modern magnum cases; and my purpose in mentioning it is to amplify the point that a 7mm magnum at the 50 to 55 thousand psi level is not all that much better than other 7mms but that at 60-odd thousand psi it is quite something. Many people seem ready to accept these giddy pressures, and they seem to be getting away with it nicely. Let your conscience be your guide!

The question as to whether we need these velocities and pressures is something else again. As I have

opinion, a far better load than its current sales figures indicate. Let's dwell a moment on this 280 Remington. It is roughly 10% more powerful than the 7x57. It is some 5% more powerful than the 270 when loaded to commensurate pressure levels. It has a nearly ideal powder capacity for the .276" bore and .284" groove diameter. It will come close to the performance of the 7mm magnums with much less powder and much longer barrel life. With it one can use heavier bullets than are practical in the 270, so it is probably a somewhat



better bet for large animals in heavy timber. There are few animals that a good rifleman could not tackle with this cartridge and 175-gr. Nosler bullets. I should only bar dangerous animals in very heavy bush. Its recoil is appreciably less than that of the 7mm magnum: 18 against about 26 ft. lbs. The rifle to handle it may, therefore, be built lighter. An 8-pound 280 is a joy to shoot if properly stocked.

Now, before going further, let me say right now that these remarks apply only to handloaded ammo for the 280. This must be clearly understood. This load was brought out, as I understand it, because

took a 280. So did Fred Huntington of RCBS. When Len Brownell made a rifle for his personal use it was a 280 on a Winchester Model 70 action. Parker Ackley, if I am not mistaken, fooled with the idea of a 280 way back when he was in Trinidad. He called it the 276 Ackley, I think. The 285 O.K.H. of Keith, Hopkins and O'Neil featured a very long, beautifully proportioned 180-gr. bullet made by Western Tool & Copper as well as their duplex loading, which simply meant the use of a flash tube to carry the primer flash to the front of the case. Brenneke had his 7x64, a load very, very similar to the

It is one of the world's great rifles, and one I'd be glad to hunt with anywhere if only I could get solid bullets for it. In fact, this was the main reason why I shifted from the 270 to the 7mms. I wanted a rifle which could be used in Africa, and I didn't want to take to Africa any rifle for which I could not obtain some solids. It is not that I plan to use them. It is just that if I am caught out alone and an inquisitive and/or belligerent rhino happens along I just want some solids.

If a man owns one of these rifles—any one of them—I certainly don't recommend that he spend a plugged nickel getting one of the



Bob Chatfield-Taylor and an elk he killed in Wyoming with a 270 rifle built on an early Model 70 Winchester by Len Brownell. He used a handload as usual—59-4831-150-gr. Nosler bullet.



The big Brown bear, shot by the author (left) on Baranof Island (Alaska) was felled for keeps with one shot at about 300 yards. Taylor's rifle was his G&H 7mm Remington Magnum, his handload 68-4831-175-gr. Nosler bullet. Ralph Young at right.

Remington wanted a cartridge similar to the famous 270, and one which would work in their auto-loading Models 740 and 742. Breech pressure had to be limited to about 52,000 psi for this objective to be satisfactory. They could not use the 270 since the maximum pressure permissible for this load has been on the order of 54,000 psi, and this was just too much for the cornshellers. The result was the 280, and throttled down so that it would work in all of Remington's models. I don't know exactly what the pressure is of a factory-loaded 280, but I do know that it is less than the average 270; yet it must better 270 pressures if energies are to be comparable.

The 280 has been the choice of some savvy gents. When Jim Converse of Tucson went to Africa he

280, and with which Col. Harry Snyder of Canada did much of his mountain hunting. The 7mm caliber has long been the pet of the dedicated gun nut in this country and abroad; and the 280, in some guise or another has been the pet of many of the more knowledgeable of these gun nuts. Don't underestimate it. It is a great load, and more than most of us need for most of the game we shoot.

The 284 Winchester will do everything the 280 will do but will work in a shorter action. My 284 is based on a 243-length Remington 700 action. It is a joy to carry and, as I mentioned previously, it has done pretty well in the fairly short time I've had it. I'd be very glad to hunt anywhere with it, including Africa.

I'll say little more on the 270.

other calibers I've mentioned here. What I've written applies, I think, to the man who is buying a new 270 rifle or one of the 7mm calibers. The differences are infinitesimal but the few I have indicated do exist for those who like to split hairs. The big 7mm magnums must be put in a class by themselves, especially when loaded with the heavier bullets. You could use the other four for the rest of your life and have the devil's own time telling the difference. ●

The various loads mentioned by the author, including the loads tested by Remington and H. P. White, are full-power loads. Do not use them without first reducing the powder charges at least 5%. Neither the author nor the publishers assume responsibility for or recommend the loads listed.



# Handloading the BRI 12-GA/500 Sabot Bullet

by WALLACE LABISKY

HIS CURIOSITY whetted to a keen edge by the booming gunfire, a resident of the area alighted from his pickup truck early one morning last summer and inquired, "Whatcha shootin' there, mister?"

"Slugs," I replied.

He sized up my scope-mounted shotgun with a searching eye. "Twelve gauge, huh?"

"Yup, 12 gauge," I responded.

Having just finished firing a 5-shot string, I was preparing to walk downrange and change targets. The stranger tagged along, and when he saw the target he fairly sputtered. "You tryin' to pull my leg, mister? Them sure ain't no 12-gauge holes!"

I agreed that he was very much correct, indeed, and pointed out they were actually 50-caliber holes. That simple statement, believe me, prompted the need for a great deal of painstaking explanation.

The 12-GA/500 sabot bullet, conceived and developed by Ballistic Research Industries (BRI), a West Coast firm located at 116 North Main St., Sebastopol, California, represents a fresh, new concept in shotgun slug design. In fact, the BRI shotgun projectile stands as the first really new design since the Foster-type rifled slug replaced the round ball some 36 years ago. It is, without doubt, truly a major break-through in terms of accuracy, energy and effective range.

As one who has clobbered a fair number of whitetails with the conventional rifled slug in 12-ga. shotguns (as well as having fired many hundreds of rounds in all gauge sizes from the bench), I have a great deal of respect for this huge chunk of lead. Although it is

roughly only half as fast as most modern rifle loads, it packs enough devastation to convert the old bird gun into a very deadly firearm for big game in the deer/black bear class—that is, providing you avoid popping at those critters way off in yonder township. But along with its capabilities, its proven put-'em-down punch at woods-shooting ranges, it also has its shortcomings.

Heading the list of ballistical faults, the Foster-type slug has poor sectional density (SD). As most of you know, SD, very simply defined, is a diameter/weight relationship which has a great deal to do with projectile behavior once it is in free flight.

Weighing in at one ounce (give or take a few grains), the commercially loaded 12-ga. rifled slug blasts out of the muzzle at around 1,600 fps. Even with a dull pencil that figures out to nearly 2,500 ft. lbs. of energy. With that in mind, it's little wonder that at brush ranges the conventional slug delivers such a sledge-hammer wallop. But its blunt nose configuration and its wide frontal area are the two factors which severely limit its aerodynamic performance. As such the slug is poorly shaped for slicing through air. Resistance is considerable, the velocity loss is rapid and, since energy is as much a product of velocity as it is of mass, stopping power suffers. Nor is that all, because as velocity diminishes with increasing range, both accuracy and trajectory take a beating.

Eliminating these faults, or at least toning them down to a large extent, was the idea in mind when William McAlvain (president of BRI) and Dr. Ward Kelly launched

the monumental project of designing and developing a better shotgun projectile for both law enforcement and hunting use.

A number of different designs evolved, were tested and evaluated, only to be discarded, some of these projectiles being pretty startling and far-out in appearance. With Kelly at the drawing board and McAlvain riding herd on the ballistics and other matters, the experimental work ate up a year's time and then some, with over 50,000 rounds being handloaded and test fired. The design finally adopted is a take-off on the ordnance practice of encasing a sub-caliber artillery round in a sleeve in order to improve sectional density and, in turn, the ranging ability of the projectile. *Sabot* is the ordnance term for this sleeve, and the word is variously pronounced *SAB-oh* or *SAB-et*.

## Birth of the BRI

In its current and final form the 12-GA/500 bullet is a wasp-waist design of 50 caliber diameter at front and rear; the waist diameter, running very close to .315", occurs at a point a half-inch forward of the base. Length of the 440-gr. Shock Point hunting bullet is 1.275". Actual weight is in very close agreement with the advertised weight—three Shock Point slugs taken from BRI factory rounds ranged from 439.5 to 441.9 grains, the average leveling out at 440.4.

There is a small drilled cavity of .315" diameter in the base of the bullet, this taking a solid plastic plug ¼" long. Nose configuration con-



*Hundreds of experimental loads were fired to bring you this exhaustive report on the new Sabot slug developed by Ballistic Research Industries. Here are detailed load data, tips on working with this great new bullet, and test results at the target.*



sists of a .200" center flat followed by a 30° angle.

According to BRI, the various surface angles of the bullet are designed to use air flow in promoting stability in flight (resistance to tipping or yaw). However, the plastic-filled base cavity makes the bullet a wee bit nose heavy, and this probably also contributes to maintaining a point-forward attitude.

The SD for the 440-gr. bullet is .251 in contrast to a mere .107 for the conventional 12-ga. slug weighing one ounce—a whopping big increase of 134 percent. This means, of course, that the BRI projectile will retain its velocity far better, thus will deliver a great deal more energy and give deeper penetration at the target. From this it will be seen that the BRI bullet very substantially increases the effective range of the 12-ga. shotgun on big game.

Ballistics listed for commercial loads credit the conventional slug with 895 ft. lbs. of remaining energy at 100 yards, while the factory-loaded 12-GA/500 bullet of 440 grains still has slightly over 1,600 ft. lbs. of punch at the same distance.

It may be of interest to further note some comparative energy figures for a range of 200 yards. The 12-GA/500 bullet, when loaded to a MV of about 1,500 fps, delivers 91% more energy than the 44 Rem. Magnum with a 240-gr. bullet. It shows a 40% edge over the 30 Remington with 170-gr. bullets; 27% over the 303 Savage with a 180-gr. bullet; 23% over the 45-70 with a 405-gr. bullet, and 22% over the venerable 30-30 Win. with the 170-gr. bullet—all of which stacks

up as mighty impressive performance.

The sabot halves which surround the bullet are made from a high-density polyethylene, and for several months now BRI has been using a new mould with improved temperature control that makes it possible to hold a plus or minus tolerance of .003-inch. When the two-piece sabot is pressed firmly around the 50-cal. bullet, the "package" has an outside diameter (OD) of .725-inch. The sabot halves, of course, are inside contoured to closely match the bullet surfaces.

The sabot approach actually serves a two-fold purpose. In addition to making possible the use of a sub-caliber projectile for a vastly improved ballistic coefficient, it also serves to keep the bullet perfectly centered in the shell as well as in the bore. And the latter is a very important factor in terms of accuracy.

Even when bore size exceeds .725" diameter, bullet centering is perfect. This is because the bullet surfaces use the set-back forces to slightly spread the sabot halves to full bore diameter. Once the sabot/bullet package exits the muzzle, the sabot breaks away and the bullet is on its own—and in perfect form, *having never touched the bore at any point.*

There is no risk involved in firing the sabot bullet through 12-ga. bores which measure less than .725-inch. The writer put a number of rounds through an old Browning Automatic-5 with a tight .715" bore and no trouble surfaced. During one of our several phone conversations, McAlvain mentioned that he had been getting top-drawer ac-

curacy with an Ithaca Deerslayer, and this version of the Model 37 slide-action, as you may know, is bored a good bit tighter than standard so as to improve accuracy with conventional rifled slugs.

### BRI Bullet Types

BRI's projectile line-up currently includes three types of 12-GA/500 bullets. All are dimensionally the same and, as far as I can tell, the sabots are likewise identical for all three versions.

First is the MK8, which is further designated as the Police Alloy bullet at an advertised weight of 440 grs. Comprised of 5% tin, 11.5% antimony and the rest lead, it is designed for use only in cylinder and improved cylinder barrels. Available only in BRI factory-loaded rounds, this type is intended for law enforcement work, such as penetrating automobile bodies and engine blocks, blasting through barricades in counter-sniper use and other related tasks.

Tests conducted by BRI showed that this MK8 bullet is capable of fully penetrating a 1/4" steel plate at 110 yards. Conventional slug loads fired for comparison would only *dent* the same plate at 50 yards. Composition of the MK8 is such that it will undergo fragmentation when striking any object that it cannot penetrate. It enables the short-barreled riot gun, which can be easily carried in patrol cars, to replace the more un-

The BRI 50-caliber wasp-waist projectile, when loaded, is encased between the plastic sabot halves, which are moulded to match bullet contour. The sabot keeps the bullet perfectly centered in the 12-ga. bore at all times; the sabot halves release and fall away on exiting the muzzle.





The 12-Ga./500 factory rounds (left) used a plastic case specially made by Federal. Bases, headstamped BRI, have slightly thicker tube walls than Federal's regular offering. Factory-load packaging is (or was) in 5-round boxes.

Both the 440-gr. Shock Point and the 260-gr. zinc-alloy bullets are offered to handloaders in 10-round sets (below). Included are the bullets, sabots and plastic base plugs. Boxes are just the right size for storing handloaded rounds.



wieldy high-powered rifle and with much the same effectiveness. Reportedly, the Police Alloy load has been enthusiastically received by many law enforcement agencies throughout the country, and it is my understanding that even some foreign governments have placed large orders with BRI for the MK8 round.

BRI's 440-gr. Shock Point bullet for hunting use carries the designation MK9 in the factory-loaded rounds, and MK5 in component form for handloading. Like the Police Alloy bullet, the MK9 and MK5 are intended for use in open-bored barrels—either true cylinder or improved cylinder. Accuracy is also fairly good in weak modified tubes. Bullet make-up is somewhat softer than the MK8, consisting of 3% tin, 10% antimony and the remainder lead.

The third type is for those shooters who may want to use the 12-GA/500 bullet in a full-choke barrel. This is a lightweight projectile which, in its current production form, weighs 260 grains. McAlvain describes the offering as being

"very hard and tough" and as giving "amazing penetration." This 260-grainer is of zinc-alloy composition, can be driven to a very high velocity without running chamber pressure into the danger zone. Available in both factory loads and separately for handloading, this bullet is called the MK7 and MK6, respectively.

The reason the 440-grainers are not suitable for tightly-choked barrels is because of their composition. The 83.5 to 87 percent lead content leaves the bullet a bit too "soft" to survive passage through the choke, the sudden squeeze-down on the sabot causing the bullet to separate at its waist. This multi-ball effect would be fine for cleaning out a rowdy alley at midnight, but mighty disappointing in the game fields.

The zinc-alloy composite has the necessary toughness to take tight chokes in stride. Attaining a bullet weight substantially heavier than 260 grs. with this alloy could not be done without going to the trouble of making major dimensional

changes in both the bullet and the sabot. Even then the move would hardly be feasible because bullet length would have to be stretched to a point where there would be no room for wadding.

### Factory Loads and Components

The MK8, MK9 and MK7 factory loads are packed in convenient, pocket-sized, 5-round boxes priced at \$2.90. Handloading sets in the MK5 and MK6 versions contain 10 bullets each, along with the plastic base plugs and the sabots, and sell for \$2.95.

Incidentally, some of you cartridge collectors who specialize in shotgun fodder may be interested to know that the first BRI factory loads were put together in Remington low-brass plastic (ShurShot) shells. Later a switch was made to the Alcan LP7 plastic shell, this also being a low-brass tube with a corrugated surface. However, since neither the Remington nor the Alcan-cased factory loads carried the BRI headstamp, there may be a problem. You'll probably never really know for sure whether you have acquired a bonafide factory load or somebody's handload.

During the past year or more, factory loads have used a low-brass plastic shell manufactured for BRI by the Federal Cartridge Corporation. Early loads in these hulls were headstamped "FC" on the top and "HL" on the bottom, with "12" and "GA" across the center. Factory loads in current production are headstamped "BRI" on the top and "12 GA" on the bottom. There are no tube markings to aid in identification.

For the factory-loaded rounds, BRI specifications call for a shell with slightly thicker tube walls—to be exact, an inside diameter (ID) of .730" as opposed to the Federal standard of .750" for use with shot loads. These special hulls as supplied by Federal are not offered for handloading use at this time, and from what I have been able to gather, BRI has no plans to release them in the future.

Like the conventional slug, loads with the BRI projectile call for a roll-crimp closure. In the interest of uniform ballistics and the best in accuracy, virgin hulls are recommended for handloading. Even though the BRI plastic hull is unavailable, there is no problem here.

Readily obtainable in 2 1/2" 12-ga. is the Remington SP plastic shell in low-brass field type (#S23470), which



is far better suited than the target type. Smith & Wesson-Fiocchi (Alcan) offers both low- and high-brass plastics (LP7 and MP7), as well as a high-brass plastic 3-incher for use in magnum chambers. Additionally, both Winchester and Federal supply virgin paper-tube hulls to the hand-loading trade. The Federal is better suited for the 12-GA/500 load because its low basewad provides greater load capacity.

Once-fired shells that were originally fold crimped are not suitable as they will not take a good roll crimp, and this holds true even for 3-inchers which have been trimmed back to  $2\frac{3}{4}$  inches. However, 3-inchers that were originally roll crimped will work out satisfactorily when trimmed to standard length.

Contrary to what many hand-loaders seem to think, you don't have to be a professional ballistician or an M.I.T. grad in order to crank out a first-class slug load. In fact, I'd say that with the 12-GA/500 bullet there is less chance of fouling up than when working with the conventional rifled slug.

By way of equipment, Lyman still offers a roll-crimper head with an adapter for use in either a drill press or an electric drill at about \$4, and if you're already set up for 12-ga. reloads this is really the only piece of extra equipment needed. All of the writer's test loads were crimped using the Lyman Easy shotshell press for which both fold- and roll-crimp dies are available. This tool will turn an excellent roll crimp on both paper and plastic shells, though with the latter several extra press strokes are usually required to make the turnover.

### Cases and Loads

The BRI 12-GA/500 bullet is still so new that only a very limited amount of handloading data is available. Packed with the 440-gr. Shock Point bullet/sabot sets is a sheet of handloading instructions giving powder and wad column recommendations for the Remington and Alcan plastic shells. Just one load is listed for each hull—28/Herco and 34/AL-7, respectively. The instruction sheet for the MK6 zinc-alloy bullet for full-choke use lists loads for Alcan, Federal, Remington and Winchester plastic hulls, with 25/Unique being the sole recommendation. These sheets also show a loaded round in cutaway view, and even a fledgling hand-loader should be able to come up with a properly loaded shell if he



Above—Recoil, always more noticeable when firing from the bench, was considerable with the 440-gr. Shock Point bullet, relatively mild with the 260-gr. projectile. Test firing was limited to a maximum of 60 loads per session, with a "take-10" break between groups to forestall flinchitis.

Right—With the same scope setting, group impact varied with different chokes and barrel lengths, as well as with different powders and the amounts used. This 5-shot tight cluster at 50 yards was almost one ragged hole; 29/Herco behind the 440-gr. Shock Point bullet, improved cylinder barrel of Mossberg M-500 pumpgun. Most BRI test shooting was done with this gun. The scope is a Lyman All-American  $2\frac{1}{2}x$  in Weaver mounts.



Below—the author looks over a 5-shot group fired at 50 yards with the Imp Cyl/Skeet barrel. A 2-inch Targ-Dot was just right for use with the  $2\frac{1}{2}x$  scope at this range.





has the good sense to follow the diagram with respect to wad column construction, et cetera. Tables VIII and IX accompanying this report list some additional loads and ballistical data for both the 440-gr. and the 260-gr. bullets—BRI the source.

As will be seen in these tables, and also in those detailing bench rest accuracy results with the writer's handloads, the medium- and slow-burning propellants—those generally used for 12-ga. shot loads weighing 1¼ ozs. and heavier—are the proper powders for fueling 12-

GA/500 handloads with the 440-gr. bullet. These include, for the most part, Herco, AL-7, HS-6, 540MS, SR-7625, AL-5 and N-2020.

Long considered an old reliable for 12-ga. use behind a 1-oz. Foster-type rifled slug, Unique is also useful with the BRI 440-grainer, but being on the fast side of the "medium" powders it is my opinion that its use should be reserved for large-capacity hulls which will permit the inclusion of a cushion wad in the column so as to keep chamber pressure at or below the 11,000 LUP level. In this role, a charge

of 25/Unique should be regarded as maximum.

As for the 260-gr. zinc-alloy bullet, Unique and other propellants of a comparable burning speed rate as a top choice regardless of the wad column used. One can go as high as 28/Unique for 1,600 fps without chamber pressure zooming into the hazardous range. Alcan's AL-120 was not tried by the writer, but chances are it will also prove useful with the BRI lightweight.

AL-5 gives acceptable ballistics behind the 440-gr. bullet, but it was not included in my tests. Others who have tried AL-5 say that it gives considerable muzzle blast which results in a disturbing influence on the sabot release. Whether or not this is actually the case, I cannot say.

Of the "slow" powders listed above, all that were tried produced good deer-hunting accuracy (and seemingly excellent ballistics) with the 440-gr. bullet. All of them, that is, except N-2020; charges of 26 and 27 grs. were tried in the Mossberg Imp Cyl barrel, but in both cases the target results were disappointing. The 50-yard groups ran in excess of 6 inches, which can be considered a poor showing for this particular barrel. The reason remains obscure. Possibly there was disturbing muzzle blast with N-2020. On the other hand, perhaps it was simply a matter of the barrel showing a strong dislike for the load.

Among the various 440-gr. hand-

**TABLE I**  
**BENCH REST ACCURACY TESTS — 50 YARDS RANGE**

**BRI 12-GA/500 MK9 Factory Load, 440-gr. Shock Point Bullet**  
**(Lot FH27H) \***

**GUN:** Mossberg 12-ga. Model 500 Slide-Action Repeater  
**SIGHTS:** Lyman All-American 2½x Scope  
(Five-shot groups measured on centers)

24" "Slugster" barrel	26" Imp Cyl barrel
3" chamber	3" chamber
Bore .733", muzzle .733"	Bore .732", muzzle .729"
6⅝" (4 in 2½")	27⅞" (horizontal grouping)
6½" (loose horizontal grouping)	3⅝" (vertical grouping)
3½" (vertical stringing)	3½" (loose horizontal grouping)
6⅝" (vertical stringing)	
3½" (4 in 2⅝")	

\* BRI 2¾" plastic shell manufactured by Federal Cartridge Corporation, Federal 209 primer, 26.1 to 27.9 grs. Herco powder for three rounds checked, Alcan PGS over-powder cup, .200" nitro card, 440-gr. Shock Point bullet in brown-colored plastic sabot, and roll crimped to an over-all length of 2.475 inches.

NOTE: Current factory loads (late 1971) employ a white-colored sabot having a slightly smaller outside diameter than the earlier brown sabot. At last report, the Winchester-Western Universal over-powder cup was being used in place of the Alcan PGS.

**TABLE II**  
**BENCH REST ACCURACY TESTS — 50 YARDS RANGE**  
**BRI 12-GA/500 MK5 Handloads, 440-gr. Shock Point Bullet**

**GUN:** Mossberg 12-ga. Model 500 Slide-Action Repeater  
**BARREL:** 24" "Slugster," 3" Chamber, Bore .733", Muzzle .733"  
**SIGHTS:** Lyman All-American 2½x Scope  
(Five-shot groups measured on centers)

CASE	PRIMER	POWDER	WAD COLUMN*	SABOT	ROLL CRIMP OVER-ALL	GROUP SIZE
Rem. S23470 2¾" Plastic	Rem. 57	29/Herco	PGS. + .045" Plastic Spacer + .135" Nitro	Brown	2.525"	3½" (4 in 2⅝")
Alcan CM 3" Plastic	220 Max-Fire	34-AL-7	PGS + ¼" FBS + .200" Nitro	Brown	2.730"	3¼"
Alcan CM 3" Plastic	220 Max-Fire	35-AL-7	PGS + ¼" FBS + .200" Nitro	Brown	2.730"	2⅝"
Alcan CM 3" Plastic	220 Max-Fire	33-AL-7	PGS. + .045" Plastic Spacer + ¼" Mono-Wad + .200" Nitro	Brown	2.750"	3¼"

\* Seating pressures: Herco 80 to 90 lbs.; AL-7 40 to 50 lbs.

PGS = Alcan plastic over-powder cup. FBS = Alcan Feltan-Bluestreak filler wad.

NOTE: New cases were used for all handloads.



**TABLE III**  
**BENCH REST ACCURACY TESTS — 50 YARDS RANGE**  
**BRI 12-GA/500 MK5 Handloads, 440-gr. Shock Point Bullet**

GUN: Mossberg 12-ga. Model 500 Slide-Action Repeater  
 BARREL: 26" Imp Cyl/Skeet, 3" Chamber, Bore .732", Muzzle .729"  
 SIGHTS: Lyman All-American 2½x Scope  
 (Five-shot groups measured on centers)

CASE	PRIMER	POWDER	WAD COLUMN*	SABOT	ROLL CRIMP OVER-ALL	GROUP SIZE
Rem. S23470 2¾" Plastic	Rem. 57	30/Herco	PGS + .045" Plastic Spacer + .135" Nitro	Brown	2.550"	2½"
Rem. S23470 2¾" Plastic	Rem. 57	29/Herco	PGS + .045" Plastic Spacer + .135" Nitro	Brown	2.525"	1¾" (4/ragged hole) 3½" (4 in 2½") 1¾" 2"
Rem. S23470 2¾" Plastic	Rem. 57	28/Herco	PGS + .045" Plastic Spacer + .135" Nitro	Brown	2.525"	2½" 3¼"
Alcan LP7 2¾" Plastic	220 Max-Fire	34/AL-7	PGS + .045" Plastic Spacer + .200" Nitro	Brown	2.500"	3⅞"
Alcan LP7 2¾" Plastic	220 Max-Fire	35/AL-7	PGS + .045" Plastic Spacer + .200" Nitro	Brown	2.500"	2⅝"
Alcan LP7 2¾" Plastic	Norma 209	25/Unique	PGS + .045" Plastic Spacer + ¼" FBS + .135" Nitro	Brown	2.525"	3½" 3⅞"
Federal H-P Plastic trimmed to 2¾"	Fed. 209	27/Herco	PGS + (2) .045" Plastic Spacers + (2) .135" Nitros	Brown	2.525"	8" (4 in 3¼")
Federal H-P Plastic trimmed to 2¾"	Fed. 209	27/Herco	PGS + .045" Pl. Spacer + ⅝" FBS + .045" Pl. Spacer	Brown	2.525"	7⅝" (4 in 4⅜")
Alcan LP7 2¾" Plastic	Win. 209	31/540MS	PGS + .045" Plastic Spacer + ¼" FBS + .135" Nitro card	Brown	2.550"	3½"
Alcan LP7 2¾" Plastic	Win. 209	31/540MS	PGS + .070" Nitro + ¼" FBS + .070 Nitro	Brown	2.525"	5½" (4 in 2¼")
Rem. S23470 2¾" Plastic	Rem. 57	27/7625	PGS + .045" Plastic Spacer + .135" Nitro	Brown	2.550"	2⅝"
Rem. S23470 2¾" Plastic	Rem. 57	26/7625	PGS + .045" Plastic Spacer + .135" Nitro	Brown	2.525"	3⅞"
Alcan LP-7 2¾" Plastic	Norma 209	27/N-2020	PGS + .045" Plastic Spacer + .200" Nitro	Brown	2.500"	6⅞"
Alcan LP7 2¾" Plastic	Norma 209	26/N-2020	W-W Universal O/P cup + .045" Plastic Spacer + .200" Nitro	Brown	2.525"	4 in 6⅞" + one wild
Alcan LP7 2¾" Plastic	Win. 209	32/540MS	PGS + ¼" Mono-Wad + .070" Nitro	Brown	2.500"	1⅞" 3½" (4 in 1⅝")
Rem. S23470 2¾" Plastic	Rem. 57	29/Herco	PGS + .045" Plastic Spacer + .135" Nitro	White	2.525"	7⅝" (4 in 2½") 4¼" (4 in 3½") 5¾" (4 in 4⅜")
Alcan LP7 2¾" Plastic	220 Max-Fire	34/AL-7	PGS + .045" Plastic Spacer + .200" Nitro	White	2.500"	9" (4 in 5¼")
Rem. S23470 2¾" Plastic	Rem. 57	26/7625	PGS + .200" Nitro Card	White	2.525"	5⅜" (4 in 3") 2¼" 4½" (4 in 1¾")

\* Seating pressures: Herco 80 to 90 lbs.; AL-7 40 to 50 lbs.; Unique 50 lbs.; 540MS 50 lbs.; SR-7625 60 lbs.; N-2020 50 lbs.

PGS = Alcan plastic over-powder cup, FBS = Alcan Felton-Bluestreak filler wad. Mono-Wad = Ljutic Industries.

NOTE: Federal cases used were once-fired 3" roll-crimp hulls which were trimmed to 2¾". All other loads were assembled in new shells.



loads tested, there was only one prescription which seemed *hot*. This was a 27/SR-7625 charge in the Remington plastic shell which resulted in noticeably flattened and flowing primers. Trying to judge chamber pressure by the condition of the fired primer is a pretty slipshod approach where shotgun loads are concerned, but pressure with this load was obviously higher than that produced by a 30/Herco charge in the same case. Reducing the SR-7625 charge by one grain seemed to bring the load "in line." Accuracy with both 26 and 27 grs. of this DuPont propellant was quite good.

Again referring to the accompanying tables, it will be noted that the long BRI bullet does not leave a great deal of room for wadding, and that in many instances there is space only for a plastic over-powder (O/P) cup topped by a nitro card. In shot loads such a spartan wad column would hardly be desirable; the lack of cushioning would deform so many pellets that patterns would surely cover the side of a barn, even at moderate ranges. But these scanty wad columns do not adversely affect performance

with the BRI projectile. One of my most accurate handloads with the 440-gr. Shock Point bullet was put together in the Remington plastic hull using 29/Herco, a recipe which permitted only a PGS O/P cup, a thin plastic spacer and a .135" nitro card.

Such slow-burning powders as 540MS and HS-6 are dense enough so that a filler can be used in 2 3/4" cases. For most of the other suitable propellants the story is the same where 3" hulls are used—but use these only in magnum chambers, please! A good rule of thumb regarding filler wadding is to use it whenever the case/powder combination permits it.

Those of you who are experienced in handloading the Foster-type rifled slug are fully aware of the need for placing a hard card wad between the filler wadding and the projectile. The purpose, of course, is to prevent the softer filler material from being driven into the open base cavity where it creates an imbalance that destroys accuracy. This practice is not necessary with the 12-GA/500 bullet, since the base cavity is filled with

a plug of solid plastic. But if topping the wad column with a card wad gives you peace of mind, then let force of habit take over. The practice will certainly do no harm.

### Plastic Spacers

It might be well to explain at this point why a plastic spacer was used over the O/P wad in most of my handloads. These were actually .045" over-shot cards which I bummed from my friends at Federal. I took my cue from early BRI factory loads in which a spacer of similar thickness was employed to reinforce the roof of the PGS wad against possible rupturing as a result of bullet set-back forces. When a card wad of .200" thickness is used, or a card wad in combination with a filler, I doubt that this practice has a great deal of merit. Again, it doesn't hurt a thing, but the necessity is questionable.

In one instance, the manner in which I employed the .045" spacer was catastrophic at the target. Using Federal 3" roll-crimp hulls that had been trimmed back to 2 3/4 inches, the load consisted of 27/Herco,

**TABLE IV**  
**BENCH REST ACCURACY TESTS — 50 YARDS RANGE**  
**BRI 12-GA/500 MK5 Handloads, 440-gr. Shock Point Bullet**

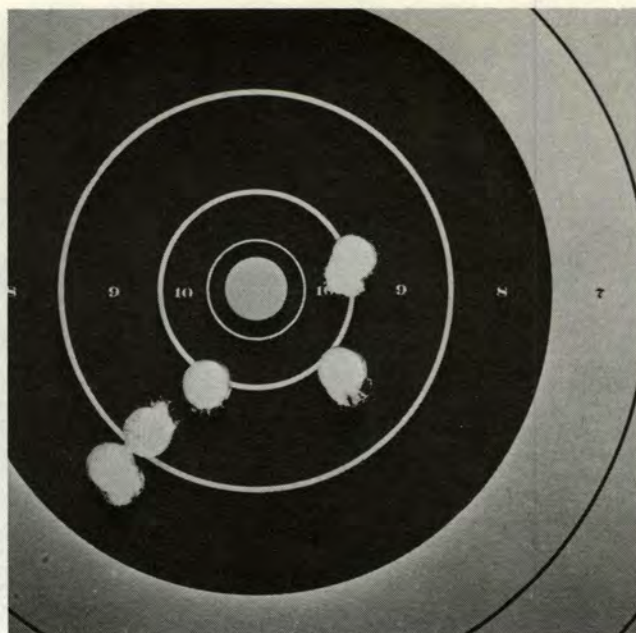
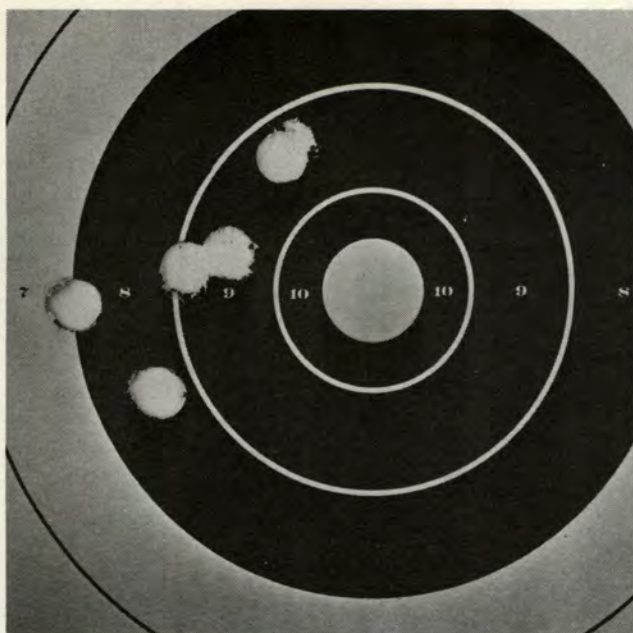
GUN: Mossberg 12-ga. Model 500 Slide-Action Repeater BARREL: 28" Mod, 3" Chamber, Bore .734", Muzzle .720" SIGHTS: Lyman All-American 2 1/2x Scope (Five-shot groups measured on centers)						
CASE	PRIMER	POWDER	WAD COLUMN*	SABOT	ROLL CRIMP OVER-ALL	GROUP SIZE
Rem. S23470 2 3/4" Plastic	Rem. 57	29/Herco	PGS + .045" Plastic Spacer + .135" Nitro	Brown	2.525"	8 3/4" (4 in 6 1/4")
Rem. S23470 2 3/4" Plastic	Rem. 57	28/Herco	PGS + .045" Plastic Spacer + .135" Nitro	Brown	2.525"	2 3/4" (4 shots)
Alcan LP7 2 3/4" Plastic	220 Max-Fire	35/AL-7	PGS + .045" Plastic Spacer + .200" Nitro	Brown	2.500"	12 1/8" (3 shots, 2 missed target)
Alcan CM 3" Plastic	220 Max-Fire	35/AL-7	PGS + 1/4" FBS + .200" Nitro	Brown	2.730"	3 7/8"
Alcan LP7 2 3/4" Plastic	Norma 209	25/Unique	PGS + .045" Plastic Spacer + 1/4" FBS + + .135" Nitro	Brown	2.525"	7"
Alcan LP7 2 3/4" Plastic	Win. 209	31/540MS	PGS + .070" Nitro + 1/4" FBS + .070" Nitro	Brown	2.525"	6" (4 in 1 1/2")
Rem. S23470 2 3/4" Plastic	Rem. 57	26/7625	PGS + .045" Plastic Spacer + .135" Nitro	Brown	2.525"	3 1/4" (3 hits mak- ing ragged hole)

\* Seating pressures: Herco 80 to 90 lbs.; AL-7 40 to 50 lbs.; Unique and 540MS 50 lbs.; SR-7625 60 lbs.

PGS = Alcan plastic over-powder wad. FBS = Alcan Feltan-Bluestreak filler wad.

NOTE: All handloads assembled in new shells.





Left—A propellant which shows a lot of promise behind the 12-ga./500 440-gr. bullet is DuPont's SR-7625. A 27-gr. charge in the Remington plastic shell produced this 2 3/8" cluster from the Mossberg Imp. Cyl. barrel at 50 yards. Load was later reduced to 26 grains, and groups were acceptably tight using both the brown and the white sabots. Right—Another 50-yard string (3 1/4" on centers) from the full-choke Tikka barrel using the lightweight 260-gr. BRI bullet and the white sabot, this load powered by 25 grains Unique. Scope was a Leupold 2-7 variable at the 7x setting.

PGS, spacer, 5/16" filler wad and, finally, another plastic spacer under the 440-gr. bullet.

This wad column produced two very wild hits, the holes in the target being of 12-ga. diameter instead of 50 caliber. What had happened was that the bullet base, on set-back, had cleanly punched through the center of the plastic spacer. The remaining ring-type

outer portion of the spacer fastened itself to the bullet and took a free ride all the way to the target. Small wonder that with this load accuracy went to pot. But with another handload in which an .070-inch nitro card was used between filler wad and bullet, trouble of this nature did not occur.

With regard to wad column pressure, follow the powder manufac-

turer's recommendations for shot loads. However, seating pressure should be applied only to the wad column itself. It is enough to just seat the bullet/sabot unit so that it makes firm contact with the wadding. Hand pressure will be sufficient for this. When seating the bullet, use a wooden dowel against the bullet's nose.

The small plastic plug must be

**TABLE V**  
**BENCH REST ACCURACY TESTS — 50 YARDS RANGE**  
**BRI 12-GA/500 MK6 Handloads, 260-gr. Zinc-Alloy Bullet**

**GUN:** Tikka 12-ga./222 Rem. Over-Under  
**BARREL:** 26" Full Choke, 2 3/4" Chamber, Bore .722", Muzzle .685"  
**SIGHTS:** Leupold Vari-X II 2-7x on 7x Power  
(Five-shot groups measured on centers)

CASE	PRIMER	POWDER	WAD COLUMN*	SABOT	ROLL CRIMP OVER-ALL	GROUP SIZE
Rem. S23470 2 3/4" Plastic	Rem. 57	25/Unique	PGS + .045" Plastic Spacer + .200" Nitro	White	2.500"	3 1/4"
Rem. S23470 2 3/4" Plastic	Rem. 57	26/Unique	PGS + .045" Plastic Spacer + .200" Nitro	White	2.500"	2 3/4"
Alcan LP7 2 3/4" Plastic	Norma 209	25/Unique	PGS + 1/4" FBS + .200" Nitro	White	2.525"	4 3/8"
Alcan LP7 2 3/4" Plastic	Norma 209	26/Unique	PGS + 1/4" FBS + .200" Nitro	White	2.525"	4 in 6"

\* Seating pressures: Unique 50 lbs.

PGS = Alcan plastic over-powder wad. FBS = Alcan Felton-Bluestreak filler wad.

NOTE: All handloads assembled in new shells.



Proof of the 440-gr. sabot bullet's inherent accuracy is seen in this 50-yard group measuring  $1\frac{3}{4}$ " on centers. Except for one shot which strayed into the X-ring, the 5 slugs would have cut one ragged hole. Barrel was the Imp Cyl of Mossberg M-500 pump, powder charge 29 grains Herco.



placed in the bullet's base cavity prior to seating, of course. In most instances, this plastic plug gives a rather loose fit, showing a strong tendency to fall out when the unit is seated with the shell in a mouth-up position. When this happens it's virtually impossible to jiggle the plug back into the cavity, and so the bullet-sabot unit must be pulled and another attempt made. But all of this can be avoided by seating the bullet with the shell held in a horizontal position.

At the outset of production and for several months thereafter, BRI factory loads and also the bullet/sabot sets for handloading saw the use of a brown-colored sabot. This version, when pressed around the bullet, was of larger OD than the currently-used white sabot and it

gave a much closer fit in the shell. The fit in the Remington plastic shell, for example, was extremely snug—actually tight—and this produced very pronounced ring-type ridging on the outer surface of the shell body.

This very tight fit in the shell did not harm accuracy in the least, as some of the tightest groups I got were with the old-style brown sabot in the Remington shell. Nor, contrary to what has been said by one of my colleagues, did the ridging of the tube walls pose a problem in regard to chambering—not in my experience.

With the now-discontinued brown sabot, it was necessary to use a sabot starter (a sleeve-like tool with a tapering ID) to squeeze the sabot halves into place around the

bullet and to start the unit into the shell mouth. (I don't know how many of these sabot starters were produced by—or for—BRI, but this is something else on which you collectors can vent your interest.)

Because of better temperature control during manufacture and the resultant elimination of circumferential "curling," and because of the smaller OD, handloading the new white sabot does not require a starter. The two halves can be pressed around the bullet with finger pressure, and the fit in the shell is such that the unit slips in with very little resistance. It is worth noting that when trying to make do with used hulls that were previously roll crimped, sabot starting will go much easier if a tapered dowel is employed to iron out and slightly bell the shell mouth.

### Wads and Crimping

The 440-gr. Shock Point factory loads sent to the writer for trial were roll crimped to an over-all length of 2.475 inches (about  $2\frac{15}{32}$ ") and as such the bullet nose was recessed about  $\frac{1}{4}$ -inch below the mouth of the crimped shell. A turnover of this depth seemed more than necessary, and accordingly my handloads in new shells were given a crimp that was slightly more shallow.

Wad-column length was regulated so that most loads in the Remington #23470 plastic shell (which, by the way, is a little tougher to roll crimp than the Alcan plastics—at least on the Lyman Easy tool) had a crimp space of about  $\frac{3}{8}$ " to the nose of the bullet. This resulted in an over-all length of 2.525 inches for a finished round in the  $2\frac{3}{4}$ " shell. Bullet

**TABLE VI**  
**BENCH REST ACCURACY TESTS — 50 YARDS RANGE**  
**BRI 12-GA/500 MK6 Handloads, 260-gr. Zinc-Alloy Bullet**

GUN: Mossberg 12-ga. Model 500 Slide-Action Repeater BARREL: 28" Mod, 3" Chamber, Bore .734", Muzzle .720" SIGHTS: Lyman All-American 2½x Scope (Five-shot groups measured on centers)						
CASE	PRIMER	POWDER	WAD COLUMN*	SABOT	ROLL CRIMP OVER-ALL	GROUP SIZE
Rem. S23470 2¾" Plastic	Rem. 57	25/Unique	PGS + .045" Plastic Spacer + .200" Nitro	White	2.500"	6⅞"
Rem. S23470 2¾" Plastic	Rem. 57	26/Unique	PGS + .045" Plastic Spacer + .200" Nitro	White	2.500"	10¾"

\* Seating pressures: Unique 50 lbs.

PGS = Alcan plastic over-powder wad.

NOTE: All handloads assembled in new shells.



nose was recessed fully  $\frac{1}{8}$ " for absolute safety while riding in the magazine of pump guns and autoloaders.

For most of the handloads that were put together in the Alcan  $2\frac{3}{4}$ " plastic shell, crimp space to nose of bullet was  $\frac{3}{16}$ "-plus, with a finished over-all length of 2.500 inches. This left the bullet nose recessed about  $\frac{3}{16}$ -inch. Needless to say, perhaps, the turnover should bear firmly against the sabot.

It should be kept in mind that the deeper the crimp, the more "vigorous" the ballistics, which is to say that chamber pressure will tend to climb as the depth of the turnover increases. It is simply a matter of the powder gases meeting with more resistance. Along with this there will be some gain in velocity, but not really enough to make a significant difference in energy.

Give or take .025", turnover depth is not all that important. What is important is that all loads be crimped to the same over-all length so that the ballistics will be uniform. This, along with unvarying powder charges, constitute the major factors that influence grouping or accuracy—that is, aside from the human element.

It has long been my policy to weigh all powder charges intended for slug loads, and to check over-all length of the loaded rounds with a vernier caliper. There is neither a substitute for uniformity, nor room for guesswork when hand-loading—not if you desire the best possible results.

As the tables show, accuracy tests with the BRI 440-gr. hunting bullet revolved around a Mossberg M-500 pump repeater outfitted with three different barrels. The receiver was drilled and tapped for a one-piece Weaver base, and a Ly-



Though it may not look it, this was one of the better 5-shot groups ( $2\frac{3}{4}$ " on centers) had with the BRI 260-ga. bullet at 50 yards. Gun was Tikka O/U (12-ga./222 Rem.) with 26" full-choke barrel; Remington plastic shell with 26 grs. Unique powder.

man All-American scope in  $2\frac{1}{2}x$  was used in Weaver detachable mounts. Scope and mounts added 11 ounces, elevating total weight to an even 8 pounds with the 24-inch "Slugster" (cylinder) barrel.

I might interject here, briefly, that the innards of the Lyman glass took the recoil of hundreds of 440-gr. loads in stride—and *recoil is considerable!* The image was bright and sharp when peering down-range at a one-inch Targ-Dot, and scope adjustments proved to be honest and reliable. All in all, this is an excellent scope, and the  $2\frac{1}{2}x$  magnification is, in my opinion, the best choice when scoping a scattergun for that whitetail safari. Possibly groups could have been tightened somewhat with a scope of greater power, but my purpose was to see what the BRI bullet would do from a practical gun/scope combination.

There is also a good chance that accuracy would have been upgrad-

ed a degree or two by anchoring the barrels at the breech end to dampen firing vibrations at that point. It's a known fact that today's pump guns, with their barrel interchangeability, will often profit through this practice when slug loads are used. With the Mossberg M-500 the approach would have been either a pair of screws through the receiver and into the top of the barrel extension (necessitating drilling and tapping) or the use of silver solder—perhaps a combination of both. However, the idea was vetoed because running the tests with an off-the-counter gun seemed much more fair than using one that was "customized."

#### Accuracy Potential

All aspects considered, including the fact that yours truly has been known to yank a trigger now and then, and that the Mossberg pull weighed close to 5 pounds, it

**TABLE VII**  
**BENCH REST ACCURACY TESTS — 50 YARDS RANGE**  
**BRI 12-GA/500 MK6 Handloads, 260-gr. Zinc-Alloy Bullet**

<b>GUN:</b> Browning 12-ga. Automatic-5 <b>BARREL:</b> 29 $\frac{1}{2}$ " Imp Mod, $2\frac{3}{4}$ " Chamber, Bore .715", Muzzle .689" <b>SIGHTS:</b> Metal bead front on ventilated rib. (Five-shot groups measured on centers)						
CASE	PRIMER	POWDER	WAD COLUMN*	SABOT	ROLL CRIMP OVER-ALL	GROUP SIZE
Fed. Monark 2 $\frac{3}{4}$ " Paper	Fed. 209	26/Unique	PGS + $\frac{1}{4}$ " FBS + .200" Nitro	White	2.525"	5 $\frac{1}{4}$ " 7 $\frac{1}{4}$ "

\* Seating pressure: Unique 50 lbs.

PGS = Alcan plastic over-powder wad. FBS = Alcan Feltan-Bluestreak filler wad.

NOTE: Handloads were assembled in new shells. Heat waves rising off barrel distorted target for both groups.



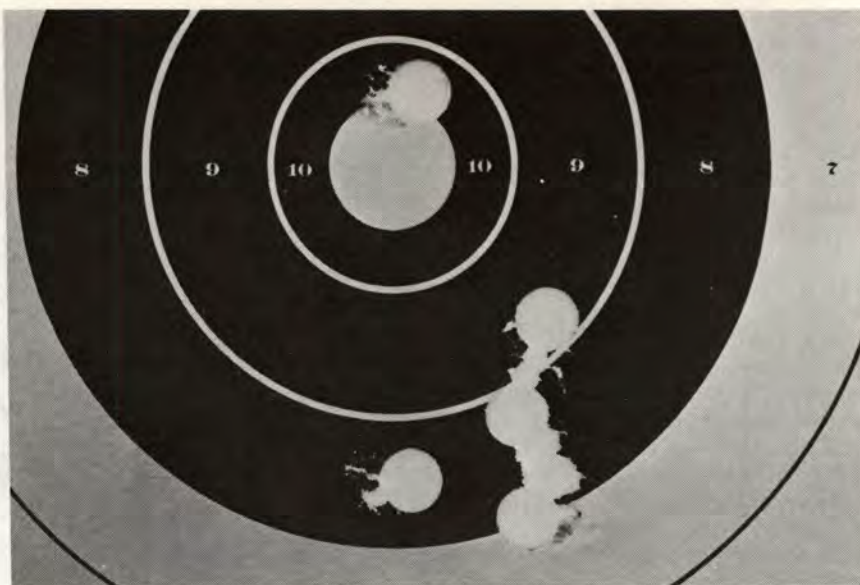
becomes obvious that the 12-GA/500 sabot bullet has the potential for outstanding accuracy—and "outstanding" in my book means the capability of producing 5-shot groups at 50 yards that measure two inches or smaller on centers.

It must be pointed out, in all fairness, that accuracy on the order of two inches is possible with conventional rifled slugs, but it invariably calls for a much-fussed-over handload to make the grade, and even then not every barrel that comes along will respond to that degree. In the final analysis I am convinced that with the BRI projectile the route has far fewer pitfalls, that it gets you where you want to go with less headache.

Looking at the results from the Mossberg's "Slugster" and Imp Cyl barrels, the headloads produced deer-hunting accuracy that ranges from "very good" to "fantastic." Interestingly, the "Slugster" barrel did markedly better with handloads than with the factory offering, and I believe it's safe to say that in general the Imp Cyl tube also gave its best performance with the home-brewed fodder.

Although BRI does not recommend the 440-gr. bullet for use in barrels choked modified and tighter, I was curious to see what the accuracy story would be. Muzzle constriction for the 28" Mossberg barrel marked "Modified" checked out at .014", which is a little on the "light" side as modified chokes usually go. The choke appeared to be of the swaged type, then subsequently reamed.

One 5-shot group was fired with each of a number of different handloads. Some of these gave very acceptable deer-hunting accuracy, while others did not. It really came as no surprise to find that some of



A flyer cutting the X-ring opened this group to 3 5/8", 4 hits printing in 1 3/4". Load was 32/540MS behind 440-gr. bullet in Alcan plastic shell; Imp Cyl barrel at 50 yards. A Ljutic Mono-Wad was used in building the wad column. A subsequent 5-shot group with same load measured just under 1 7/8".

the loads which shot very well out of the Imp Cyl barrel (.003" of choke), gave a rather lack-luster performance from this tighter boring. All of which serves to prove the old adage that shotgun barrels are often as temperamental as a middle-aged prima donna.

It would be remiss of me not to point out that all three Mossberg barrels had 3" chambers, and this raises an interesting question. When used with 2 3/4" loads, are the long chambers detrimental to accuracy with the 12-GA/500 sabot bullet?

McAlvain seems inclined toward the theory that short loads in long chambers do not help matters, that there may very well be a certain degree of accuracy impairment. Personally, I am not prepared to offer a conclusion. I feel that a vast

amount of test shooting would be required in order to resolve the matter one way or another.

My initial shooting with the 260-gr. zinc-alloy bullet was with the brown-colored sabot, using a 26" full-choke barrel with .037" of muzzle constriction (Tikkakoski—Finland). The scope on this gun is a Leupold 2x7 variable and the 7x setting was used.

Apparently because of the brown sabot's larger OD, these trials were disappointing, to say the least. Later, BRI sent along a supply of the smaller diameter white sabots and the improvement in grouping was truly dramatic. Whereas with the brown sabot it was tough sledding to keep 5 shots on the standard 100-yard smallbore rifle target (14 inches square) at 50 yards, group

**TABLE VIII**  
**BALLISTICS — BRI 12-Ga/500 MK5 Sabot Bullet**

CASE	POWDER	WAD COLUMN	SABOT	BULLET, GRAINS	MUZZLE VELOCITY	CHAMBER PRESSURE
W-W AA 2 3/4"	31/HS-6	PGS + 1/4" filler	Brown	440 SP	1,554 fps	10,900 LUP
W-W HB 2 3/4"	25/Unique	PGS + 5/16" + .135" Nitro	Brown	440 SP	1,535	10,500
Fed. H-P 2 3/4" Plastic	27/Herco	PGS + .200" Nitro	Brown	440 SP	1,400	11,000
Alcan LP7 2 3/4" Plastic	34/AL-5	PGS + .135" Nitro	Brown	440 SP	1,340	10,980
Rem. S23470 2 3/4" Plastic	30/Herco	PGS + .200" Nitro	Brown	440 SP	1,400	10,750

NOTE: Above data furnished by Ballistic Research Industries. Primers were not specified, but presumably primers and cases were of matching brands.



size shrank right down to 3 or 4 inches with the white sabot.

Selecting the two handloads that performed best in the Tikka combo gun, the Mossberg with modified-choke barrel was again trotted out to the bench. After a pair of 5-shot strings it was clearly evident that this tube did not favor the 260-gr./white sabot load in the smallest way. One group opened to nearly 11 inches on centers.

As a final fling, two 5-shot strings with the 260-grainer were poured through a Browning Automatic-5 with an improved-modified barrel (.026" of choke). Group size at 50 yards averaged roughly 6 inches, and that's not half bad considering that sighting equipment was the common metal front bead on a ventilated rib, and further that heat waves rising off the barrel were doing a bang-up job of distorting the 6-inch bull.

### Need for Trials

When all ballots are in and counted, there is one fact which stands out regarding both the 260-gr. and 440-gr. sabot bullets. A handloader can get lucky and come up with a winning load the very first time around, of course. But, in general, he had best be prepared to try different case/powder/wad combinations in arriving at the one gilt-edged prescription that will perform well in his particular barrel.

Late in January, 1972, word reached us from the author (later confirmed by BRI and Alcan/S&W-Fiocchi) that the two latter companies would be marketing the BRI Sabot slug cartridges on a national basis. BRI, we understand, will supply the sabots and the 50-cal. slugs, these to be loaded in Alcan and S&W/F cases. Whether BRI will now supply components to the handloader is not known at this time.

As we have already seen, the most accurate load in one barrel may approximate sour apples in the next, so do not bank too heavily on the top-performing loads as shown in the accompanying tables. Incidentally, all loads listed are believed to be safe loads, but neither the writer nor this publication will assume any liability in this connection.

There is really no question about it. The BRI sabot bullets, particularly the 440-gr. Shock Point, gives the sometimes-criticized practice of shotgunning deer a big shot in the arm. Bullet design and weight combine to give accuracy and power, all of which adds up to an appreciable increase in effective range over the conventional rifled slug. And trajectory over the usual deer-busting distances is still another feather in BRI's corporate cap.

When the scope-equipped Mossberg was zeroed dead-on at 50

yards with the 440-gr. bullet driven by 29/Herco, groups printed 3 inches low at 100 yards. When zeroed for 100 yards, the trajectory curve put the group center just 1.5" high at 50 yards. For a scoped gun, the 100-yard zero strikes me as the most practical for general use, as it will provide a "point blank" range on deer-sized animals from a few yards off the muzzle to well beyond the 100-yard marker. So zeroed, you're always in the money if you can manage a center-of-the-rib-cage hold.

My confidence in the BRI 440-gr. Shock Point bullet is such that on a recent three-day hunt in mule deer country I carried the Mossberg with its Imp Cyl barrel and a supply of 29/Herco handloads. This was rimrock country where shots from a favored stand, or when still-hunting the edges of narrow canyons, might range anywhere from 50 to 150 yards.

By way of dry practice, I put the crosshairs on many prime does, as high as 10 and 12 per day. But, alas, the bucks weren't moving and time ran out. So learning precisely about the stopping power of this 50-caliber projectile will have to wait for another time and another place.

But as I've said, I've got confidence, and I strongly believe the bullet has got the rest. That's really all it takes. ●

## TABLE IX

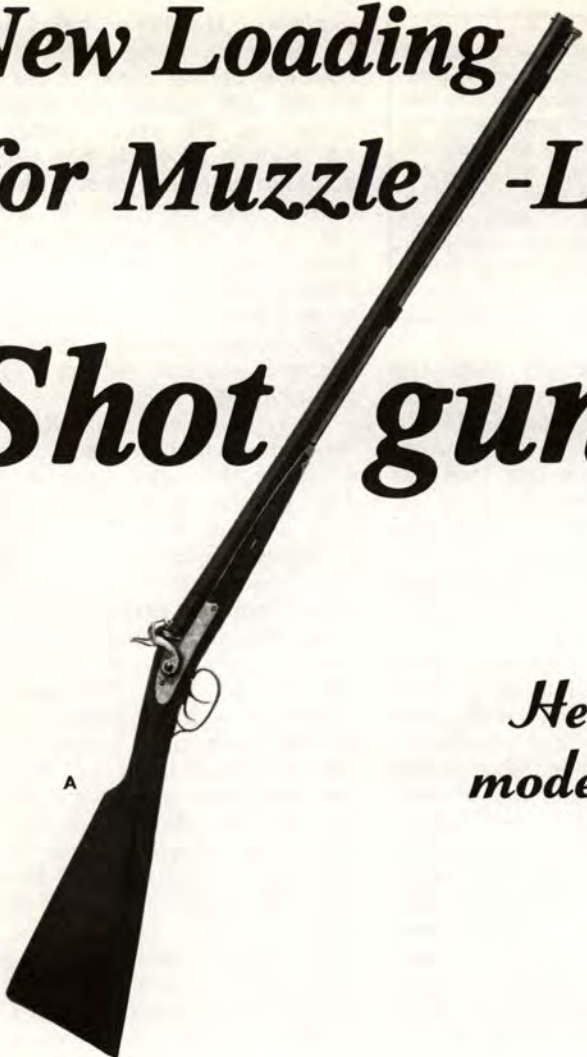
### BALLISTICS — BRI 12-Ga/500 MK6 Sabot Bullet

CASE	POWDER	WAD COLUMN	SABOT	BULLET, GRAINS	MUZZLE VELOCITY	CHAMBER PRESSURE
Rem. S23470 2¾" Plastic	24/Unique	PGS + .200" Nitro	White	260	1,388 fps	7,400 LUP
Rem. S23470 2¾" Plastic	25/Unique	PGS + .200" Nitro	White	260	1,435	8,500
Alcan LP7 2¾" Plastic	24/Unique	W-W Universal + ¼" FBS + .200" Nitro	White	260	1,408	8,100
Alcan LP7 2¾" Plastic	25/Unique	W-W Universal + ¼" FBS + .200" Nitro	White	260	1,440	8,240
Winchester 2¾" Plastic	25/Unique	PGS + .200" Nitro	White	260	1,434	7,700
BRI (Fed.) 2¾" Plastic	24/Unique	W-W Universal + ¼" FBS + .200" Nitro	White	260	1,479	8,700
BRI (Fed.) 2¾" Plastic	25/Unique	W-W Universal + ¼" FBS + .200" Nitro	White	260	1,516	9,380
BRI (Fed.) 2¾" Plastic	26/Unique	W-W Universal + ¼" FBS + .200" Nitro	White	260	1,576	10,166
BRI (Fed.) 2¾" Plastic	27/Unique	W-W Universal + ¼" FBS + .200" Nitro	White	260	1,621	10,333
BRI (Fed.) 2¾" Plastic	28/Unique	W-W Universal + ¼" FBS + .200" Nitro	White	260	1,647	10,666

NOTE: Data furnished by Ballistic Research Industries. Lab tests by Hodgdon Powder Co., 30", full-choke test barrel. Primers were not specified, but presumably primers and cases were of matching brands.



# *New Loading Technique for Muzzle-Loading Shot guns*



by Major R. O. ACKERMAN

*Here's a stunt lifted from the  
modern shotshell loader, but it  
works well, so why not?*

WITH THE RAPIDLY growing popularity of the muzzle-loading sports, it was inevitable that new and quicker methods would be devised for loading the front-stuffers. While the traditionalist cherishes his pioneer heritage, and rightfully wishes to preserve every detail of the original techniques, the great majority of sportsmen entering this field have other reasons for doing so. To mention examples, there is the much lower cost of ammunition, the opportunity to construct one's own arms and accessories if desired, and the lighter legislative restrictions so far upon ownership of muzzleloaders.

Then, too, their skillful handling presents a challenge to anyone, whether or not he is interested in their historical background. This is particularly true of hunting with them.

In the Southwest, for example, a favorite sport is dove hunting with percussion shotguns. These fast-moving birds are thickest during the morning and evening flights,

each of which may be as brief as 10 or 15 minutes duration. To stand any chance of getting his limit, a charcoal burner may be forgiven for taking a few short cuts in loading.

The fastest system I've found is shown in my drawing. The basic idea of using plastic shot cup wads originated with Bill Dalton of the General Trading Co., distributor of a popular percussion shotgun made in Australia and India. I enlarged upon Bill's suggestion, to further speed loading in the field. Now the muzzle-loading shooter, like the reloader of modern shells, may put together his supply of ammunition ahead of time. The time spent at home is certainly saved under the cottonwoods, when the birds are coming in bunches!

This system only works in shotguns which are cylinder bored. However, that includes most of the replica guns being sold today, and for the choked-bore ones there are other short cuts.

If your shotgun is cylinder bored

and if it is a true 12, 16 or 20 gauge by today's standards, the appropriate plastic shot cup wad should be a snug fit but free-sliding. Buy your shot cups for the shot charge you intend to use—there's a big variety of them by many makers, including Remington and Winchester.

Fill the plastic cup level full of the desired size of shot, center a thin card wad upon this, then secure the card with one or two strips of ¼-inch Scotch tape. It is wise to mark the card wads ahead of time with the gauge and shot size. A fine point felt pen is good.

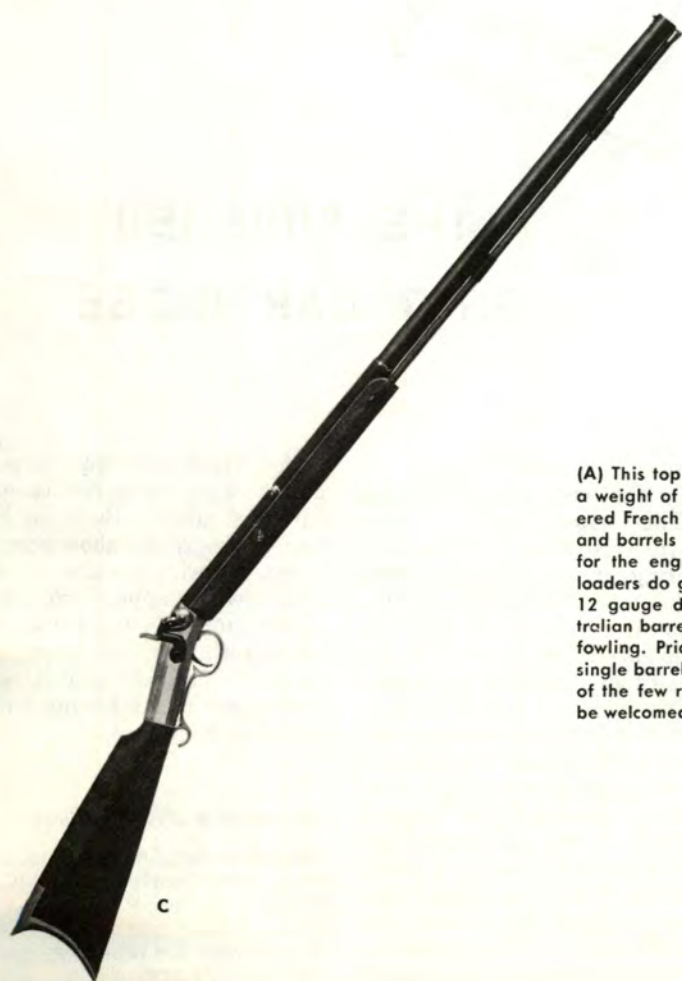
Nitrated paper should have been prepared in advance. Simply make a saturated solution of potassium nitrate in luke-warm water (all the nitrate that will dissolve). Thoroughly immerse sheets of typist's onion skin paper in the solution, but do not allow to soak. Spread to dry on newspapers.

From the dry, nitrated paper, form small cylinders with Elmer's glue. Close one end, using glue





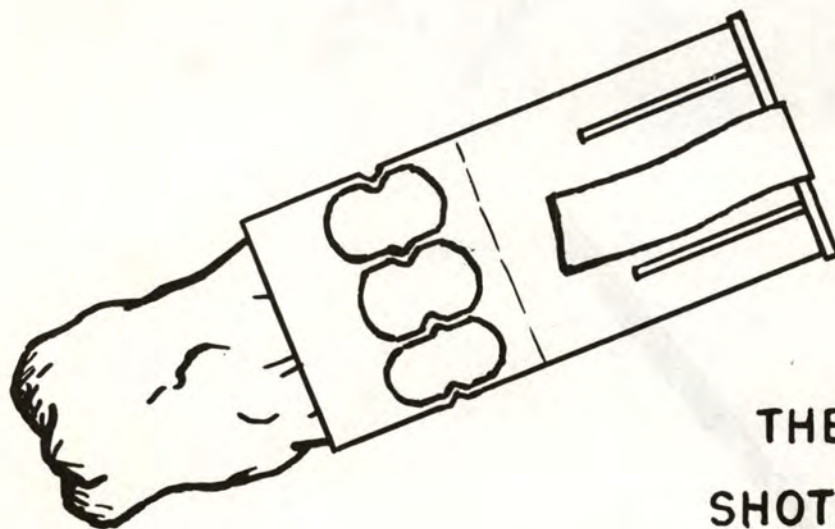
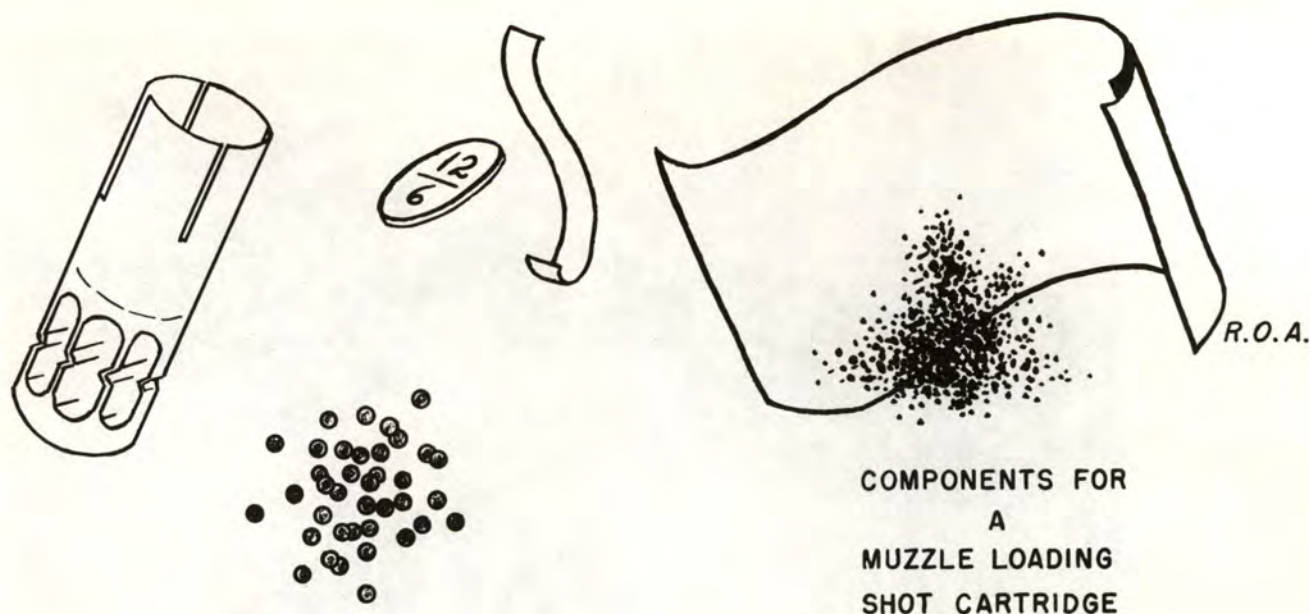
B



C

(A) This top grade 12 gauge percussion double has handsome lines and a weight of only 5½ pounds! It offers European hand-engraving, checkered French walnut stock, hard-chromed bores choked modified and full, and barrels authentically browned. From Replica Arms, Inc., it is \$169.95 for the engraved model, \$134.95 for the standard grade. (B) Muzzle-loaders do get game. Here is the start of a dove hunt with a percussion 12 gauge double from General Trading Co. Made in India, with Australian barrels and teakwood stock, this heavier gun is suitable for waterfowling. Priced at \$95.00. (C) Rugged strength is the key word for this single barrel 12 gauge percussion shotgun from Mowrey Gun Works. One of the few recommended for either shot, ball or a shotgun slug, this will be welcomed in "shotgun only" hunting areas.





## THE FINISHED SHOT CARTRIDGE

sparingly. When dry, pour the desired powder charge in each cylinder, trim off and glue the other end closed. As you finish each step on a row of these, the first one will be dry enough for the next step. The "shot cartridge" is completed by gluing the powder-filled cylinder into the concave base of each plastic shot cup.

No great skill is necessary in forming the paper cylinders. Just keep them well under bore diameter. When the cartridge is rammed down the bore, the brittle paper will break open and release the powder. As the shot is fired, the nitrated paper will be completely consumed.

One necessary step is to wipe the

bore out before reloading, so the next snug shot cup may easily slide down. This wiping with a damp patch will also insure that any smoldering spark is extinguished—and that alone is well worth the time. Please remember, if only one barrel is fired, *to remove the cap from the other nipple before reloading!*

Not only will these prepared cartridges greatly speed loading, but the plastic cups prevent deformed shot pellets, improve the pattern, add several yards to range, and serve as a cushion to reduce recoil.

Of course, the plastic shot cups may also be used in conventional, loose-component loading if you like.

Percussion shotguns are really

being "re-discovered" these days, and every leading replica manufacturer is adding them to his line. Our photographs show some of the latest offerings—each a different type, with appeal to individual tastes and needs. Some may be used with the shot cartridges described here, or loaded with the traditional flasks having built-in adjustable measures.

### Percussion Shotgun Suppliers

General Trading Company, Inc., 116 Sycamore Circle, Clearfield, Utah 84015.  
Replica Arms, Inc., P.O. Box 640, Marietta, Ohio 45750.  
W. L. Mowrey Gun Works, Inc., Box 711, Olney, Texas 76374.



# SIMPLE CALCULATOR SOLVES ACCURACY PROBLEMS

by **HAROLD O. DAVIDSON**

How much do we really know about the effects that ammunition, the rifle and shooter skill have on accuracy? Here's a readily made device that tells the tale, with clear and graphic instructions on its use.

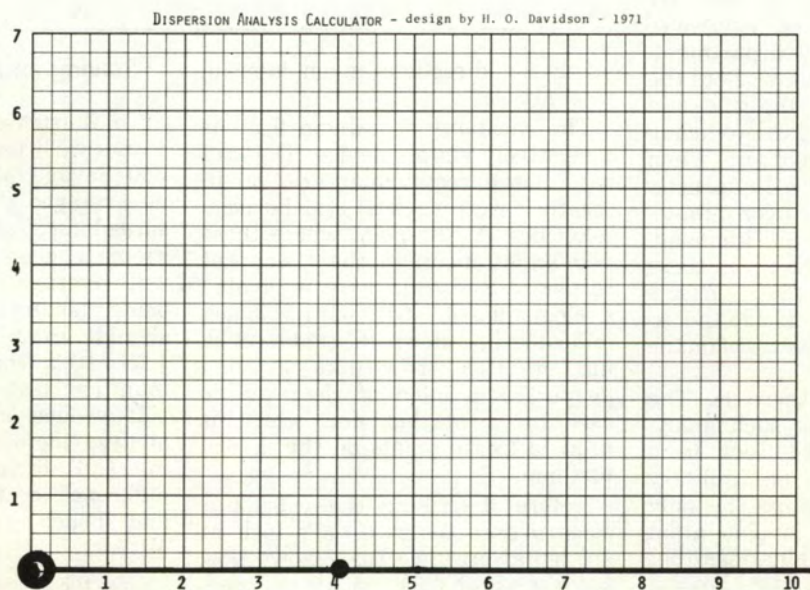


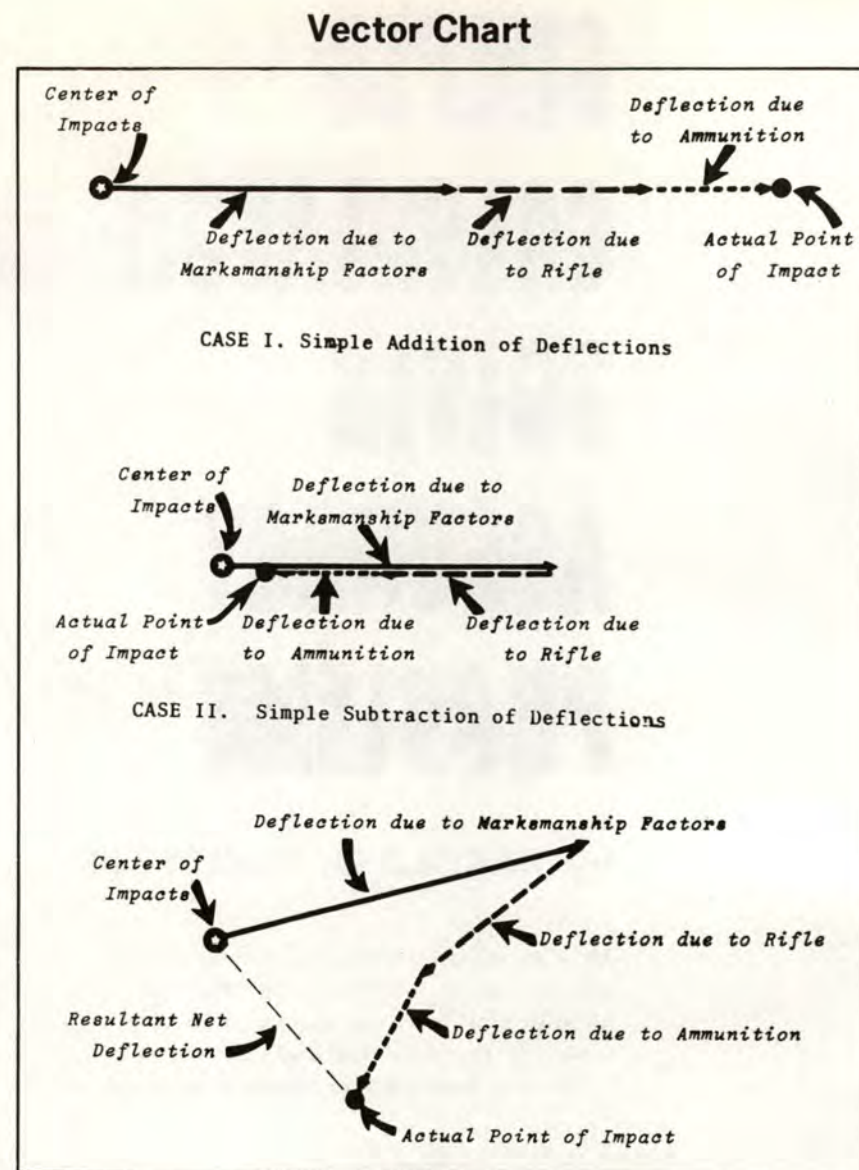
Fig. 1. Dispersion analysis calculator for solving accuracy problems. Indicator line is set directly over horizontal scale, and marker dot is over figure 4, which for most applications would be 4 minutes of angle. However, scale units may represent multiples or fractions of minute-of-angle units; or other units such as inches of extreme spread may be used.



# SIMPLE CALCULATOR SOLVES ACCURACY PROBLEMS

DEVELOPMENT of low-cost digital chronographs, and devices such as the Powley Psi Calculator, made it possible for the shooter of modest means to get a pretty good handle on the ballistic performance of his rifle and ammunition. It's a different story, however, when we've had questions about accuracy. Sure, those of us who take our shooting seriously check group sizes to see how we're doing in the accuracy department. But how much do we know about the effects of ammunition, the rifle, and our own shooting skills in producing a particular level of accuracy? When Tom Tackdriver and Joe Jumpshooter launch into a debate over minute-of-angle (MOA) bolt actions *versus* autoloaders for deer hunting, is there any way of sorting out the basic facts and analysing them to decide the argument on its merits instead of on the sound level?

It turns out that there is. The techniques for making such analyses have been checked out in a number of projects on military arms and marksmanship. The only trouble is that they involve a lot of mathematical manipulations that most of us have forgotten how to do, or would rather not have to remember. Fortunately, the mathematical aspects of the problem can now be avoided with a simple calculator, one easily constructed



using the directions given later in this article.

The calculator (shown in fig.1) is a relatively simple device. The stiff base has a rectangular grid on it, together with vertical and horizontal scales. At the point where these two scales meet, in the lower left corner of the grid, there is pivoted a clear plastic strip with a black indicator line down its center. Sliding on this strip (like a sling keeper) is a band of clear plastic carrying a marker dot, which is used to locate points on the indicator line.

Before describing the calculator construction in detail, let's look at an actual example that shows how accuracy problems can be analysed. Then we'll check out a few of the basic principles to help us get a better understanding of dispersion, and review the methods of measuring dispersion.

## Solving an Accuracy Problem

To illustrate how the calculator works we'll use the author's scoped 300 Savage Model 99, with which he averages about 4 MOA extreme spread for 5-shot groups, kneeling. From a good bench rest, groups will average about two minutes using factory loads, which loads should group somewhere around 1.25 MOA from heavy factory-ammunition test barrels.

If we use ordinary arithmetic to analyse these data then the shooting skill factor, indicated by the difference between field (kneeling) and bench rest groups, is two MOA.

Group size with skill factor included = 4 MOA  
Minus: Group size with skill factor minimized = 2 MOA  
Difference = skill factor dispersion = 2 MOA

Right? Wrong! The mathematics of dispersion analysis don't work



like ordinary grocery store arithmetic. Instead, it involves a special variety called *orthogonal vector addition*. Which is where our special calculator comes in.

In order to solve this problem with the calculator we first pivot the indicator line to coincide with the bottom scale of the calculator (fig.1). We then locate the value of the largest dispersion (4 MOA) on the lower, horizontal scale of the calculator, moving the marker dot slide so that the dot coincides with this point, as shown in fig.1.

We next locate the point on the vertical scale corresponding to the bench rest group size (2 MOA extreme spread) as shown by the solid arrow in fig.2. Being careful not to change the position of the marker slide on the indicator, we then pivot the indicator upward until the marker dot is superimposed on the 2 MOA horizontal grid line, as shown. The solution of the problem is now found by reading the value on the horizontal scale directly below the marker dot, as designated by the open arrow in fig.2.

In this case the calculator shows that dispersion caused by the shooting skill factor is just under 3.5 MOA. Thus the rifle and ammunition factors which produced about 2 MOA dispersion when checked from the bench rest contribute barely a half-minute additional dispersion under field shooting conditions (kneeling position). To appreciate why such results

occur in dispersion analysis we need a quick rundown on basic principles.

### Basic Principles—In Brief

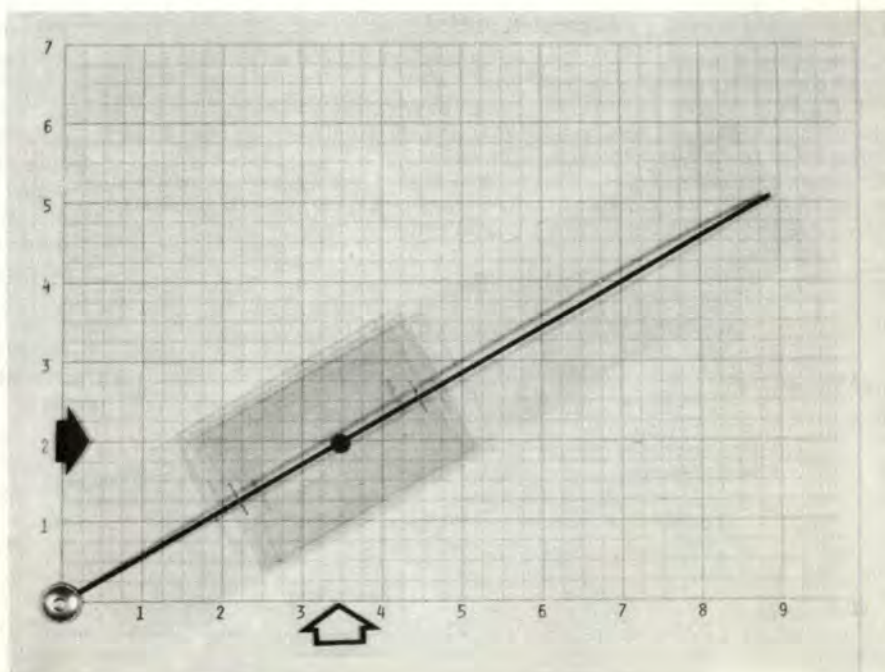
As every bench rest competitor soon learns, there are literally dozens of different factors that affect group size. As a practical matter, however, we can sort out all these factors into a couple of major categories. Thus, variations in primer performance and in propellant energy, and in bullet dimensions, weight, concentricity, etc., can be lumped together as "ammunition dispersion" factors. The combined effect of these factors will cause the bullet to deviate in a *variable amount and direction* from the point that all would strike if every one of the ammunition factors were exactly controlled, and if there were no other sources of dispersion. But, in actuality, there are other sources of dispersion. The rifle contributes to dispersion in a number of ways, and so also does the shooter through variations in hold, sighting, and trigger release.

Now let's consider how all these separate sources of dispersion work in conjunction with each other to cause deviations of the impact point from round to round. In the worst case, all factors would be acting in the same direction so that their separate effects would be added together in the usual arithmetic fashion to cause a deviation left or

right, up or down, equal to the sum of the separate effects (see Case 1 in the Chart shown). This is not a likely situation, however. It's also possible that some sources will be acting in direct opposition to others so that their effects are partially cancelled (Case 2 in the Chart), but this situation isn't very likely either. In a typical case the various sources of dispersion are each working in a different direction, as shown in Case 3 of the Chart; and that's why ordinary arithmetic won't work in dispersion analysis.

The reader should appreciate that, for the sake of simplicity, the Chart shows the effects of the dispersion factors as though they occurred sequentially, one after the other, whereas this is not actually the case. Some of the ammunition dispersion factors act simultaneously with the rifle and skill factors to establish the bullet's initial flight attitude and line of departure. Other factors, such as bullet concentricity and variations in point geometry, exert their influence as the bullet travels toward its target. Nevertheless, for purposes of analysis we can treat the effects of the various factors as though the factors operated in sequence. This fact is the basis for the mathematical techniques which let us calculate what effect on group size each of several factors will have. They also enable us to answer such questions as—"What will be the effect on over-all (field shooting) group size

Fig. 2. Second step in solving problem shown set up on calculator in fig. 1. Indicator has been pivoted upward as described in text. Solid and open arrow are not part of calculator, but have been added in the illustration to assist reader in following the example.





if I cut the bench rest groups from 2 MOA down to one MOA?"

Since the calculator takes care of the mathematics we won't need to go further into the technical theory of dispersion analysis. There are some questions, however, about measurement of group size (dispersion) that need answering before we go on. The questions shooters most frequently ask are:

1) How many shots should there be in a group? Is it true that 20-shot groups are better than 10-shot groups for judging accuracy?

2) How many groups do I need to get a good average value for group size?

3) Is "extreme spread" OK for group size, or must I use one of those sophisticated textbook methods?

The first question is easily answered. Three, 4, or at most 5 shots are the best numbers to use

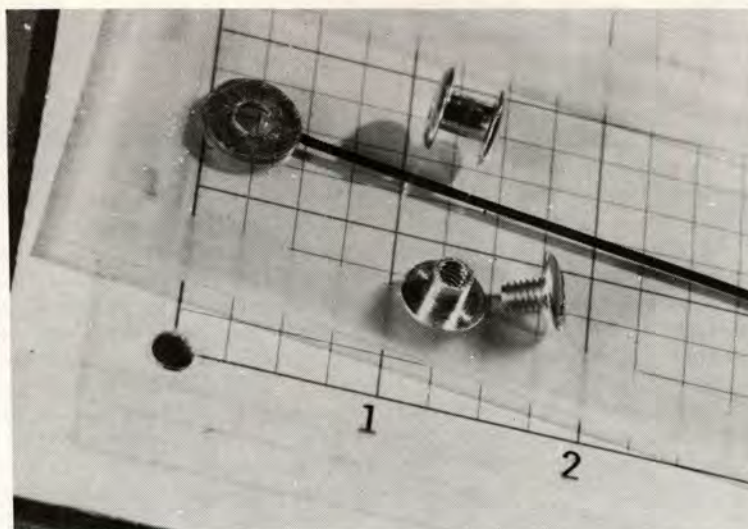


Fig. 3. Construction detail showing brass washer cemented to indicator strip as pivot bearing, aluminum binding posts (one required) used as pivot pin, and hole for pivot precisely located at intersection of vertical and horizontal scales.

**Table 1**

**Factors for Converting Extreme Spread Values to Equivalent Extreme Spread for a Different Number of Shots**

FROM: No. of Shots per Group	Conversion Factors					
	TO: No. of Shots per Group					
	2	3	4	5	10	20
2	1.00	1.35	1.57	1.73	2.15	2.50
3	.74	1.00	1.16	1.28	1.58	1.85
4	.64	.86	1.00	1.10	1.36	1.59
5	.58	.78	.91	1.00	1.24	1.45
10	.47	.63	.74	.81	1.00	1.17
20	.40	.54	.63	.69	.85	1.00

#### Examples of Use

No. 1: The extreme spread of 5-shot groups fired from kneeling position with the Model 99 300 Savage mentioned in the article averages 4 MOA. What would the equivalent extreme spread be for 20-shot groups fired under the same conditions?

Answer. Find factor in table to convert 5 to 20, which is 1.45. Multiply this times the 4

MOA value— $1.45 \times 4 = 5.8$  MOA for 20-shot groups.

No. 2: What extreme spread for 5-shot groups would be equivalent to MOA 10-shot groups?

Answer. Find factor in table to convert 10 to 5, which is .81. The answer is .81 MOA for 5-shot groups.

**Table 2**

**Comparison of Dispersion Measures**

Number of Shots per Group	Relative Precision of Measure (Root-mean-square radial deviation = 100%)		
	Mean Radius	Figure of Merit	Extreme Spread
2	100%	100%	100%
3	99	98	98
4	99	97	95
5	98	97	94
10	96	91	87
20	96	82	77

in firing groups for dispersion analysis. Larger groups would not be better unless one were trying to judge from a single group, which is not a good method. Using the recommended number of shots per group you can get a pretty good estimate of the average accuracy level (dispersion) with 100 rounds or so (thirty 3-shot groups, 25 of 4 shots, or 20 of 5). Obviously, you can save yourself time and effort trudging down the range to mark or change targets if you set up a half-dozen or so at a time.

If you prefer to fire 10- or 20-shot groups you should fire a total of 150 rounds (fifteen 10-shot groups) or 200 rounds (ten 20-shot groups) to establish an average extreme spread. Whatever number of shots you use you can always determine the equivalent extreme spread for a different number by using the conversion factors in Table 1. Average extreme spread is determined by the usual method of adding up the values for a whole set of groups and dividing by the number of groups. A short cut method is taking the "median" (middle) group in a ranking from largest to smallest.

#### Measures of Accuracy

In this article the author recommends the extreme spread as the preferred measure of dispersion (accuracy). However, if you like to while away the hours with slide rule and calculating machine you may prefer the "root-mean-square radial deviation." The *Handbook of Probability and Statistics* by Bur-



ington and May, or almost any reference on mathematical statistics, will explain the method of computation. Another measure, used in military small arms ammunition specifications and in commercial ammunition testing, is the mean radius. This is the average of the radial distances of all the shots in a group from the center-of-impact of the group (not the aiming point). As the reader would imagine this method also involves a good deal of measuring and calculating.

One of the simpler techniques is the "figure of merit" (FOM) which is the average of the maximum vertical spread and the maximum horizontal spread of each group. This is not at all difficult, but the "extreme spread" is simpler still. This method requires only one

measurement per group (distance between the two most widely separated shots) and no calculations. Although the other methods are theoretically more precise than the "extreme" spread the difference for groups of three to five shots is negligible, as may be seen from the data in Table 2. It should also be noted that the more complicated a procedure is, the more opportunities it presents for the occurrence of error which vitiate its theoretical advantages. It is the writer's opinion, therefore, that the extreme spread is superior to the more complicated measures for practical applications. (An exception to this view would be made in special cases where there is a particular reason for analysing differences be-

tween horizontal and vertical dispersion.)

### Constructing the Calculator

All materials for making the calculator can be obtained at a well-stocked office supply store. The base is a piece of double-weight illustrator's board about  $8\frac{1}{2} \times 11$  inches (hardboard or masonite would also serve). The grid is a piece of 4 lines-per-inch graph paper mounted on the base with rubber cement. (Alternatively, they could be drawn on the illustrator's board with a drawing pen.) The scale numbers come in plastic sheets and are transferred to the grid one at a time by positioning the selected number, and then rubbing the back of the plastic sheet in that area with the end of a pencil. It's an easy way to do professional lettering with no talent or training. If one has the skill the scale numbers can be put in by hand, or else typed on the graph paper before it's cemented to the base. The completed grid with scale numbers is covered with a sheet of self-adhesive clear plastic.

To make the indicator, cut a two-inch wide strip from a sheet of clear acetate plastic about an inch longer than the grid. The pivot pin for the indicator is an aluminum binding post (fig. 3) of the type used for holding business records together. Check the diameter of the binding post (typical dimension is .20"), and select a brass washer of appropriate internal diameter to serve as the pivot bearing. To be sure of getting a good fit the author used a washer slightly undersize, and reamed it. Cement the washer to the indicator strip about an inch from one end, and on the center line, using Dupont "Duco" or "Ambroid." After the cement has hardened use a finger-held sharp drill bit to cut away the plastic from the pivot hole. (If you try to put the pivot hole through the plastic before cementing on the washer, you'll have a lot of trouble centering it and will probably split the plastic.) It is possible, but difficult, to get an indicator line on the plastic with drawing pen and ink. An easier way is to use special Scotch tape, which is made in various widths and colors to produce lines on charts. For this purpose, the  $1/32$ " width jet black tape is best. Take care to lay the tape down in a straight line which passes through the center point of the pivot hole. This completes the indicator.

In mounting the indicator to the base it is important to locate the

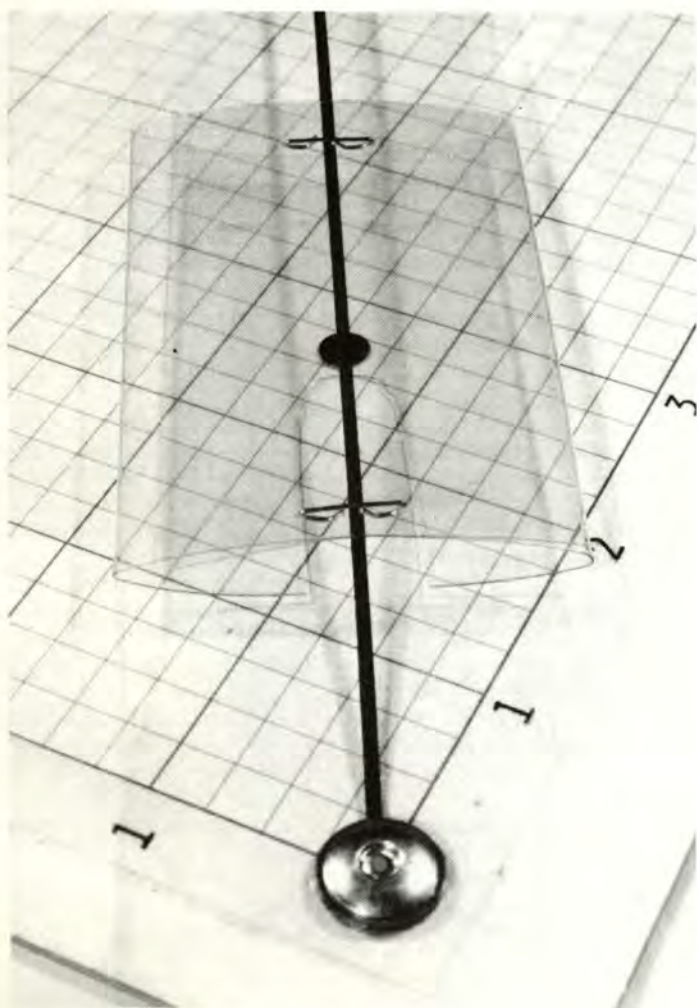


Fig. 4. Construction detail showing marker slide.



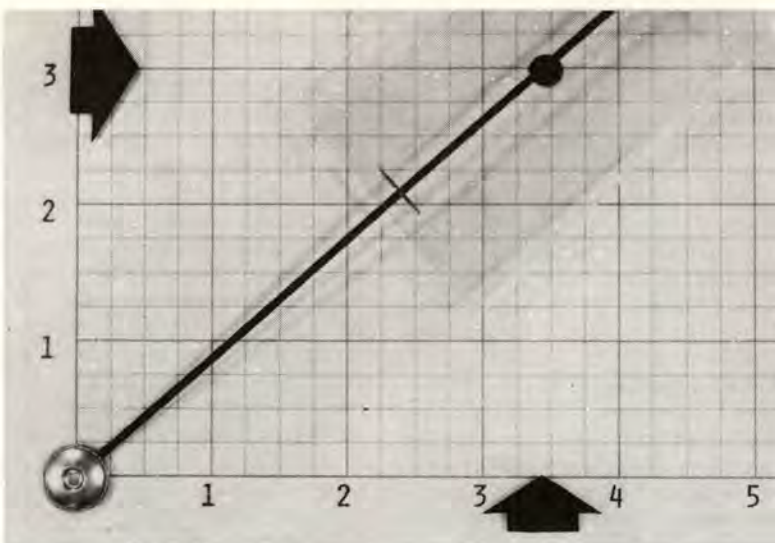


Fig. 5. Initial setup of calculator to determine over-all dispersion resulting from 3 MOA ballistic dispersion and 3.4 MOA dispersion due to marksmanship factors.

center of the pivot hole exactly at the intersection of the scale lines in the lower left corner of the grid. The best way to do this in relatively soft material is to put through a pilot hole using a #50 drill in a pin vise. Replace this with a slightly larger drill, and so gradually enlarge the hole to just under finished size. A small amount of epoxy resin applied around the hole area will harden and reinforce the base so that the pivot hole will not deform as the calculator is used. When the resin is hard, ream out the hole for an easy press fit of the pivot pin. With pivot pin in place, assemble the indicator, and add washers to take up the extra space under the head of the binding post screw (or use a file to shorten the pivot pin so that the indicator turns freely on it, but without play).

The marker slide is formed from a 3x6 inch piece of plastic sheet (see fig. 4). Make a fold 2 inches in from one end, on a line perpendicular to the long dimension. Make a second fold at such a position that when the two ends of the strip are lapped over and stapled, or Scotch-taped, the slide will move freely but without side-play along the indicator. Before stapling the slide, however, a black indicator dot should be stuck on the inside lower surface of the slide so that it will superimpose on the indicator line as the slide is moved back and forth. When the dot has been properly located, cut a clearance slot in the bottom surface of the marker slide so that the slide can be moved to the left to a point

where the indicator dot is almost touching the pivot. Slip the complete slide over the indicator and relax—your calculator is ready for use.

#### Using the Calculator (More Examples)

In the first example at the beginning of the article, we subtracted ballistic dispersion (rifle and ammunition) from total dispersion to determine the amount of dispersion caused by the shooting skill factors. Let's now try an example in which vector addition is involved instead of subtraction. We'll assume the same shooting skill dispersion as in the previous example; namely, just under 3.5 minutes. The question to be answered is: what would happen to group size if, because of poorer quality ammunition, the ballistic dispersion were to increase from 2 MOA as in the first example, to 3 MOA?

To solve this problem we find a point (see fig. 5) that is vertically above the skill factor dispersion (smaller black arrow) on the horizontal scale, and directly to the right of the ballistic dispersion (larger black arrow) on the vertical scale. Setting the marker dot over this point, we then pivot the indicator down to the horizontal scale (as in fig. 6) and read the answer under the marker dot. The result, designated by the open arrow, is 4.6 MOA.

Now suppose that ballistic dispersion were decreased to a minute of angle instead of increased to three. We would go through the same procedure with the calculator, but this time our answer for total

dispersion would be 3.6 MOA. Now let's see how the dispersion analyzer might be used to settle the argument on deer rifles. Let's say that Tom and Joe are both tolerably good marksmen, fellows who would average 6 MOA dispersion for skill factors under offhand, field shooting conditions. Tom's bolt action is good for minute-of-angle groups on the bench rest, while Joe's autoloader averages about three. Using the same procedure as illustrated in figs. 5 and 6, we find that field groups for the three-minute autoloader will be about 10% larger at 6.7 MOA. This result conforms to what experienced hunters have long known; namely, that gilt-edge accuracy is one of the less important qualities in a rifle for many hunting situations (varmint and long-range plains shooting excepted).

#### How to Get Your Own Dispersion Data

From what's been said up to this point the reader has doubtless inferred that data on ballistic dispersion are obtained by bench rest firings under the assumption that the shooting skill factor has a negligibly small effect on the result. This isn't necessarily true. However, the assumption should be a tolerably good one if the shooter is a competent rifleman, uses a scope sight with reticle and aiming point combination suitable for precise aiming, and does his shooting on a calm day—and if the ballistic dispersion is not *less* than a minute of angle. With thirty-three 3-shot groups fired under these conditions the average dispersion should be a pretty good estimate of the actual ballistic (rifle and ammunition) dispersion.

If you want to find out how much dispersion is introduced by the use of iron sights you could fire another set of bench rest groups with the same rifle-ammunition combination. Using the average dispersion obtained from these firings the calculator could then be used to subtract out the dispersion from the scope-sighted bench rest firings (under the assumption that aiming errors are negligible) to determine the dispersion resulting from iron sight aiming errors. It goes without saying that there are a good many facets to the sighting question, including reticle configuration and dimensions, open *vs.* peep sights, nature of the aiming point (target), lighting conditions, and so forth. It would be possible, therefore, to work



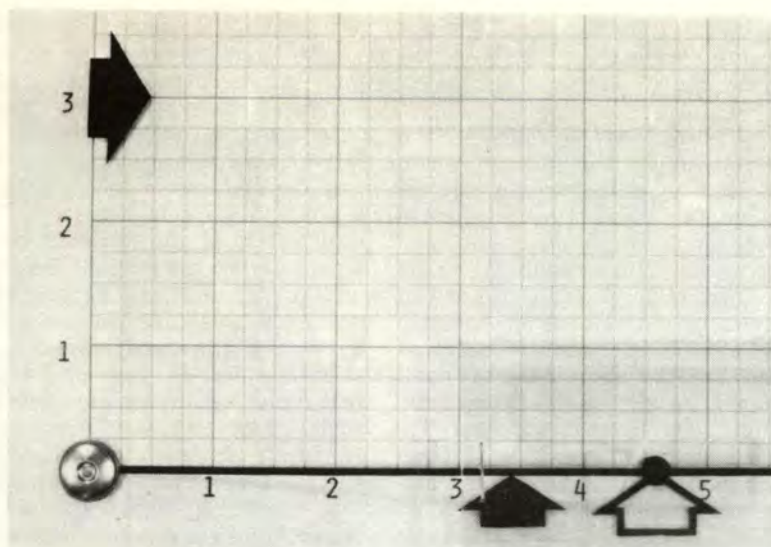


Fig. 6. Solution (at open arrow) of problem shown in fig. 5.

up a rather extensive research program which dealt with nothing but these sighting factors. That's not what we had in mind, however. On the other hand, if you've got "emergency" iron sights on a favorite scope-sighted hunting rifle you may, like the author, be interested in finding out how much accuracy you'd lose if you had to fall back on the iron sights. The calculator can give you the answer. Moreover, once you know the answer from the bench rest tests you can apply that result to all other shooting positions by means of the calculator. This brings us to the next, and more important point.

Since marksmanship is affected by shooting position it's necessary to fire a set of groups (100 rounds) for *each* position you're interested in. For some these will be the regulation range firing positions. Others, like the author, will be interested in duplicating field shooting conditions as closely as possible. In the latter case, for example, one can simulate snap shooting by walking up to a firing point (line) with safety one and rifle in a typical field carry, and without concentrating on the target. At the firing point bring the rifle up and fire with the quick sight picture typical of snap shooting. Re-load, set the safety, walk back from the firing line, and repeat the process for each shot in the entire series. This doesn't exactly duplicate snap shooting at live game, but it's a better approximation than regulation offhand shooting.

#### Planning Your Own Accuracy Analysis Program

The reader has probably come to the conclusion that although the calculator is itself simple to use it

requires some careful planning and a fair amount of shooting to get the data needed for accuracy analysis. There are no hard and fast rules for laying out such a program, but we can offer some ideas that may be useful as guidelines to those interested in working up their own projects.

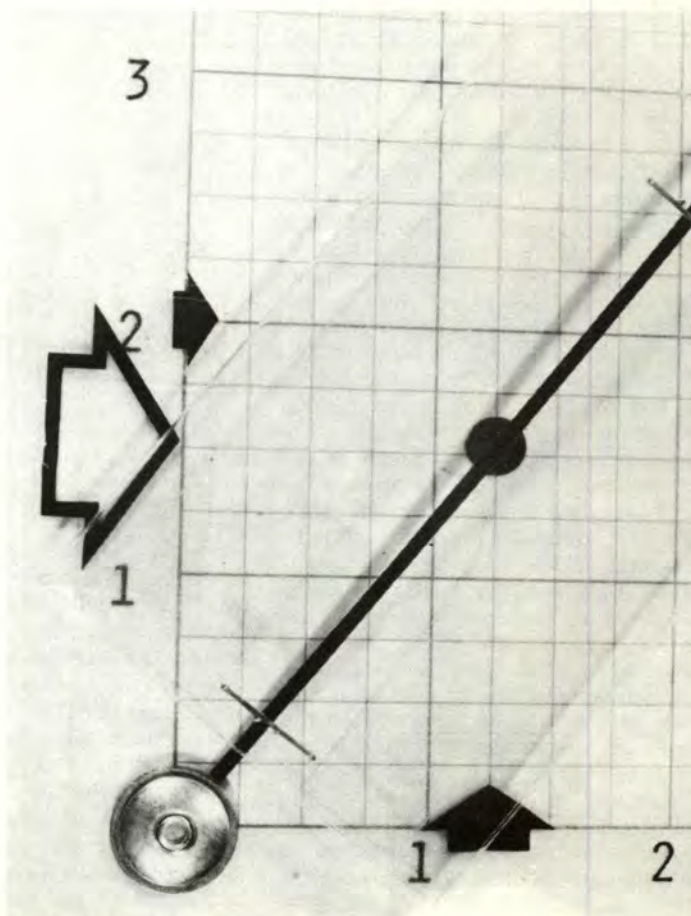
In the author's opinion, a program for the field shooter could include some and perhaps all of the following (thirty-three 3-shot groups for each): bench rest with scope, bench rest with iron sights, offhand snap shooting, offhand deliberate, kneeling, sitting, and prone with folded jacket over a log or boulder as a field rest. All of this shooting should be done with the same rifle-ammunition combination. This would add up to 700 rounds, and the result would be 7 average extreme spread values (one for each position). Using the calculator to subtract out the ballistic dispersion and to adjust for the difference between scope and iron sights, you should be able to put your own results into the following table:

#### Marksmanship Dispersion, MOA

Scope Sights	Iron Sights
--------------	-------------

Offhand, snap	
Offhand, deliberate	
Kneeling	
Sitting	
Prone, field rest	

Fig. 7. Use of calculator to separate ballistic dispersion into rifle and ammunition components.





Now come the obvious questions. What happens if one uses a different load that changes the bench rest group size? And what happens if you switch to a different rifle? Is it necessary to fire a couple dozen boxes of cartridges for each such case? The answer is a definite "no" to the first question, and a qualified "no" to the others. The author's procedure in testing a new load is to fire ten 3-shot groups, comparing the extreme spread to the average spread of a load he's previously used. If no more than 7 of the 10 values are above or below the average spread of the previous load he concludes that the new load has essentially the same dispersion characteristics and that's the end of the test. But if 8 or more spread values are above or below the old average he fires 23 additional groups and then takes the average extreme spread for all 33 groups for the new load. Then, by using this value for ballistic dispersion and combining it by means of the calculator with the marksmanship dispersion factors from the table, the effect of the new load on over-all field shooting performance is easily determined. Thus, the amount of additional firing for a new load is either 30 or 99 rounds to get the information that originally required about 700 shots. That's one of the real advantages of the accuracy analysis procedure.

In switching from one rifle to another the basic question is whether or not the handling characteristics are sufficiently different to influence the shooter's marksmanship to an appreciable extent. It wouldn't be reasonable to assume that marksmanship dispersion data obtained in firing a 243 Winchester would be applicable to a 458 Magnum. Nor would marksmanship performance with a 6-pound hunting carbine be the same as with a 10-pound varmint rifle. In snap shooting, balance and stock fit may influence marksmanship to an appreciable degree. Within limits, however, the marksmanship dispersion developed with one rifle should apply reasonably well to another so that good estimates of over-all dispersion in field shooting can be obtained by determining the ballistic dispersion through bench rest test, and then employing the calculator to combine this value with data from the shooter's marksmanship dispersion table as previously calculated. If there is serious doubt about the applicability of the tabular data, one can

always use the method of firing a 10-group verification test as described above.

### Analyzing Ballistic Dispersion

Thus far in the article we've been dealing with ballistic dispersion without attempting to analyse it into its rifle and ammunition components. The method for doing this is exactly the same as for the analysis of marksmanship and ballistic dispersion, and is illustrated in fig.7 for the data of our original example. As the reader will recall, the ballistic dispersion for our 300 Savage Model 99 was 2 MOA from bench rest firings. The factory ammunition dispersion was given as 1.25 MOA. In fig.7 the marker dot was first set to the ballistic dispersion ("2" on the vertical scale at the smaller black arrow), and then the indicator was pivoted downwards until the marker dot was directly above the value of the ammunition dispersion on the hori-

plished by working on the rifle.

It is apparent from this example that information on the average dispersion characteristics of ammunition as determined in extra stiff factory test barrel equipment is of considerable use to shooters with a serious interest in accuracy. Such information is not published by the ammunition companies, however, and in the author's experience is not even available on special request. Several simply failed to answer the letters, and one replied with the quaint suggestion that such data were "proprietary." Hopefully such short-sighted policies will one day be reversed. In the meantime, those of us who cannot afford a private ammunition testing laboratory can get an approximate answer by using bench rest loading techniques (with the help of an experienced friend, if necessary) to make up a lot of high precision ammunition with the same bullet weight and muzzle

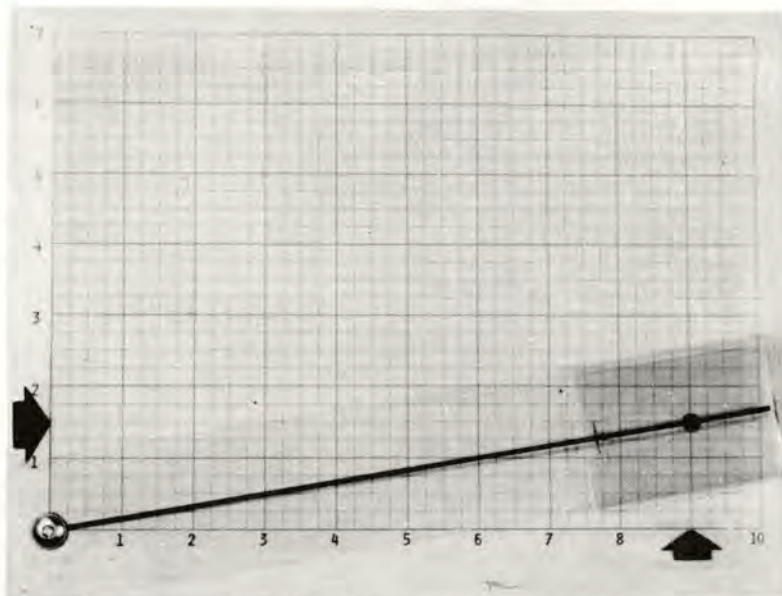


Fig. 8. Another illustrative application. As described in text, each numbered scale unit represents 4 minutes of angle. Hence solid black arrow on horizontal scale designates 36 MOA, while arrow on vertical scale denotes 6 MOA for this problem.

zontal scale (1.25 as designated by the larger black arrow). The dispersion due to rifle alone is now read directly to the left of the marker dot on the vertical scale, which in this case is just over 1.5 MOA as designated by the large open arrow. Since this is the absolute limit of performance for this rifle with perfect ammunition, we know that no amount of fiddling with the ammunition will turn it into a minute-of-angle tack driver. If accuracy is to be improved beyond the limit it can only be accom-

plished by working on the rifle. velocity of our regular factory loads. Use the calculator to subtract the average dispersion of the test ammunition from the average dispersion of the factory ammunition fired under the same bench rest conditions. What this procedure does is factor out the rifle and marksmanship dispersion so that the result obtained is the difference between the test ammunition and the factory ammunition. Since the test ammunition will not be perfect the actual dispersion due to the factory ammunition will be some-



what greater than the value estimated in this fashion.

### Concluding Notes

Two questions not previously answered in the discussion are worth some comment. In using the bench rest to determine ballistic dispersion we cannot, of course, totally exclude the marksmanship factors. It may be reassuring to know that as long as they are small, relative to the rifle and ammunition effects, there will be very little error in the results, as shown by Table 3.

Let's take an example. Assume that we're trying to measure a ballistic dispersion (rifle and ammo) of 2 MOA, but that in reality (due to a bad hangover or some such case) we've got a marksmanship dispersion of 1 MOA in our bench rest firing, in addition to the 2 MOA ballistic dispersion. In other words, the marksmanship dispersion is 50% of ballistic dispersion as in the first line of Table 3. In

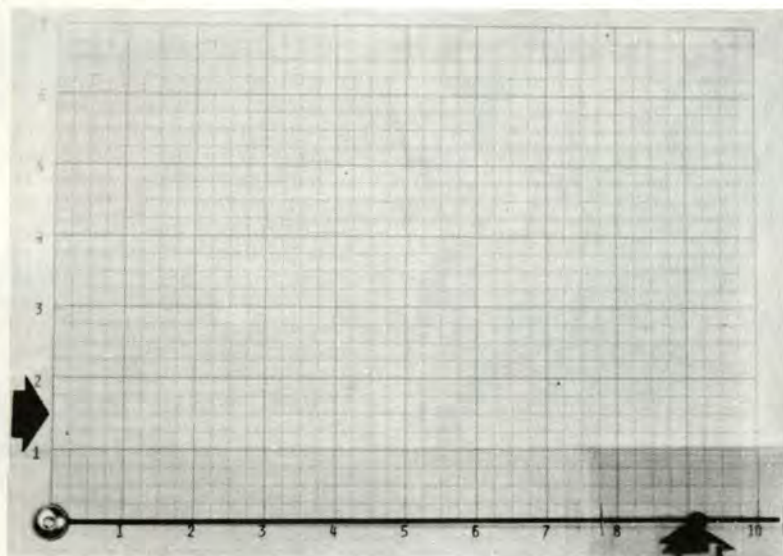
**Table 3. Effect of Marksmanship Dispersion in Bench Rest Testing on Estimate of Ballistic Dispersion**

Marksmanship Dispersion, as % of Ballistic Dispersion	% Over-estimate of Ballistic Dispersion
50%	12%
33	5
20	2
15	1
10	0.5

eliminate marksmanship dispersion completely to get a good fix on a ballistic dispersion for rifles in the hunting accuracy category. In the varmint rifle class one would have to be quite meticulous about minimizing bench rest marksmanship errors to have faith in the ballistic dispersion estimate. In the bench rest competition rifle category the marksmanship dispersion will prob-

cate that the shooting ability of an average soldier corresponds to an extreme spread of about one meter at a hundred meters, or 36 minutes of angle. Let's also imagine for the sake of illustration that a question has been asked as to whether the difference between 3 and 6 MOA ballistic dispersion would have any practical significance on the battlefield for the average soldier.

To solve this problem on our calculator we begin by noting that 36 is approximately four times the largest value marked on our horizontal scale. Therefore we can get the answer by first dividing all the "input" numbers by four, and then, after solving the problem on the calculator, multiplying the result by four. Thus, in fig. 8 we have set the marker dot for 36 (=9) and 6 (=1.5) as indicated by the solid black arrows at the horizontal and vertical scales. Now, swinging the indicator down to the horizontal scale we find the value under the marker dot (at the open arrow) of 9.12. Multiplying this by 4 gives us  $9.12 \times 4 = 36.48$ . (Obviously the result for 3 MOA must lie between this value and 36 MOA and so the conclusion for this case would be that there is no practical difference between 3 and 6 MOA ballistic dispersion.



**Fig. 9. Solution of problem with initial setup shown Fig. 8.**

this case we will actually get a dispersion of about 2.24 MOA in our bench rest firing; and using this figure as our estimate of ballistic dispersion will mean that we're in error by 12% on the high side. However, if the eye is clear, the hand steady, and the breathing even, so that our marksmanship dispersion on the bench rest is, say, 0.4 MOA (20% of the true ballistic dispersion) we will then get an average dispersion of around 2.04 MOA instead of the 2 MOA true value—not enough error to worry about.

Conclusion: you don't have to

ably be greater for most of us than the ballistic dispersion. For me, at least, I'd be more inclined to take the approach of using high precision bench rest rifle and ammunition to estimate my bench-rest marksmanship.

Another matter we passed over in the discussion is the procedure for handling an occasional problem in which the spread is greater than the maximum value on the scale of our calculator. Suppose, for example, that we were interested in some problems in combat marksmanship. Tests conducted under simulated combat conditions indi-

### Commercial Availability of Calculator

The author is currently seeking to patent the calculator and to arrange for its commercial production and marketing at a price commensurate with its relative simplicity. Commercial production by others of a device embodying the general principles of this calculator, or of a kit from which such a device could be assembled, would constitute a potential infringement of the author's rights. However, the construction of an accuracy calculator by an individual for his own use, but not for sale to others, is expressly authorized. ●



# Idle Thoughts of an Idle Fellow\*

by DON MARTIN

*Judge Martin's 40-odd years as an enthusiastic handloader have taught him many things.*

*Some of his ideas you may not agree with, but his opinions are well-founded, valid and valuable, we think.*



MY FORTY year romance with handloading began in a small village in southeastern Alaska in 1927. The community would hardly have rated a Deputy U.S. Marshal, my job, had not the Canadian border line run through the north edge of it. It was peaceful and well behaved. The principal illegal activity was petty smuggling; liquor to Alaska and cigarettes to Canada. I was a gun nut with time on my hands, so reloading was a natural. I tooled up for a 38 Special and a 30-06 rifle. For three years I fired at least a hundred 38 handloads a week. I was then transferred to Juneau. I had time to handload but suitable places to shoot were harder to find. However, I was fortunate enough to find several master gun experts. They gave me a college education in gunology.

In 1933 I found myself on the wrong side of the political fence and lost my job. I returned to my Idaho ranch. It was located in good shooting territory and well-supplied with varmints but my reloading time was restricted. Fourteen years later I sold the ranch and moved to town. The first thing I did, after buying a home, was to build a reloading shop, the garage in front of it an afterthought. My shop is tooled up for 12 different cartridges and there is a good gunsmith just across the road. Between us there are few modern cartridges we cannot load. Elmer Keith lives only two blocks away.

Here, then, are some of the things I've learned in my four decades as a case stuffer, along with a note in there on gadgets and tools I've found useful.

One of the best aids I've found lately, a gadget I think you'll like, is a dial caliper. This tool will make any measurement a handloader needs — case or cartridge length, diameters,

\*With apologies to Jerome K. Jerome.





Karl Neise MT-11 dial indicator caliper measures inside, outside or depth to 6 inches by half-thousandths — \$31.80 with leather case.

depth or pressure indications — quickly and exactly. No magnifying glass is required, as with a vernier caliper. The data is all on the dial in plain sight.

### Manuals A Must

All handloaders should have Lyman, Speer, Hodgdon, Pacific and Hornady manuals in their shop. Each one specializes on slightly different angles of the reloading game — Lyman on cast bullet management with accuracy loads for different bullet weights. Speer gives 100 and 200-yard velocities, plus the Kentucky elevation necessary for 300-yard hits. Hodgdon gives maximum and minimum pressures for most of the cartridges he lists, and a thorough run down on his own powders. Hornady gives no pressures, otherwise his tables are perfect and a study of the exact ballistic data in the back of the book will enable the shooter to evaluate his own rifles and loads versus advertising claims and inflated stories.

The data that follows is from these manuals and from a Du Pont loading brochure. Regard them as maximum unless otherwise indicated; this to give us a fixed reference point, not because we favor bloated pressures. These are to be understood as indicative and true in a general way but never as exact. There can be no such thing as *exact* reloading data. The possibility of variation is endless.

Hornady, by the way of introduction, tells exactly how the data published in the manual was obtained.

Two quotes from this section are certainly enlightening, and remember that this information was taken under strict test conditions. "In many cases we used two or even three new rifles to shoot the data for one cartridge. This was necessary because the testing itself eroded (barrel) throats to the point that test results (with that rifled barrel) were not reliable — and might have produced over-loads in new firearms." That is a pretty kettle of fish indeed. You can bet your last dollar that these blow-

torch cases were small bore, hot shot, high velocity magnums. It sounds as though a man could shoot the accuracy out of a rifle just sighting it in! It isn't that bad, really, but it most certainly denotes a short barrel life. The second quote follows: "We have encountered case after case of identical loads delivering velocities varying as much as 100-200 fps when fired in different rifles chambered for the same cartridge." Whatever the causes of this velocity difference may be, it is almost certainly accompanied by an equivalent, or greater, variation in chamber pressure.

### Bullets More Accurate

The frequency of one-hole bench rest groups at 200 yards proves the accuracy of modern bullets. The long range varmint shooter is well taken care of with high velocity, small bore, disintegrating bullets. The man who handloads ammunition for big game hunting has a complicated problem, that of finding a bullet that will deliver maximum efficiency under his hunting conditions. It should not be too difficult for the eastern deer hunter since he is not likely to get a shot at any legal game other than a deer or possibly a black bear, but a western deer hunter may easily run across a trophy bull elk. The deer calls for quick expansion and the elk for a slowly expanding slug with maximum penetration. It is all very frustrating.

There are many bullet variants — hardness and toughness of the core, jacket strength, sectional density and the type of point, whether spire, round (with more or less lead exposed), cavity form and such things as bronze points. Once the bullet is out of the gun it is affected by its own velocity, by rotational velocity





and the amount of impact resistance it meets. The hunting handloader has to balance all these diverse factors to get the best over-all coverage possible, including reasonable accuracy. Complicated as it may appear he can certainly build a better balanced hunting cartridge than he can buy. The factory product cannot be personalized.

Between professional gun writers and the average hunter there is a great gulf, one not fully recognized by either. The pro spends all of his time shooting, hunting and studying guns. He makes his living that way. The rest of us may be doctors, farmers, truck drivers, anything you can think of. We can only spend our spare time on our shooting hobby. We don't have the time or money to make long hunting trips into Asia, the Middle East or Africa. We're mostly limited to whatever game is nearby and short hunting seasons. The pro can use a highly specialized gun and ammunition. The rest of us get along with a 22 rimfire, a varmint rifle, a big game rifle and a pump shotgun. We don't hunt bears in Alaska or buffalo in Africa. We don't take 500-yard shots at mountain sheep and antelope. A 270 or 30-06 is magnum enough for 95% of us.

### Heavy Bullets

This may be the reason — at least in part — why we get so much high velocity propaganda. It promotes small bores and light bullets. There may not be very much difference in the energy of a light fast bullet and a slower and heavier one, from muzzle to target. The light bullet derives its energy from its velocity, which it starts to lose as soon as it leaves the muzzle. The foregoing sentence is equally true of the heavy bullet but if it has equal energy with less velocity the difference is in its weight. Velocity is lost but weight is a constant. The heavier bullet is a more reliable performer at all ranges.

Commonsense will tell the reloader how to equate the above paragraph. In 243, 6mm and 257 possibly the 70-gr. open point varmint bullet would be the best medicine for coyotes. I would suggest that the 170-gr. flat point 30-30 slug be used in the 300 Savage and in the 30-40 Krag for deer. It would be a deer stopper in the 308 and 30-06 but might be excessively destructive.

In western Montana, during the last few years, grizzly bears have been responsible for several tragedies, the victims all unarmed campers. One of the results has been to popularize the 30-caliber magnums. I hear that these magnum packers tend to favor the 220-gr. round nosed bullet, their reasoning being it is a better bear and elk stopper, and that it doesn't damage deer to the extent that light-



er high velocity bullets do.

Trouble from undependable and unpredictable bullets is the offspring of high velocity. It was never heard of before the 30-06 appeared. Its Mom is speed in feet per second; its Dad, who gets little attention, is rotational speed. Every time Mom travels 6 feet Dad rolls over 7 times if the gun has a 10" twist. Using the most exaggerated example I can think of, the 300 Weatherby Magnum with a 110-gr. bullet and a 10-inch twist, Mom starts at 3900 fps and Dad rotates 4550 times a second. The atmosphere belts Mom on the nose as soon as she gets out of the barrel and slows her down but the resistance to Dad's rotation is much less. He arrives at the target rolling almost as fast as when he started. There is no exact data on this ballistic fact except that a bullet fired straight up usually falls back, still rotating.

We spin bullets to give them a bull-headed gyroscopical notion that they should not deviate from the path they started in. Unfortunately we can't do that without creating centrifugal energy as well, which pulls the outer part of any rotating object away from its center, the axis it spins on. The centrifugal energy developed in our bullet rotating 4550 times a second is enormous. It would take about 2½ minutes for an ordinary shop grinder to make as many revolutions as it does in a second. Every molecule in it is imbued with intense ambition to break loose and fly sideways. If it hits anything that is exactly what it does. It might be a twig, a leaf, a spider web or a bright sunbeam, and such a bullet doesn't lose its explosive possibilities nearly as rapidly as it does its velocity. It will perform effectively on

small varmints. On big game it is a wounding, game-losing fraud. Used on a dangerous animal it is suicidal, and the cemeteries of Africa contain plenty of proof.

High velocity bullets for the big magnums, however, are being improved. Four of the best are the Nosler Partition Jackets, Bitterroot Magnum slugs, Remington Core-Lokt and Speer Heat Bonded bullets. Don't expect spectacular results loading them much under 3000 fps. Varying velocities foul up high speed loading no matter how you figure it.

The best bullet points are the old-fashioned soft points — round-nosed for moderate velocities and spitzer-shaped for high velocity. The least reliable point is any type of wedge nose "designed" to start expansion. There is no telling what it will do. The cavity or hollow point will absolutely insure the impact explosion of a lightweight high speed bullet, but it may do quite well at 2600 or 2700 fps if it has a long shank behind the nose.

Muzzle velocity does not have much real meaning. Bullets lose from 200 to 300 fps, depending on muzzle velocity, sectional density and ballistic coefficient, for every hundred yards they travel. They may impact on a frail deer or a tough old bear. Actually there is only about 150 to 200 yards in their total range where they will perform as they are supposed to. It would simplify rifle handloading greatly if bullet makers would classify their product in some such manner as: "Low velocity — up to 2400 fps. Moderate velocity — from 2400 fps to 2700 fps. High velocity — from 2700 fps to 3000 fps. Magnum velocity — exceeding 3000 fps. Muzzle velocity, of course.



There is a simple and reasonably accurate way to evaluate hunting bullets. Place a quart can of tomatoes, corn or peas on a block about 35 feet from the firing point. Set a smooth, planed board or plank two feet behind the vegetables to catch the evidence, then fire a bullet into it through the can. This target is about as good a substitute for living flesh as you will ever find. I fired a handloaded 7mm Magnum with a Core Lokt 150-gr. bullet at an estimated velocity of 3000 fps. in such a test a short time ago. The bullet made a hole in the plank of 0.60" diameter. Two small fragments hit two inches to the left of the bullet and about two inches apart.

Let's quit talking about bullets. No matter what we, or anyone else, says, it simmers down to this: a satisfactory hunting bullet is the product of the experience and good judgment of the loader.

### Powders and Pressures

Let's look into the propellant situation for a while. One rather common error is that pressures have increased down the years. Whelen's book, *The American Rifle*, published in 1918, mentions a 256 Newton load with a chamber pressure of 56,200 psi. Mat-tern's book, *Handloading Ammunition*, copyrighted in 1926, notes that the first factory load for the 280 Ross had a psi rating of 55,000. I don't know of any ammunition on the market today that tops those figures, nor of any reloading data that suggests such pressures. Thanks to advanced metallurgy a modern American (or better class European) rifle would be vastly safer with such pressures than were those of 40-50 years ago.

As every handloader knows — or should — the brass case is the weakest link in his chain. That statement is entitled to a certain amount of qualification. If the headspace is on the snug side, and if the case exactly fits the chamber so it is fully supported all the way around, it will take fantastic pressures without giving away. The evidence for this is that now and then a rifle is fired with an overload or an oversized bullet or too heavy a bullet, creating enough pressure to lock the action and usually requiring the services of a gunsmith to unlock it. If the case had not held the gun would have blown up. In one such incident the front of the chamber was swelled .005" at least. Also every handloader has heard of fire-forming cases.

Of course, in this imperfect world, a weak or bad case turns up once in a while but most rifle brass trouble derives from over working the metal. Loose chambers and too much headspace accounts for most of it. These faults allow the case to swell more than it should. Every time it is re-



loaded it probably gets a full length trip through the resizing die. Every such round trip through the rifle and die takes some of the stretch and life out of the brass. Eventually it gets tired and lets go.

By way of introducing gun powder to this compendium of unsupported opinion, an older Du Pont loading chart for the 30-06 with 150-gr. bullet will be copied verbatim.

Powder/grs.	MV/fps	Psi
SR 4756/20 gr.	2060	48000
*SR 4759/31 gr.	2350	49500
IMR 4227/29 gr.	2205	49200
IMR 4198/39 gr.	2600	50000
IMR 3031/47 gr.	2820	50000
IMR 4064/52 gr.	2910	49700
IMR 4320/52.5 gr.	2850	50000
IMR 4350/61 gr.	3000	50000

\*Now obsolete

There are quite a few interesting facts revealed in the above table, including one that all of us who handload ammunition should file for future reference — excess pressure does not necessarily mean super velocity. We might also remember that so called "squib" loads may develop rather startling pressures.

As shown, Du Pont's maximum load with 3031 gives a velocity of 2820 and a pressure of 50,000 psi. The Hodgdon manual lists a load of 4831 for the same 30-06/150-gr. bullet of 61 grains for a velocity of 2825 and a pressure of 43,400 psi. A shooter satisfied with 2800 fps velocity is foolish not to get it at the lower pressure price, which includes less heat, less throat erosion, less strain on his brass and a much wider margin of safety. He cannot overload since it is a case-capacity load.

It appears to me that the secret of successful handloading is not trying to squeeze the last foot second of velocity possible out of a gun but to get a satisfactory velocity with a moderate pressure. Pressure data helps

but it is possible to do a pretty good job without it, especially if the loader has the Hornady manual. It starts, as does the Du Pont tables, with the fastest burning and least progressive propellants at the top and works down to the slowest suitable powder at the bottom. It will be noted that the charges increase as they come down the column. At the bottom some may be stopped before they get across the page by case capacity. The slowest and most progressive burning charge is certainly the one with the most powder in it. Starting with the maximum charge at the right, move back toward the left until the desired velocity column is reached and there, in all probability, is the powder charge that will produce the most velocity for the least pressure.

Beside the type of propellant and the size of the charge, chamber pressures are greatly influenced by case capacity, bore diameter and bullet weight. No. 4198 will push a 55-gr. bullet in the 220 Swift up to a velocity of 3685. The chamber pressure will be 54300. 4831 will give the same bullet a velocity of 3647 at a pressure of 46,300. It is the small bore that gives 4831 its chance in the 220 Swift. It does very well in the 243, 6mm and 257 Roberts also. A little more powder capacity compensates for their slightly larger bores.

I will not knowingly load to exceed 50,000 psi chamber pressure. I have several reasons for this self-imposed limit, such as giving myself a small margin for error, to reduce throat erosion, to conserve brass and because, in my opinion, there is very little to be gained by exceeding it.

"The balance point" is an expression that appears to have slipped out of the handloader's vocabulary. It was common 40 years ago. It means the pressure point where a propellant begins to lose its progressive burning qualities and starts to become detonative. In other words, where adding to the powder charge builds up chamber pressure *without* a commensurate velocity gain. The faster a powder burns the lower the balance point. Regardless of how rapid or how slow the combustion may be, each grain increase in a charge adds more to chamber pressure than a previously added grain did. If we are loading a cartridge at 50,000 psi no one can tell how much a single extra grain will build up the pressure except that a fast-burning powder will exceed a slower number.

Speer gives a good example of how pressure builds pressure on page 342 of his manual. The cartridge is a 44 Magnum and the powder 2400.

Grs.	MV/fps	Psi
23.0	1564	40,000
21.0	1423	30,000
19.0	1303	26,000



Adding 2 grains to 19 grains gives a pressure boost of 4000 pounds (2000 per grain) and a velocity gain of 60 fps per grain. Adding 2 grains to 21 grains raises the pressure 10,000 pounds (5,000 pounds per grain), or  $2\frac{1}{2}$  times as much as the previous 2-gr. raise, and a velocity increase per grain of 70.5 fps which is only 10.5 more than the 4000 psi raise gave us. I don't think that last 2-gr. addition can justify itself. I have a Ruger 44 Magnum with a  $6\frac{1}{2}$ -inch barrel and hand-fitted Herrett grips. We have been getting along with each other fine for quite a few years using the intermediate load. I do not foresee any changes.

### Case Capacity

Over-capacity cases have been frequently mentioned. Any rifle case can be made over capacity by using too fast a propellant. The charge of 20 grains of SR 4756 listed in the Du Pont quote is an outstanding example. When loaded with 61 grains of 4350 it was not over capacity, and gave nearly 1000 fps more velocity with only 2000 psi additional chamber pressure. Today's handloader has a very wide choice of propellants. There are so many, in fact, that he may be a trifle confused. The Hornady loading tables will give him a clue. His best choice is the slowest powder that will give him the velocity he chooses with whatever bullet weight he decides on. In the 7x57 Mauser he could choose 4064 for a light bullet, 4350 for a middleweight and 4831 for the heaviest slug. In the 7mm Magnum 4831 becomes a fast powder and H870 or H570 will do the job with less pressure, certainly with heavier bullets.

The slower and more bulky powders enable us to fill cases, or come somewhere near doing it. This is a distinct advantage since it insures more uniform velocity. Such velocity variations are not very important at close range, up to 200 yards perhaps, but could cause a miss at 3-400 yards. Magnum primers should be used with 4831, H570 and H870, also with Norma's 205. Norma's 204, by the way, is rated as being between 4350 and 4831. None of these propellants should be loaded under the stated minimum. In case of doubt not more than 10% under maximum. These propellants are progressive, slow burners because they have been coated and chemically treated to retard combustion. They naturally are more difficult to ignite than faster-burning powders. The charge must not be reduced to a point where there is any possibility of the powder not getting the full primer flash square on the nose.

There is a small fly in the soup however. Marksmen generally agree that a moderately heavy bullet and

total powder combustion are essential to accuracy. Case capacity may limit some of these slower propellants to pressures too low to wholly burn the powder, causing some fluctuation in velocity, recoil and gun vibration. If tack driving accuracy is essential it may require a faster-burning powder.

Hornady and Lyman do not give pressures in their manuals. Hodgdon gives maximum and minimum pressures for most of the cartridges he lists. That enables the loader to maneuver between two fixed points. Speer gives pistol pressures as it should be done — a maximum, minimum and intermediate charges which give the pistol loader the exact information he needs. Du Pont gives maximum pressures only. What the handloading rifleman needs is the Hornady velocity table with pressures so he can exactly tell what the pressure cost will be for increased velocity.

(The pressure figures in these manuals, of course, reflect only the results arrived at in the respective ballistic laboratories, results obtained with the particular elements existing in these labs — rifle barrel or pressure barrel, the particular bullets used [a most important source of pressure variables], etc. The laboratory barrel alone will vary in one or more aspects — and in great or small degree — from your barrel. For these reasons, the pressure cited in the manuals may be less — or more — in your rifle, with your components, with your loading techniques. Be warned!)

Perhaps there is a credibility gap between handloaders and manufacturers. They may think we are easier to get along with if we don't know too much, but the German cartridge makers (DWM and RWS) publish their pressures for all to read.

It is alleged that pressures cannot be exactly measured. Perhaps, but in the dark even a tallow candle is better than no light at all.

We have seen from the Du Pont data that a slower propellant gave approximately a third more velocity, with nearly the same chamber pressure, than with other powders listed. The Speer quote shows that the first two grains of powder added to a minimum charge raised pressures 4000 psi, and that the next two grains boosted the pressure 10,000 psi. The velocity data gave little indication of this pressure jump. The velocity increase at the 10,000 psi addition was only 10.5 fps per grain more than at 4000 psi.

There are now no less than 7 different brands of smokeless powder on the market. How do we evaluate them without pressure data? We don't. We accept the manufacturers' data and the rest is guess work. We

are constantly warned to never exceed maximum loads. This good advice would be many times as effective if pressures were given with those same warnings, and if we could see with our own eyes how much the pressure potential of each added grain of powder increased as the burning in the chamber neared the balance point.

If manufacturers can take pressures for their own information they can print them for ours.

I am quite thoroughly exasperated by this "hush, hush, papa knows best" attitude. Papa doesn't know best. No one can be as competent a reloader without pressure data as he could be with it.

Some recent powders have chemicals added to reduce the heat of the gases produced by the burning powder. It is usually remarked that this temperature-reducing effect is of little value to the ordinary rifleman but adds greatly to the life of machine-gun barrels. I disagree with this comment so far as it concerns citizen shooters and am in good company for once. Winchester-Western advertise a new rifle powder as follows: "It has a low chamber temperature. Which means it treats your gun with tender loving care. (And can save a diligent shooter a small fortune in the long run.)" The throat, that short section in front of the cartridge case, is the most vulnerable part of a rifle chambered for modern high intensity cartridges. Save the throat and save the rifle. High pressures and high temperatures wash out throats. The life of a machine-gun barrel under full automatic fire is a matter of minutes, that of a rifle barrel may be for years. The benefits to a rifle barrel may be greater than to a machine-gun barrel but not so spectacular.

Rifle barrels are usually worn out on target ranges and not in the field. On the range avoid over-heating the barrel as much as possible. When a shot is fired, eject the empty and leave the action open as long as you can. If it is a hot summer day keep the gun in the shade. Speer states that the velocity difference between zero Fahrenheit and 100° in the shade will run from 200 to 300 fps. What this could mean in pressures is guess work but it would be plenty. A loaded cartridge left in a hot chamber for five minutes before firing it could give the rifle something like a factory proof test.

All this may be futility. Perhaps we are all wasting our time — reader, publisher and writer alike. If the anti-gun fanatics in this country are not curbed, within 10 years, quite possibly, anyone caught with reloading tools in his possession may be tossed in an iron cage just vacated by a paroled rapist or a pardoned murderer. ●



# The 375-284 — A Magnum



## for Lever Actions

by PETER J. SPILIOTIS

Developed for hunting the big ones—browns and polar bears, moose and elk—the author's new cartridge is chambered in a 19-inch barreled 6½-lb. rifle, the Savage 99-C he favors. Recoil? No problems, he says!

AT 9:47 A.M. ON THE third of April, 1971, the 375-284 spoke for the first time. A Speer 235-gr. bullet, backed by a healthy charge of Norma powder, leaped across the 100-yard range of the Danvers (Mass.) Fish & Game Club, kicking up a cloud of dust halfway up the high dirt banking. It created a miniature cave where it hit. Another wildcat among many? Well, maybe, but the 375-284 was designed with an express purpose in mind—to develop a cartridge which could be adapted to modern lever action rifles, and to give them an adequate capability against such heavy game as elk and moose, brown, grizzly and polar bear under conditions of dense cover and/or moderate range.

The field of commercially available calibers for bolt action rifles provides the hunter with many to choose from, adequate for everything from moles to elephants, for close ranges, and for long distances. Add to these the many excellent wildcats that have been developed for bolts, and one finds much duplication in capability. But the field of lever action calibers has dwindled to a few selections, calibers I'd classify in the deer/black bear/antelope category. I know of no recent wildcats developed to improve the hunting ability of us poor lever action lovers.

The last good heavy-game lever action caliber (commercially available) was, in my opinion, the excellent 348 Winchester and its 250-gr.

Silvertip. Another more recent and good lever action caliber (why it wasn't more popular I'll never understand) is the 358 Winchester. Handloaded, 45-46 grains of 3031 behind a 250-gr. bullet gave 2400 fps and 3200 ft. lbs. from a 22" barrel, figures far superior to any 30-06 load for heavy game at short to moderate ranges in dense cover.

In developing my big game lever action wildcat, I made two decisions: Use the largest *modern* case adapted for lever actions, and open it up to the largest caliber feasible, since an increase in both powder capacity and caliber produce increases in available energy.

The largest case currently available for today's lever actions is the 284 Winchester. This case has the same powder capacity as the 30-06, but in a shorter, "fatter" configuration. It also matches the capacity of the 350 Remington Magnum (wildcats formed from the 284, 30-06 and 350 RM cases provide similar performance when fired in equal length barrels). In addition, the 284 Winchester case is good for pressures up to 54,000 psi according to the *NRA Handloaders Guide* (2nd printing, page 199).

I selected the caliber because I've always considered the 375 one of the best. Bullets are available ranging from 235- to 350 grains from various sources, heavily construct-

Fig. 1. Author's 99C has 19" barrel, recoil pad and Lyman receiver sight.

ed to stay in one piece when used against heavy animals. The 284 Winchester case, unlike the 30-06, has sufficient diameter to be opened out to 375 and still have adequate shoulder remaining for correct and safe headspacing. The upper limit for the 06 case appears to be 358 (35 Whelen). Attempts to open this case out to larger calibers (375 Whelen, 400 Whelen) have resulted in wildcats with a doubtful amount of shoulder remaining. No such problem arises with the 284 case.

### Why the 99?

As for my choice of a lever action, I've always had a soft spot for the Savage 99, especially the more recent ones with the thumb (tang) safety. Although I consider their rotary-magazine action outstanding, I decided against it for the 375-284 conversion, assuming that its magazine might be more troublesome to alter. Instead, I bought a new Savage 99-C (clip model) in 284 Win. caliber. As it turned out this clip model required very little feed work, and no clip alterations, to handle the 375-284 cartridge. (Possibly the rotary magazine model can also be easily converted but as of this writing I don't know.) The Savage 99/284 can be converted to any 284 wildcat if original 284 pressures are not exceeded.

I decided to have the original



284 barrel re-bored and re-rifled to 375 caliber since the 375-284 has identical case and headspace dimensions as the original caliber. The gunsmith gave it a 12" twist (as on the 375 H&H Magnum), lopped off three inches of the barrel to make a handy 19" barrel carbine, and added a recoil pad to soften the kick. My 19" 375-284 weighs 6½ lbs. with four loaded rounds aboard, and it's 39½" over-all, making it a handy, light rifle to carry around all day.

I bought the following tools from RCBS to load this wildcat. I consider all of them necessary:

- 375-284 Full Length Resizer
- 375-284 Bullet Seater
- 375-284 Trim Die
- 284 to 375 Special Expander

The Special Expander is intended to open the 284 cases to 375 caliber in one press operation by means of a step-expander piece. However, in view of the great increase in caliber (284 to 375) the device didn't work for me, the trouble usually being off-center necks. This problem was quickly cured by first running the 284 brass into the properly adjusted Trim Die, then driving the step expander through the case mouth with a plastic hammer, and finally withdrawing the case from the Trim Die. The whole operation takes only 15-20 seconds per case when mastered, and produces perfect 375-284 cases. The cases are then full length resized, primed, and loaded. New Winchester-Western 284 cases measure 2.162" to 2.163" as they came out

of the box, and extend slightly beyond the Trim Die length. The expansion process reduces the empty case length to 2.136"-2.137", exactly flush with the Trim Die so that no additional filing is necessary—a lucky coincidence.

### Powder Choice

In selecting the proper powder for this wildcat, I was faced with one problem: When using bullets of high sectional density and restricted to a maximum loaded cartridge length of 2.80", the bullet base extends deeply into the powder space. This problem is common to the 284 Winchester, the 350 Remington Magnum and all wildcats formed from these cases with a maximum over-all length of 2.80" fully loaded. To make the best use of this restricted space without excessive powder compression, a dense powder is necessary. Ball powders are more dense than the IMR powders, but they are more critical if loaded to high pressures. Sudden jumps in pressure are common with certain of the ball powders. In addition, ball powders do not usually produce the energy available from the extruded types, although double-base ball powders (nitroglycerine included) have improved this disadvantage.

With these facts in mind I decided to try the new Norma powders exclusively in working up loads for the 375-284. They perform like IMR powders, but have considerably greater density, as the table below indicates. This table represents

the amount of powder the 375-284 case holds (without packing or compression), flat or flush to the top of the neck. NOTE: These are *not* loads but only an indication of powder density:

### Relative Density-Capacity

Norma 203	67.0 grs.
Norma 201	66.3
Ball H380	64.8
IMR 4350	62.8
IMR 4895	63.5
IMR 3031	60.0

As a guide to those readers interested in using Norma powders in place of the IMR series, the figures below indicate the relative burning rates of both series. The powders shown opposite each other do not necessarily have the same burning rate. This does *not* mean that loading data between the two types is interchangeable; it is not! This table simply compares speed of powders so that the correct type may be selected as to speed and proper loads worked up in a safe manner:

Norma	IMR
200 (Fastest)	4198
201	3031
203	4064, 4895
204	4350
205 (Slowest)	4831

### MV and ME Report

The following loads were developed for this 375-284 in my Savage 99-C. All velocities were chronographed on my Oehler chronograph and represent the average, rounded off, of many firings.



Fig. 2. Other 284 wildcats adaptable to the Savage 99, Winchester 88 or other actions with limited magazine length. From left—6.5-284, which duplicates 6.5 Remington Magnum and 6.5-06 performance ● 30-284, equivalent to the 30-06, may be most versatile of 284 wildcats ● 35/284 offers ballistics like the 350 Remington Magnum and 35 Whelen ● 375-284, the wildcat cartridge described here.

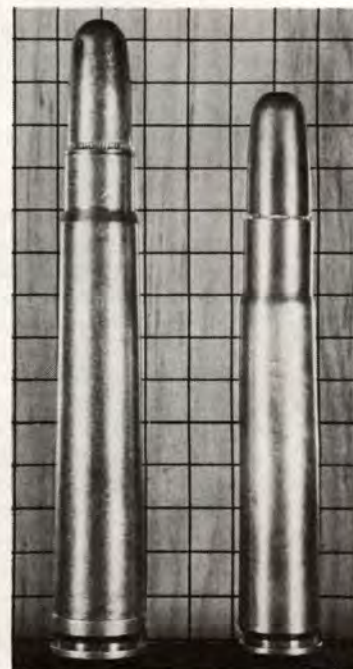


Fig. 3. Two other 375 cartridges. From left—the justly-famed 375 H&H Magnum, used the world over on big game. Its only disadvantage, at least for some, is a heavy recoil. The 375-06 was an effective load but tiny shoulder section gave trouble in maintaining headspace adequately.



Bear in mind that these velocities are actual measurements from the 19" barrel, and that longer barrels would add 20 to 30 fps for each additional inch of barrel.

#### Speer 235-gr. Semi Spitzer Soft Point

Charge/grs.	MV	ME
51.0/N203	2300	2760
52.3/N203	2350	2880
53.6/N203	2400	3000
54.9/N203	2450	3130
56.2/N203	2500	3260
57.5/N203 (MAX)	2550	3390

#### Hornady 270-gr. Round Nose Soft Point\*

Charge/grs.	MV	ME
48.3/N201	2100	2640
49.6/N201	2150	2770
50.9/N201	2200	2900
52.2/N201	2250	3030
53.5/N201	2300	3170
54.8/N201 (MAX)	2350	3310

\*Recently discontinued, replaced by 270-gr. Spire Point Soft Point.

Cases: Winchester-Western 284, expanded to 375 caliber. Primers: CCI #200 Large Rifle.

All loads kept 2.80" over-all. The Speer 235-gr. carries the .375" diameter farther forward, as a result just touches the barrel lands. The Hornady 270-gr. starts its taper farther back, hence has about 0.2" of free-bore.

The above loads worked well in my rifle. They may not in yours.

**WARNING:** Loading wildcat cartridges is usually a much more critical operation than commercial cartridge reloading. Loads should begin at a very low and conservative level and increased in a small and safe manner to the maximum level applicable to the particular rifle with the components used. In addition, lever action rifles don't have the extraction capability of bolt actions. A load which may be structurally safe may stick in the chamber of a lever action rifle after firing. This would be highly embarrassing if confronted by a wounded and irate grizzly. Keep all maximum loads low enough to prevent this problem. The 375-284 has enough punch without squeezing that last 10 feet per second.

If one were to standardize on one of the Norma powders for all 375-284 loads, I believe N201 would be the proper choice. I used N203 in working up loads with the Speer 235-gr. bullet because it is about 0.10" shorter than the Hornady 270-gr., thus 3 to 4 more grains of powder will fit into the case without compression. This permits the use of more grains of a slightly slower powder. (Besides, I had some N203 I wanted to use up!)



Fig. 4. The lightly lubricated 284 case is inserted into properly adjusted RCBS 375-284 Trim die ● Fig. 5. The RCBS 284 to 375 Step Expander is driven into the case mouth ● Fig. 6. Before and after. The expanded 375-284 case is shown at right. The opened case is next full length resized, primed, and loaded. (Note adequate shoulder of 375-284.)

N201 will produce the same velocities with the Speer 235-gr. as offered by N203, but with a few grains less powder. The 270-gr. bullet seats so deeply that N203 would be highly compressed in producing maximum velocities. Therefore I consider Norma 201 the best single choice for loading both the 235-gr. and the 270-gr. bullets. (Bullets above 270 grains are not recommended for the 375-284. They cannot be driven fast enough to expand properly. They should be reserved for use in the great 375 H&H Magnum.)

To test the accuracy of my 375-284 I mounted a 3x-9x variable Bushnell Scopechief and shot some 10-round 100-yard groups. The Speer 235-gr. gave the best results, the best group only 1½" center to center; best group with the Hornady 270-gr. was 2". The accuracy of both bullets is more than adequate considering the size of game they're intended for and the conditions under which the 375-284 will be used.

#### Comparison

Now the proof of the pudding. Let's compare the performance of the 375-284 with such well-accepted big game cartridges as the several 300 Magnums (Norma, Winchester, Weatherby or the 30-338, they're all ballistically similar). To be fair, let's set equal barrel lengths and equal sectional densities. Let's also set equal ballistic coefficients so that velocity losses (per cent loss for distance travelled) are equal.

We'll use the 375-caliber, 270-gr. bullet with the 375-284, the 308-caliber, 180-gr. bullet with the 300 Magnum (both sectional densities about 0.275). The Hornady 270-gr. round nose has a ballistic coefficient of some 0.260; the Speer 180-gr. 308 round nose is very similar, possibly slightly better. Finally, a 24" barrel will be standard.

Most bullets in the high power, centerfire category pick up 20 to 30 fps additional velocity for each added inch of barrel length. Since the 375-284/270-gr. has been chronographed at 2350 fps with a 19" barrel, it should show (approximately and conservatively) about 2450 fps when fired in a 24" barrel. Muzzle energy calculates to almost 3600 ft. lbs. (3570) when a 270-gr. bullet is pushed to 2450 fps.

The factory 300 Magnum/180-gr. when chronographed from a 24" barrel produces about 3000 fps. (Forget the very optimistic advertised velocity from 26" barrels. The *Speer Manual No. 8*, page 99, gives





Fig. 7. Typical 100-yd. 10-shot group fired with the author's 375-284 wildcat. The load was 56/N203/235-gr. Speer bullets, the primers CCI 200.

their measured velocity of the 300 Winchester Magnum, with 180-gr. bullet, between 2949 and 3000 fps from a 24" barrel.) A 180-gr. bullet traveling at 3000 fps produces 3600 ft. lbs. energy, almost the same as the 375-284. Assuming the same ballistic coefficients, energies of the 375-284 and the 300 Magnum will be the same for equal ranges.\*

But let's compare the momentum system now. The momentum of a bullet is its ability to "keep going," to plow through brush, hide, muscle and bone, to reach vital organs. The formula for momentum is mass multiplied by velocity. The formula for energy (kinetic) is  $\frac{1}{2}$  times mass times (velocity squared). To compare momentum of the two cartridges see Technical Note at end of article

$$\frac{270 \times 2450}{180 \times 3000} = 1.225$$

A 24" barreled 375-284 has, therefore, 22½% greater momentum than the 300 Magnum and the same energy at all ranges. This should make this short wildcat a

\*In making these comparisons please note that the author's 375-284 has a 19" barrel, not one of 24", thus his kinetic energy figures at the muzzle are really 3310 ft. lbs., not the 3570 a 24" barrel gives. His momentum quotient also becomes 1.17 at 2350 fps. On the other hand, at 300 yards the remaining KE of the 270-gr. bullet is about on a par with the 180-gr. Magnum bullet's 1330 ft. lbs.

more effective "Big Beast Buster" than the various and popular 300 Magnums on the market.

The large diameter of the 375 bullet also produces a larger wound channel and a better blood trail if the bullet does not hit exactly where desired. There is NO 30-caliber bullet that can match the 375 in this respect. Add to this the fact that the 375-284 can be had in a 6½-lb. rifle (empty), while most 300 Magnums run 8 pounds plus, and the superiority of this wildcat in tight situations is evident—apart from recoil!

### Conclusions

Having extolled the excellence of the 375-284, I feel I must, in all fairness, point out what I consider to be the only defect of this wildcat: its recoil. When loaded to maximum, recoil is a bit brisk. Any rifle under 7 pounds that fires a 270-gr. bullet backed by 54-55 grains of powder just has to come back hard. However, with the heavy hunting clothes usually worn and the small number of shots usually fired on a typical hunt, recoil should be no problem.

Winchester has produced a strong and flexible case in its 284 Winchester, greatly increasing the capability of actions limited to a

cartridge length of 2.8" maximum. The 284 was developed to duplicate 270 Winchester performance in lever actions. I believe a 308-caliber version would have been more versatile, duplicating in short actions 30-06 capabilities. 308 bullets are available in weights ranging from 110- to 220 grains, and would cover a greater variety of hunting conditions than the 125/150-gr. loads available in the 284 Winchester. I hope Winchester follows through with additional calibers (308 and larger) based on this excellent rebated case.

The 375-284 is, I feel, truly worthy of the title "Magnum." It is not the belt around the case that determines the magnum, but *performance*. The 375-284 can keep up with, and in many cases exceed, the performance of the best of modern cartridges. •

### Acknowledgements

I'm grateful to the following men for their assistance in my project:

First, Elmer Keith, who convinced me many years ago that the big ones drop better when hit with a minimum 33 caliber, minimum 250 grains.

Bob Snapp of Clare, Mich., who did the conversion work on my Savage 99. The outstanding performance of this rifle/cartridge is due largely to the excellence of Bob's workmanship.

Will Hafler of Weippe, Idaho, who provided me with an outstanding procedure to follow in developing loads for never-before-tried cartridges.

Inspector (and photographer) Roger Cyr of the Danvers, Mass., Police Department, who produced the pictures accompanying this article.

Not least, my many friends at the Danvers Fish & Game Club, who provided moral (and sometimes physical) assistance needed at the range to develop the 375-284.

### Technical Note

I'm sure some sharp-eyed reader, knowledgeable in the science of kinetic physics, will notice in momentum calculations that I used the bullet *weight* (in grains) instead of the *mass* factor in comparing the two bullets. The weight of an object is its mass subjected to a force of acceleration; no acceleration, no weight. Here on earth all objects with mass are subjected to an acceleration by a well known force called GRAVITY. Gravity produces an acceleration of 32.2 feet per second per second. Since all objects are subjected to this same acceleration, comparing their weights is a valid way to compare their mass. Since I am attempting to compare *ratio* of momentum and not the actual *amount* of momentum, it is perfectly valid to use the bullet weight in grains in the example instead of the bullet mass.



# Telepacific Chronograph

*Battery-operated, low-cost instrument performed excellently, with a bonus of multi-shot screens.*

by **BURTON T. MILLER**

SOME 12 MONTHS AGO I acquired one of the first ballistic chronographs made by Telepacific Electronics Co., Inc., 3335 Orange Ave., Anaheim, Cal. 92804.

In the meantime I've come to appreciate what a convenience and education such an instrument can be. In the past year I've chronographed literally hundreds of rifle loads, air pistol projectiles and surprisingly enough, reloaded shotshells! Add to this the capability of chronographing rifle loads at distances up to 300 yards and it can be readily seen that this is a very versatile piece of equipment—and for just \$135!

A crystal-controlled clock insures the accuracy of an expensive laboratory instrument. Operation is by two \$1.35 batteries on separate circuits. If one begins to weaken they can be reversed and the unit will continue operation. No worries about being unable to complete a test program through lack of power when afield, no dependence on 115V power, no lengthy extension cords, thereby reducing the bulk of the equipment.

The 9" x 5½" x 7½", 6-lb. TPB-01 comes from the factory with two aluminum frames and 5 pair of screens, velocity tables and two cables, 15 and 20 feet long. These cables permit placing the readout unit alongside the shooter, in full view and reach at all times.

The front or first screen is 3" x 4", the far screen is 5" x 7". To assure a hit on the rear screen, the shooter centers the front screen so that the entire periphery of the rear screen is in view; thus, if you hit the front screen there is no way to miss the rear one!

The major advantage of these screens is that they can be used for 10 to 30 shots per pair, without getting up!

For normal use in determining "muzzle" velocity, the only extra needed is a piece of 2x4 lumber of about 64 inches long. The two screen frames provided are mounted on this 2x4, separated by exactly 5 feet.

Once set up and the circuits checked, the shooter fires, reads the velocity from the tables as indicated by the panel lights, records the velocity, pushes the reset button and continues firing.

One man can do everything necessary without help, and he can probably chronograph 10 times faster than can be done with the one-shot, replaceable-screen chronographs. With the TPB-01 he doesn't even have to get up—at least not for 10 or more shots.

My extensive testing shows that velocities attained were highly accurate and as



consistent as those obtained with much more sophisticated instruments.

It is well recognized that some variance from published data will always exist for several reasons, for any given load—the inherent differences in individual firearms of the same caliber, temperature, humidity, powder lot, variations in case dimensions, primers used, etc. These things can't appear in the various manuals, but with these unknowns identical readings can hardly be expected!

To give an example of Telepacific performance, I first checked USAF velocities attained during a 10,000 round endurance test of ten M16 5.56mm rifles and ten AR18s of the same caliber. The velocity averages were taken from ten 10-round series from each rifle using mixed lots of G.I. ammunition:

M16	AR18
3138 fps	3095 fps
Barrel length of the M16 is 20", of the AR18, 18¼". Thus a higher average would be anticipated for the M16.	

The TPB-01 gave 3128 for Winchester ammunition and 3138 for Remington in a new AR18—very close to the over-all Air Force averages.

Using one of the current manuals showing 223 velocities for the AR15, with its 20" barrel, the following reloads were fired for comparison:

Powder/grs.	Bullet/grs.	Average Velocities	
		Manual	TPB-01
B1-2/26.5	Speer/55	3276	3263
RL-11/25	Speer/55	3272	3200
RL-11/25	Speer/HP52	3289	3247
RL-7/22.5	Speer/55	3231	3209
H335/27.5	Speer/HP52	3419	3364
4895/26.5	Speer/HP52	3239	3165
4064/23	Speer/70	2900°	2681

\*Bob Hutton's Rifle Ranch 26" barreled rifle. NOTE: Based on the above USAF official figures, the AR15 should average about 40 fps higher than the AR 180.

Recently we "manufactured" a frame from scrap 2" x 2" suitable for attaching long TPB screens to allow room for shot charges to pass through, the same frames afford space for 22" x 22" screens for up to

Telepacific's chronograph uses these multi-shot screens, permit 10-20 shots without changing.



300-yard chronographing of rifle bullets.

Using Federal 12 gauge cases and Federal primers, here are a couple of typical load results:

30 grs. Herco	19 grs. 700X
1½ ozs. 6s	1½ ozs. 7½s
1317 fps TPB*	1217 TPB*
1330 fps (manual)	1290 (manual)

\*About 12 fps should be added to the TPB figures to correct for distance from muzzle to center point between screens.

Pete Cooke, president of Telepacific, recently told me that a new TPB-02 model, even more convenient to use, will be out very soon. It will read out the exact velocity, with no reference to tables required; just record the velocity, reset and fire again!

This unit will have the same general dimensions, uses the same screens, etc., as the TPB-01 and, surprisingly, the cost will be only \$197.50. Considering the convenience, the small \$62.50 difference would appear most reasonable.

Soon to be announced also are Telepacific's "Electroscreens," an optional extra for both chronographs. Each new screen comprises a pair of short, vertical rods between which the bullet passes; the convenience of expensive and cumbersome photoelectric screens is obtained through two units measuring only 6" x 3" x 2", and they operate from the same internal batteries in the chronograph. Owners of the TPB-01 instruments need have no fear of obsolescence, for Pete Cooke says that these new screens will adapt to all TPB units in use without any modification. The Electroscreens, (Model TE-01) will sell for around \$30 per pair.

The value of a truly functional chronograph to the amateur handloader was demonstrated very clearly recently when Pete Cooke set up a TPB-01 system at a local rifle range one Sunday morning, and offered its free use to any of the shooters present. Although most of the shooters—lined up at the chronograph until late afternoon—had been rolling their own for many years, this was the first time for most of them that the results of their labors had been anything but a matter of wild conjecture! Many were the smiles and many were the disappointed faces as those figures came rolling in, but on two questions they were all agreed: "How can a guy pretend to know anything about handloading without the use of a good, reliable chronograph?" and "Hey Pete! You gonna be out here again next Sunday?"

Prices for Telepacific products—the TPB-01 and TPB-02 chronographs, the TE-01 Electroscreens—have increased. Write to Telepacific for current information.



# SHOTGUN BALLISTICS AND LOAD SELECTION



Carefully collected and appraised data, received from numerous hunters and other sources, produced the new Nomograph shown here. This valuable tool will be useful to both factory load shooters and shotshell handloaders.

BY L. L. SCHNEIDER

THIS NOMOGRAPH makes it easy to compare the merits of different shot sizes on game. Simple and easy to use, it will also save time in finding pellet energies and velocities. Everything is conveniently located on one page; there is no need to leaf through pages of numbers or interpolate between them. The only tools needed are a straight edge and a pencil. Since this is paper ballistics, the proviso of reasonable judgment and good assumptions must also be added. Numbers do not always give all the facts.

The extreme right-hand scale is the pellet velocity in feet per second. Velocity data are available from reloading manuals, gun catalogs, books, and some of the yearly annuals of the hunting or firearms magazines. Some good sources are the *Lyman Shotshell Handbook*, *The NRA Firearms and Ammunition Fact Book*, and the *Sports Afield Gun Annual*.

The middle scale—the scale between shot size grid and pellet velocity—gives the pellet energy. (Energy equals one half of the mass times the velocity squared ( $E = \frac{1}{2}mv^2$ ). In reality this equation is being solved when using the nomograph.

The scale on the left is a little more complicated. There is a grid

of shot size and quantity and also an index line. To use this scale it is necessary to get the intersection of two lines and then connect the intersection with the index line. For example, to put one size  $7\frac{1}{2}$  shot on the index line find the intersection of one pellet from Number-of-Pellets scale and  $7\frac{1}{2}$  shot from shot size scale, then move horizontally directly to the right until intersecting the index line. To put four 4s on the index line follow the four on the Number-of-Pellets scale until it intersects the sloping 4 size pellet line, then follow the horizontal line to the right until it intersects the index line. Always read the *pellet size* on the steeply sloped line and *pellet number* on the vertical lines. Just use the horizontal lines as a guide over to the index.

The bird scale shows a range of energy needed to bring down game. From top to bottom the birds are turkey, goose, duck, grouse, crow and dove. Other birds can be added by estimating their position on the scale. Since information on required killing energy is scarce, this scale should be considered only as a suggestion. Magazine writers occasionally report the energy needed, in their experience, to kill certain species. Books such as Bur-

rard's *The Modern Shotgun* and Oberfell and Thompson's *Mystery of Shotgun Patterns* also give information on needed energy. A final source was my own experience combined with that of hunting friends. The conclusions from these combined sources are plotted on the bird scale. The scale is not absolute; it only represents a consensus of experience. It does not mean that game can't be brought down at less energy. Neither will using more energy mean that the game will be pulverized, but more luck will be needed by going further in either direction.

The following examples illustrate the use of the nomograph.

**Question 1** What is the energy of one size 4 shot travelling at 900 fps?

**Answer** First put one #4 shot on the index. Follow one pellet on the Number-of-Pellets scale directed upwards until it intersects #4 shot size, then go directly right to the index. Draw a straight line between the index intersection and 900 fps. The straight line intersects the energy at 5.8 ft.-lb.

**Question 2** What is the maximum distance at which one #4 pellet can kill a crow?

**Answer** First put one #4 pellet



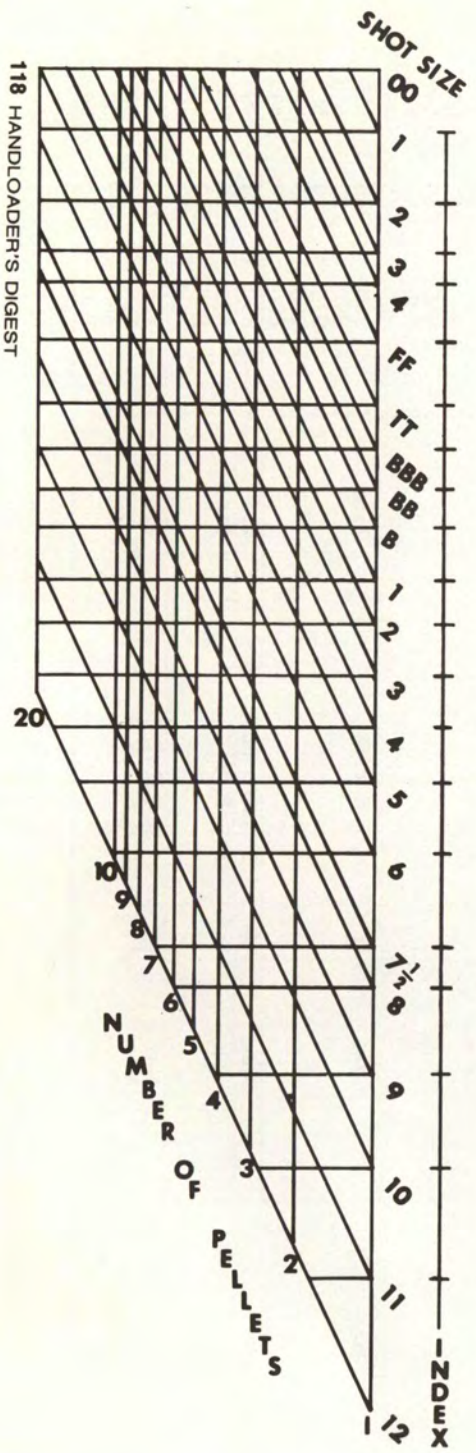
# SHOTSHELL VELOCITY TABLE

Muzzle Velocities in Descending Order

(Compiled by L. L. Schneider)

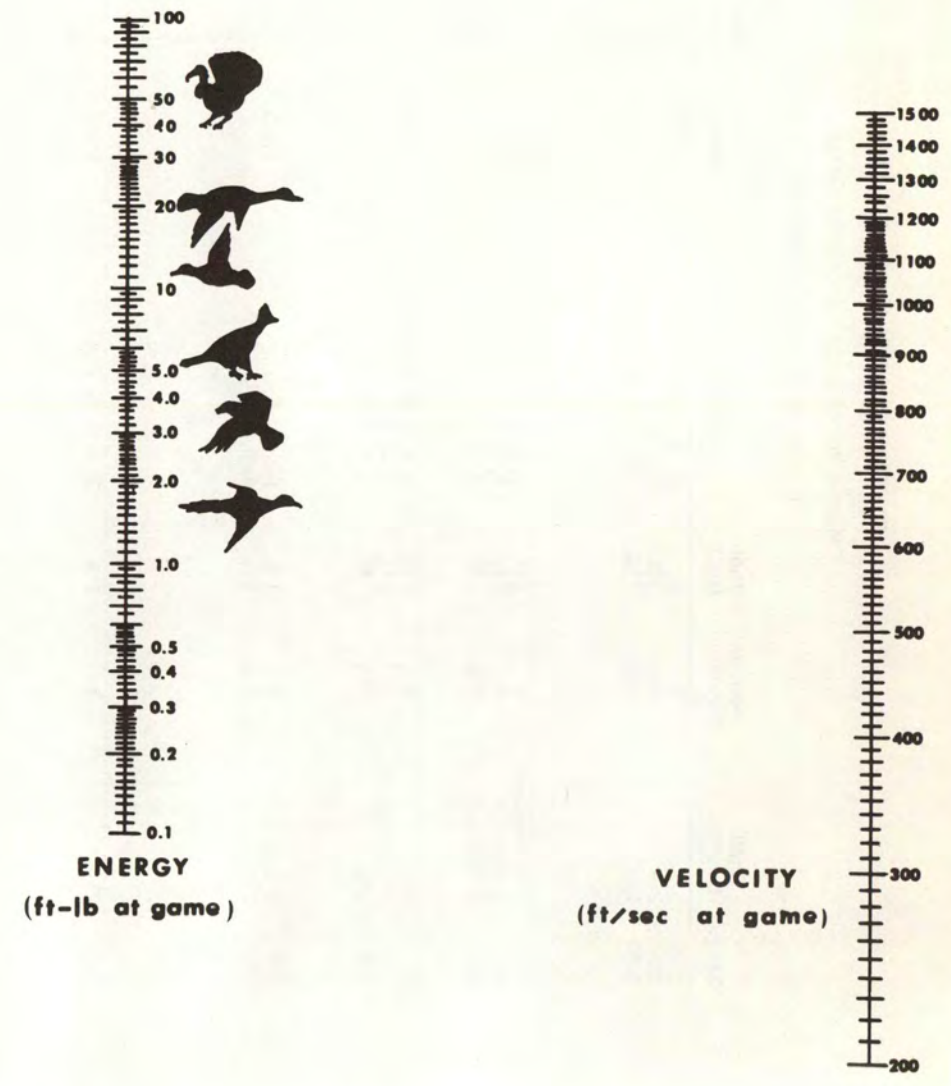
Gauge	Shell Length	Powder (dr.-eq.)	Shot (oz.)	Shot Sizes	Muzzle	Velocity (fps)			
						Shot Size	20 yds.	40 yds.	60 yds.
10	3 1/2	5	2	2, 4	1330	BB	1085	915	790
10	2 7/8	4 3/4	1 5/8	BB, 2, 4		2	1045	860	730
12	2 3/4	3 3/4	1 1/4	BB, 2, 4, 5, 6, 7 1/2, 9		4	1010	815	685
						5	990	790	655
						6	970	765	630
						7 1/2	930	715	580
						9	880	660	525
12	2 3/4 magnum	4	1 1/2	2, 4, 5, 6	1315	BB	1075	905	785
12	3 magnum	4	1 3/8	2, 4, 6		2	1035	855	725
12	3 magnum	4 1/4	1 5/8	2, 4		4	1005	810	680
						5	985	785	655
						6	960	760	625
16	2 3/4	3 1/4	1 1/8	2, 4, 5, 6, 7 1/2, 9	1295	2	1025	845	720
16	2 3/4 magnum	3 1/2	1 1/4	2, 4, 6		4	990	800	675
28	2 3/4	2 1/4	3/4	4, 6, 7 1/2, 9		5	970	780	650
						6	950	750	620
						7 1/2	910	705	575
						9	865	650	520
12	3 magnum	4 1/2	1 7/8	BB, 2, 4, 6	1255	BB	1035	880	765
12	2 3/4	3 1/4	1 1/8	4, 5, 6, 7 1/2, 8, 9		2	995	830	705
						4	965	785	665
						5	950	765	640
						6	930	740	610
						7 1/2	890	690	565
						8	880	675	550
						9	845	640	515
16	2 9/16	3	1 1/8	2, 4, 5, 6, 7 1/2	1240	2	990	820	705
						4	960	780	660
						5	940	760	635
						6	920	730	610
						7 1/2	885	690	560
12	2 3/4	3	1	4, 5, 6, 8	1235	4	955	780	660
						5	940	755	635
						6	920	730	605
						8	870	670	545
12	2 3/4	3 1/4	1 1/4	7 1/2, 8	1220	2	975	815	695
20	2 3/4	2 3/4	1	2, 4, 5, 6, 7 1/2, 9		4	945	775	655
20	2 3/4 magnum	3	1 1/8	2, 4, 6, 7 1/2		5	930	750	630
20	3 magnum	3 1/4	1 1/4	2, 4, 6, 7 1/2		6	910	725	605
28	2 3/4	2 3/4	1	6, 7 1/2, 8, 9		7 1/2	875	680	560
						8	860	665	540
						9	830	630	505
12	2 3/4	3	1 1/8	7 1/2, 8, 9	1200	4	935	765	650
12	2 3/4	3	1 1/8	4, 5, 6, 8, 9		5	915	740	625
16	2 3/4	2 1/2	1	9 (skeet load)		6	900	720	600
20	2 3/4	2 1/4	7/8	9 (skeet load)		7 1/2	865	675	555
28	2 3/4	2 1/4	3/4	9 (skeet load)		8	850	660	540
410	2 1/2	Max.	1/2	9 (skeet load)		9	820	625	505
16	2 3/4	2 3/4	1 1/8	2, 4, 5, 6, 7 1/2, 8, 9	1185	2	955	795	685
						4	925	760	645
						5	910	735	620
						6	890	715	595
						7 1/2	855	670	550
						8	845	655	535
						9	815	620	500
16	2 9/16	2 1/2	1	4, 5, 6, 8, 9	1165	4	915	750	635
20	2 3/4	2 1/2	1	4, 5, 6, 7 1/2, 8, 9		5	895	730	615
						6	880	705	590
						7 1/2	845	665	545
						8	835	650	530
						9	805	615	495
20	2 3/4	2 1/4	7/8	4, 5, 6, 8, 9	1155	4	905	745	635
						5	890	725	615
						6	875	700	585
						8	830	645	530
						9	800	610	495
410	3	Max.	3/4	9 (skeet load)	1150	9	800	610	495
12	2 3/4	2 3/4	1 1/8	7 1/2, 8, 9	1145	7 1/2	835	655	540
						8	825	640	525
						9	795	610	495
410	2 1/2	Max.	1/2	4, 5, 6, 7 1/2, 9	1135	4	895	740	630
410	3	Max.	3/4	4, 5, 6, 7 1/2, 9		5	880	715	605
						6	860	695	580
						7 1/2	830	655	540





# SHOTGUN BALLISTICS NOMOGRAPH

by L.L. SCHNEIDER





on the index as described in the previous question. Select 3.3 ft.-lb. of energy as that needed for crows. Connect the index intersection with 3.3 ft.-lbs. and the straight line will intersect the velocity scale at 680 fps. The *Lyman Shotshell Handbook* shows that a #4 pellet will be travelling the needed 680 fps at 60 yards (1315 muzzle velocity). One pellet *should* be sufficient at 60 yards, but our "reasonable judgment and good assumptions" stipulation must also be considered. The pattern will be very open and a crow could fly through it. A hit from a cylinder bore gun would be pure luck. An 85% full choke gun would have a fair chance. The hit must be in a good location. Judging speed and range at 60 yards is very difficult, and the pattern may not even be close to the crow.

**Question 3** Will any other shot size be suitable for killing the crow in the previous question? (3.3 ft. lb. of energy stipulated.)

Yards	Velocity—from published tables	Pellets needed—from Nomograph using 16 ft.-lb. energy	Pellet delivered —to picture of duck
20	960	2¾	13
30	850	3	10
40	780	3¾	8
50	730	4¼	6
60	660	5	3
70	540	7	1

**Answer** Yes, but not at the same yardage. Any size could be used, but for this example let's pick a 7½ and a B for trial. Put one size 7½ shot on the index. Draw a straight line between the intersection and 3.3 ft.-lb. The line intersects the velocity at 1075 fps. The ballistic table shows that one 7½ pellet travels 1075 fps at about 10 yards (muzzle velocity 1300 fps, and approximate interpolation between 0 and 20 yards). Now put one B on the index line. Connecting the index intersection and 3.3 ft.-lb. crosses our velocity scale at 400 fps. Most published velocity charts do not go as low as 400 fps for Bs, but interpolation will give 400 fps at about 90 yds. That one B pellet will have the energy if by some miracle it were to connect.

**Question 4** The crow was brought down with either one #4, one #7½, or one B but what about multiple hits with two or four or more pellets?

**Answer** Multiple hits are handled the same way as single hits. For example, follow the #7½ sloping line up to the left until it intersects

the first vertical line extending up from 2 on the Number-of-Pellets scale. This intersection is two #7½s. Follow the horizontal line directly left until it intersects the index. A straight line can now be drawn between the intersection with the index and 3.3 ft.-lb. and the velocity will be 765 fps. Notice one important thing. Two #7½s intersect the index at the same place as one #5. The two #7½s and one #5 therefore have equal value. Continuing up on the sloping line to three #7½s shows that three 7½s equal about one #3. Four 7½s would equal one #2. Seven 7½s would equal about one B. Nine 7½s would equal one BBB and so on.

**Question 5** What are some other combinations that would give the same effect and energy as the one #4 shot in Question 2? That is, 680 fps and 60 yards.

**Answer** The nomograph shows that we would have the same energy with four 9s, ten 11s or 17 12s.

We would not necessarily have the same effect. Shotguns are multiple-hit guns and they are designed to spread out the energy. Many hunters have reported over the years that two shots in two different places have more effect than one shot with the same total energy in one place. This is a case in which figures do not tell the whole story. Decreasing shot size (i.e., increasing number) and getting more hits can also not go on indefinitely because a limit is reached when shot size becomes too small or the pattern density may not be enough to deliver the required number of pellets. The 17 hits with #12s would be impracticable.

Knowing the required energy at a certain yardage and the number of pellets needed to obtain the energy is not enough to compute the farthest range for bringing down game. The pattern must also be dense enough so that the number of pellets needed will actually hit the game. With my full choke 12 gauge the pellets needed for ducks will equal the number of pellets delivered at 55 yards. This

is with 1½ ounces of 4s. The pellets needed were calculated from the nomograph. The pellets delivered were obtained by shooting at a picture of an average size duck. The table shows how the range limit was found. At 50 yards 4½ pellets are needed and 6 were delivered. At 60 yards 5 were needed and only 4 were delivered. The ideal farthest range is therefore in between or about 55 yards maximum for this gun. There were areas in the complete pattern at 70 yards that would deliver the needed pellets to the duck, but these were rare occurrences. The very next shot at the duck could, by luck, hit with 7 pellets at 70 yards; on the other hand it could take another 100 shots before the right combination connected. That's 99 cripples for one sure duck.

There is an optimum range for each gun, based on a combination of choke, load, and shot sizes. Every hunter must choose what he thinks is right for him. This can be done scientifically by playing with equations, numbers and graphs, technically by patterning and/or measuring velocities, or by intuition based on a lot of actual field experiences.

The killing energies are almost unarguable. My chart for ducks should be read as a range from 10 ft.-lb. (probably Buffleheads) to 18 ft.-lb. (larger Blacks or Mallards). 16 ft.-lb. is for an average size wood duck or large teal, my most common trophy. The 22 ft.-lb. figure has always seemed slightly high to me for several reasons. First, my experience for 1969 included 17 inspected ducks. Eight ducks were overkills, four were unrecovered wounded, five were marginal and therefore useful for data. The five were hit with 3 to 6 pellets of which 1 or 2 pellets were considered ineffective. Energies were all calculated as under 20 ft.-lb. Secondly, other writers seem to verify lower energies. Francis Sell in the April, 1969, *Gun Sport* gave a figure of 14 ft.-lb. for ducks. Lucian Cary in the October, 1959, *True* has figures which, when calculated, give about 15 ft.-lb. for 0 to 10% cripples on suspended farm-raised ducks. Occasional NRA articles have given 10 to 15 ft.-lb. for ducks when the writer's data is converted to ft.-lb. Bert Popowsky in one article calculated that even 13 ft.-lb. was adequate for geese. My criticism of the 22 ft.-lb. 5-pellet hit standard is that it ignores the occasional ineffective pellets that hit but don't contribute much to the killing. ●



# Why

HE WAS A JAUNTILY dressed trapshooter and he walked the trapline with pride. After all, he was wearing the "best" in approved trapshooting fashions and, as every clay target shooter knows, special shooting apparel is expensive. He smoked a large, imported cigar—his own special brand—and he always had a day's supply of them jutting out of his handsome shooting jacket.

As he walked up to a trap to start his shooting, this prosperous appearing gentleman would nonchalantly toss away his half-smoked cigar or, perhaps, place it on a nearby post or gun rack. If it should accidentally be knocked off or be dropped on the walkway or grass, would he stoop to pick it up? No, sir! Not this affluent trapshooter. Even though it were the better part of a good, fifty-center, he wouldn't deign to bend over and pick up his own half-smoked cigar. Why should he? After all, they were relatively inexpensive (for him) and anyhow, bending over had been getting just a little more difficult for him during recent years. He had gained a little weight and, well ... it just wasn't worth the effort.

But bend over on the trap range he does, and quite often, too. But he is not picking up half-smoked cigars. No, indeed! This well-dressed trapshooter is picking up empty shotshells. For, you see, he's also a reloader and, as every gun club management and ammunition manufacturer has learned during the last few years, the reloader is a character to be reckoned with, a customer to be favored.

This well-dressed fellow ogles an empty shotshell lying on the ground as though it were a gold nugget. Furthermore, like the old-time gold prospectors in the Far North, this avid shotshell stuffer carries his own private "poke," fastened to his belt, to hold his empty shotshells—and anyone else's empties he can get his hands on. For he knows that when he runs out of empty cases to reload his trapshooting will be sharply curtailed. So he hoards those spent shotshells as though they were



indeed gold nuggets.

Oh, he could buy new, factory loaded ammunition, of course, but there lurks an almost secret thought in the back of his mind that his reloads, unlike those of other claybirders', are slightly better than factory loads. Why not? He extends the utmost in tender, loving care to the preparation of his reloaded shotshells. Nevertheless, he does love those shiny, "once fired" factory cases and collects them at every opportunity.

Almost like a small boy's collection of prized marbles, some empty hulls are more highly desired than others by our reloader. A once-fired, plastic case manufactured by one of the major ammunition companies is, of course, top dog in our man's covetous eyes. Older plastic cases, as well as paper case shotshells, are relegated to a second choice position. None, however, are too bad to be picked up and used. For our happy reloader has a formidable array of "practice loads," carefully designed to be dropped in well-worn empty cases. It's clean-up time at the reloading bench when he acquires a collection of worn cases, and everything from old fashioned fiber wads to

reclaimed shot go into these venerable hulls. No indeed, those precious shotshells are seldom wasted.

## The Old Days

It wasn't always so. Not too many years ago, empty shotshells were considered a nuisance by gun clubs, to be burned or hauled away to the nearest dump. Most gun club boards of directors sat around scratching their heads trying to figure out a way to salvage something from all those empty shells. They knew, of course, that the brass bases were worth something for scrap metal but nobody could come up with a practical and economical way to separate the brass base from the paper body of the empty shotgun shell. Reloading, by the primitive methods then known, was too slow and laborious for even the most frugal of clay target shooters.

One old time shooter, with more time than money, carefully cut the paper from the brass heads and imbedded them, face up, in fresh cement in his home patio as a sort of novel paving. Others made attractive buttons for shooting jackets from discarded brass-head shotgun shells. But there is an obvious



# Reload?

More particularly, what is it that makes the well-heeled claybirder spend hours a day filling shotshells? It can't be economy, though that's the big reason for many. The author believes he has the answer.

by CLARENCE MASSEY

limit to such uses, and most of the empty shotshells were burned or otherwise wasted in the gun club's trash barrels.

But times have changed. Nowadays everything in the empty shotshell is used. One avid shooter I knew saved all the expended primers punched from the empty shells that he reloaded. About once every year or two, this fellow would carry several one gallon cans full of fired primers down to the local salvage yard and pick up a few extra dollars for the scrap metal contained therein.

In the early days of the current boom in the reloading of shotgun shells, each operation from the empty shell to the finished reloaded shell was a separate procedure. Even though helpful reloading tools were gradually appearing on the market, most reloading operations were done pretty much by hand. Primers were punched out as one operation of the primitive reloading tools, but the new primers were often pounded into place by the use of a round, wooden rod. This was inserted inside the shell and pounded with a wooden mallet to force the new primer into the empty primer hole.

Primed shells were usually put into a specially made wooden block containing holes for 50 shells. Then each shell was charged with propellant from a powder measure. A hard cardboard overpowder wad was shoved into the case by hand, one or more fiber wads were also put in by hand and rammed home one at a time. Shot was dropped into the shell with a little scoop that was often carefully handmade (often from a discarded brass rifle cartridge) to hold just the right

weight of pellets for a regulation clay target load.

After the shot was dumped into the shell, the cumbersome loading machine would put more or less of a uniform crimp on the shell. Final crimps sometimes left much to be desired. Early day reloaders often found loose shot rolling around in their shooting jacket pockets, a sure sign of poor crimps on their reloaded shotshells. Some reloaders kept a supply of paper tape on hand to patch the end of each shell that had a poor crimp.

Meantime, as the early reloaders struggled to find ways and means to perfect their reloading procedures, major ammunition companies viewed the growing popularity of reloading shotshells with alarm and dismay. They put their corporate heads together and came up with a decision; they would kill the idea of reloading shotshells by inserting a little slip of paper into each box of factory shells with the printed warning that the reloading of their shotshells was hazardous, and that it was forbidden to reload their empty cases. They went on to disclaim any responsibility for such a *dangerous* practice. In other words, the major ammunition companies would have no part of reloading shotgun shells and frowned darkly upon the hazardous reconstruction of their product.

Their dour warnings about reloading of shotgun shells went over the shooter's heads like a faint, wispy cloud passing over on a beautiful, spring day. The reloading of shotshells increased tremendously. New and better reloading machines appeared on the market and numerous small companies sprang up to make components for the

reloading of shotshells.

The ammunition companies, who had been so afraid of losing part of their market for new shotgun shells, now saw tempting visions of profit in selling reloading components. Corporate appetites were whetted, and virtually overnight, major ammunition companies began to extoll the virtues of their reloading components. Primers, powder, wads and shot were offered for sale. They pointed out the tough, long-lasting qualities of their shotshell cases, the utter dependability of their primers and the perfect roundness of their shot. Suddenly the reloading of shotshells was no longer hazardous and they were quite anxious to help the shotshell reloader. It was really quite a switch! I haven't seen such a sudden change of direction since our duly chosen representatives repealed the 18th amendment.

## The Modern Claybirder

Today's reloader, if he is a trap-shooter, probably has a loading tool that will punch out finished shotshells at a rate that would astonish the handloader of just a few years ago. Shotshell reloaders now report the ability to knock out from 100 to 600 shells *per hour* from their modern reloading machines. If our man is an avid Skeet shooter he may have a regular lineup of reloading tools, one for each gauge he customarily shoots in major tournaments, all lined up prettily on his reloading bench. Of course, an affluent Skeet shooter could use one reloading tool for all gauges, but you know how it is; it's a little nicer to be able to switch from one gauge to another without having to change dies on the reloading tool each time.



Today's reloader has all manner of helpful gadgets designed to help him with his reloading problems. One such item made to fit certain shotguns, catches the fired shell as it is ejected from the gun's chamber. This is handy in more ways than one—the shooter doesn't have to endure the sour glances of gun club management if he should try to retrieve an empty shell from the ground. Did you know that certain gun clubs have imposed a rule that says all empty shotshells on the ground belong to them. (By the way, that's really quite a rule! It would be interesting to see how that one would stand up in court. Kind of makes a fellow afraid to drop his watch or wallet on the grounds of a gun club. Maybe it could suddenly be construed as being gun club property!)

But back to the modern reloader. After he pulls the just-fired shell from his gun, he makes a slight move with his right hand and drops the empty into the gaping mouth of a huge bag hanging from his silver-buckled belt. He pulls another reloaded shell from the pocket of his shooting jacket, gazes at it admiringly for a moment and confidently drops it into the chamber of his shotgun.

He is the picture of confidence as he mounts his gun, calls "Pull!" in a husky baritone bellow, follows the bird and slaps the trigger. He lurches forward to counteract the expected recoil but—it doesn't come. Instead of a soul satisfying "Bang," a weak, little "pop" is heard and shot dribbles from the end of his barrel. The trap boy condescendingly gets down from his scoring table and disdainfully hands our reloader a wooden ram-



Interested reloader watches other shooters while prominent red and white sign proclaims ownership of empty shells on gun club ground.

rod to push the wads from his barrel. Other trapshooters stand by quietly and exchange knowing glances as our reloader, slightly embarrassed, removes the wads from his barrel.

"Must have been a hang-up in the powder measure," he says apologetically to the other shooters. "It never happened before." With that dubious statement, he hurriedly drops another shell into the chamber, mounts his gun, calls for the target, shoots too quickly and, of course, misses.

### Problems, Problems!

There are other errors that plague the reloader once in awhile. Fortunately, most of them are discovered on the reloader's bench.

Many a shotshell stuffer has watched in dumb despair as powder dribbled through the open primer hole of a supposedly primed case. Or perhaps he picks up his reloaded shell only to have a loose primer fall out, then watches the powder make its messy exit from the empty primer hole.

Or if he is the proud owner of one of the fully automatic reloading machines, he may not catch the error until he attempts to fire the shell at the range, with the aforementioned embarrassing results.

In the early days of shotshell reloading, wad pressure was a necessary ingredient of most loading recipes, and it was sometimes an annoying problem. Inadvertant variations in wad pressure caused consternation and a wide variety of booms, bangs and cracks when different shells were fired. It seemed that reloaders, like normal people, had a tendency to become sloppy, often not paying strict attention to the task at hand. In reloading, regardless of whether it is shotshells or rifle and pistol ammunition, every step must be carefully watched.

To this end, semi-automatic shotshell reloaders are a big help, of course, but like all machines, there must be an observant human to check for mechanical errors. To trust a shotshell reloading machine completely is folly, as any truthful reloader could tell you—probably with one or two tales of woe to illustrate his experiences.





Indeed, the sad tales told by reloaders is enough to bring tears of sympathy to even the most hardened of clay target shooters. Second only to the never ending variety of a trapshooter's reasons for missing a target, the shotshell loader can cite strange happenings that go on within the crowded confines of a shotshell that would confound the most astute ballistic expert.

Seriously, though, the shells that a careful reloader will use in an important shooting tournament are given the most careful personal treatment. Usually nothing but new or once-fired cases are used, powder and shot charges are carefully checked and rechecked. If the final crimp is less than perfect, the shell is relegated to the practice box and another shell with a better crimp is used. But enough of the reloader's mechanical problems. It's all part of the fame and, there's no doubt about it, the avid reloader enjoys these minor trials and tribulations.

### Why Reload?

Why, then, does the claybirder bother to reload his shotshells? There is the economical factor, of course, for many of them. Most of these shooters find that they can now reload for less than a dollar a box, a considerable saving over the price of factory loaded ammunition. But how about our prosperous, even wealthy shooter, the guy

After firing a shot, the reloader drops the empty shell into a large bag carried just for that purpose. The smaller pouch holds his loaded shells.



who could just as well buy new factory shells for all of his shooting? Why does he reload?

Certainly *he* doesn't need to economize. Furthermore, even with the fastest reloading machines on the market today, he must still spend considerable amounts of time at the loading bench if he's an avid claybird buster.

He may confide to his shooting companions that his carefully reloaded shells are superior to the factory product, but it's doubtful whether most shooters really believe this. No, I'm convinced that

this fellow just enjoys reloading, and any semi-logical reason he can conjure up to spend more time at his loading bench adds to his shooting pleasure.

While he may work hard mentally in his daily routine at the office, he does virtually nothing with his hands. It's pretty well accepted in more learned circles that many men gain untold satisfaction and relaxation by making something at home, using their hands. This is especially true of the office bound executive. To him, the reloading of his own shotshells is a relaxing achievement. He enjoys the time spent with reloading procedures, he welcomes new methods and new developments in the shotshell reloading world, he buys and tries the new gadgets.

Another plus factor for the reloader is the personal satisfaction to be gained by the winning of a shooting trophy with his own hand-loaded shotgun shells. It's something like the fly fisherman extending the pleasure of catching a fine trout by using his own brand of a "do-it-yourself" trout fly. Even though he knows that he can probably buy better made trout flies at the local sporting goods store, he gets more satisfaction from catching a lunker on his own idea of what a gourmet trout would like for dinner.

So it is in the happy world of the shotshell reloader. If he can win an important shoot with his reloads, that win is just a little bit sweeter, and a further tribute to his personal skills. ●



This reloader, shooting a semi-automatic shotgun, bends over to retrieve his empties as he walks from one trapshooting post to another. This practice is frowned upon nowadays by gun club managements. Notice the scarcity of empty shells on the ground even though this photograph was made during a large trapshooting tournament.



# Ponsness-Warren Presses

The best of their kind, the Size-O-Matic and Du-O-Matic loaders are precision built, function flawlessly and—perhaps most importantly—they remanufacture shells, they don't reload 'em.

by BOB BELL



I DIDN'T BEGIN reloading shotshells until 1959, some 15 years after I started stuffing metallic cases. Even then I wasn't as intrigued with the practice as I was in concocting centerfire rifle loads. Specific goals with a rifle—accuracy, velocity, and so on—could be striven for and, when achieved, could be tightened to keep the game interesting, but what could anyone really do with a shotshell? Yeah, you might try to assemble that genuine 80-yard goose load, but somehow the idea never tempted me. A shotgun is basically a short range firearm, and over 30 seasons of upland shooting have convinced me that 50 yards—genuine three-foot-to-the-yard yards—takes in some 99-plus percent of my shooting. At this distance or less, readily available factory ammo in any of the three common gauges will do the job when the choke is right and the lead correct. Anyway, for years I muddled along in the shotshell loading business, using a number of inexpensive tools which produced shells giving good patterns at normal velocities in the amounts I needed.

Then, some years back, I got interested in claybird shooting. That makes a difference. I still didn't need anything to lower the boom on an 80-yard gander, but I did need something that would turn out shells—normal velocity, 1½-oz. loads of 7½s—in considerably greater quantity than anything I'd ever used before. Previously a few hundred hulls would take care of all my hunting for a year, but I now needed some thousands just to keep me going as a rank beginner on clays.

A number of tools will do this. The one I chose early in 1968 was the Model 800-B Size-O-Matic, made by Ponsness-Warren, of Rathdrum, Idaho. This is a big, progressive-loading bench tool, distinguished by a rotating head which holds 8 full-length resizing dies. It can be classed as semi-automatic in operation, for the operator must feed the empty cases and wads into it at the proper time and work the operating handle. So long as this is done, and the component hoppers are kept full, each pull of the handle produces a loaded shell.

For the reloader used to a single-stage tool, the rate at which shells appear is fantastic. In fact, on a normal loading bench shells are soon rolling all over the place,

A rear view of the Ponsness-Warren Size-O-Matic shotshell loading machine. The author holds the tiller, having just popped a case toward the cavern below his bench.



actually preventing full speed operation because you have to take time to pick 'em up. The solution to this is simple—a bench having a 6-inch hole in it, just under the chute down which the ejected shells slide. Beneath this is a good-size box. That's the arrangement I built in a corner of my basement, and it works fine. One of these days I'm going to install a large, sliding, foam-lined drawer to catch the shells, but in the meantime a strong pasteboard box suffices. One other note about this part of the procedure might be useful. When the brass head of the loaded shell hits the metal chute, there is a *ding* that can be pleasant to hear once. But when you hear it maybe every few seconds for an hour or so at a stretch, it can drive you batty. A layer of moleskin—the stuff you use to keep a new pair of boots from giving you blisters—eliminates the sound.

### How It Works

But to get back to the working parts of this Size-O-Matic. Those full-length sizing dies are highly important. After a case is inserted on station 1, it remains in the die until all operations are complete. This prevents case swelling under loading pressure, and this goes a long ways toward preventing chambering problems in a pump or autoloading gun. The dies are ground and polished for an extremely smooth surface, and after over four years of use they've given me no trouble whatsoever.

As the head rotates one step, the case is deprived on the upward lever movement, reprimed on the downward. Primer feed is automatically governed by gravity, a tray on the left side of the tool holding a box of primers which move downward through a chute that holds them on edge. Vibration from the tool's normal operation moves them from the tilted tray into the chute. In my tool (serial number 707) this action is not completely dependable, and I've made it a habit to keep an eye on the primer supply, manually moving some into the chute if it becomes necessary. Photos of current tools show a slightly altered primer tray, so perhaps this minor fault has now been corrected. It's also necessary to keep enough primers in the chute so that their total weight forces the lower ones across the flattened curve at the bottom. When down to a dozen or so primers in the chute, they will



Front of the P-W Size-O-Matic press. A case is about to be inserted into one of the 8 dies furnished with the tool.

not feed into the horizontal unit which moves a primer into seating position. So you do have to keep an eye on your primers—and also on the powder and shot supply, for this tool uses up components faster than you can believe at first, despite its large-size hoppers. Fired primers go into a good-size metal box—most of 'em—and there's a gate to shut off the flow of new primers, if necessary.

At the next stop the powder is dumped. Different loads are made possible by exchanging bushings. At last count, 27 powder bushings were available, giving a selection of charges varying from 8 grains of Red Dot to 75.5 grains of Hodgdon HS5. Because most powders have different densities, a given volume, such as thrown by a given bushing, will normally give a different weight with each powder. Thus it sometimes is possible to get several desired loads of different powders with the same bushing. Literature supplied with the tool lists average weights thrown by each bushing with most of the readily available shotshell powders.

### Bushing Test

Having, as mentioned earlier, considerable experience with load-

ing rifle ammo before I started on shotshells—a game where tiny amounts of powder always seem important—I was curious as to the accuracy of powder charges thrown on this tool. Accordingly, I inserted the bushing which P-W literature states will throw 16.5 grains of Red Dot, a common load for trap, and threw and weighed 10 charges. Then, while I had the tool set up, I did the same for four other shotshell powders I happened to have on hand—Green Dot, Herco, AA12 and Unique. The results are shown in the accompanying table, with the weight specified in the literature in parentheses beneath the averages. While I was at it, I also threw and weighed 10 shot charges using the 1½-oz. bushing and 7½ shot.

The Red Dot and Green Dot charges are very close to those specified in the literature, on average, while Herco and Unique run about a grain light in these tests. However, I should point out that the powders used here were upwards of a year old and might have lost some moisture. This could affect their density slightly, though I doubt if it would account for this much change. It seems more likely that the weights given in the P-W tables are merely close approximations or, perhaps, the results of weighing samples just as I did, in which case minor discrepancies are normal. I weighed the powder charges on a Redding scale, incidentally, in a draft-free basement. The shot charges were weighed on a Lyman-Ohaus 505 scale, which handles greater weights than the Redding. I've often checked them against each other with identical results.

A 1½-oz. shot charge should weigh 491 grains; I got an average of 484, 7 grains light. A single 7½ pellet weighs 1.32 grains (average of 100), which means that these charges ran about 5 pellets light. I don't know if this is significant in a charge that averages over 370 pellets, but 5 pellets are only 1.3% of the total.

After the case is charged with powder a shotcup/wad is manually inserted into the wad carrier, which swings out automatically in the horizontal plane for easy access. The next handle movement seats the wad, and this is automatically followed by shot charging, crimp starting, final crimp and shell ejection. Wad pressure is adjustable, as is crimping depth. Shot and powder can be drained or shut



off whenever desired—a pious idea in a progressive loader, as soon or late everyone will get one or more unprimed cases making the rounds in there, or some other goof-up, and the best thing to do then is stop everything until you've figured out exactly where each case is in the cycle, and what you should do about them individually.

I've talked about only one case here, but of course a new case is inserted after each cycle of the operating handle, which means that once the 8 sizing dies are full you always have one in each stage of loading. This is great when all the hoppers are full and everything's perking properly, but when something goes wrong stop immediately and figure out the correct course of action.

### Production

It's been my experience that trouble is most likely to come when you're forcing things; that is, trying to get more loads per hour than you're really capable of. The literature says that two adept operators can load *at the rate of 1200 shells per hour*. This does not necessarily mean that they can load 1200 every 60 minutes. Nor does it guarantee that you and a buddy are, at least at this time, adept at this business. You would really have to work well together, one man keeping the hoppers full, etc., the other operating the machine, to get this many loads out of it, in my opinion.

With my setup, I don't have room near the bench to accommodate a second man. I run mine myself. Doing so, I have on several occasions loaded over a case of shells—500 to 600 in an hour. For me, this is fast enough. It's faster than I can shoot them. Yet this rate is not especially difficult. It's largely a matter of finding a routine, having the components readily available—the cases near my right hand, the wads near my left—and working at a consistent rate. I use Winchester AA plastic cases almost exclusively in this Size-O-Matic—they give good case life and I like the one-piece case/base wad—with AA shotcup/wads, 16.5 grains Red Dot and 1½ ounces of 7½ shot. Other combinations will load as easily, of course.

All surfaces of the Size-O-Matic are blued or chrome-plated, and bushings are of nylon. By means of a complete set of Allen wrenches supplied with it, the tool can be taken down if necessary. Both 8- and 6-point crimp starters are



Ponsness-Warren's Duo-O-Matic shotshell loader offers ready interchangeability to gauge setups via their head-tools assembly.

available.

The almost infinite number of shot and powder combinations possible with this tool will permit a load for any type of shooting. As I said earlier, however, I wanted a tool that could crank out a lot of shells in a small amount of time. This Size-O-Matic certainly meets that requirement. It's a solid, carefully machined unit of obvious quality.

### The Du-O-Matic

If there is any drawback to the 8-die Size-O-Matic tool, it's the price, \$449. Not that it isn't worth this, for it is. However, the average

shotgunner may feel that he doesn't need the high production the Size-O-Matic is capable of, looking upon it more as a gun club machine or a tool that several shooters might go together on. Meanwhile, he needs something that will give him a good supply of ammo for an evening's time at the bench.

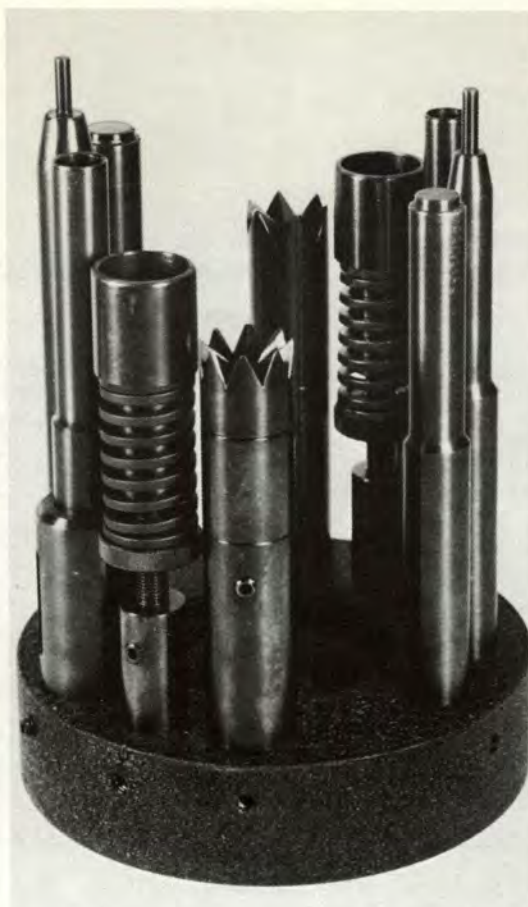
Ponsness-Warren has a unit in this category too. Called the Model 375 Du-O-Matic, it sells for \$119.50, and it's easy to see it belongs to the same family as the Size-O-Matic. All parts are machined tool steel that fit and work as they're supposed to, and the shells that come out look like handloads are supposed to look. I don't want this to sound like an advertising blurb, but when a top-notch tool comes along it should get some credit. It's durable too. I got mine in early 1969 and have used it regularly since, without a bobble.

Perhaps the most interesting aspect of the Du-O-Matic is that two gauges can be simultaneously set up on the headplate, with the changeover made in three or four minutes. This is very convenient for the shooter who uses more than one gauge. Tooling setups are available in all common gauges—12, 16, 20, 28, 410, and, on special order, 10 gauge. Three-inch magnum dies are made for the 12, 20 and 410. An extra headplate can be bought if you want to keep four gauges set up at once. I shoot the 20 and 12 primarily, so I got tooling for these.

As with the Size-O-Matic, at the first loading step the fired case is inserted into a full-length sizing die which holds it until loading is complete. On the Du-O-Matic, though, there is but one die and it is rotated manually from one step to the next, being precisely centered at each station by a spring-loaded ball which engages a detent. A new primer is manually positioned in its cup. The case is deprimed on the downstroke of the handle, reprimed on the up stroke. It is then moved under the powder charging tube, the propellant dropped, the case lowered and a shotcup/wad inserted via a swinging wad-guide unit. This is seated by the same drop tube, which now is used for the shot load. The die-enclosed case is then moved under a self-aligning crimp starter (both 8- and 6-point starters are available), on to final crimping, then back to station 1 where the loaded shell is ejected.



Head assembly to change  
P-W Duo-O-Matic shotshell  
press to another gauge.



within five or six pellets of being exactly as calculated.

The Du-O-Matic will not turn out shells as fast as the Size-O-Matic, of course, but you can still fill a lot of boxes with one in an evening. I've timed myself on different occasions and find that 200 shells an hour is not straining anything. Again it's a matter of having the components properly positioned, finding a rhythm and maintaining it. And the Du-O-Matic has one advantage over its big brother—you often can use cases which have been reloaded until the mouth is so disreputable the progressive tool doesn't want to accept them, since you can manually overcome enough "wear-outs" to manage just one more load. I know such procedures aren't recommended by any big-wheel authorities (who maybe get their cases for free!), but I also know that most handloaders absolutely hate to throw away a case, and that they'll do most anything to get another load out of it.

If it's a high production rate you want, and to hell with the cost, get the Size-O-Matic, but if your needs are less and your poke isn't fat, buy the Du-O-Matic. They're both best quality tools in every way ●

Wad pressures are adjustable, the shot and powder hoppers are easily drained through the drop tube, and the movable plate which contains the shot and powder bushings can be locked to prevent "got-ta see how it works" visitors from dumping these components all over your bench when you take your eyes off of them for a second. A metal box is intended to catch fired primers on ejection, but I haven't mastered whatever knack it takes to make this routine.

All of the shot and powder bushings available for the Size-O-Matic will interchange in the Du-O-Matic. Curious as to what results might be typical, I threw and weighed the loads shown in the accompanying table. According to the P-W tables, the loads shown in parentheses would be average for the bushing used. I also tried a  $\frac{1}{8}$ -oz. shot bushing, often used in 20 gauge, and a  $1\frac{1}{2}$ -oz. size.

These results are reasonably consistent, I feel, both within themselves and as compared with the nominal charges. As mentioned earlier, powder out of different cans (and possibly lots) varies slightly in density, and the shot charges are

#### Size-O-Matic Powder and Shot Charge Test

Red Dot	Green Dot	Herco	AA12	Unique	$1\frac{1}{8}$ -oz. Shot
16.0	16.0	19.1	19.1	22.3	494
16.0	16.1	19.2	19.2	22.4	477
16.3	16.9	19.5	19.2	22.8	495
16.2	16.2	19.3	19.2	22.6	472
16.3	16.1	19.5	19.1	22.7	477
16.4	16.2	19.3	19.0	22.6	479
16.5	16.3	19.1	19.4	22.6	490
16.1	16.2	19.5	19.2	22.4	483
16.3	16.2	19.2	18.9	22.7	482
16.4	16.1	19.3	19.0	22.3	491
16.25 (Avg.) (16.5)	16.23 (16.5)	19.3 (20.5)	19.13 —	22.54 (23.5)	484 (491)

#### Du-O-Matic Powder and Shot Charge Test

Red Dot	Green Dot	Herco	AA12	Unique	$\frac{7}{8}$ -oz. Shot	$1\frac{1}{8}$ -oz. Shot
18.8	19.0	22.0	22.8	26.5	372	487
19.1	18.8	21.9	22.9	26.5	377	459
19.0	18.9	22.0	23.0	26.5	377	488
18.8	18.9	22.1	23.0	26.6	366	487
19.2	18.9	22.0	23.2	26.7	368	489
19.2	19.0	22.1	23.3	26.8	377	489
19.2	18.7	22.1	23.3	26.6	376	487
19.3	18.8	22.2	23.3	26.8	378	489
19.3	18.6	22.2	23.3	26.6	373	484
19.4	18.7	22.5	24.6	26.7	374	493
19.1 (Avg.) (18.5)	18.8 (18.5)	22.1 (23.0)	23.3 —	26.6 (26.0)	374 (382)	485 (491)





February 1, 1972

Handloading Data  
for  
BLUE DOT® SMOKELESS SHOTGUN POWDER  
(A Premium Smokeless Powder for Magnum Shotshells)

All loads developed with once fired shells.

12 GAUGE - 2-3/4 INCH - 3-3/4 DE - 1-1/2 OUNCE LOAD - APPROX. VELOCITY 1275 fps

Shell	Primer	Shot Container	Charge Weight (Grains)	Approximate Pressure
Federal Plastic Game	Fed. 209	Alcan Flite Max No. 2	36.0	9800
RP Plastic Game	Rem. 57*	Alcan Flite Max No. E (See Note) <sub>1</sub>	35.5	10800
WW Plastic Game	Win. 209	Alcan Flite Max No. E	34.0	10700

12 GAUGE - 3 INCH - 3-3/4 DE - 1-3/8 OUNCE LOAD - APPROX. VELOCITY 1325 fps

Federal Plastic Game	Fed. 209	Rem. Power Piston #W29924	42.5	8400
RP Plastic Game	Rem. 57*	Rem. Power Piston #W29924	43.0	8200
WW Plastic Game	Win. 209	Rem. Power Piston #W29924	41.5	8100

12 GAUGE - 3 INCH - 4 DE - 1-5/8 OUNCE LOAD - APPROX. VELOCITY 1300 fps

Federal Plastic Game	Fed. 209	Rem. Power Piston #W29924	41.5	9800
RP Plastic Game	Rem. 57*	Rem. Power Piston #W29928	41.5	9100
WW Plastic Game	Win. 209	Rem. Power Piston #W29928	41.0	10800

12 GAUGE - 3 INCH - 4 DE - 1-7/8 OUNCE LOAD - APPROX. VELOCITY 1250 fps

Federal Plastic Game	Fed. 209	Rem. Power Piston #W29926	39.5	10500
RP Plastic Game	Rem. 57*	Rem. Power Piston #W29926	38.5	9400
WW Plastic Game	Win. 209	Rem. Power Piston #W29926	38.5	10800

16 GAUGE - 2-3/4 INCH - 3-1/4 DE - 1-1/8 OUNCE LOAD - APPROX. VELOCITY 1325 fps

Federal Plastic Game	Fed. 209	Rem. Power Piston #W29934	30.0	9400
RP Plastic Game	Rem. 57*	Rem. Power Piston #W29934	30.0	9700
WW Plastic Game	Win. 209	Rem. Power Piston #W29934	30.0	9400

20 GAUGE - 2-3/4 INCH - 2-3/4 DE - 1-1/8 OUNCE LOAD - APPROX. VELOCITY 1200 fps

Federal Plastic Game	Fed. 209	Rem. Power Piston #W29944	23.0	10600
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20 GAUGE - 3 INCH - 3-1/4 DE - 1-1/8 OUNCE LOAD - APPROX. VELOCITY 1300 fps

Federal Plastic Game	Fed. 209	Rem. Power Piston #W29942	27.5	10400
RP Plastic Game	Rem. 57*	Rem. Power Piston #W29944	27.5	10900
WW Plastic Game	Win. 209	Rem. Power Piston #W29944	27.5	11200

20 GAUGE - 3 INCH - 3-1/2 DE - 1-3/16 OUNCE LOAD - APPROX. VELOCITY 1325 fps

Federal Plastic Game	Fed. 209	Rem. Power Piston #W29942	27.5	11300
RP Plastic Game	Rem. 57*	Rem. Power Piston #W29944	27.5	11300
WW Plastic Game	Win. 209	Rem. Power Piston #W29944	27.5	11500

20 GAUGE - 3 INCH - 3 DE - 1-1/4 OUNCE LOAD - APPROX. VELOCITY 1225 fps

Federal Plastic Game	Fed. 209	Rem. Power Piston #W29942	25.0	10600
RP Plastic Game	Rem. 57*	Rem. Power Piston #W29944	25.0	10700
WW Plastic Game	Win. 209	Rem. Power Piston #W29944	25.0	10900

NOTE:<sub>1</sub> Add a 20 Gauge card wad to shot container

The handloading of shotshells and center-fire metallic cartridges should be undertaken only by those who are familiar with and are extremely careful to observe all possible safety precautions and conservative practices. The data and other information above were developed by us under controlled conditions at our own facilities, and would not necessarily be the same under different circumstances elsewhere. Since we do not have any control over the manner in which our powder is stored, handled, loaded, or used after it leaves our plant, we cannot be responsible by warranty or otherwise for the results or effect of its use.



**DESTROY  
ALL  
PREVIOUS  
LISTS.**

**THE**



**IDEAL**

**HAND BOOK**

—OF—

**USEFUL INFORMATION**

—FOR—

**SHOOTERS.**

**PRESENTED  
WITH THE COMPLIMENTS OF**

This 4th issue of the famed *Ideal Hand Book* was published about 1891, at which time there were some eight different Ideal loading tools offered. Look at the now seldom-seen Perfection and Ideal Cylindrical moulds, both offering a wide range of bullet weights in the one tool. They're hard to find today. The Table of rifling twists should be helpful to those with older rifles. Somewhat surprisingly, the variety of bullet moulds listed is not large, certainly far fewer than were available a few years later.



## ADVERTISEMENTS.

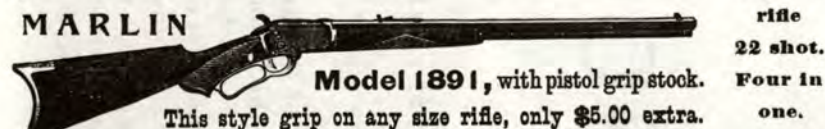
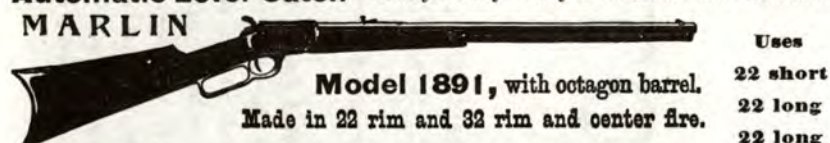
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**DISMOUNTED TO CLEAN.** Only 22 repeater that uses the long rifle cartridge. This cartridge will shoot accurately at 100 yds. By unscrewing the thumb-screw on the side of the action, the entire side of the frame can be removed and also, in order, all the pieces of the action. The breech-bolt can be taken out and cleaned perfectly and the barrel wiped from either end. In cleaning a 22 barrel it is necessary to pass the rod entirely through the barrel, in one end and out the other. This can be done in no other repeater without using tools.

The 32 calibre uses the 32 short and long rim-fire, and by changing the firing-pin, 32 short and long center-fire cartridges. Saves 60% on cost of ammunition over any 32 calibre repeater made.

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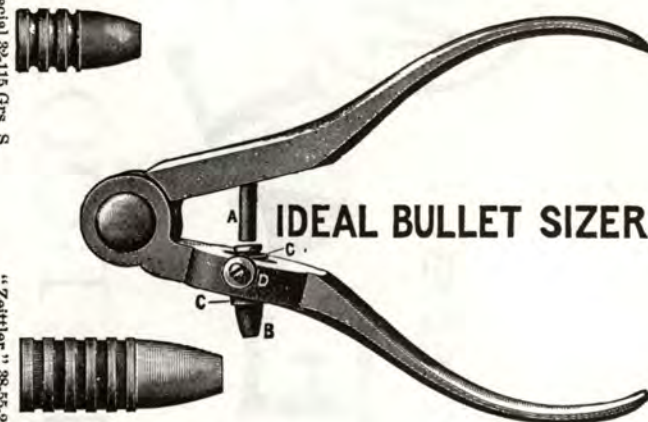
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## SPECIAL LIST.

## THE IDEAL BULLET SIZING TOOL.

Ideal Special 32-115 Grs. S. & W. Rifle (Sized to 32-40, makes a fine short range). Plain Mould \$1.50.

"Zettler" 38-55-295 Grs. Used by Zettler Rifle Club, New York City. Price \$1.50.



IDEAL BULLET SIZER.

N. B.—Moulds to cast 2, 3 or 4 bullets made on order.  
 Force, double mould, ..... \$2.20  
 " triple " ..... 3.00  
 " quadruple " ..... 4.00

The value of this tool will be appreciated by those who have arms of different calibres, or those who may desire bullets of a special diameter. It is made so that dies of any calibre can be used in it. It will be noticed that the die swings upon centres, which are located near the top of the die, the presser punch is also swung upon a pivot which, while forcing the bullet through the die will keep it in perfect alignment with the pressure. This construction also permits the placing of the die near the joint, thereby giving the required power with shorter levers, which makes the tool a handy and convenient length. The tool will be the same for all calibres. The die only being made for the calibre desired, they will be interchangeable and for all standard sizes, from .22 to .50 calibre. We are also prepared to make dies of any special size if dimensions are sent us in thousandths of an inch, or we will fit a die to a bullet sent us, or will fit a shell sent. Thus a selection of some bullet from the Ideal table of bullets that may be a few thousandths above the size wanted can be sized down to what may be desired without the expense of a special mould. Any questions regarding the advisability of what you desire will be answered with pleasure, as your interest is ours.

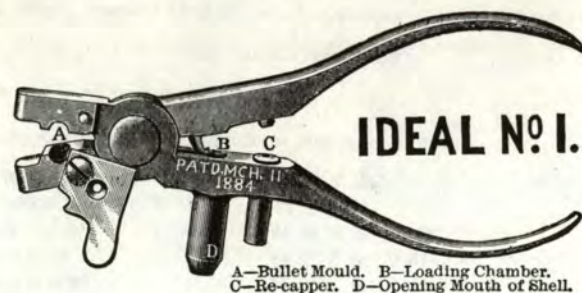
Price of tool with one Standard die ..... \$1.75  
 " " Standard die, any calibre ..... .50  
 " " Special die, any size ..... .75

ASK YOUR DEALER FOR THEM.

Sample by mail on receipt of price. 10c. extra for registered mail.



## REGULAR LIST.



A—Bullet Mould. B—Loading Chamber.  
C—Re-capper. D—Opening Mouth of Shell.

This is a light, compact and complete little tool, designed especially for loading the smaller pistol cartridges, and is capable of performing all the operations required in reloading. As constructed, it moulds the bullet, expels the exploded primer, reseats the new one, forces the bullet to place and crimps the shell upon it, leaving the cartridge ready for use. As many of the cartridges that this tool is made for have outside lubrication, and the formation of the bullets are such (HEEL BULLET) that they cannot be sized by forcing them through a die, there is consequently no ball sizer.

Outside Lubricated Cartridges, such as .32 Cal. Short, Long and Extra Long, .38 Cal. Short and Long, Colt's .41 etc., cannot have the bullets fastened by crimping the shell upon them; they can only be held by fitting the shell tightly. The edges of the shells that are turned inward should be chamfered with a knife, so as to allow the bullet to enter without scraping or cutting the lead.

When ordering, state what particular cartridge is to be reloaded, as only one size can be reloaded with a single set.

The .32 Long tool will only reload the Union Metallic Cartridge Co.'s .32 Long, and the Winchester .32 Colts, which are in reality the same.

No. 1 Tool will only be made for the following cartridges:

* { 22-10-45	32 M. & H.
22-15-45 W. C. F.	38 Short.
32 Short.	38 Long, Outside Lubricated.
32 Long, U. M. C. & Colts W. R. A. Co.	38 Ex. Long.
32 S. & W.	38 S. & W.
	38 M. & H.
32 Ex. Long.	41 Short, Colt's D. A.
32 H. & R.	41 Long, Colt's D. A.

The weight of this tool complete in box is 20 ounces.

Nicely finished and all nickel plated . . . . . Price \$2.25

ASK YOUR DEALER FOR IT.

Sample mailed postage paid on receipt of price.

If you desire it registered, 10c extra. \*See Special list for new .22 Cal. bullets.

## REGULAR LIST.



A—Bullet Mould. B—Loading Chamber. C—Re-capper. D—Bullet Sizer.  
E—Opening Mouth of Shell.

This implement like No. 4, is complete, performing all the operations required. It also has the bullet sizer, and is adapted to load the larger cartridges Military and Sporting.

No. 6 Tool will be made for the following cartridges.

32-35 Stevens & Maynard † Adj.	40-90 Bullard.
32-40 Bullard.	40-90-330 *B. N. Adj.
32-40 Marlin, Ballard, and Winch.	40-90-330 S. S. † and Rem. Adj.
32-40 Remington.	40-90-330 Ballard Adj.
38-40-250 Rem.	42-77-370 Russian Adj.
38-50-250 Rem.	43-77-395 Spanish Adj.
38-55.	44 Evans N. M.
38-56 Win. and Colt's.	44 Long.
38-90 Ex. Winch. Adj.	44-77-400. *B. N.
40-50-285 *B. N.	44-90-470. *B. N.
40-50-285 Rem. and S. S. †.	45-60 W. C. F.
40-60 W. C. F.	45-70-405 U. S. Gov't.
40-60 Colt's and Marlin.	45-70-500 U. S. Gov't.
40-65 W. C. F.	45-70 Marlin.
40-70-330 *B. N. Adj.	45-85-285.
40-70-330 S. S. † and Rem. Adj.	45-90 W. C. F.
40-70-330 Ballard Adj.	50 Carbine, U. S. Gov't.
40-82 W. C. F.	50-70 U. S. Gov't.
40-85-330 Ballard Adj.	50 Ex. Win. and Colt's.

The weight of this tool complete in box is 32 ounces. Nicely finished and nickel plated.

Price . . . . .	\$3.00
" with adjustable chamber (N. B.—At Bottom) . . . . .	3.50
" with Express mould, extra . . . . .	.50

ASK YOUR DEALER FOR THEM.

Sample by mail on receipt of price. 10c. extra for registered mail.

\*B. N.—Bottle Neck.

†S. S. Sharps Straight.

†Tools for all cartridges over two and one half inches in length will have adjustable chambers.

N. B.—If adjustable chambers are ordered for tools other than as specified in above list, they will be considered as special.



## REGULAR LIST.



A—Opening Mouth of Shell. B—Bullet Mould.  
C—Re-Capping. D—Loading Chamber. E—Bullet Sizer.

This is a very popular tool, it is complete in itself, no extra pieces to get lost or carry, it performs all the operations required, as constructed, it moulds the bullet a trifle above the standard size, which after they are lubricated can be forced through the sizing die which packs the grease firmly in the grooves, removes the surplus and makes the bullet perfectly round and of the correct diameter. The value of this is appreciated by those who make their own ammunition.

No. 4 Tool will be made for the following cartridges:

25-20-77, Ideal Bullet.	*44 Colt's O. M. Heel Bullet.
25-20-86.	44 Colt's Lightning.
32 Colt's Lightning.	44 W. C. F.
32 W. C. F.	44-40 Marlin.
32-20 Marlin.	44 S. & W. Russian.
32-30 Rem.	44 S. & W. American.
38 W. C. F.	44 M. & H. O. M.
38 Colt's Lightning.	†45 Colt's.
38-40 Marlin.	45 S. & W.

The weight of this tool complete in box is 24 ounces.

Nicely finished and all nickel plated. . . . . Price \$2.50

ASK YOUR DEALER FOR IT.

Sample mailed postage paid on receipt of price. 10c. extra for registered mail.

For the various bullets that we can furnish moulds for see the "Ideal" Table of Grooved and Round Bullets.

\*See No. 1 Tool about Heel bullets.

†The users of the 45 Colt's Revolvers will find the Ideal Special 185 and 200 Grs. bullets fine shooters with a lighter charge of powder. See special list of bullets.

## SPECIAL LIST.

32 Cal.



50 Grs.



83 Grs.



98 Grs.

38 Cal.



70 Grs.



110 Grs.



100 Grs.



IDEAL N°2.

A—Bullet Mould. B—Loading Chamber.  
C—Re-capper. D—Adjustable Plunger.  
F—Bullet Sizer.

## TARGET PISTOL, CARTRIDGE TOOL.

Revolver practice is receiving more attention than formerly, and there is no reason why this pastime should not become as popular as Rifle shooting. The subject of a suitable Revolver and proper method of loading the same has been considerably discussed lately and has resulted in the Smith & Wesson and Colt's Fire Arms Co's. putting on the market Revolvers for that specific purpose. The Union Metallic Cartridge Co. have made special ammunition for the same, that has given very satisfactory results. Seeing the necessity of a tool to reload the shells as they originally were, we offer this Implement to the sporting fraternity, knowing that if it has merit it will be appreciated. With it the shells can be loaded with either the round or conical bullet; the cuts of bullets show the different ones that can be loaded with this tool. The 100 Grs. .38 Cal. is a special of our own that has met with much favor. The tools have but one mould attached. When the mould is for round ball the tool is called Gallery, when for the conical bullet it is called Target. The purchaser can have which he desires, and with the extra moulds he can have the variety, as the tool will seat all that are of the same calibre, with the exception of the 98 Grs. (32 S. & W. Rifle), the Rifle tool will seat the other 32 Cals. with the addition of an extra adjusting screw and vice versa. The adjustable plunger will seat the ball on any charge of powder.

No. 2 Tool will only be made for the following cartridges.

32-44 S. & W. Target, Grooved Ball.	38-44 S. & W. Target, Grooved Ball.
32-44 S. & W. Gallery, Round Ball.	38-44 S. & W. Gallery, Round Ball.
32 S. & W. Pocket Pistol.	32 S. & W. Rifle.
	38 S. & W. Pocket Pistol.

The weight of this tool complete in box is 20 ounces.

Nicely finished and all nickel plated. . . . .	Price \$3.50
Price of separate Mould for round ball or the 110 Grs. bullet. . . . .	1.50
Price of Hollowbase Mould, 100 Grs. . . . .	2.00
Price of extra seating screw for any shaped bullet. . . . .	.50

ASK YOUR DEALER FOR THEM.

Sample mailed postage paid on receipt of price, 10 c. extra for registering.



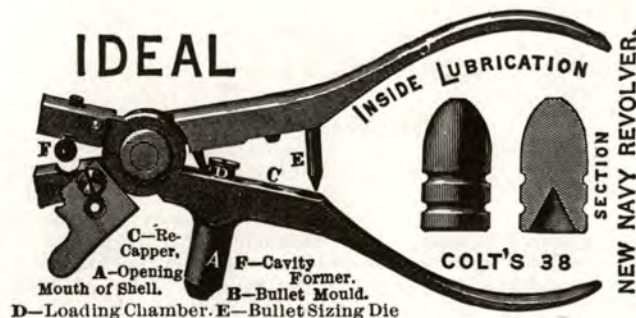




50 IDEAL MANUFACTURING CO., NEW HAVEN, CONN., U. S. A.

## SPECIAL LIST.

## NO. 8 IDEAL TOOL.



This cut represents a special tool for reloading the Union Metallic Cartridge Co.'s new .38 cal. long, inside lubricated ammunition. This ammunition was first made for the Colt's New Navy revolver. Both revolver and ammunition have been adopted by the U. S. Government after a thorough test. The superiority of inside lubrication is acknowledged by all. This tool will not load the old model\* .38 long shells as they are shorter than the new; the bullet is seated in the new shell deep enough to cover the grooves which hold all the lubrication. The new shells and the hollow based bullets (see cut) as made and loaded with this tool will, however, be all right for any pistol or rifle using the old outside lubricated .38 long, and will be found superior. This bullet will also shoot well in the .38 cal. extra long Ballard or other rifles, and will make clean ammunition.

Weight of this tool complete, in box, 22 ounces. Nicely finished and nickel plated.

Price . . . . . \$3.00  
Price of separate mould for this bullet . . . . . 2.00

ASK YOUR DEALER FOR THEM.

Sample by mail on receipt of price. 10c. extra for registered mail.

\*See No. 1 tool for .38 long old model outside lubricated cartridge.

N. B.—The above ammunition only, should be used in all our arms of that calibre (.38 Cal. Long C. F.). When reloading the shells, use the Ideal Reloading Tools.—Colt's Pat. Fire Arms Mfg. Co.

48 IDEAL MANUFACTURING CO., NEW HAVEN, CONN., U. S. A.

## SPECIAL LIST.



## THE ARMORY TOOL.

This tool is designed especially for the .45 cal. U. S. Govt. ammunition, and with the several attachments it makes a most complete outfit for the military shooters. The integral chamber (D) is for the standard 45-70-405 U. S. Govt. cartridge; the re-sizing die (B) is calculated to re-size\* the muzzle of the shell only, for about one-half inch, so that they will hold the bullets firmly. An extra chamber screws in the same place (when the die is out) that will seat the 500 grs. bullet. For armory practice the double adjustable chamber will seat the round and the 210 grs. Ideal bullet. With these attachments the various bullets here shown can be loaded to suit the requirements of all, thus giving a great variety of ammunition and a field for experimenting.†—See "Perfection" Mould, page, 51.

## DOUBLE ADJUSTABLE CHAMBER.



Price of No. 5 re-loader, only with re-sizing die . . . . . \$2.50  
" " 45-500 chamber . . . . . .50  
" " Double adjustable chamber for round ball . . . . . 1.00

Moulds for either regular or special bullets may be selected as desired.

ASK YOUR DEALER FOR THEM.

Samples by mail on receipt of price. 10c. extra for registered mail.

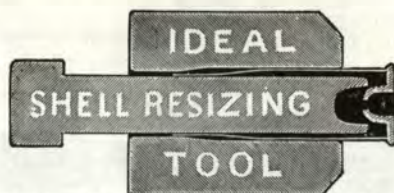
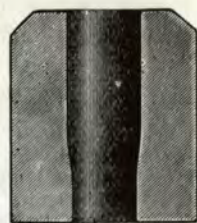
\*On re-sizing expanded shells see Ideal Shell re-sizing tools.

†Regarding various charges of powder see Combination Powder Flask.



## REGULAR LIST.

## THE IDEAL SHELL RE-SIZING TOOL.



Sectional Cuts of Die, Plunger and Shell.

**FOR RE-SIZING EXPANDED SHELLS.**

Nothing But Solid Headed Shells should be used, for the light shells are not strong enough to stand the driving in and out from the die.

It is supposed by some that the chamber of a reloading tool should be shaped so as to re-form a shell that is swollen or expanded, and at the same time force the bullet in, pack the powder and crimp the shell. This process is impracticable for several reasons: FIRST.—The shells are made of elastic metal, and must be compressed beyond the desired size, so as to allow for the springing back of the metal. To do this requires more power than is consistent with the construction of a practical, portable hand tool. SECOND.—As the shell is primed and the powder is in, there is more or less danger attending this operation. THIRD.—The bullet is composed of non-elastic metal, and as the shell is being compressed with the bullet in, it of course compresses the bullet, which being non-elastic, remains to the size compressed, and the accurate diameter of the bullet is lost, and it would be loose in the shell were it not for the crimping of the shell into it, and the powder pressing the bullet up against the crimp. These reasons are facts. Experience has proven that the shell if expanded, should be re-formed *while empty*, and in a separate tool. Fortunately the majority of shells do not expand so as to interfere, and loading tools as constructed are all that is required. If, however, shells do expand after firing them several times, the most practical and convenient implement is a solid die of steel, *hardened and ground to shape*, into which the shell should be driven (with a mallet or billet of wood), re-forming them the entire length from muzzle to head, and as they do not require to be re-sized every time they are discharged, the die and plunger are only used when necessary, *without destroying the simplicity and utility of the reloading tool*, and they take up but little room in a sportsman's kit. The die should be kept clean and free from rust, and slightly oiled inside. The shells should be wiped over with an oiled rag before entering the die. Too much oil will distort the shells.

The mouth of the shell should be opened before entering the re-sizing die. Insert the new primer after re-sizing. Shells that have been fired in one arm may not fit a different arm of the same calibre owing to the slight difference of the chambers, but after re-sizing them with these tools they will fit any arm that is chambered for that particular cartridge.

Price of re-sizing tools per set, all calibres . . . . .	\$2.00
" " " " " " for 10, 12 and 16 Gauge Brass Shot Shells, . . . . .	\$2.50

ASK YOUR DEALER FOR THEM.

Sample by mail on receipt of price. 10c. extra for registered mail.

N. B.—Rest the die on something solid when using. Drive shell to the head.

REGULAR LIST.



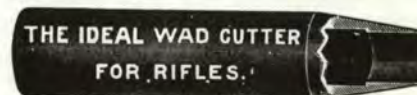
These moulds have wood handles, the shanks are securely fastened. The joint face is broad, and is secured by a large pivot pin, which prevents them getting out of place. Moulds are made for all standard sizes, and we have cherries for many special bullets (see Ideal table of bullets). Single moulds will be invariably made to cast bullets as near the standard size as possible. If it is desired to have the mould cast bullets large so as to size them, it must be ordered so specifically.

The average weight of moulds in box is 12 ounces.

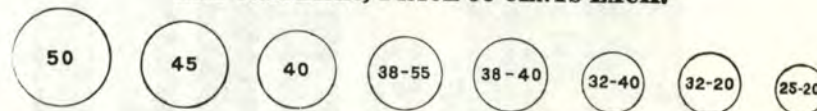
Price of Bullet Mould Grooved, . . . . .	regular size, . . . . .	\$1.10
" " " "	for round ball, " "	1.50
" " " "	for Express ball, " "	1.70
" " Blank " "	ready to cut . . . . .	1.10

For Patched bullets see Cylindrical Mould. Page 52.

## THE IDEAL WAD CUTTER.

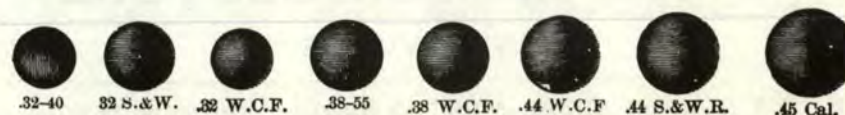


**ALL CALIBRES, PRICE 50 CENTS EACH.**



ASK YOUR DEALER FOR THEM.

Sample by mail on receipt of price. 10c. extra for registered mail.  
See Ideal table of bullets. We can make moulds for all in the table.  
Here are some of the sizes of round bullets we make moulds for.





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## REGULAR LIST.

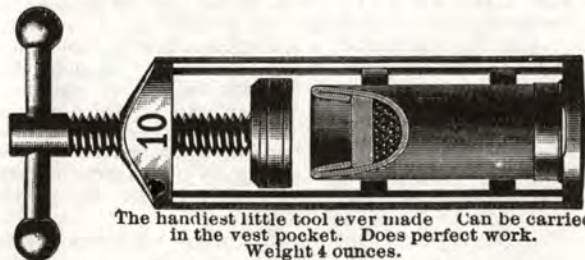
## The New "IDEAL."

Paper and Brass Shot Shell Loader.  
Capper, De-capper, Rammer and Extractor.

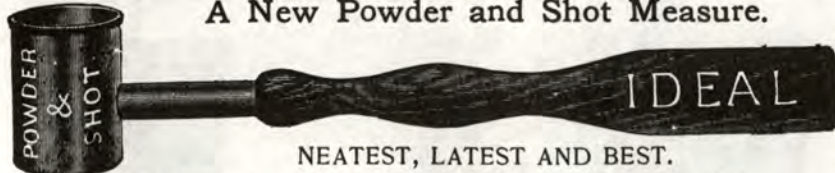
A new and novel implement for loading shot gun cartridge shells. It is a very compact, complete and perfect working combination of instruments, arranged in such a manner that each part can be operated for its specific work without causing any inconvenience from the others so frequently found in combination tools. It is four distinct implements in one, viz.: a de-capper, re-capper, rammer and shell extractor, so arranged as not to be any larger than a common rammer. By referring to the illustration the reader can readily understand its operation.

Price of this tool with funnel and base . . . . .75

## The Ideal Hand Closer for Paper Shells.

The handiest little tool ever made Can be carried  
in the vest pocket. Does perfect work.  
Weight 4 ounces.Price, Japanned Finish . . . . .50  
" Nickel Finish . . . . .75

## A New Powder and Shot Measure.



NEATEST, LATEST AND BEST.

It is finely graduated and can be set to a hair for any charge desired. Rifemen using from 70 Grs. and upward of powder, will find this the handiest measure in the market. Sample by mail, 20 cents.

Set complete, consisting of Capper, De-capper, Rammer, Closer, Funnel, Base.  
Powder and Shot Measure, Japanned Closer . . . . . \$1.00

Set complete, consisting of Capper, De-capper, Rammer, Closer, Funnel, Base.  
Powder and Shot Measure, Nickel Closer . . . . . 1.25

Closers, per dozen, Japanned . . . . . 3.20

" " " Polished and 'Nickeled' . . . . . 1.00 extra net.

Loaders, with Funnel and Base, per dozen . . . . . 5.75

Sets complete, per dozen . . . . . 9.55

SAMPLES SENT BY MAIL ON RECEIPT OF PRICE.

ONLY 10, 12 AND 16 GAUGE.

BE SURE AND STATE GAUGE WHEN ORDERING.

IDEAL MANUFACTURING CO., NEW HAVEN, CONN., U. S. A. 51

## SPECIAL LIST.

## THE "PERFECTION" MOULD.

Adjustable for Grooved Bullets Only.



The "Perfection" is the result of many enquiries for an Adjustable Mould for grooved bullets. Our Brothers of the Rifle Fraternity compel us to supply their wants, and we readily do so, for we like to be able to please them. The above cut of bullets convey a partial idea of what can be done with one of these Moulds, yet the adjustment can be varied not only one groove at a time, but any fractional part thereof, varying the length and weight five or ten grains at a time, anywhere between the lowest and highest limit, thus securing any weight desired, the points being the same, one adjustable chamber or seating screw being correct for all. With this Mould the most "Cranky Crank" can experiment to his heart's delight; he can determine for himself just what is in his rifle at all ranges, with every variety of powder charge and weight of bullets and all at the expense of one Mould. We show the bullets with hollow base and can make them as ordered, but our experience prefers the flat base, as it does not gather and hold grease when lubricating, which must be thoroughly wiped off before seating upon the powder. The Perfection Mould *will not* be made for all calibres, only for a few of the popular sizes as mentioned below; *neither* will they be made for *patched bullets*, as the "Cylindrical" is the Perfect Mould for patched bullets.

Perfection Moulds will invariably be made to cast bullets slightly above size, so as to allow for shrinkage of all mixtures, and the bullets may require sizing, which will make them all uniform and perfectly round, &c.

## PERFECTION MOULDS ARE MADE FOR THE FOLLOWING:

25 Cal. Diam.*	.257—weight 56, 67, 77, 86 and 96 grains.	.....\$3 00
32 " "	.311, .319, .323—weight 75, 100, 125, 150, 175, 200, 225 grains.	.....3 00
32 " "	.319 (32-40 M) weight 80, 120, 155 grains ( <i>Special</i> short range).	..3 00
38 " "	.375—weight 135, 170, 205, 245, 285 and 325 grains.	.....3 00
45 " "	.457—weight 305, 365, 405, 465 grains No. 5 45 Gov. Tool O. K.	..3 00

Common Mould to cast any one bullet of above Cal. and weight. . \$1 50 *special list*.

ASK YOUR DEALER FOR THEM.

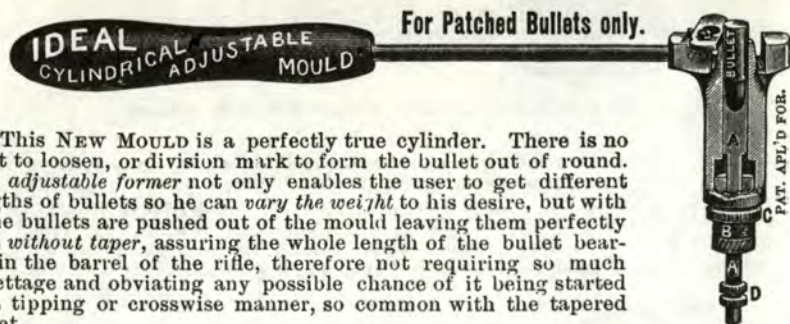
Sample by mail on receipt of price. 10c. extra for registered mail.

\* See Ideal table of bullets.



## SPECIAL LIST.

## The "Ideal" Cylindrical Adjustable Mould.



This NEW MOULD is a perfectly true cylinder. There is no joint to loosen, or division mark to form the bullet out of round. The adjustable former not only enables the user to get different lengths of bullets so he can vary the weight to his desire, but with it the bullets are pushed out of the mould leaving them perfectly true without taper, assuring the whole length of the bullet bearing in the barrel of the rifle, therefore not requiring so much upsetage and obviating any possible chance of it being started in a tipping or crosswise manner, so common with the tapered bullet.

To set the Mould, screw in the bushing *B*, which will carry forward the former punch by the shoulder at *A*; when at the height desired securely fasten it with the check nut *C*. Next adjust the check nuts *D* at bottom of the former punch *A*, so that the forward end of punch will slide up to within one sixteenth of an inch of the face of the mould; this will enable the user to push the bullet out of mould should it not drop out when it is reversed. Set the check nuts securely to prevent the forward end of punch projecting beyond the face of the mould, as it might be injured if it came in contact with the cut-off; this it can never do if kept inside of mould with check nuts *D*.

The Ideal Dipper and Pot should be used to get the best results. Should the bullets not drop out of mould when reversed, do not strike the plunger, as it has a tendency to upset the bullet and enlarge it. With the billet of wood used for striking the cut off, press upon the plunger—which will push the bullet out.

These moulds can be furnished for the following calibres; viz., .25, .32, .38, .40 and .45. When ordering be sure and give calibre and name of arm, or better still send sample of shell such as you want bullets for.

Price, all Calibres.....\$3.00

Cut of bullets below show the variety that can be cast in one mould.  
Sample by mail on receipt of price.

Registered mail, 10 cents extra.



Bullets cast in the cylindrical mould are so much better that we will not make any more hinged moulds for patched bullets. Send stamps for sample bullet with either round or flat point.

## SPECIAL LIST.



For convenience, accuracy and adaptability for all kinds of powder for Shot Guns, Rifles and Pistols, the Ideal Flask is unequalled. It is graduated for both drachms and grains. It measures from three to one hundred and thirty-five grains, and from one-quarter drachm to five drachms; this feature alone is worth more than the price of the Flask, as there is no other graduated measure in the market that has such a range. The Flask holds three-quarters of a pound of Black Powder. The drop tube enables the user to get more powder in a given space in shell, than can be done in any other way except by compressing and crushing the grains to an extent that is destructive of uniform and accurate shooting. The value of this will be recognized by users of Nitro-Powders in Shot Guns. Rifle men who desire to get more powder in their shells and retain the standard length of cartridge for magazine Rifles, will also appreciate it. This Flask is now beyond the experimental stage, having been in use for two years by the leading shooters throughout the country, who have sent us the stamp of their approval in the shape of hundreds of letters testifying to its value.

As the graduation on the Flask is for Black Powder, you will use the Drachm measurements as per table below.

## COMPARATIVE TABLE OF NITRO-POWDERS.

		Schultze.	"S. S."	"E. C."
2½ drs.	(Black Powder measure) equal	35 grains.	34 grains.	36 grains.
2½ "	" " " " "	38 "	36 "	40 "
3 "	" " " " "	42 "	38 "	44 "
3½ "	" " " " "	45 "	40 "	47 "
3¾ "	" " " " "	48 "	43 "	50 "
3½ "	" " " " "	51 "	46 "	53 "

Important suggestions for loading shot gun shells with nitro-powders, such as Schultze, American Wood, S. S. and E. C. The U. M. C. Co.'s Trap, Smokeless, and other brands of high-grade shells, have the justly celebrated No. 3 primers, made exclusively by this company. These primers are of extra strength, give quick ignition and complete combustion to the powder charge, and are perfectly adapted to the various nitro-powders as well as to black powder.

To obtain the best results with these shells, and the various nitro-powders, the following suggestions should be observed: Charge of nitro-powder should not exceed—

3½ drams (Black Powder measure) for 10 gauge.

3½ " " " " " 12 "

2½ " " " " " 16 "

Do not prime with Black Powder, as No. 3 primers render such trouble unnecessary. Use wadding of liberal thickness, but not too hard, nor too large in gauge. Leave one-quarter inch of shell for crimping.

Ramming or hard pressure of wads on nitro-powders should be avoided. Press the wads firmly home, and crimp tightly on the shot wad, with the Spangler Ideal Crimper.

Do not expose nitro-powders to artificial heat, which will dry out their moisture. The strength of these powders is regulated to give best results when in their normal condition. Above tables and suggestions from

UNION METALLIC CARTRIDGE CO.

The Flask is made of Brass throughout, finely polished and nickel-plated.

Price of No. 1 Flask for Shot Guns, also Rifles from .38 to .50 calibre, \$2.25

" " No. 2 " for Rifles and Pistols, " .38 to .32 " 2.25

" " Extra Shell Receiver (gives range from .32 cal. to Shot Gun), .50

Be sure and mention what number of Flask is wanted, when you order. Sent by mail on receipt of price.



56 IDEAL MANUFACTURING CO., NEW HAVEN, CONN., U. S. A.

## SPECIAL LIST.



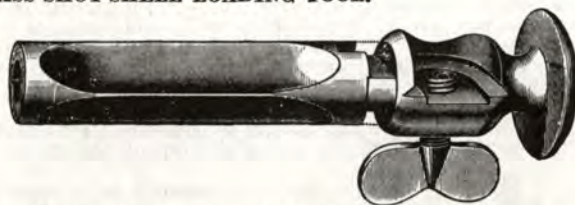
## "SPECIAL" BULLET MOULD.

The lovers of extra fine tools are growing in numbers every day. To such we would say that we make (when ordered) fine, heavy extra finished moulds with polished cocobolo handles.

Price, all regular sizes.....\$1.75  
 " Express Mould (same finish) core peg, extra large base.....2.50

## BRASS SHOT-SHELL LOADING TOOL.

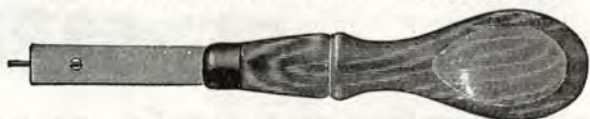
Round Ball Moulds  
 for  
 10 & 12 Gauge  
 SHOT GUNS.  
 \$2.50 each.



The above cut represents a tool that is complete for loading brass shot shells. It will be found the handiest implement ever used. It is made for loading brass shot shells, Nos. 10 and 12 gauge *only*. It will *not* load paper shells. Shooters using brass shells will find in this just what they want. It is made entirely of iron, is nicely polished and nickel plated, and will last a life-time. Nothing to lose, break or wear out. It is a Capper, De-capper and Rammer.

Price......50

## COMBINED DE-CAPPER AND SHELL SCRAPER.



Every one will appreciate this little tool. With it the old primer is thrown out, and by turning it around in the shell the old burnt powder and corrosion is scraped out, leaving the shell clean for the bullet. It is made of the best cast steel, hardened and tempered. Made for .45 calibre *only*.

Price......30

Samples by mail on receipt of price. 10c. extra for registering.

IDEAL MANUFACTURING CO., NEW HAVEN, CONN., U. S. A. 55

## SPECIAL LIST.



Target Shooters who use a Single-Shot Rifle and do not desire to crimp their shells, but seat the bullets in the barrel in advance of the shell, will find these tools just what they have been looking for. The re-capper opens on the side. The die "A" rests upon a perfectly machined seat, and is held in place with the screw "C." The de-capping plug "B" is also interchangeable, being securely held by the knurled set screw "C." Re-capping dies and de-capping plugs for any calibre from .22 to .50, will be furnished to fit the same tool. The levers are polished and nickel-plated. The implement is first-class throughout and weighs complete but five ounces.

Price, complete, any calibre.....\$1.00  
 " extra re-capping die, all calibres......25  
 " " de-capping plug, "......25

## THE "IDEAL" BULLET SEATER.



With the Single-Shot Rifle *at the range*, the desire is to get the best possible results that can be obtained with rifle, powder and bullet. The most accurate shooting that has ever been done thus far to our knowledge, was with the bullet seated into the barrel about 1-32 of an inch ahead of the shell. The bullet is thus well in the rifling, before the explosion takes place, obviating any possible chance of it being started in a tipping or crosswise manner. The shell is then filled with powder (a wad on top or not as desired), and inserted in the chamber after the bullet. The *Ideal Bullet Seater* has an adjustable plunger, "B," that can be set with check nut, "D," to seat the ball any depth desired; and they will be absolutely the same depth, which *must* be, to insure uniform shooting. The implement weighs but four ounces. It will be made for all calibres from .22 up.

Price.....\$1.00

N. B. When ordering above tools always mention name of shell, such as 40-70 Bottle Neck, 40-70 Sharps Straight, 32-40 M., 32-20 C. Outside form and diameter of shells govern as well as calibre.

Sample by mail on receipt of price, 10 cents extra for registering.



## TWIST OF RIFLING IN RIFLE BARRELS AS MADE BY THE VARIOUS ARMS CO.'S.

AS MADE BY THE REMINGTON ARMS CO.			
.22 Short, Long and Extra Long.....	One turn in 20 inches.		
.22 Long Rifle.....	" 16 "		
.22-15, W. C. F.....	" 15 "		
.25-10, R. F.....	" 16 "		
.25-20, C. F.....	" 12 "		
.32 Short, Long and Extra Long.....	" 20 "		
.32-20 W. C. F.....	" 20 "		
.32-30 Remington }.....	" 16 "		
.32-40 " }.....	" 16 "		
.32-40 Ballard, }.....	" 16 "		
.38-40, W. C. F.....	" 20 "		
.38 R. F.....	" 20 "		
.38-40 Remington, }.....	" 16 "		
.38-50 " }.....	" 16 "		
.38-55 Ballard & Marlin }.....	" 16 "		
.40-50 Sharp & Remington, Straight }.....	" 18 "		
.40-60 Marlin, }.....	" 18 "		
.40-65 Sharp & Remington, Straight }.....	" 18 "		
.40-90-3 $\frac{1}{4}$ , Straight.....	" 16 "		
.44-40 W. C. F.....	" 20 "		
.45-70.....	" 20 "		
.50-70, State Model.....	" 42 "		
.50-70, State Model Quick Twist.....	" 24 "		

AS MADE BY THE COLT'S PATENT FIRE ARMS CO.			
.22, .....	" 20 "		
.32, .....	" 24 "		
.38, .....	" 30 "		
.44, .....	" 28 "		
.38-56, .....	" 25 "		
.40-60, .....	" 25 "		
.40-65, .....	" 25 "		
.45-60, .....	" 25 "		
.45-75, .....	" 25 "		
.45-85, .....	One turn in 25 inches, 6 grooves.		
.50-95 Exp.....	" 52 " 6 "		

AS MADE BY THE MARLIN FIRE ARMS CO.			
.22 Ballard.....	One turn in 20 inches.		
.22 Magazine.....	" 18 "		
.32 Ballard.....	" 20 "		
.32-20 Magazine.....	" 23 "		
.32-40 Ballard and Marlin.....	" 16 "		
.38-55 Ballard and Marlin.....	" 20 "		
.38 and 44 Marlin Magazine.....	" 36 "		
.45-70 Marlin Magazine.....	" 20 "		
.40 Calibres.....	" 20 "		

AS MADE BY THE STEVENS ARMS CO.			
.22 Short R. F.....	One turn in 26 inches.		
.22 Short or Long Rifle.....	" 17 "		
All .32 and .38 Calibres (regulars).....	" 26 "		
.25 Cal. Rim Fire.....	" 17 "		
.25 Cal. Central Fire.....	" 14 "		
.32-35, .32 40, .38-55 and .38 cal. long bullets.....	" 18 "		

AS MADE BY THE WINCHESTER ARMS CO.			
.22 Cal. C. F.....	" 16 "		
.22 Cal. Short and Long R. F.....	" 20 "		
.22 Cal. Long Rifle R. F.....	" 17 "		
.22 Cal. Win. Mod., 1891, W. R. F.....	" 14 "		
.25 Cal. R. F.....	" 17 "		
.25 Cal. C. F.....	" 14 "		
.32 Short and Long R. F.....	" 26 "		
.32 W. C. F.....	" 20 "		
.32-40.....	" 16 "		
.38-55.....	" 18 "		
.38 Cal Short, Long and Extra Long R. F.....	" 36 "		
.38 Cal. W. C. F.....	" 36 "		
.38-90 W. C. F.....	" 26 "		
.38-56 W. C. F.....	" 20 "		
.40-60 W. C. F.....	" 40 "		
.40-82 W. C. F.....	" 28 "		
.40-65 W. C. F.....	" 26 "		
.40-70 S. S. and Ballard.....	" 20 "		
.40-90 S. S. and Ballard.....	" 18 "		
.43 Cal. Spanish.....	" 20 "		
.44 Cal. W. C. F.....	" 36 "		
.45-60, 45-75 and .45-70 W. C. F.....	" 20 "		
.45-125 Express, W. C. F.....	" 36 "		
.50-95 and .50-110 Express, W. C. F.....	" 60 "		
.45-70 U. S. Gov't, as made at Springfield Armory.....	" 22 "		
.45-90 W. C. F.....	" 32 "		

### How to Find Out the Twist of Rifling.

Lubricate the inside of the barrel well. Take a bullet that is large enough to fit snugly so as to get a full impression of the rifling. Force it through the barrel carefully. Get a piece of straight wire smaller than the bore of the rifle; drill a hole in the bullet and fasten one end of the wire to it; shove the bullet with the wire fastened to it from the muzzle to the commencement of the rifling at the chamber. Fasten the barrel in a vise or otherwise; make a chalk mark on the breech and muzzle of the barrel, also one on the wire in alignment with those on the barrel. Make a mark on the wire even with the muzzle, and force the bullet toward the muzzle, and when the chalk mark on the wire has turned completely around, and is again in a line with those on the barrel, measure the number of inches the mark on the wire has traveled from the muzzle of the barrel, and you will find what you are looking for.

The rifling of a barrel is from two to five-thousandths of an inch deep.



## Special List.

## SPECIAL IDEAL BULLETS.

To avoid mistakes the price of mould is placed under each bullet.

45 Grs. 35 Grs. 25 Grs.	25-20-47 Grs. Also 98 and 56 Grs. 32-40-98 Grs.	Marlin. 80 Grs. 120 Grs. 155 Grs.	32-40 Marlin. 38-44 S. & W. T. 110 Grs.	38-44 S. & W. T. 100 Grs. 44 S. & W. Gallery. 110 Grs.
\$1.50	\$1.50	\$1.50	\$1.50	\$2.00
44 S. & W. Gallery. 130 Grs.	44 S. & W. Russ. 175 Grs.	44 S. & W. Russ. 160 Grs.	45 Colt's. 200 Grs.	45 U. S. Govt. 185 Grs.
\$1.50	\$1.50	\$2.00	\$1.50	\$2.00
38-55 Marlin. 250 Grs.	38-55 255 Grs. Marlin round point.	38-55 Marlin. 145 Grs.	38-55-155 Grs. Marlin.	50 Cal. U. S. Govt. 360 Grs.
\$1.50	\$1.50	\$1.50	\$1.50	\$1.50
Colt's Revol. Rifle. 30 Diameter. 300 Grs.				
\$2.00				
Old Reliable. 45 Sharps. 450 Grs.	Colt's Picketts. 45-325 Express.	Col. Pickett Sharps. 45 Cal. Hollow Base. 360 Grs.	32-40 Marlin. [Pickett]. 220 Grs.	32-40 Marlin. [Pickett]. EX. p. e. s. 205 Grs.
\$1.50	\$2.50	\$2.00	\$1.50	\$2.50
Cooper, Stevens, Maynard and Bul- lard. 32 Cal.	44-77-315 Grs.	44-77-315 Grs. Ex.	U. S. Govt. 45 Cal.	Express 335 Grs. 45 Cal. U. S. Govt.
200 Grs. 225 Grs. 250 Grs.	\$1.50	\$2.00	\$2.00	\$1.50
\$1.50				
305 Grs. 450 Grs.	45 Cal. U. S. Govt.	305 Grs. 50 Win. Express.	450 Grs. Solid.	
\$1.50	\$1.50	\$1.50	\$1.50	

Moulds for these bullets are only made when ordered. We present here the finest line of short range bullets that is made in the country. The users of rifles chambered for the .22 Cal. Winchester will find our 55 and 63 Grain bullet a great improvement over the old 45 grs. Try our short range bullets in your .45 Colt's Revolvers, also those for the .38-44 S. & W. Target Pistol. Ask your dealer for them. Sent by mail on receipt of price. 10 c. extra for registered mail.

## COLT'S LIGHTNING MAGAZINE RIFLE.



ALL CALIBRES

HAMMERLESS SHOT GUNS.  
TEN AND TWELVE GAUGE.

## DIFFERENT STYLES OF REVOLVERS.

ALL CALIBRES.

COLT'S  
NEW NAVY,  
38 & 41 CALIBRES.

For descriptions, etc., send for illustrated Catalogue.

COLT'S PATENT FIRE ARMS MFG. CO.  
HARTFORD, CONN.

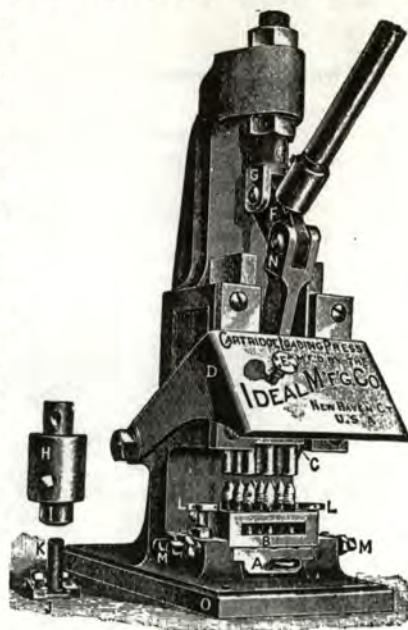


## IDEAL CARTRIDGE-LOADING PRESS.

This is a new, powerful hand-lever press, for loading metallic cartridge shells or cases. It was produced, responsive to the numerous calls for such a machine. It is intended, particularly, for use at regimental armories, where several companies, a whole regiment, or several regiments may participate in its production at State arsenals or other military ordnance headquarters. These machines can be used to great advantage as an economizer of ammunition. The allowance of cartridges to each regiment amounts to a considerable sum annually, yet the quantity is far from being sufficient. The militiaman who desires practice at the range, so as to become an efficient marksman, must put his hand in his own pocket and bear the expense largely; this deters many who would do so did it not cost so much. Thousands of metallic shells are wasted annually, which should be preserved, cleaned, reloaded and reissued to the men, so that each and all may enjoy the

practice at the range that is required to perfect the men in actual shooting. In every well-arranged regimental armory, there should be a room fitted up with appurtenances for preserving and reloading the empty shells that *are now wasted*. A complete outfit would not be very expensive, yet it would prove to be a great saving to the individual members, by furnishing them with the extra ammunition for practice; it would, also, be a source of wholesome instruction and information as to the make-up of the cartridges they shoot. The more he knows about his gun and ammunition, the better soldier he is.

There should be two small iron cauldrons or kettles, arranged so that they can be heated up with coal or gas; the latter is preferable, as it is clean and can be turned on or off as desired. One kettle should be for hot soda water, for cleansing the shells, which should be brought in as soon as possible after discharge; the other kettle for melting metal, casting bullets, etc. There should, also, be a set of heavy, strong, well made bench moulds that will cast a number of bullets at a time, and a cartridge loading press, similar to the one shown herewith; same should be securely fastened to a strong bench. The Ideal Cartridge Loading Press, with one set of tools complete, will weigh about 175 pounds. The tools consist of *one pin plate*, shown on machine (see cut) and designated by the letter *C*; *one shell plate B*; *one shell resizing die I*, shown in collet *H* at side of machine. These tools must be made specially for each different cartridge. They will be made interchangeable. Thus the same ma-



chine may be fitted up with various sets of tools, such as .50-70 Govt., .45-70 Govt., .43 Spanish, .45 Martini-Henry, .32-20, .38-40, and .44-40 calibres Winchester, Marlin and Colt's. All machines will be made to a specific standard gauge, so that tools may be ordered from any part of the world for any particular cartridge (foreign or domestic) and the fit and interchange guaranteed. The adjustments are such, that with the proper tools, the largest military and sporting shells, as well as the pistol sizes, can be loaded, making it a universal tool of special value in localities that are situated far from the manufactories of ammunition, yet use arms extensively, for the metallic shells or cases can be used over and over many times. We would remark that this press is no experiment, it is modeled after those used by the largest manufacturers of ammunition, with which they load the majority of their shells. At the factory they use six sets of shell plates, having boys fill them, keeping the men continually at the press, thus loading many thousands per day.

**Caution.**—When corresponding with us pertaining to this press, we would especially request you to note that each different kind of cartridge requires a specific set of tools, but tools for all kinds can be fitted to the one machine. To avoid misunderstandings and to make your inquiries clear and comprehensive, we respectfully ask all (especially those in foreign countries) to send us samples, three of each kind of shells and bullets, and one dummy, same as loaded cartridge, but without powder, that you desire machine fitted up for. State plainly that you desire one pin plate to load the regular standard cartridge as sent, and whether you require a pin plate for seating round balls within the shells for armory or gallery shooting (short range); also state how many (one or more) shell plates for each particular cartridge. The reason we require samples is to avoid mistakes, as the trade names for the various kinds of ammunition are confusing. For instance, the .44 cal. Colt may mean .44-40 Winchester, or Marlin, as they are the same, or it may mean the Old Model .44 Colt, which is entirely different. This is the same exactly with the .44 Merwin & Hurlburt, as there is the Old Model and the .44-40.

For .38 long Colt there is the inside and outside lubrication, both fitting the same arms, yet a tool that is correct for one is useless for the other.

These explanations will suffice, we think, to show why we ask you to be particular and send samples and specify particularly what is desired for each and every different cartridge.

The cost of extra pin plates and shell plates that may be required beyond the one set that constitutes a machine and outfit for \$150.00, may be determined by reference to prices on next page.

## INSTRUCTIONS.

Fasten the press firmly on to a strong bench, cut a hole through bench under the plate *A*, so that cartridges or shells will fall into a receptacle underneath the machine. See that the Pin Plate *C* is properly fastened on to the gate or slide, the word *front* toward you. Raise the lever up to its highest position, and the safety guard *D* to position shown in cut; see that the locking bolt *E* is in catch; adjust stripper screws *LL* so that shell plate *B* will slide under the heads freely. To fill shell plate, rest it bottom upwards on two blocks fastened to the work-bench, height of blocks, so shells will drop full length and rest on heads in counterbored holes. Place the thin plate over the shells and reverse them, bringing shells muzzle upwards, place the powder charge required in each shell with the powder scoop, then with the fingers enter the base of the bullets securely into the muzzle of shells. See that the mark *front* is toward you. Draw the bottom plate *A* forward on the slide, set the plate *B* with charged shells and bullets on to it; slide the plate *A* together with the shell plate, back into place under the pin plate, against the gauging screws; withdraw the thin plate and let the safety guard *D* down on the base of press; pull down the lever as far as it will go, holding it there while the safety guard is raised and the bottom plate *A* is drawn forward, then raise the lever and the cartridges will fall. To adjust the



# STEVENS RIFLES AND PISTOLS.



This Company manufactures a full line of **Target and Hunting Rifles, Pocket Rifles and Pistols.** Those seeking for **SPECIAL RIFLES** should examine our catalogue. **STEVENS RIFLES** are made in a great variety of styles, in weight from 4½ pounds upward. Models for Range Shooting, for Hunting. Special Models for Ladies, also for Youths. **POCKET RIFLES** in several models, light and heavy, in various calibres; can be carried where it is impossible to carry a full-sized rifle. **STEVENS POCKET RIFLES ARE MARVELS OF ACCURACY.**

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The Catalogue published by this Company should be secured by every sportsman **FOR REFERENCE**, as sooner or later you are likely to want some kind of a **STEVENS Rifle or Pistol.** Sent free to any part of the world. Address,

## J. STEVENS ARMS AND TOOL CO.,

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WHEN WRITING ABOVE MENTION "IDEAL HAND BOOK."

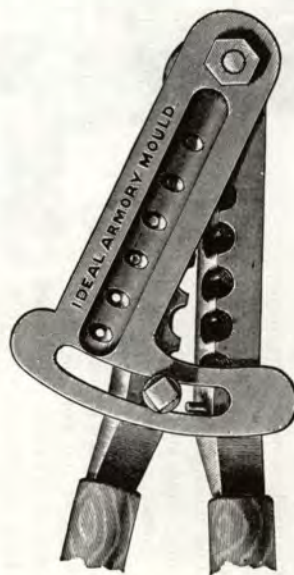
62 IDEAL MANUFACTURING CO., NEW HAVEN, CONN., U. S. A.

seating of the bullets or crimping of the shells, raise or lower the screw C at top of press; this can be set to suit the work required.

As there is always danger where powder is, *never pull the lever down on loaded cartridges until the Safety Guard is down.*

To resize expanded shells, remove the pin plate, insert the collet H (shown at side of press) into the hole in gate or slide; securely fasten it with set screws. Set the bottom plate A back in the press, and fasten it with screws M.M. Locate the stripper J, on the bottom plate A, with the screws furnished, leaving it loose. The screws nearly down to place. Insert the resizing die I, into the collet and securely fasten it; adjust the screw C, at top of press, so that when the lever is down, the die I will nearly touch the stripper J; insert a shell into the stripper, and bring down the die into it, when die is nearly over the shell, set the stripper correctly by it, as it projects from the die, and fasten it securely, so as to be a guide for all others. Die must be kept clean and free from rust. Shells must be clean inside and out, as suggested above, and thoroughly dried, and before resizing they should be wiped over with a slightly oiled cloth, as they must not be resized dry, or must they have too much oil on them, for it will cause the shells to wrinkle.

## THE IDEAL ARMORY MOULD.



This is a strong, heavy, well-made bench mould. It is cut for six of the largest military and sporting bullets. Length of mould complete, about 13 inches; weight, about 4 pounds.

Military companies, clubs, or those using large quantities of bullets and ammunition, will find the Loading Press and Mould a great time saver and economizer.

Price of Press complete, with one set of tools for any one calibre, \$150.00	
" " Extra Shell Plate -	" " " 10.00
" " " Pin " -	" " " 15.00
" " " Resizing Dies, -	" " " 3.00
" " " Shell Strippers, -	" " " 3.00
" " " Ideal Armory Mould, Six Bullets -	" " " 10.00

IDEAL MFG. CO., NEW HAVEN, CONN., U. S. A.





## RIFLES RE-BORED.

I am now ready to receive orders for re-boring, rifling and chambering, old shot out, or rusted rifle barrels, to take the .32 calibre Ideal cartridges: 32 calibre short, long or extra long, or .32-20, single-shot, barrels may be re-bored to use them. Rim fires may be changed to central fire. Rifles of 22 calibre may be re-bored to take the .25-20 or .25 Stevens cartridges.

There are many rifles of small calibre, now considered worthless, that may be made new again at a comparatively small expense. We will be pleased to make estimates on the probable cost. Write and give full particulars.

## HARWOOD'S LUBRICATING PUMP

for grooved bullets, forces cold lubricant into the grooves by screw pressure. Made to order *only*. Price, \$5.00 net.

Harwood's jointed and solid brass cleaning rods for rifles, made for all calibres. Pumps and jointed rods can be sent by mail.

## BULLET CASTING AND LOADING SHELLS.

We are now prepared to fill orders for casting all regular standard sizes and special "Ideal" bullets. Having first-class facilities we feel confident of meeting orders promptly.

Special Cartridges for rifles or revolvers loaded to order. Shells reloaded for either military or sporting rifles with care and dispatch. It pays, the shells cost half as much as the whole cartridge.

Write us just what your wants are and enclose stamp for reply. Remember, *we deal with the consumer direct.*

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PLEASE MENTION "THE IDEAL HAND BOOK" WHEN YOU WRITE.

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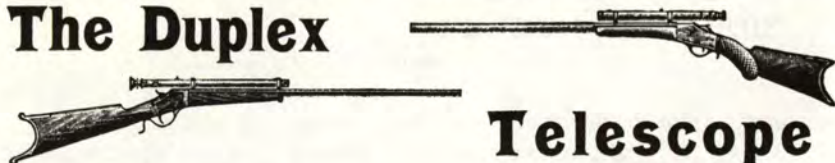
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## Telescope Sight,

MANUFACTURED BY

LAWSON C. CUMMINS, Montpelier, Vt.

This telescope sight is in a handsomely engraved steel tube, and is strongly and rigidly attached to the barrel by two steel rings with dovetailed bases, which are set in slots in the barrel.

The tube is secured within the rings by four screws, and may be removed in a moment's time, and returned as quickly. As the name implies, there are two sights, one of which consists of a tiny dot, and is permanently fixed, and points with the bore of the rifle, and the other, a cross hair, is adjustable by means of a thumbscrew, to give the elevation required.

With this device, mathematically correct elevation is secured with one shot.

Its optical power is varied, according to requirements, of from eight to fifteen times the human eye, and the bore used is three-fourths of an inch, except for pistols and very light rifles, which are about one-half inch. It will do accurate work with less light than any metallic sight. Price, with complete hangings, \$12.00. Range telescopes of sixty power. Price, \$12.00.

Mention Ideal Hand Book when writing, and enclose stamp for catalogue.



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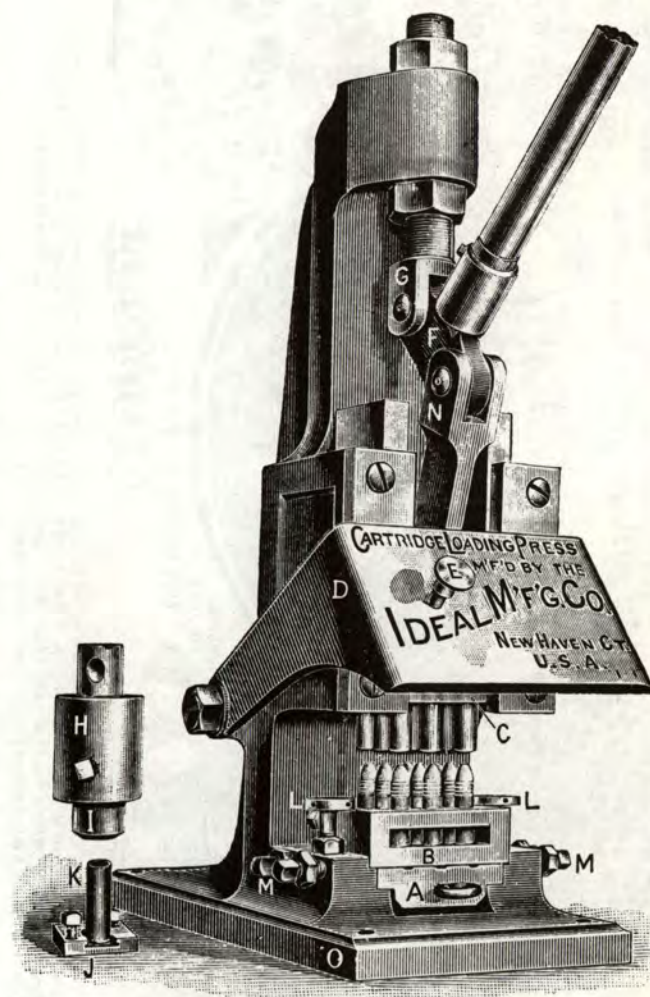
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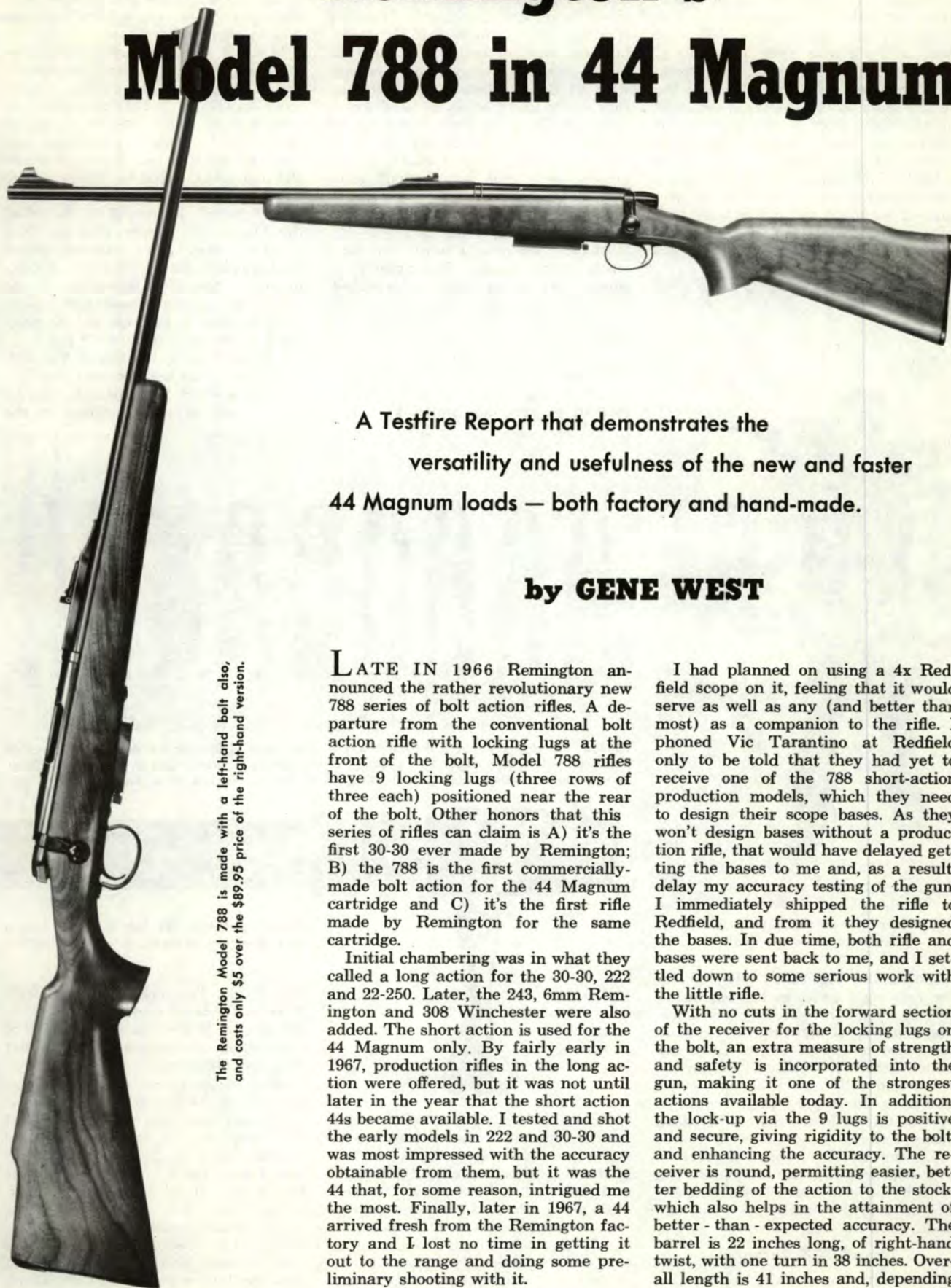
Send five cent stamp for full illustrated catalogue. Postal card requests will  
not be noticed. Mention Ideal Hand Book when you write.

## Ideal Cartridge Loading Press.





# Remington's Model 788 in 44 Magnum



The Remington Model 788 is made with a left-hand bolt also, and costs only \$5 over the \$89.95 price of the right-hand version.

A Testfire Report that demonstrates the  
versatility and usefulness of the new and faster  
44 Magnum loads — both factory and hand-made.

by **GENE WEST**

LATE IN 1966 Remington announced the rather revolutionary new 788 series of bolt action rifles. A departure from the conventional bolt action rifle with locking lugs at the front of the bolt, Model 788 rifles have 9 locking lugs (three rows of three each) positioned near the rear of the bolt. Other honors that this series of rifles can claim is A) it's the first 30-30 ever made by Remington; B) the 788 is the first commercially-made bolt action for the 44 Magnum cartridge and C) it's the first rifle made by Remington for the same cartridge.

Initial chambering was in what they called a long action for the 30-30, 222 and 22-250. Later, the 243, 6mm Remington and 308 Winchester were also added. The short action is used for the 44 Magnum only. By fairly early in 1967, production rifles in the long action were offered, but it was not until later in the year that the short action 44s became available. I tested and shot the early models in 222 and 30-30 and was most impressed with the accuracy obtainable from them, but it was the 44 that, for some reason, intrigued me the most. Finally, later in 1967, a 44 arrived fresh from the Remington factory and I lost no time in getting it out to the range and doing some preliminary shooting with it.

I had planned on using a 4x Redfield scope on it, feeling that it would serve as well as any (and better than most) as a companion to the rifle. I phoned Vic Tarantino at Redfield only to be told that they had yet to receive one of the 788 short-action production models, which they need to design their scope bases. As they won't design bases without a production rifle, that would have delayed getting the bases to me and, as a result, delay my accuracy testing of the gun. I immediately shipped the rifle to Redfield, and from it they designed the bases. In due time, both rifle and bases were sent back to me, and I settled down to some serious work with the little rifle.

With no cuts in the forward section of the receiver for the locking lugs on the bolt, an extra measure of strength and safety is incorporated into the gun, making it one of the strongest actions available today. In addition, the lock-up via the 9 lugs is positive and secure, giving rigidity to the bolt, and enhancing the accuracy. The receiver is round, permitting easier, better bedding of the action to the stock, which also helps in the attainment of better - than - expected accuracy. The barrel is 22 inches long, of right-hand twist, with one turn in 38 inches. Overall length is 41 inches and, depending



upon the density of the wood, the weight is approximately 7 pounds. The stock is a solid, functional piece of American walnut, devoid of checkering or other ornamentation. The length of the pull is 13 $\frac{3}{8}$ ", drop at heel is 2 $\frac{5}{8}$ ", with drop at comb of 1 $\frac{7}{8}$ ". It has a three-shot, detachable clip magazine, with the release to the rear of the clip. The safety, positioned at the right rear of the receiver, is positive and easily operated—back for safety, forward to fire. It comes with a blade front sight and a fully adjustable U-notch rear sight. It is also tapped for scope mounts, but the tapping is for the stronger 8x40 screws. Should you want to mount a target



Gene West shoots the Remington 788, his scope a 4x Redfield.

scope on the 788, that's OK, too, for the rear sight holes in the barrel are correct for a target scope block. Ejection is almost straight up, so if 2-piece bases are used, the empty cases are prone to hit the windage knob on the scope and fall back into the action. Redfield's one-piece bridge mount is beveled on the lower right side, which nicely deflects the empties off to the right, and there's no ejection problem. The trigger guard is adequately big enough for use with gloves, and the trigger pull is excellent—crisp and clean, with no creep.

#### Model 788 Versatile

Versatility is one of the key features

of this highly modern rifle, in that it will smoothly handle all ammunition—from any factory 44 Specials up to and including 44 Magnum factory loads and hot handloads. Feeding from the clip magazine into the chamber was flawless in all instances, using 44 Special factory ammo, reloads with 44 Special brass, and both factory ammo and reloads in 44 Magnum cases. While I certainly don't intend to peg this as an all-round rifle, I do feel that, with proper loads, it will answer very well for a small game rifle, as well as a short range brush or timber rifle for deer, bear and similar species of big game.

In factory ammo, I have tried, as a small game round, Remington's 44 Special 246-gr. lead load, index #5544. Experimenting was also done with Remington's 240-gr. jacketed soft point 44 Magnum, index #6944; Norma's 240-gr. jacketed soft point 44 Magnum, index #175; Norma's 240-gr. jacketed soft point special carbine load in 44 Magnum, index #176, and

will prove superior, by a considerable margin, to other 44 Magnum loads (except for the Super Vel 180-gr. load). Accuracy has also proved more than acceptable with it, but I'll go into that in greater detail later.

Most 44 Magnum carbine velocities are based on an 18" barrel, so chronographing some of these loads proved most surprising, in that the actual velocities from the M788, as shown on my Model 10 Oehler, were higher than those advertised. Lee Jurras of Super Vel had told me that his 180-gr. ammo would develop under 2300 fps out of an 18" barrel. From the 22" barrel of the Model 788, it went 2355 fps. The Norma hollow point carbine special load checked out at 1843 fps, as compared to the 1705 indicated on the box. Their conventional soft points went through at 1790 fps and Remington's #6944 went up to 1826 fps.

I haven't tried the Super Vel 180-gr. hollow point load on deer, but it is fast for a 44 at 2355 fps and, like all other loads, is very accurate in the



Some of the 44 ammo shot in the author's tests. From left—44 Spl. factory; 44 Spl. handload; 44 Magnums with 180-gr. Super Vel; 240-gr. Norma Carbine (2 loads); 240-gr. Remington; 200-gr. Speedy bullet; 240-gr. Norma and 240-gr. cast bullet, the last three handloads. See text.



Remington Model 788 bolt carries 9 locking lugs, three rows of three, giving short bolt lift.

Model 788. The jacket is some 0.030" thick at the base, tapering to 0.025" at the mouth. It does an excellent job of expanding, yet holds together to offer deep penetration.

As it seems to me that most, or at least many, 44 shooters are cast-bullet buffs, and also that many cast-bullet buffs are also 44 fans, most of my loading was with these homebrew bullets. I used the Lyman 250-gr. 429421 bullet, as well as both of its 235-gr. hollow point and hollow base variations. In all instances, these bullets were cast from wheel weights, all were sized to .430", and all were lubed with Javelina lubricant. Initially, my sizing

Norma's 236-gr. jacketed hollow point, another special carbine load, index #168, and lately Super Vel's hot 180-gr. loading in both jacketed soft point and jacketed hollow point. Norma's #168 will probably be without peer as a deer and black bear brush load for the 788 in 44 Magnum. Both penetration and expansion tests give all indications that, up to about 100 yards, it



and lubing was done with the older Lyman No. 45 Sizer and Lubricator, but more recently it has been done with their new No. 450, which is a great improvement over the older model. Herter's dies were used for the 44 Special reloads, and Eagle dies for the Magnum loads. None of the aforementioned cast bullets carry gas checks, but even in the hottest loadings no trace of leading was found, which speaks pretty highly for the Javelina lubricant. While large rifle primers are to be recommended for 44 Magnum loads that will be used in rifles, I also tried RWS, Norma and Federal large pistol primers. Results were entirely satisfactory with all loads that I worked with, although none were as hot as some recommend. However, it is suggested that rifle primers be used, especially in the heavier loads.

### Loads in the 788

While loads for 44 Magnum handguns are a dime a dozen, with prefer-

bly. I also worked up to a maximum of 18.0 grains of Herco with the Lyman 429421 bullet. Either 25.0 grains of 2400 or 18.0 grains of Herco will move the bullet out with a muzzle velocity of about 1900 fps, with a corresponding muzzle energy of about 2,000 foot pounds. This is sufficiently hot for this cartridge. With a ton of muzzle energy it should do a more than creditable job as a 100-yard big game cartridge if the shots are correctly placed. These bullets also do a good job of chopping through brush, as I discovered recently. I did considerable shooting through some fairly heavy thickets, many of the limbs going  $\frac{3}{4}$ " to 1" thick. These cast loads, with both 2400 and Herco, punched right through, with no apparent deflection. These loads, while stiff, could probably be safely used in a sixgun on occasion, although I haven't so-ried them—and I don't intend to! For those of you who might want a load usable in both rifle and handgun, I suggest you drop the 2400 load to 22.0

ing done, I settled down to see just what degree of accuracy my various loads were going to give me. My initial testing was done with ammo available at that time, but more recently I've done considerably more shooting with ammo lately introduced. Gratifyingly, I discovered that most loads will give me  $1\frac{1}{2}$ " groups for 5 shots at 100 yards. Surprisingly, by far my best groups came with Remington factory 44 Magnum ammunition. With that ammunition I could get them all into one ragged hole, regularly, with center-to-center dimensions of  $\frac{7}{8}$ ". For a rifle of this kind, and one chambered for the 44 Magnum cartridge, that is exceptional accuracy. Remington 44 Special factory ammo, as well as my light and medium-heavy 44 Special loads, all shot to the same point of aim at 100 yards, as did the 44 Magnum ammo. This is a common trait in a 44 sixgun, and Remington's little rifle also has it. As a fairly tough test I set up a target at 100 yards, then fired 5 rounds of each of the following loads: Remington 44 Magnum; Norma 44 Magnum; Norma 44 Magnum soft point carbine special; Norma's 44 Magnum hollow point carbine special; my 18.0-gr. Herco loads behind the three different cast bullets, all of these in 44 Magnum cases. I also shot Remington 44 Special factory ammo, and 44 Special reloads with the Lyman 429421 cast bullets over both 18.0/2400 and 8.5/Herco. All told, this came to 50 rounds of ammunition and 10 different loadings. All rounds were fired quite quickly, not giving the rifle time to cool between shots. Outside measurement of this 50-shot group was  $4\frac{3}{4}$ ", or 4.32" center-to-center. With the exception of 5 shots, all were in a  $2\frac{1}{4}$ " hole, which was centered  $2\frac{1}{2}$ " above the point of aim.

Marlin's Sighting in Guide shows that if you will zero in such loads at 15 yards, you will be 2" high at 50 yards,  $2\frac{3}{4}$ " high at 100, dead on at 150 and  $10\frac{1}{2}$ " low at 200 yards. This comes very close to the results of my 50-shot group, and graphically illustrates that the range of this cartridge is limited to about 150 yards. I also found out that beyond approximately 150 yards or so, the bullet drops with amazing rapidity, accurate though it may be within its range limitations.

This coming summer, or late spring, when I go on my annual bear hunt, I have a hunch that this is the rifle I'll be using. I'll either have it loaded with Norma's hollow point carbine special load, or possibly, my cast hollow point bullet loaded over 25.0 grs. of 2400. None of the several bear I've taken in the past have been at ranges in excess of 100 yards, and most of them at considerably less than that. With the 788 Remington in 44 Magnum, I think I'll be well prepared for old blackie when he shows up this summer. ●



Lyman mould, hollow-point blocks and bullets made in them.

ence generally going to 2400 as the best powder. I'll list the various loads that have worked well in the 788 rifle. I have had highly satisfactory results with both 2400 and Herco, but I don't load as hotly as some writers recommend. I've seen loads published as strong as 27.0 grains of 2400 behind a 250-gr. bullet, but in my book this is too hot. 25.0 grains of 2400, using both my cast bullets, and also pushing some 240-gr. Norma bullets, proved maximum in my rifle. Extraction was a little hard, and the primers were well flattened compared to lesser loads. With both the 235-gr. hollow points and the 235-gr. hollow bases, however, 25.0 grains of 2400 performed admirably.

grains and the Herco charge to 16.0. Both of these could probably be worked up slightly from these levels, but it would be a safe starting point. For lighter, midrange loads, 7.5 to 8.5 grains of Unique work well, as does 12.0 grains of Herco. You could also drop down to 16.0 grains of 2400, but in using 2400, I prefer to use it primarily for heavy loads. I have had very poor results using extremely light loads of Bullseye, and I cannot recommend them at all.

### Range Testing the 788

After mounting and bore sighting the 4x Redfield, I went to the range to sight it in. With preliminary zero-



# LONG RANGE LOADS

## 12 Gauge Standard and Magnum

Ultra long range, to be sure, distances too far for regular hitting by most shotgunners. But some loads here show good density at 70 yards and good wallop at the other end, too.

by FRANCIS E. SELL

FOR LONG RANGE 12 gauge reloads, using 2¾" and 3" shells, there are, of course, many excellent combinations using the various plastic shot sleeve-wad column combinations listed in the various brochures available to the handloader. Beyond these—and in the main superior to them—are the special long range reloads touched upon here. The techniques used for extremely long range 12 gauge reloads are essentially the same as those used for the 20 gauge, and with the same type of components. Yet there are some differences to be considered.

With very light shot charges in the 12 gauge, such as 1 ounce and 1½ ounces, pattern dissipation for each 5 yards of range beyond 40 yards is greater than when these smaller shot charges are shot in the 20 gauge, using the same type of long range wad columns. The reason? These 12 gauge shot charges are moved with a faster, more violently

acting powder in the larger bore.

It is not to be supposed, however, that fairly long range gunning with the standard 2¾" 12 gauge shell, using 1- or 1½-ounce shot charges, is to be discounted. These light 12 gauge loads are very practical. They fill an important ballistic niche in the spread of recommended 12 gauge reloads, making that gauge a highly versatile gun. I simply point out a basic reloading fact: if you confine your reloading efforts to ¾-, 1- and 1½-ounce shot charges, your best gauge for such reloads would be the 20 bore with 3" chambers. The 3" 20 Magnum permits of an excellent selection of wad columns via its greater length.

With the differences and similarities of these long range loads in mind, let's consider some of the

The useful and interesting information presented here is from Chapter 14 of Mr. Sell's forthcoming book, *Advanced Shotgun Reloading*. Publication is expected sometime in 1972. Watch for it.

long range patterns produced by the 12 bore chambered for 2¾" shells. The test gun used for these pattern evaluations is, I feel, fully representative of the average well bored 12 gauge—a double bored full and modified.

Here are the results at 40 and 55 yards, using 1 ounce of 5s.\*

40 yards, full choke .034", 5 rounds fired:

Powder/grs.	Pattern	Percent.
DuPont 700X/18	140	80

55 yards, full choke .034", 5 rounds fired:

Powder/grs.	Pattern	Percent.
DuPont 700X/18	88	50

\*174 copper-plated W-W Lubaloy shot. Remington plastic target shells (high base wad), Remington 97 primers.

These reloads had the following wad column: One .200" paper over-powder wad, one .070" paper spacer wad, one ¾" fiber wad cupped to



½ its depth and used cup down. One Alcan PGS, perforated with a 410 gauge wadcutter, and used skirt up under the shot charge. In addition, about 10 grains of common white flour are used with the first half of the shot charge.

Here, as in making my 20- or 16-gauge long range loads, half of the shot charge is dropped, the white flour is placed on this, the shell tapped to settle the flour among the shot pellets, then the other half of the charge is dropped.

Evaluation of the above 1-ounce pattern average shows that even the smallest number of pellets placed in the 30" circle at this yardage would deliver a 4-5 pellet hit on average size ducks. Individual pellet energy at this distance is well above minimum requirements, too. This light 12 gauge reload would be excellent on Chinese Pheasant to 50 yards. At this maximum distance one size 5 shot, given a muzzle velocity of 1200 fps, would have a remaining pellet energy of 2.45 foot pounds.

The wad column outlined for this 1-ounce 12 gauge reload may be changed to give more open patterns. You may space out slightly and use an Alcan shot sleeve instead of the perforated PGS. This is especially recommended if black shot is used instead of copper-plated pellets. Another excellent variation of this wad column is made with a perforated filler wad, using a ⅜" leather punch, then inverting an Alcan PGS plastic wad under the shot column.

Turning to the slightly heavier 1½-ounce shot charge\* in the standard 12 gauge 2¾" shell (same high base shells, though you may substitute *any* shell brand of like capacity), here are some pattern results.

40 yards, full choke .034", 5 rounds fired:

Powder/grs.	Pattern	Percent.
Herter's #160/24.5	128	82

\*155 Winchester-Western copper-plated Luba-  
loy shot.

55 yards, full choke .034", 5  
rounds fired, 1½ ounce of #4s:

Powder/grs.	Pattern	Percent.
Herter's #160/24.5	88	56

Obviously, this particular light 12-gauge load would be effective on ducks to the test distance of 55 yards. It would be equally effective on geese to 55-60 yards also. Yet it is not the longest range, com-



paratively light reload you can make for your 12 gauge. To get full benefit of a slower-burning powder, the 2¾" 12 must have at least a 1¼-ounce shot charge. Here is just such a load average put to the steel pattern plates.

40 yards, full choke .034", 5  
rounds fired, 1¼-ounce of #4s\*:

Powder/grs.	Pattern	Percent.
AL5/30	157	92

40 yards, modified choke .017", 5  
rounds fired:

There is no substitute for long range patterning. Here the author looks over a maximum range  
goose gunning pattern of 2s.

Powder/Charge	Pattern	Percent.
AL5/30 grs.	147	86

60 yards, full choke .034", 5  
rounds fired, 1¼-ounce of #4s.\*

Powder/Charge	Pattern	Percent.
AL5/30 grs.	96	56

\*170 Winchester-Western copper-plated Lu-  
baloy shot.

The pattern dissipation for the  
above load, using copper-plated





shot, is about 9% for each 5 yards of range beyond the 40-yard test distance. The greater pattern loss occurs between 45 and 50 yards. The muzzle velocity of this loading is about 1230 feet a second. The pressure reading is well below 10,000 psi. Remington low-base plastic shells were used, with Remington 97 primers.

At maximum range of 60 yards the remaining velocity of this reload is about 655 fps—compared to 685 feet a second for the same size shot pushed at a muzzle velocity of 1330. Individual pellet energy is 3.06 foot pounds, compared to 3.35 for the 1330 fps 1¼-ounce loading. Certainly you are not handicapping yourself on duck or geese with the slower muzzle velocity, and you can bring a beautiful high pattern to this 60-yard long range gunning!

The high pattern density produced by this loading at all ranges is inherent in the wad column to a great extent. Some of the patterning ability, however, comes from matching the velocity to the choke constriction. This gun, using .034" full choke constriction, produces its best patterns with a velocity of 1155 fps to not more than 1250.

Using this same powder charge

(30 grs. of AL5) with an Alcan Flite-Max #1 for comparison purposes, this reload produced 86% patterns from the full choke barrel at 40 yards. The modified barrel delivered 81% average at the same distance. At 60 yards the full choke delivered 52% to the 30" circle, with an average of 88 pellets. These results with the Alcan Flite-Max shot cup are definitely worthwhile, but they are inferior to the special long range loads comparatively tested.

Now we come to the basics of these reloads. Of course you have noted that the velocity level is kept *below the permissible maximum level* for the shot charge used in the standard 2¾" 12 gauge. I keep coming back to this point for the specific purpose of emphasizing that long range killing patterns *and* good retained individual pellet energy at maximum yardage are not matters of the highest permissible velocity. Indeed, in most cases the muzzle velocity of these reloads could be reduced even further, especially with the larger size shot. Emphasis is placed on *remaining velocity and remaining individual pellet energy at maximum range*, where it should always be. You are not killing your birds at the muzzle. That must always be remem-

These long range loads, standard or Magnum 12, can make plenty of work for a good Labrador.

bered for best long range coverage with your reloads.

You actually have two wad columns to choose from in making these 12 gauge long range loads—though both are basically the same. Here is one:

One .200" paper over-powder wad.

One ¾" cupped fiber filler wad.\*

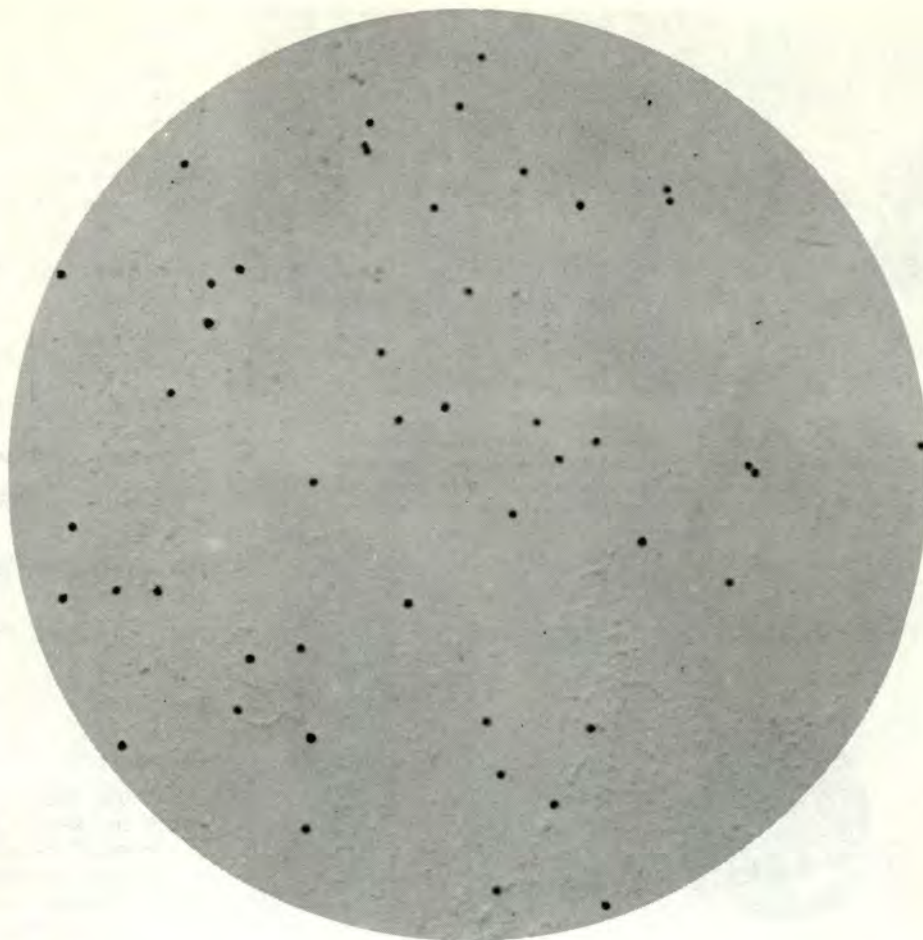
One 12 gauge Alcan PGS plastic wad, perforated with a 410 gauge wadcutter.\*\*

\*This cup is made with a size 12 leather punch, making a ¾" hole. It may also be made with a size 14 leather punch, delivering a 7/16" perforation or cup. The cup is about the thickness of the ¾" filler wad.

\*\*\*The perforated Alcan PGS is used skirt-up, under the shot charge. If you find a 410 wadcutter unavailable, perforate with the ¾" leather punch, then increase the hole diameter by using a small cutter in your electric drill.

Apply enough wad column pressure on the over-powder wad to seat it firmly. The rest of the column is seated snugly, but with





Here is the same reload put on the steel plate at 65 yards. 51 pellets in a 30 inch circle for excellent coverage in geese.

very little pressure. You may use any plastic or paper 12-gauge shell with this wad column except the Winchester-Western compression-formed plastic Superx Mark 5 shell, which has tapered walls.

If you need to space out for proper crimping, use a paper nitro over-powder wad directly on the .200" paper. If you need slightly less space, substitute a 1/4" cupped filler wad for the 3/8" one—with the cup 1/8" deep.

The next wad column for long range, high patterning reloads is essentially the same as for the first and, with proper size components, may be used not only in the 12 gauge but in the 20, 16 and 10 gauge Magnum as well.

One .200 paper over-powder wad.

One 1/4", 5/16" or 3/8" fiber filler wad perforated with a 3/8" hole, centered.

One Alcan PGS, inverted and used skirt-up under the shot charge.

*With either of these 12 gauge wad columns, you may use any recommended powder charge with its complementing shot charge for this gauge.* Your best bet is the powder and shot charge recommended for any of the plastic over-powder wad/shot sleeve combinations.

There is positively no lack of proper obturation or gas seal with these wad columns. This effective sealing is brought about by the air cushion effect of the perforated or cupped filler wad under the heavy pressure of the initial combustion. You can, because of this superior gas-sealing qualities of this specialized wad column, drop down two or three grains below the recommended powder charge for a complementing shot charge used with the regular shotcup-plastic wad column combination. There is little point, however, in using a plastic over-powder wad instead of the regular paper over-powder one.

Of the two above recommended wad columns, the cupped combina-

tion yields the higher pattern percentages, though the actual difference is very small. Both wad columns may be employed with either ground plastic or white flour in the shot charge. In either event, drop half of the shot charge, use the filler in this, then drop the other half on top. Shake the flour or plastic down into the interstices of the shot column by tapping the rim of the shell gently on your loading bench—no danger in this.

The use of white flour, recommended instead of ground plastic, increases pattern density at maximum ranges without greatly increasing the pellet count in the 30" circle at 40 yards. This is brought about by a smaller amount of pattern dissipation between 40, 60 and 65 yards.

Before leaving these 1 1/4-ounce reloads in the 2 3/4" 12 gauge shell, there is one combination, quite simple to make, that must be remarked. This is the use of the Alcan Flite-Max shot cup with its inside cushioning





Basic wads used, other than the .200" paper over-powder type. From left—cupped filler wad; Alcan PGS, used skirt-up with the perforated wad. With the cupped wad this plastic wad is perforated with a 410 gauge punch and used skirt-up, topping the cupped wad. Cup wad is used cup down to create an air cushion.



Here is how you stack up (right) a cupped-wad column. Three wads used. Bottom, .200" paper over-powder, then cupped center wad. Topping these is the Alcan PGS, holed with a 410 gauge punch, and used skirt-up under the shot column.

wad cupped  $\frac{1}{8}$ " deep with a  $\frac{3}{8}$ " leather punch. To remove the filler wad of the Alcan Flite-Max, use an ordinary corkscrew. Replace this filler wad, cup down.

Using this altered combination I have had a 40-yard average of 89% with  $1\frac{1}{4}$  ounces of copper-plated 4s from a full choke barrel. At 60 yards it averaged 90 pellets in the 30" circle for 53%; an excellent long range reload.

There is just one other shot charge weight to be considered in the regular 12 gauge 2 $\frac{3}{4}$ " shell, the  $1\frac{1}{2}$ -ounce load. You'll notice that in the  $1\frac{1}{2}$ -ounce factory loads that the muzzle velocity is slightly less than maximum, compared to the  $1\frac{1}{4}$ -ounce factory loading—1330 fps against 1315. This particular velocity level for the  $1\frac{1}{2}$ -ounce charge may be cut further with profit, to as little as 1150 fps for 2s, and not more than 1220 fps for 4s or 5s. This velocity reduction makes a much more comfortable reload to shoot from the standpoint of recoil. The ballistics at extended ranges will not be greatly changed,

either, so far as individual pellet energy is concerned.

An excellent wad column for the  $1\frac{1}{2}$ -ounce reloads is a paper over-powder wad, the cupped filler wad and a perforated Alcan PGS under-shot wad. With some shells you may have to use a .135" O.P. wad rather than the .200" size. If this doesn't give enough space for proper crimping, then use an Alcan PGS, with a thin over-shot wad directly on this plastic for a more perfect gas seal.

Turning to the 3" Magnum 12, the story is briefly told. By spacing out, you can use any of the standard 12 gauge 2 $\frac{3}{4}$ " reloads. Usually this spacing out may be achieved by using a  $\frac{1}{4}$ " felt wad directly over the wad used at the powder end of the shell.

In any event, you are overlooking an excellent combination for the 3" Magnum 12 if you don't use some of these lighter loads for a lot of your gunning. Extra good long range patterns are achieved because these 3" chambered Magnums are usually choked properly

for the larger shot sizes.

Turning to the heavier shot charges, let's examine some patterns at both 40 yards and at extended ranges. Here is one of the best heavy 12 gauge  $1\frac{1}{4}$ -ounce Magnum loads.

40 yards, full choke barrel .034", 5 shots fired of #4s.\*

Powder/grs.	Pattern	Percent.
AL8/46	199	82

40 yards, modified barrel .018", 5 shots fired of #4s.

Powder/grs.	Pattern	Percent.
AL8/46	197	82

\*240 Winchester-Western copper-plated shot.

60 yards, full choke barrel .034", 5 shots fired:\*\*

Powder/grs.	Pattern	Percent.
AL8/46	112	46

65 yards, full choke barrel .034", 5 shots fired:

Powder/grs.	Pattern	Percent.
AL8/46	96	40

\*\*Muzzle velocity 1265 fps.

Pattern loss between 40 and 65 yards checks out at 8.4% for each 5 yards of range. Excellent. This particular pattern average has sufficient density for good coverage on duck sized targets. This is very close to maximum range from both the standpoint of individual pellet energy and pattern density, using size 4 shot.

In reloading for any gauge it is well to remember that it is a very simple matter to reach 60 yards, with good target coverage, using  $1\frac{1}{8}$ - and  $1\frac{1}{4}$ -ounce shot charges in a standard 2 $\frac{3}{4}$ " 12 gauge, or in the 20-gauge 3" Magnum using these same shot charge weights. The 5 yards or so of extra ranging realized by heavier Magnum 12 shot charges is paid for with heavier recoil, from a much heavier, slower gun. I mention these factors to keep the entire reloading routine in perspective.

Here is the same  $1\frac{1}{4}$ -ounce reload as above except for a reduction in the powder charge of 3 grains, for a velocity of 1220 fps instead of 1265. This time with size 2 shot,\* goose patterns at maximum range mind.

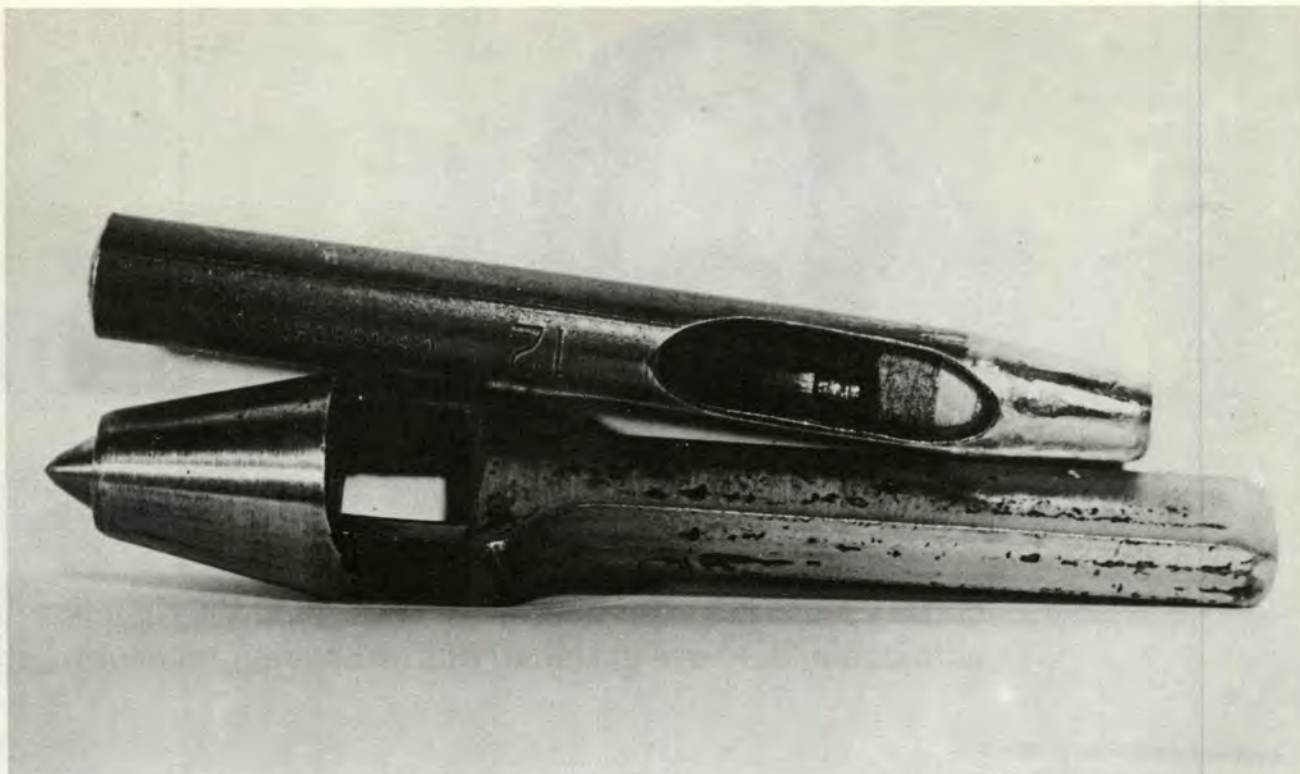
40 yards, full choke .034", 5 shots fired:

Powder/grs.	Pattern	Percent.
AL8/43	137	89
*150 Winchester-Western copper-plated Lubaloy shot.		

Here is the same load at a greater range.

60 yards, full choke barrel .034", 5 shots fired:





Specialized punches used for making long range wad columns. Top. #12 punch, producing a  $\frac{3}{8}$ " hole or cup. Bottom, special punch, made by Pete Rogers (3072 Baywood Lane, San Pablo, Calif. 94906), for perforating the Alcan PGS plastic wad with a .410 gauge hole.

Powder/grs.	Pattern	Percent.
AL8/43	76	50

Obviously, this loading will carry sufficient pattern density for a goose size target well beyond the 65 yard test distance. Here is how it checks out at 5 yards greater range, same 1 $\frac{3}{4}$ -ounce of 2s.

70 yards, full choke barrel .034", 5 shots fired:

Powder/grs.	Pattern	Percent.
AL8/43	60	38

This, obviously, is sufficient pattern coverage for a long range pass shooting of geese to 70 yards. Using Burrard's formula for figuring the probable number of hits with a well-placed pattern, we come up with a hit figure of 7-8 pellets on a 7-pound goose. This is a bit above minimum requirements of a 5-pellet hit with the individual pellet delivering an energy of 3 foot pounds, for a total of 15 foot pounds.

Would a still heavier 12 gauge Magnum load add any farther range? This is doubtful, though you can use 2 ounces of size 2 shot in the 12 gauge 3" Magnum in one reload I developed.

Before considering its pattern density and ranging we should remember that the average Mag-

num 12, weighing from 7 $\frac{3}{4}$  to 9 pounds, delivers plenty of recoil with the previously-mentioned 1 $\frac{3}{4}$ -ounce shot charge. With the 2-ounce shot charge, not recommended for any 12-gauge Magnum except a double or a pump gun weighing around 9 pounds, the recoil is still well above the 60 foot pound mark. This stiff load—actually too much for the average gunner—shouldn't be fired except by a very seasoned wildfowler, and he'd be better served with something lighter.

But for those who look with longing on the 2-ounce, 10-gauge Magnum shot charge, here is the technical data for 2 ounces of shot in a 3" Magnum 12:

One Alcan PGS plastic over-powder wad.

One  $\frac{1}{4}$ " fiber filler wad, cupped.\*

One Alcan PGS perforated with a .410 wadcutter.\*\*

Fold crimp, 60-pound wad column pressure.

\*Cupped to half its depth and used cup down, using a  $\frac{3}{8}$ " punch.

\*\*You may substitute an Alcan Quick-Sert shot sleeve for the perforated PGS.

Muzzle velocity of the above loading is 1230 fps, pressure average 9666 psi. Federal plastic 3" shells, Federal primers.

Here are the pattern tests averages.

40 yards, full choke .034", 2 ounces of 2s\*:

Powder/grs.	Pattern	Percent.
AL8/42	151	86

70 yards, full choke .034", 2 ounces of 2s\*:

Powder/grs.	Pattern	Percent.
AL8/42	54	30
*174 Winchester-Western copper-plated Lub-alloy shot.		

The powder charge of this 2-ounce 12-gauge Magnum reload can be reduced by *three grains* with ballistic profit when size 2 shot is used. When this is done, the pattern average at 40 yards is very close to 90%. At 70 yards, with the reduced velocity, using 2s, the average number of pellets in a 30" circle is increased to 63, in my tests here. But—there is no difference, actually, in the ranging power between the 2-ounce shot charge and the 1 $\frac{3}{4}$ -ounce. The lighter reload is recommended.

With all factors considered, this 2-ounce shot charge is best left to the 10-gauge Magnum.

*In both the 1  $\frac{3}{4}$ -ounce and the 2-ounce 12 gauge Magnum reload, the use of 10-15 grains of ground plastic or white flour is recommended in the first half of the shot column.* •



# Q

## UEST FOR

**Factory loads have got better and better, but the right handload obtainable. Here are excellent tips on bedding, magnum charges,**

**T**HE SEARCH for greater accuracy has been going on ever since the invention of gun powder made it possible to squirt a round ball from the muzzle of a smoothbored barrel. As time went on it was found that a conical bullet rotated by spiral lands and grooves cut in the bore gave better accuracy than did the round ball. But other problems—many of them—were to come. Bore and bullet diameters decreased with the advent of the metallic cartridge, and velocities went up. It was soon evident that the smaller diameter bullets required a greater rate of spin to stabilize them than did the big bores.

To further complicate matters, the coming of smokeless powder brought even smaller bores and still higher velocities, which required jacketed bullets of stronger construction and harder jacket material. Also, where there had been only one or two bullet weights for a given cartridge, and usually only one grade of black powder used to propel it, the trend was now for several bullet weights and forms within calibers, and several different smokeless powders to start them on their way. All of which eventually led toward the ultimate in velocity and accuracy levels, but a great deal of experimenting along the way was also entailed. Another thing that created accuracy problems was this—barrels for black powder rifles, and many of the early smokeless pow-

der barrels, were of big diameter, their stiffness and weight helping accuracy. But then the trend turned toward lighter, thinner barrels that vibrated like taut piano wires when bullets driven at high velocities by big charges of smokeless powders were driven through them. These thin barrels also heated rapidly from hot powder gas and bullet friction to the point where internal stresses within the steel caused bullet impact to "walk" in one direction or another, or open groups to unacceptable levels after the first two or three shots. Even with modern barrel steels and today's methods of rifling we have not completely eliminated this accuracy problem, although it has improved.

Actually, barrels, especially the mass-produced commercial tubes, are better on average today than anything quantity-made in the past, and nearly any good quality barrel will shoot very well if it is fed the right load and is bedded correctly for that individual barrel. It is this aspect of accuracy with which this article is concerned; the rifleman has little control over the accuracy of which the barrel is capable, but if he knows how he can achieve the greatest accuracy it will produce.

### Levels of Accuracy

There are, in fact, three basic accuracy levels to be considered for

different requirements: target-bench rest shooting, varmint shooting and big game shooting. While one should try to get the best accuracy possible from a rifle for any of these, the requirements are different and so are the rifles used. For target shooting we have bullets giving the highest accuracy levels, but these bullets are not necessarily designed to be effective on either big game or varmints. Jackets are normally quite hard and, even though they may be of cavity point design, are not designed to expand reliably, and many are of solid point design. They are usually of high ballistic coefficient to retain velocity at long range with consequent flat trajectories.

The ideal varmint bullet should possess not only a high ballistic coefficient and accuracy capability, but must be designed to literally explode on contact with the smallest object. Also, to be effective, accuracy should be attained at very near top velocity for the cartridge used, which high speed is necessary only in the long range target load.

For big game hunting a large assortment of bullet weights, point designs and shapes are used, which complicates loading for highest accuracy. For the best results for big game hunting one usually wants to load to the highest velocity the cartridge and bullet weight will give *with acceptable accuracy*. This



# A CCURACY



**in your tuned and adjusted rifle will give you the highest accuracy best-load development, and many valuable others.**

**by BOB HAGEL**

is especially true for long range shooting. If lower velocity is indicated, for a certain game and hunting conditions, it's usually better to pick a lower velocity cartridge to start with. Most big game hunting does not require the high degree of accuracy necessary for target or varmint shooting, but it never does any harm to have it if you need it.

One big difference in rifles made for the three listed is in the weight of barrels used. Rifles made exclusively for targets have heavyweight barrels which are, of course, selected especially for that purpose. These barrels have greater stability when fired in long strings because they heat up more slowly than lighter barrels. They are also less likely to change point of impact because of changes in pressures at one place or another caused by the stock warping through variations in atmospheric conditions. Varmint rifles also usually have heavier barrels than big game sporters, giving the former types some built-in accuracy. The lighter-barreled big game rifle, especially one that will be used as a combination varmint-big game rifle, is the one that will give the most headaches because of the degree of accuracy required from relatively powerful cartridges.

## **Tuning the Stock**

Let's take a look at the stock first, and what must be done to

make the rifle shoot its best (with everything else performing), to deliver the highest degree of accuracy.

While most off-the-shelf factory rifles made today usually shoot quite well, most of them can be made to shoot better. Some of these rifles are bedded close enough that a good stockmaker can rebed them correctly in the wood. However, some of them shoot poorly because of a loose fit of metal to wood in the wrong places, and very often there's not enough wood left at that point to correct the trouble. We are better off today when this happens than we were a few years ago; epoxy bedding compounds have made the difference.

One prime reason why many factory stocks do not shoot as well as the barrel/load is capable of is that the recoil lug does not fit squarely against its abutment. This usually causes bullet impact to shift back and forth horizontally. Then, if the high side of the abutment is scraped down enough to square it with the lug, often enough the lug no longer contacts solidly. If the rifle is shot that way it may well split the wood at the abutment and can also split the stock behind the magazine and into the grip. This can be corrected by cutting the face of the abutment back about  $\frac{1}{8}$ " and filling the gap with an epoxy bedding goop. While

you are at it it's a good idea to remove a little wood from the receiver ring mortise and a couple of inches around the chamber area of the barrel and fill that with glass also. If the tang does not make perfect contact give that the same treatment. Unless there are unsightly gaps between metal and wood along the sides of the receiver at the top edge of the wood, forget that section except to coat it as a sealer. This glass bedding is done by thickening the epoxy with floc to the right consistency, coating the barrel and action with release agent, then tightening the guard screws or, preferably the special stock screws (that custom stockers use), to the correct tension. This will give a perfect fit at the critical points when dry. It will also work just as well for bedding actions on stocks being made from scratch, and the action will never set back into the wood under recoil as it often does if bedded in wood alone.

I know that many top-drawer stockmakers frown on the use of stock bedding compounds except where holes must be filled in factory stocks, as mentioned above. They claim that it is only a way to cover up poor workmanship, and they are right in some cases. But let's face the fact that the man never lived who can fit wood to metal as closely as good bedding compound will mould to the metal, and that epoxy is stronger and does not compress after much firing as wood is bound to do. I'm



not guessing at this; I've made many dozens of stocks and looked inside of many made by the best stockmakers in the business. I'm not saying that all stocks should be bedded in glass, only that a glass bedding job is not inferior to bedding in the wood, and not a sign of poor workmanship, if it is done right. I use both methods.

### Bedding—Glass or Wood?

You can bed the receiver full length in glass, but if the wood is inclined to warp badly this can and often does exert tension in the wrong places. If bedded in the wood make sure there is no pressure between the rear of the receiver ring and the tang section, except in those actions using three guard screws. In the latter case be sure that contact is made between wood (or epoxy) at points on both sides to the rear of the magazine, under the center guard screw.

Normally the most critical aspect in bedding for accuracy is in the way the barrel is bedded. Here, again, looks can be deceiving. Many stockmakers, and a lot of riflemen who like fine workmanship, want the wood of the barrel channel to contact the barrel the full length of the fore-end, while others want the wood to touch along the top edges but not along the

bottom. Few barrels will shoot their best with either method. First, the full contact method never gives truly full contact when bedded in the wood even when first bedded, much less after atmospheric conditions change it, or after years of hunting use in rain, snow and hot sun. The close-fit edge method also changes pressures continually from one point to another as the wood warps. Full length use of epoxy gives a perfect contact fit, but also changes pressure when the fore-end warps. Some barrels will shoot good groups with these bedding methods, but I have yet to see one that would hold its point of impact for any great length of time when used in all kinds of weather.

Normally most heavy barrels shoot the best with the first couple of inches at the breech bedded tightly and floated from there on, while many sporter barrels do better with some up-pressure near the fore-end to damp vibrations. However only trial and error with a load known to be good will prove which is the best system for an individual barrel. I recently bedded a pair of Savage M110 rifles that were identical, in the 7mm Remington Magnum cartridge, to try to get the best out of each barrel. One shot its best full floated from two inches forward of the receiver ring,

the other with a cradle of glass two inches back of the tip that exerted about 7 pounds of up-pressure.

There are two ways of checking fore-end up-pressure: First, if you have a common spring scale—a good fish scale is ideal—hook it on a C-clamp that has been clamped to the fore-end about 2" from the tip. (Be sure to pad with leather or felt.) With the stock butt in a vise and the barrel on a rest, pull down on the scale until the wood moves away from the barrel and read the pounds shown on the scale.

A second method is to hang an object of known weight on the C-clamp, observing how much the fore-end moves away from the barrel. Now remove weight and clamp, keeping the scale or weight handy to check. Grasping the fore-end, with thumb and fingers on either side of barrel, then place your index finger against the under side of the barrel and push upward until the barrel lifts from the wood, about the same amount it did with the attached weight. Do this several times and you'll get the "feel" of what 6-7 pounds of pressure is. Add C-clamp weight to spring reading or to weight.

To reduce up-pressure remove wood or glass from the pressure

Some shooters seem to think that any bullet of a given caliber should shoot well in any rifle regardless of weight, design or make. Not so. What one rifle digests well another may reject. Also, even in this small collection of styles

and weights, few will shoot to the same point of impact with the same powder and charge. Two of these bullets are made for long range match shooting, the others for big game hunting. All have quite different ballistic coefficients.





point(s). To increase pressure lower the receiver by scraping away material from the bedding area at receiver ring and barrel shank. If the glass cradle or V was used you can add pressure with a thin layer of glass.

In using the up-pressure method of bedding there should be a cradle of wood or epoxy below the bottom quarter or so of the barrel, or a V of wood with a wing on either side, to support the bottom of the barrel just behind the fore-end tip, with the rest of the barrel contacting the wood nowhere except for that two inches of bedding immediately in front of the receiver ring. The barrel channel can clear the barrel by a wide margin except for the top edges, which should not touch the barrel at any point but need not have a great, unsightly gap. Do leave enough top clearance so that normal warping of good wood will not cause the edges to touch the barrel.

If a trial of this fore-end up-pressure technique is desired first, cut a business card into about one-inch strips, say one or two inches long, and place one (sometimes two) at the bottom of the fore-end and a couple of inches or so from the tip. Try positioning these bits of card closer to or farther from the tip also, if first results aren't satisfactory.

Other materials can be used as well—masking tape, fiber strips,

etc.—and two such strips may also be worth trying, one on either side of a center line along the barrel channel, perhaps separated by a quarter-inch or so.

These up-pressure methods sometimes have a further effect when tried with factory bedding. Use of the card(s) or whatever raises the barrel out of the channel, thus giving (sometimes) a floating barrel condition.

With the full floating method the barrel does not touch the wood at all except for the two-inch bedded section forward of the receiver ring. If the barrel will shoot its best, or as well, with the floating method over any other, then the big game hunter is better off because there is much less chance of his rifle changing impact by absorbing moisture or drying out on a hunting trip. Especially in places like coastal Alaska.

Few riflemen have the ability, knowledge and patience to do this kind of accuracy experimenting and bedding, but many gunsmiths and stockmakers do. However, the time consumed in doing a good job often makes such work rather expensive, so have at it—it can be done.

### Finding the Right Load

Finding the load that shoots the best in a given rifle does not require the special tool handling skills that correct bedding does, but it does take time, a reasonable amount of handloading knowledge, care in assembling the loads, plenty of components, and an open mind—the latter helps assure completely unbiased results.

Many reloaders feel that in this day of the computer it is silly, old fashioned, and perhaps downright stupid to work up handloads to obtain the utmost in accuracy or the optimum hunting load for a given purpose. Maybe I'm all three, but I'll say flatly that the best computer made won't give the best possible load for any individual rifle, except by accident. This is

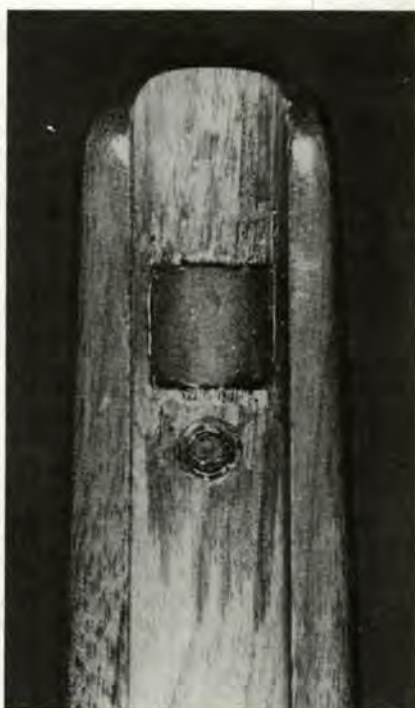
certainly not to imply that such computers as the Powley are not reliable sources for arriving at what powders and charges should give good results behind certain bullet weights in this or that case. What I do say is this: They may hit that best load right on the nose, but there is a much greater chance you'll have to use it for a starter, then "work up" *your* load from there.

In doing much reloading for any given caliber you will soon find that, with all other components identical in kind and amount, one brand and style of bullet of a certain weight will shoot better groups than any other brand or style of the same weight. Now no computer can tell you which one will shoot best in *your* rifle, nor will it tell you exactly the amount of which powder it will take to do it, or which primer will give the best accuracy behind that powder, charge and bullet. You'll have to work this out yourself, or have someone else do it, and you will likely have to do it for every rifle you may own in the same caliber!

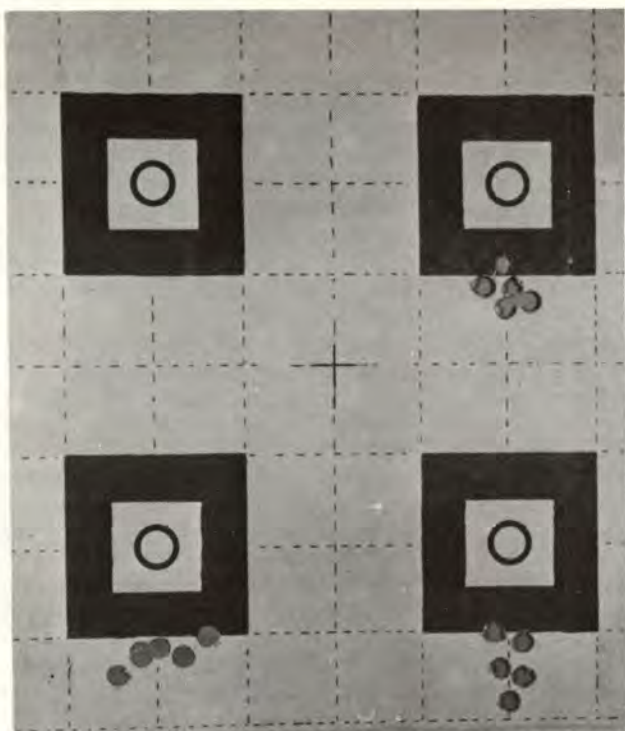
The first step in working up the most accurate load for your rifle is to pick the bullet weight you want to use, then choose a certain powder and charge that you know to be good in other rifles of the same caliber, or from a computer or reloading manual. Try a 3-shot group with it and see what it does,



Left—One prime cause of inaccuracy, especially fliers, is a recoil lug that does not bear even against abutment. Glass bedding of this area will cure this once and for all. If made thick enough it never compresses as wood does. Right—Many light sporter barrels require some up-pressure near fore-end tip for best accuracy. Here is cradle made of Acraglas moulded to barrel for perfect fit. Some barrels, particularly heavy varmint jobs, require full floating, from a point about 2" ahead of receiver ring, to deliver top accuracy.







Left—Poor bedding or the wrong powder charge will cause groups to string vertically like target at lower right, or horizontally as at lower left. The ideal is a rounded group like upper right. Only trial and error, or a load known to be accurate in that rifle, will tell whether the trouble is in the bedding or loads. Above—This method of attaching load data to groups of cartridges with different loads allows sticker to be transferred to target so that both accuracy of load and point of impact is permanent record on target.

both for accuracy and signs of pressure. If pressures are normal and the load seems good, now load up three more rounds with the same load, plus three more that are one grain below and three others with one grain more powder. The easiest way to keep track of them is to write the load on a piece of paper and attach it to the three rounds with a rubber band. After firing each 3-shot group stick the tab on the target with tape. Rotate the target 90 degrees and repeat with another three. This will take some walking back and forth, but you probably need the exercise. This will give you a visual record of group size and point of impact of the various loads. In such small cases as the 222-base size vary the charges only in half-grain increments, and you'll probably go down to  $\frac{1}{10}$ -gr. to come up with the best load. These first three groups will do two things: they'll let you know if your first group was a true indication of average, and they'll show if a milder or hotter load will give better accuracy. If the best group is either the lighter or heavier load, try three more rounds using one grain of powder on either side of that load, provided that if it is the hot load it does not show high pressure signs. Eventually you'll find what seems to be the best load for that bullet with that powder. When you do, try at least two or three more groups to get an average.

If none of the loads produce the groups you feel you should get you'll have to go through the same procedure with other powders and/or bullets of the same weight. Some rifles refuse to shoot any make of bullet in a certain weight and style regardless of the powder charge or primer used. In that case you may have to go to another weight or style as near as possible to your first choice. However, some make or style of the desired bullet weight will give acceptable results in big game rifles and most varmint rifles.

Primer make or potency is not usually critical in big game cartridges, but can often cut groups in half in the small capacity target-varmint cartridges.

### Magnum Load Development

In working up loads for big game cartridges, particularly the magnums, I usually go up to the maximum *working pressures* for that rifle with the components I am using, then try groups of three in 1-gr. reductions. By "maximum" loads for that rifle I do not refer to a load that is all the cartridge case will stand without primer leaks. Such a load, in my opinion, is not a *maximum working load*, but is maximum for the case, and one which would become excessive with some slight variation. My maximum loads are based on charges 1 grain below the load that shows .001" expansion of

the belt or web, depending on case design. Some writers deplore the use of the term "maximum," but I wonder what interpretation they put on the word: I know that they often recommend a load ammunition with charges that would be beyond a safe maximum load in my rifle, so...

Belted cases will show about .001" belt expansion above the diameter of an unfired case with the first full-throttle load fired in that case. A factory load will usually do this also. After the case expands this initial amount on the first firing, or when it expands this much after a certain load if you are working up loads from scratch in new cases (which load may be several grains above the starting point), you will find that you can fire the same load in the same case many times without further expansion. It will usually take about two (2) more grains of the same powder (depending on the kind and quickness of the powder) to further expand the belt. When this second belt expansion goes up .001", back off *at least one (1) grain for a maximum working load for that rifle*. Take into consideration, too, at what temperature the load was tested and at what temperature it is likely to be fired at.

Another aspect that must be considered when taking belt-expansion measurements is the design of the case. Some makes of cases have internal webs thick enough to sup-





Different makes, weights and styles of bullets, different powders, and even different brands of primers can and usually does make a big difference in the accuracy an individual barrel will give. Some barrels shoot nearly anything you feed it well, others require juggling of some or all components.

port the belt to its forward edge, while other brands have thinner webs which do not support the belt at the forward end. If the belt shows expansion that seems premature by other pressure signs, check its diameter at the rear end. If it does not show undue expansion there use that point for future measurements in working up loads.

While we're talking about maximum working loads, I want to tell about another means of obtaining the highest degree of accuracy, one that is seldom mentioned. This is that, contrary to popular belief, many cartridges with certain bullets and powders give the highest degree of accuracy with the *hottest*

load the case will safely handle. In fact, I have rifles that shoot their best with loads that are *too hot* for that rifle! This situation is particularly true of large capacity cases using bullets of great sectional density, although it happens with smaller cases on occasion. My most accurate loads with the new 17 Remington came with maximum working pressures with some bullets and powders, while other bullets and powders did better 200-300 fps below full throttle. On the other side of the fence, every 222 rifle I've ever fired, from light sporter to bench rest, shot the best groups with 52/53-gr. bullets at about 3000 fps, some 200 fps under maximum, and with any powder that gave good results.

Here's another clue to accuracy that isn't really new, but it's not well known today. I have seen many hunters, using rifles with long heavy bullets like the 7mm magnums, who were disappointed in their 100-yard shooting with any

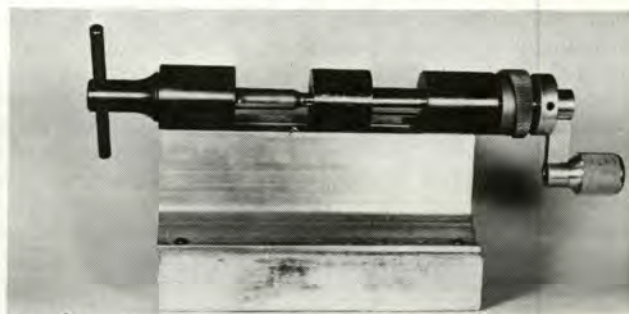
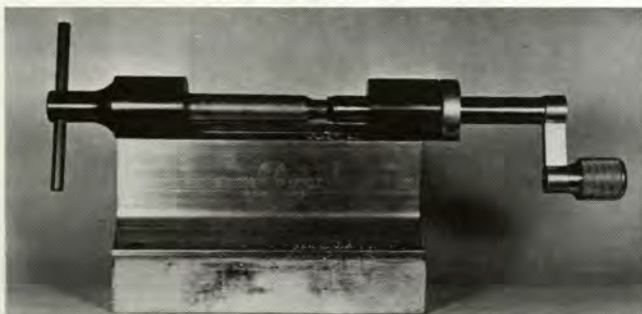
load they could concoct, even in a perfectly tuned rifle. What they did not realize is that very often those same loads would shoot just as tight at 200 yards as they did at 100. A 1½" 100-yard group is certainly nothing to brag about today, but the same group size at 200 yards is something else. I've seen many rifles do just that, particularly those chambered for long range, large capacity cases, and when match and hunting bullets with high ballistic coefficient were shot. What's the reason? That long bullet has not gone completely "to sleep" at 100 yards. It has not settled into a true smooth spin around its axis, so it's showing a slight yaw at the shorter ranges, and less accuracy.

### Cases and Necks

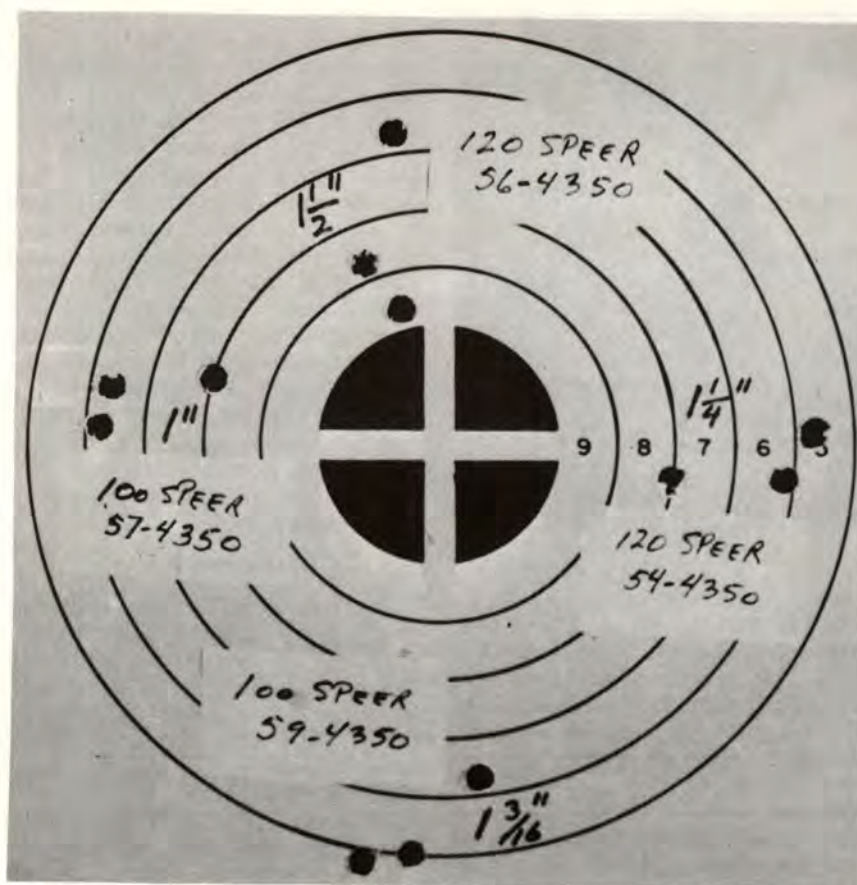
The cases you use can also give you fits by shooting inaccurately with exactly the same load that delivered tight groups previously from the same rifle. To go even further, the same cases you have been reloading can do it. Many cases stretch quite badly when fired several times at high pressures. This stretching is caused by the brass flowing forward and, as this happens the forward part of the case, including the neck, becomes thicker. This can cause the case neck to become so thick that it can't expand enough to completely free the bullet when fired. This usually results in loss of accuracy. Run a bullet into a fired case with your fingers now and then; if they are tight or will not enter, ream or outside turn the necks. Also, some chambers have tight neck sections that prove too close with one brand of cases while others work freely; these will have to be turned or reamed after the

Left—If case neck is long enough to jam into front of neck recess in chamber accuracy will suffer, and pressure will go up. Keep necks trimmed to minimum length; better too short than too long  
 ● Right—Chambers with tight necks often require reaming or outside neck turning of cases

to allow expansion sufficient to free bullet completely on firing. Outside neck turning as shown here will also true up case necks of uneven thickness. If neck of fired, unsized case is too tight to take new bullet by seating with fingers accuracy is almost certain to be very poor.







This 6.5 Rem. Mag. shows method of sighting rifle about 3" above center. Groups are kept separate by rotating target 90° between groups. Load data tab is transferred from cartridge group to target for permanent visual record.

first firing. These tight necks also cause pressures to rise.

Too long necks also give no end of trouble, especially if some are longer than others. Some reamers cut chambers with neck sections barely long enough for unfired factory ammo; if you have a rifle with such a chamber you'll have problems with some cases on the first reload. Some chamber necks terminate in a square shoulder while others end in a sloping shoulder. In the former situation over-long cartridge necks usually won't chamber at all, but in the latter the neck is actually crimped tightly on the bullet if the bolt is forced down hard in closing. This situation will cause pressures to jump drastically and the bullets to fly several inches from the group. Check any case on which the bolt closes hard to see where the trouble is.

Some brands of belted cases are especially bad, giving trouble with elongated necks after being fired only once. This occurs because belted cases headspace on the belt instead of the shoulder, and with

some brass the tolerance between the case shoulder and the chamber shoulder is sloppy, too great. The end result is that on firing the shoulder is pushed far forward to fill the chamber, with the neck section coming out too long.

### Old Ammo

Another headscratcher is brought about by ammunition that has been around for from one to several years. Every now and then someone with a very accurate rifle and a batch of ammo that gives exceptional accuracy will check his rifle before a hunt—perhaps a year or so after he's loaded the stuff—only to find that accuracy has gone down the drain. He immediately presumes that either the bedding has gone sour, the mount screws are loose, or something inside the scope has slipped. It never hurts to check scope mount ring and base screws occasionally, but before you start trying to rebed the rifle or change scopes try this: Set your bullet seating stem down just enough to move the bullet in the case—just break it loose from its

original seating, then try a group. You'll probably find "old Betsy" still shoots as well as she ever did. If you've ever pulled bullets from old lots of ammo you will have noted that some take much more pull to remove than others, which does nothing for accuracy. There are probably several causes for this uneven bullet pull in old ammo, but whatever they are the trouble is hard to find.

In summing up the various things that cause rifles and ammunition to be inaccurate, it might be well to touch lightly on some points that are so similar in results that it is difficult to be sure whether the rifle or ammo is at fault.

As an example, when bullets string horizontally it is often caused by too much tension on one side of the fore-end against the barrel—if the gun shoots right the pressure comes from the left. This is also true if the group continues to walk in one direction as the barrel warms up. If, however, it shoots first one way then the other, but always on a horizontal line, it may be caused by light side pressure on one side where the barrel vibrates against the wood, or on both sides at different points—another reason for not trying to bed the edges of the barrel to contact the wood. Warping and poor bedding both cause this.

If the rifle walks continually upward as it warms up it can be brought on by too much fore-end up-pressure. However, whether the barrel has up-pressure near the tip or is completely floated, it will almost always lose accuracy if the wood warps just enough to make very light contact somewhere along the bottom. With up-pressure barrels the wood-metal contact is lost, or almost so, when the warp is down. The floated barrel makes contact as the wood warps up.

A load that is not just right for a given rifle will also cause vertical and horizontal stringing, but the bullets usually work first one way then the other in the group—two here, three there. Usually if you work both up and down from that particular powder charge you'll find that in one direction or the other the groups start to take a round shape. Only 1/10-gr. will often bring it to the rounded shape we strive for.

There are, of course, other causes why rifles and ammo do not group well, but if you check all of the things mentioned here you'll probably find the answer somewhere along the line. ●



# Handload the 8mm NAMBU

*Pull that Japanese pistol off the wall and shoot it. Here is full information on making and adapting cases, suitable bullets and charges with various powders. A Testfire Report.*

by **LARRY S. STERETT**



The Japanese Model 14 (1925) semi-automatic pistol, caliber 8mm Nambu, with the winter-style trigger guard.

**T**UCKED AWAY in dresser drawers or hanging on the wall in many homes are souvenirs from the Pacific Theater of Le Guerre II in the form of the Japanese Pattern 14 or Model 1925 automatic pistol, commonly known as the Nambu. Modified from the original Nambu design, the 1925 model may be seen with the round trigger guard or an enlarged cold-weather guard; it may have a knurled, solid, round bolt knob, or a grooved knob with flats on top and bottom; even the grips will vary slightly. The caliber remained the same. All of the Nambus, except for the 7mm Baby version, are chambered for the bottlenecked, solid drawn-brass, semi-rimmed, 8mm Nambu cartridge, unheadstamped.

The original 8mm Nambu cartridge is quite unlike any other pistol cartridge. It resembles the 7.65mm Luger, except for being larger and using a slightly heavier bullet—the Nambu cartridge has a total weight of approximately 159 grains. The case carries a brass Berdan-type primer cap, filled with 0.12-gr. of detonating composition.

The bullet has a lead alloy core and a cupronickel jacket. Average bullet weight is 100 grains, with ranges from 98 grains to 102 grains being noted. Length of the full-jacketed bullet is 0.59-inch.

The propellant consists of 4.63 grains of 95.2% nitrocellulose and 4.8% diphenylamine powder, a load that fills the case. Two different-colored powders have been noted—one ash-colored and one a pale yellow—with both being the same approximate size—0.05" x 0.05" x 0.04". Velocity of this military load from a 4.56-inch barrel averages 1066 fps.

Surplus Nambu ammunition has never been on the market in shooting quantities, nor were any of the pistols

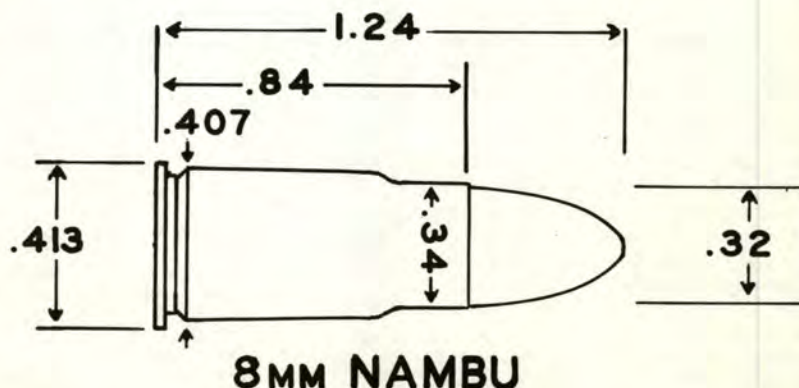
ever liberated in large numbers. For this reason very few of the Nambu pistols have been shot extensively, although many of their owners have wanted to do so.

Two such owners—Robert E. Bard and Osborne Klavestad—with the backing of several others—formed the B&E Cartridge Company of Minneapolis, Minn., in 1948, with the specific purpose of manufacturing one caliber of ammunition—8mm Nambu. Since it was necessary to keep the initial costs of the company to a minimum the production of the cases was jobbed out to a machine shop. Here 10-foot lengths of naval brass rod were fed into a 6-spindle screw machine which cut and shaped a complete brass Nambu case in 5 seconds; this amounted to 720 cases per hour. The cases were not annealed as in regular deep drawn case manufacture by the large ammunition companies, but it was not necessary. Drawing work-hardens the brass and it has to be softened to prevent cracking. However, the B&E cases were turned rather than drawn; work-hardening did

not occur and the annealing step could be skipped. Further, the cases would not be subjected to extremely high chamber pressures and would be capable of handling regular pistol pressures as manufactured.

The completed cases were then taken to a basement workshop for priming with regular small pistol primers (Boxer-type), powder charging, and bullet seating, using more or less conventional automatic loading equipment. There were no Japanese powders available, so the B&E firm started from scratch using American powders. Load after load was tested before finally arriving at what was considered to be a suitable charge.

Faced with the expense of having special bullets made to order the B&E firm designed their own, based on the Nambu design, and set about manufacturing them in a punch press. Slugs of lead wire were cut and formed in a die in the press, then plated with a copper alloy to improve appearance and provide a slightly harder surface. The bullets—weighing about 95 grains—were then loaded into the charged



Dimensions of the Japanese 8mm Nambu cartridge taken from a previously restricted ammunition identification guide issued by the British Arsenal at Kirkee, India.





From left: 8mm Nambu, 7.63mm Mauser, 9.8mm Colt, 9mm Mauser and 9mm Parabellum. All are original factory or arsenal loads.

cases via the altered punch press and the result was a complete American-manufactured 8mm Nambu cartridge.

The case head of the Minneapolis-produced cartridge is headstamped B NAMBU E MPLS. As might be expected, these cartridges were never too plentiful and most were rapidly picked up by collectors. Whatever happened to the company itself isn't known to the author, but if it were revived it should do a fair amount of business.

The summer of 1963 almost saw the Nambu cartridge problem solved; this time by two Connecticut firms. Watertown Shooting Supplies, Watertown, Conn., took the 41 Long Colt case, removed the rim and turned a new extractor groove. The result, when resized and trimmed, was a case almost identical to the original Nambu. Although more expensive than other altered cases to be mentioned later, the 41 case is a much better fit in the Nambu chamber and the reloading life is longer. The Watertown firm apparently dropped the project shortly thereafter, but the job of alteration is not outside the scope of the average handloader with a drill press or lathe. There is another catch; manufacture of the 41 Long Colt cases has been discontinued, although supplies may still be available from some dealers.

The Connecticut Cartridge Corp., Plainville, Conn., had intended to have the new 8mm Nambu cartridges ready for the market by late 1963. However, production problems arose, along with an increase in orders for other cartridges, and the pilot lot was not started until October, 1964; the testing of the first lot took place in November, 1964. Originally the cartridges were to have been available in boxes of 40 for \$7, loaded with a 100-gr. lead copper plated bullet to a velocity of 1040 fps. With testing completed it was apparently decided to drop the loaded cartridges and make the unprimed cases available at \$7 per 100. However, only a limited number of cases were manufactured as CCC turned to manufacturing M1 Carbine ammunition full time shortly thereafter and discontinued all other cartridge calibers.

The CCC cases were turned from brass stock and then necked down and trimmed to the Nambu shape in much the same manner as had B&E. Tool marks are faintly visible on the inside and outside of the cases. The bases are

plain—no headstamp—as on the Japanese Nambu cases. The flash holes are drilled and averaged .067-.068", using a Herter Flashhole Gauge. The flash holes of several converted 41 Long Colt cases (Remington) were also checked and found to average .082-.083", with some 38 AMU (Western) cases averaging .080-.081".

Whenever a cartridge case is not available the next step is to convert some existing case to this caliber. One such case that's been used is the 38 AMU necked down and trimmed; it produces a means of shooting the Nambu, but case life is short—sometimes only one or two loadings—because of expansion of the smaller head diameter. An even more time-consuming method involves removing a portion of the rim, turning an extractor groove, necking down and trimming regular 38 Special cases. Both of these converted cases have been sold by several custom loaders the past few years. George Spence, Box 222, Steele, Mo. 62877, has turned out over 200,000 of these altered cases since the Big Fracas ended and they function well.

Several other cases can be used for the 8mm Nambu cartridges with a fair amount of success. Included are the Remington rimless line of rifle cases—25, 30 and 32; the 38 ACP and 38 Super, the 9mm Steyr, and even the rimless Remington line of 221, 222, 223 and 222 Magnum.

The 25, 30 and 32 Remington cases must be trimmed, resized, neckreamed, and annealed to prevent split necks. This is more work than some may wish to do, but it is a way to ob-

tain shooting fodder for the Nambu and the carefully annealed cases have a reasonably long life.

The 38 ACP and Super, 9mm Steyr, and .223"-size cases are undersize more than .020" at the head and often split on the first or second firing, as do the 38 AMU and Special cases. The Steyr and .223"-size cases require trimming and resizing, but resizing is sometimes all that is necessary in the ACP and Super cases. Whether the trimming is necessary with the latter cases depends on the pistol.

Reloading dies and shellholders are available from RCBS, CH, Holly-wood, and possibly others, but there is one small catch—you won't find the 8mm Nambu cartridge listed in the various handloading manuals. Reloading data is simply not readily available—until now.

The choice of bullets for loading the 8mm Nambu cartridge is rather limited. The original military round used a jacketed bullet of .320" diameter, weighing about 100 grains. (Listed weights have varied from 98 grains to 102 grains.) Custom jacketed bullets of this size and weight have been produced in limited quantities by a few firms in the past, and it is possible that some enterprising firm might do so again. It is also possible to "bump" the 30-cal. 100-gr. plinker bullets—as sold by Hornady and Speer—up to the 8mm size; this process requires a die, such as the type used to make half-jacket bullets, or a two-piece die which can be used in a vise.

Jacketed bullets are fine, but cast bullets will do just as well at handgun velocities, and they are more economical. The Lyman 31950 design as cast weighs about 100 grains, and for a lightweight bullet the Lyman 32362 design can be used; sized to .320" the 32362 weighs around 81 grains, depending on the alloy content of the lead being used.

The 32362 bullet can be used, but it is short and stubby—too much so to feed properly in some Nambu pistols. It can be loaded so the fired case ejects, but the following round will often hang up on the feed ramp. For

#### 8mm Nambu Load Data

Case*	Powder/grs.	Bullet	M.V.†
41 LC	630P/8.0	31950	1150 fps
41 LC	230P/3.0	31950	N.C.
41 LC	N2020/3.5	31950	1050 fps
41 LC	N2020/3.3	H&G 116	950 fps
41 LC	N1010/3.0	31950	980 fps
CCC	Unique/3.8	31950	1000 fps
WCC 66	Trap 14/3.7	H&G 116	N.C.
WCC 66	B'eye/3.7	31950	1130 fps
WCC 66	B'eye/3.5	H&G 116	1050 fps
WCC 66	B'eye/4.0	32362	1225 fps

\*Once-fired cases used so that case capacity was at a maximum. WCC 66 cases were actually twice-fired, having been fired first as a 38 Special. 41 Long Colt and CCC Nambu cases were new brass before fire-forming in the Nambu chamber.

†Velocity obtained at 3½ feet.

N.C.—Not chronographed

All cases were primed with Alcan Max-Fire small pistol primers for the chronographing, although Norma, Herter, and SacMag small pistol primers were also used during the preliminary work.

All cases ejected positively from the test pistol with the loads listed in the table above. Feeding was reliable except for the last load with the 32362 bullet.



this reason work with this particular bullet was discontinued after some preliminary testing to determine that it could be used if necessary.

George Spence, Box 222, Steele, Mo. 63877, has probably loaded more 8mm Nambu cartridges than any man or factory—Japanese arsenals excepted—and he recommends the Hensley & Gibbs 116 design sized to .323". Cast and lubed this bullet weighs about 105 grains, and duplicates the original 8mm Nambu bullet in basic contours.

After consulting available handloading manuals to determine suitable powder charges for pistol cartridges of similar capacity and bullet weight, actual reloading began. (The cases had been prepared previously and all those shown in fig. 7 were used in the preliminary work.) One round at a time for each powder and bullet weight was assembled in the various cases, starting well below the charges shown in the table. Primers and cases were checked carefully after each firing. If no signs of excessive pressure were noted the powder charges were increased 0.1-gr. at a time until the cases were ejected on firing. As soon as positive case ejection was obtained, or a powder charge proved near maximum for a particular case, the charge was standardized and additional rounds were loaded for accuracy and functioning tests.

At the bench accuracy tests were conducted using a sandbag wrist rest and a two-handed grip. Three-shot groups were fired with all reloads at 25 yards. Considering the issue sights, the results were surprising, the center-of-impact was in the black for all loads listed. Group sizes averaged just over two inches center-to-center for 3 shots for the loads listed in the table; 630P, N-2020, and Bullseye gave groups of less than two inches. The smallest group,  $1\frac{1}{16}$  inches for 3 shots, was with Norma-primed 41 Long Colt cases and 3.5 grains of N-2020 pushing the 31950 bullet.

Some Spence Nambu reloads, bought earlier, were used as a standard by which to judge the performance of the new Nambu reloads. One 5-shot group of the Spence rounds went into  $1\frac{15}{16}$  inches. Out of curiosity a 10-shot rapid-fire string, consisting of two 5-shot runs, was fired. The slim Nambu barrel heats rapidly, but the 10 shots grouped in  $4\frac{5}{8}$ ", all in the black. The Spence loads consist of trimmed and sized 38 Special and 38 AMU cases of various makes—WCC, RA, Western, etc. The rims have been reduced slightly and an extractor groove turned. Primed with Remington primers, and loaded with 3.3 grains of Bullseye behind the H&G 116 bullet (105-gr.), the resulting cartridges perform as well as the original issue rounds. Checked out on a T333 Avtron chronograph the Spence reloads had an average velocity of 1018 fps at 7 feet from the Nambu pistol being



From left: Original Japanese 8mm Nambu cartridge, reload using trimmed and sized 41 Long Colt case and Lyman 31950 bullet; original B&E 8mm Nambu cartridge produced in Minneapolis, and a reload based on the 38 Special SR case, with an H&G 116 bullet.



From left: The H&G 116, Lyman 31950 and Lyman 32362 bullets; a reloaded 8mm Nambu cartridge made from the 41 Long Colt case.

used.

The loading and firing of several hundred rounds has led to some definite conclusions. As previously mentioned some of the undersized cases tend to split on firing. Every case from one lot of Western 38 Special SR (AMU) cases split on the first firing in the Nambu. The split started at the shoulder and varied in length from approximately  $\frac{1}{8}$ " clear to the base, depending on the powder and charge being used. Yet from a lot of WCC 66 regular 38 Special cases not one split occurred through 5 reloads. Feeding and functioning were satisfactory with the 31950 and H&G bullets when used in the 38 Special cases. Ejection was positive with the loads listed in the table, and spent cases landed within two-three feet of the firing point.

223 cases won't feed well from the magazine the first time, and often they won't even stay in the magazine unless the lips have been bent in slightly. After fire-forming the case will have expanded enough to be retained by the magazine lips (usually) and will then chamber satisfactorily; ejection, though, is not always 100% because of

the smaller rim diameter. Case life varied with the 223, but splits did not often occur on the first firing with the lot of Rem-UMC cases used.

Not enough firing was done with the 9mm Steyr cases to determine case life. But feeding and functioning were satisfactory, at least in the test pistol. However, this is a last resort reload; it doesn't require much alteration but 38 Special cases are much more plentiful and much easier to reload versus the Steyr's Berdan-type primer pocket.

Turned CCC cases are not plentiful, but for anyone having a few they feed and chamber perfectly, and they do have Boxer-type primer pockets. Case life depends on the load used and the N-1010 load listed caused case separation on the first shot in nearly half the cases. The separation always occurred where the thinner walls tapered into the thicker brass of the base section, and at 7¢ or more a case, this is rather expensive. With different powders—such as Unique—case life is almost infinite.

As long as they can be obtained the altered 41 Long Colt cases produce the best 8mm Nambu cartridges. Case life is long—something beyond 8 reloads each—reloading is easy, and functioning is almost perfect. Dimensions approximate those of the original Nambu closely and, except for the stab crimp marks of the original and the absence of a headstamp, it's hard to tell the cases apart if viewed from the outside. (The original Nambu cartridge has a Berdan primer pocket and the difference is readily noted from inside the case.)

The reloads should be crimped rather heavily. Recoil of the Nambu is mild, but the case neck is short and so is the bearing surface of the bullet. Over-all length of the loaded round should not exceed 1.24" if it is to feed through the magazine; otherwise there will be problems.

Loading for the 8mm Nambu pistol is not difficult. If you don't want to form your own cases, a box or two of the Spence reloads will provide some shooting ammo in a hurry and the fired cases will provide a supply of ready-formed cases for reloading. Why not give it a try? Instead of letting that souvenir hang on the wall get some fun out of it.



From left: Original Japanese 8mm Nambu cartridge; 41 Long Colt case trimmed and sized; CCC 8mm Nambu case; 9mm Steyr case; 223; Western 38 Special SR case (note split at shoulder); WCC 66 38 Special case and an 8mm Nambu reloaded cartridge based on the Western SR case. All cases shown above have been trimmed, sized, loaded and once-fired in the Nambu pistol. Note that most of the cases have bulged to fill the larger Nambu chamber.



# Norma's

WHEN NORMA 205 powder first appeared on the market, one of the advertising captions read, "The Norma Man says 205 powder makes Magnums move." For some time I had been wondering if this powder would improve velocities in rimless cases.

A practical test seemed to be the only solution, and the first trials were made in a 30-06. The rifle, a late Model 70 Winchester with 22" barrel, has considerable throat wear. The bullets used were Remington 180-gr. Bronze Points, the primers Winchester 120s. All velocity figures were taken at 15 feet instrumental distance.

Case	Charge/grs.	MV
LC65	62/N205	2732
LC67	62/N205	2755
LC67	62/N205	2762
LC67	62/N205	2747
LC67	62/N205	2755

This is a rather impressive uniformity, and velocity is unusually high from a 22" barrel. Pressure seemed OK, but in a 5-groove 1917 Enfield 58/N205 or 52/4350 were maximum with the Sierra 180-gr. Match King bullet.

For comparison, here are three of the M70 rifle loads using the same Remington 180-gr. bullets and 120 primers.

Cases	Charge/grs.	MV
LC43	54/4350	2506
LC65	57/4350	2632
FA58 (Match)	57/4350	2660

Pressure of the 57-gr. load was apparently very slightly lower than the 62-gr. charge of 205 showed.

Four LC67 cases were again reloaded with 180-gr. Remington Bronze Points and Winchester 120 primers. The rifle used was the same M70 in 30-06. This time the chronograph read:



Bullets used in the author's testing. From left—168-gr. Hornady .308" Match ● 140-gr. Speer .264" ● 160-gr. Speer .284" ● 180-gr. Barnes .284" (with late type point) ● Same as last, with old style point ● 250-gr. Barnes .333" ● 300-gr. Barnes .333".

Case	Charge/grs.	MV
LC67	61/N205	2660
LC67	61/N205	2732
LC67	61/N205	2695
LC67	61/N205	2667

Pressure appeared to be substantially lower than with 62/N205. Weighing the cases revealed that the one giving 2732 fps was about 3 grains heavier than the average of the other three.

At the time I didn't realize it, but these figures revealed two characteristics of N205 that were to be very evident in later testing:

N205 powder is highly sensitive to case-weight variations.

N205 powder is harder to ignite when loading density exceeds a certain value.

Both factors can be used to counteract each other and to produce quite uniform velocities. This, I

think, is what happened in the 62-gr. test, but this means a narrow loading range and the pressures developed may be different from those desired.

Since N205 is primarily a powder for use with heavy bullets, I decided to test it in two wildcat rifles I own, both chambering cartridges based on the 30-06 case. One is a 333 OKH—the case simply necked up, with no change in shoulder angle or body—with 27" barrel, using .333" diameter bullets of 250- and 300-gr. weight. The other wildcat is a 285 OKH or 7mm/06, to use its more common designation. Again this is merely the case necked to take .284" bullets with no other changes. I use Winchester or Western cases in the 333 and GI cases in the 285.

Results in the 333 OKH with the 300-gr. Barnes Spitzer bullet were impressive. 60 grains of N205 and



# 205 Powder

by RALPH AVERY

Federal 210 primers gave an instrumental velocity (at 15 feet) of 2325 fps for 5 rounds, and the velocity variation was 27 fs. This is 60 to 70 fs over what 54/4350 will do at about the same apparent pressure.

Using the 250-gr. Barnes Spitzers in the 333 was frustrating. Charges from 64- to 67 grains were tested, but any over 64 grains gave erratic results. Primers included Win. 120, Fed. 215 and CCI 250. Uniformity of velocity was rare. Some loads varied 100 fs for 5 shots, and there was severe non-uniformity of pressure symptoms. Loads in the 66/67-gr. bracket are potentially dangerous because of erratic pressures. Some shots gave over 2700 fs, but at 64/64½ grains speeds ranged from 2580 to 2600 average. Velocity variations ran about 50 fs for 5 shots. CCI 250 and Win. 120 primers gave about the same results, but Fed. 215s were erratic. A check test using 61/4350 and Win. 120 primers gave 4 shots registering 2618 fps, with one shot of 2611, pressure signs normal. This is typical performance with 4350 in this rifle.

My analysis of N205 in this 333 OKH is that the loading density is too high for uniform ignition when the 250-gr. bullet is used at normal velocities. This theory was pretty well borne out when the 7mm/06 tests were completed, during which variation was usually 20 to 40 fs for 5 shots. With the 180-gr. Barnes SP bullet, 56/N205 produced 2790 fs with easy pressures. 57/N205 in cases weighing 200 grains gave 2837 at OK pressures. (With the old style 180-gr. Barnes bullet this 57/N205 gave signs of pressure in the summer.) The same charge in 204-gr. cases gave 2873 fs and stiff pressures. I would not try to exceed 2850 fs in this rifle using the

180-gr. Barnes .284" bullet. 54/4350 gave 2809 fs, and this is really all the 4350 you want. My impression is that N205 will give 50 to 75 fs more velocity than 4350 in the 7mm/06 at comparable pressures when using the 180-gr. Barnes bullets.

The Hornady 175-gr. RN bullet was tested with 55/N205 and 2753 fps resulted with easy pressures. 58/N205 back of the 154-gr. Hornady Spire Point recorded 2967 fps, while 59 grains pushed speeds to 3030 at normal pressures. The 160-gr. Sierra produced 3050 fps with the same charge, and pressures appeared safe. 4350 and the 160-gr. Sierra generally peaked at 2950 from the 26" barrel of this 7mm/06.

At this charge level in the 7mm/06 loading density of N205 is in the easy-to-ignite area, and velocity uniformity is excellent.



From left—30-06 GI case holds armor-piercing bullet ● 333 OKH case with Barnes 250-gr. bullet ● 333 OKH case with Barnes 300-gr. load.

Tests in a 1937 8x57 Mauser with 250-gr. Barnes bullets and 55 grains of N205 gave the highest velocity recorded and also the most uniform velocity. The average speed was 2335 fps. 54 and 56 grains of N205 produced lower speeds and more variations in velocity. 52/4350 in the same 8x57 pushed the 250-gr. Barnes to 2250. These 8mm tests used W-W brass and 120 primers. Pressures with 55/N205 and the 250-gr. Barnes bullet were relatively mild, but recoil in this military stocked 8mm is not mild at the shoulder!

In discussing these results with Evan Sheldon of Norma-Precision he stressed a point that is obvious to seasoned handloaders, but one which may escape the novice—N205 is *not* suitable for every cartridge or bullet. While N205 will drive extremely long bullets to unusually high velocities in almost any cartridge where 4350 or 4831 is a good propellant, it is also possible to cram too much N205 in a case, the result being erratic velocities and pressures. This is just what I did with 64 to 67/N205 in the 333 and 56/N205 in the 8x57. Norma also cautions against using too light a load of N205 because of the potential erratic-pressure danger.

In summary, N205 will find its greatest usefulness in rimless cases—and those that are necked down rather than up—when matched with bullets that are at the top of the weight range for that diameter. You may decide that you don't need a magnum at all after you test your N205 loads, for this excellent powder will also make non-magnums move. N205 is a good powder, though a neglected one, so if you want to discover those performance levels you used to think about with awe, try some. ●



# Remington

## PLASTIC WAD DATA

There are a great many plastic shot containers available to the shotshell reloader. So many are offered that making an intelligent choice or exploring the usefulness of one or another in advance is difficult because of a lack of descriptive and dimensional data. Remington Arms Company supplies quite an array of plastic shot

holders—more so than anyone else, we believe. The specimens pictured are all made by Remington-Peters, all are shown life size and pertinent data given.

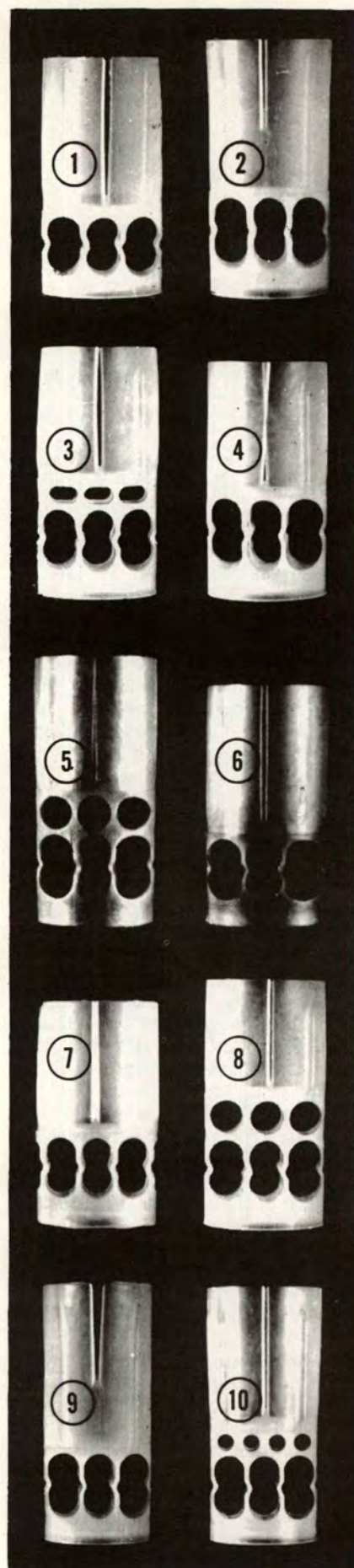
We hope this information will help our readers to make a more informed, useful selection.

No.	Index No.	Gauge	Shot	Color	Case
1	W29926	12	1¼	White	Plastic field (3¼ dr.)
2	W29928	12	1¼	White	Plastic field (3¾ dr.)
3	W29924	12	1½	White	Plastic field
4	W23694	12	1½	White	Plastic target
5	W29930	12	1½	Green	WW AA plastic target
6	W23618	12	1½	Green	Plastic target (Post Wad)
7	W23676	12	1½	Lt. green	Paper target
8	W29922	12	1	White	Plastic field
9	W29934	16	1½	Lt. blue	Plastic field
10	W29932	16	1	White	Plastic field
11	W29944	20	1	White	Plastic field
12	W23678	20	1	Yellow	Plastic target
13	W29942	20	7/8	White	Plastic field
14	W23680	28	¾	White	Plastic target
15	W23668	410	½	White	All plastic Skeet 2½"

Remington's 1972 Components catalog does not show Index Nos. W23618 or W23676 (our numbers 6 and 7 above), but a new 410 plastic wad is listed, its Index No. W23670, for use in 3" plastic shells.

Cases indicated for field loads have low-base wads (or more powder capacity), target cases have high base wads or less powder room.

With one exception (the WW-AA case) all cases listed are of Remington make. However, these Remington wads may be used with other cases—paper or plastic—after determination of wad/case dimensions and powder/shot capacity.





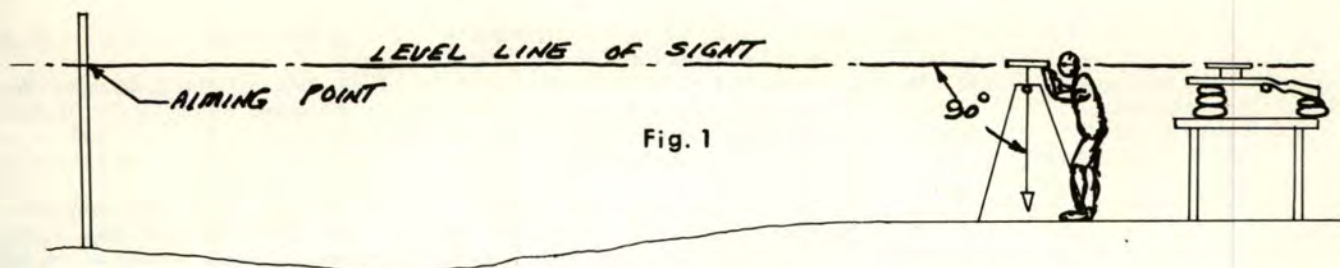


Fig. 1

# Trajectory Chronograph

by PEYTON AUTRY

Here is an interesting and intriguing method for determining velocities out to 400 yards that is at once simple and difficult! You'll need a transit, up to 1200 feet of range facility and a target about 6 feet deep!

OVER THE PAST few centuries ballisticians have needed to know the velocity of projectiles by actual test. There are two commonly known methods of testing for velocity. The first is the ballistic pendulum, first devised by an artillery officer by the name of Benjamin Robins in 1742.\* Velocity was determined by firing the projectile against the "bob" of a pendulum and measuring its deflection or swing. The pendulum was used in the early days before more refined methods based on electrical circuits came into use—known today as the electronic chronograph. An accurate electronic chronograph can be purchased or built today for a nominal sum. Many amateurs use them extensively.

However, for the rugged individual who likes to try out new things there

is a third method of testing for velocity. All you need is the fundamental equipment of the ordinary bench rest shooter, plus a few ordinary odds and ends. You need a bench rest, sand bags or other rests for your rifle, a large target screen of heavy paper or fiber board, a short measuring scale, a tape measure, any kind of construction level for projecting level lines, and a firing range as long as possible. If a flat range is not available, shooting downhill or from one hillside to another is even better, using a horizontal line of sight. In this way you can use a long upright target screen with sighting bull at top and plenty of room at the bottom for the bullet drop—since the bore axis must be as horizontal as possible. Another thing which you need is a scoped rifle which is as accurate as possible. A target rifle and target scope is best, but a

good sporter and hunting scope will do the job. You also need some graph paper, pencil and a shallow draftsman's curve.

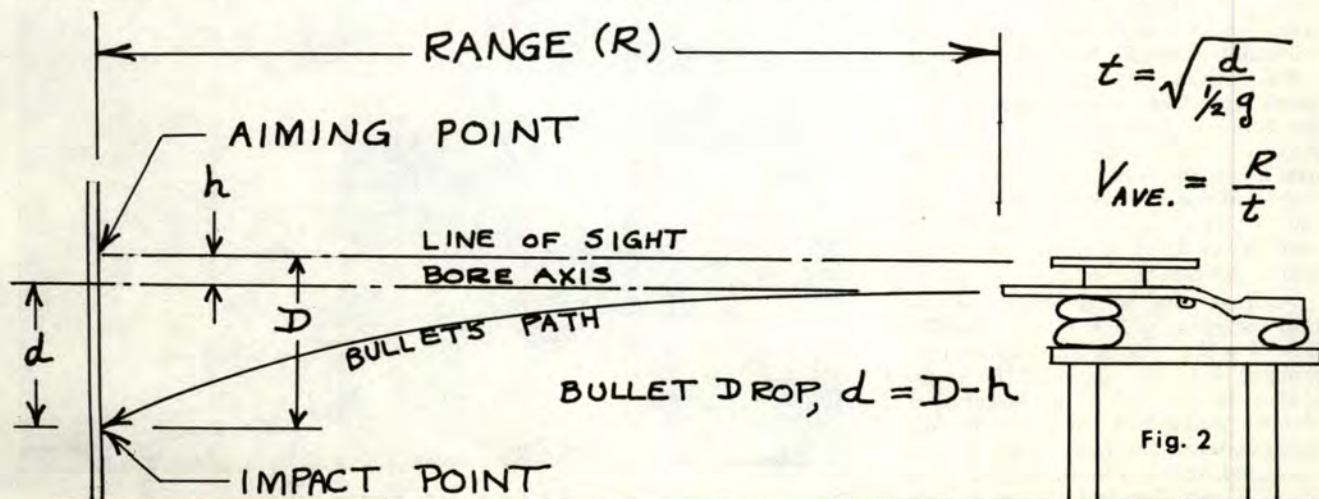
This method is very simple. For want of a better name it is dubbed the *trajectory chronograph*—for that's what it really is—a technique for finding the velocity by measuring the bullet's drop at the target. It is based on measuring the true drop of the bullet from the muzzle to target over a given range which can be used ultimately to get the velocity. The steps in the method follow:

1. Measure the true drop of the bullet below the muzzle (bore axis horizontal).
2. The time of the bullet drop is determined by the following:

$$t = \sqrt{\frac{d}{\frac{1}{2}g}}$$

$$t = \sqrt{\frac{d}{\frac{1}{2}g}}$$

$$V_{AVE.} = \frac{R}{t}$$



\*See his *New Principles of Gunnery*, London, 1742 and later eds.



where  $g$  equals the acceleration of gravity (32.2 ft./sec./sec.),  $t$  the time in seconds and  $d$  the drop in feet.

3. Knowing the time, the average velocity over the range  $R$  is

$$V \text{ ave. (feet per second)} = \frac{R}{t}$$

4. The average velocity then occurs at about mid-range.
5. At least three different distances are tested to get three mid-range velocities. Four or five would be even better. These figures are plotted on graph paper to get the velocity decrease with range. This line is then extended or "extrapolated" back to zero range to get the muzzle velocity.

A graph (fig. 3) has been plotted to simplify the procedure for the reader, so that no actual calculations need be made. So, one of the "tools" the reader will need is a copy of this article.

Let us take an example case and exercise it to illustrate how the system works. Let's suppose we are going to test a standard 30-06 load having a 180-gr. bullet.

The first thing needed is to determine exactly the distance between the scope center and the bore center of the barrel so that an allowance can be made for it when measuring bullet drop at the target. See dimension  $h$  on fig. 2. Do this as accurately as you can. Here's one way: Let's say your scope has a 1-inch tube, your rifle barrel is of 1-inch diameter, while the distance between the barrel and mounted scope is unknown. Using a caliper if handy, find the measurement from top of the scope tube to the bottom of the barrel. If this is 3 inches, then the bore axis/scope axis separation is 2 inches ( $\frac{1}{2}$ -inch or half of scope diameter plus  $\frac{1}{2}$ -inch, half of barrel diameter, subtracted from 3 inches). Clear? The next step is to adjust your scope so that the bore axis and the scope axis (line of sight) are parallel (see fig. 2). This can be done with the aid of one of the "bore scope" or collimation instruments commercially available for bore sighting rifles. Adjust the bore axis and the scope cross-hair on the target so that the bore axis centers below the cross-hairs a distance equal to that of scope axis above the bore center. In the example above this would be two (2) inches. This should be checked at each range firing to make sure it remains the same.

Another—and better—means of getting the scope and bore axis parallel is to fire the rifle at  $12\frac{1}{2}$  yards ( $\frac{1}{8}$ -minute) until the center of the group strikes directly below the target at a distance equal to  $h$  (fig. 2). Over this short distance the bullet drop can be neglected, but if you want exactness, allow  $\frac{1}{8}$ -inch for bullet drop at this

range. This method automatically takes into account the flip or vibration inherent in virtually all barrels, be it positive (upward) or negative.

The target screen should be set up so that the bore axis be as level as possible when the rifle is fired. To do this very accurately, use an ordinary construction level or a transit at the rifle position, locating the aiming point on the target screen so that it is dead level with the rifle muzzle (see fig. 1). These instruments can usually be rented at low cost, or one can be bought from Sears or Wards for a modest amount. Have the target screen long enough to "catch" bullets well below the aiming point. This may mean you will want to shoot downhill or from one hill to the next—or elevate the bench rest. You will need room for up to 5 feet of drop for 400-yard shooting for a 30-06. Lower

velocity loads will require more drop room.

Now, let's test the 30-06 load. We have measured scope height, finding it 2 inches above the bore, and we've adjusted it parallel to the bore axis as previously described.

Let us plan to run the drop tests at 100, 200, 300 and 400 yards. This means having targets set up for each range and level with the firing point, as in fig. 1. Five shots should be fired for each range and the drop  $d$  measured for each. The average of these 5 shots is then used as the selected drop for each range (total the 5 drop measurements and divide by 5). For a more exact determination of drop center, draw a line horizontally through the lowest bullet hole, then measure from that point to the other 4 holes. Now add these figures and divide by 5. Needless to say, your

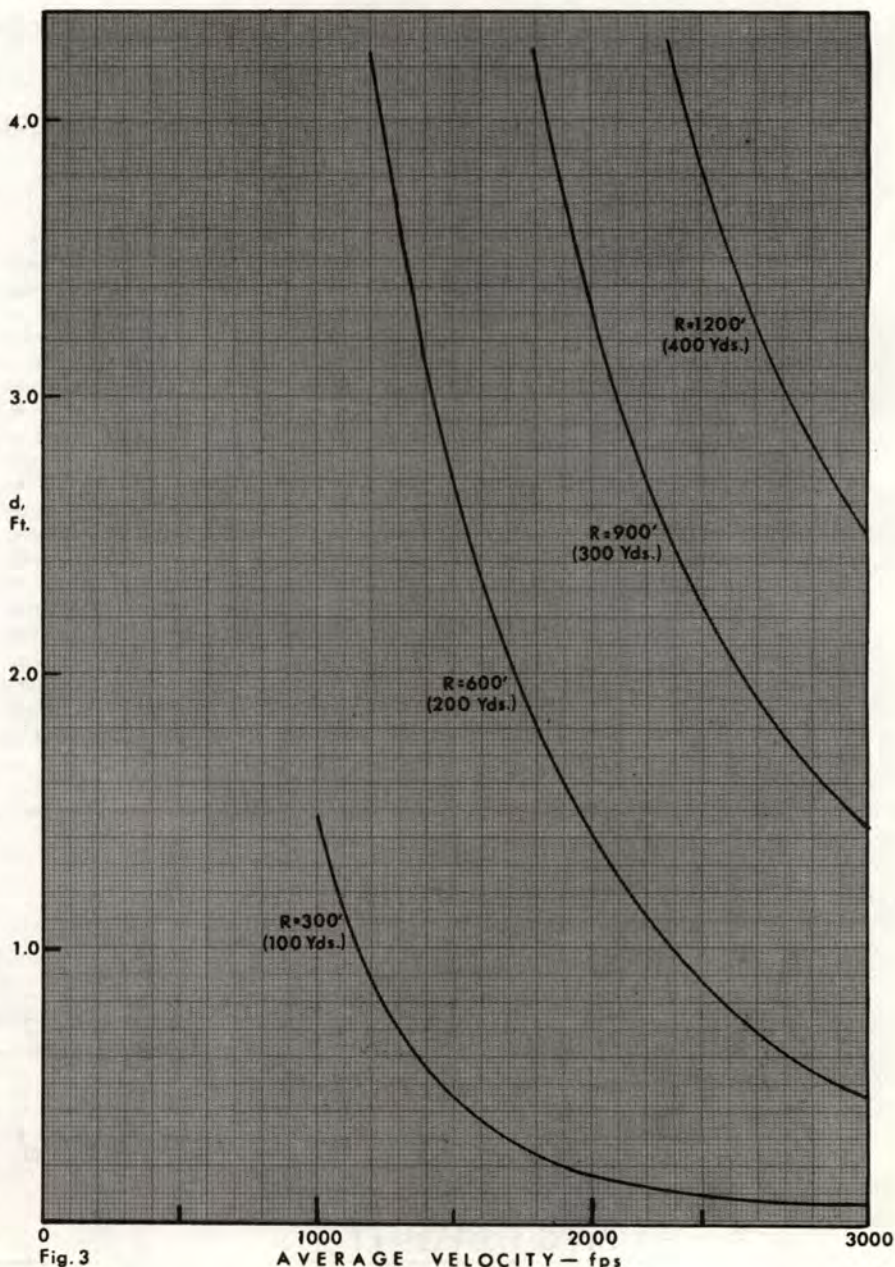


Fig. 3



ammunition should be loaded as accurately as possible.

Let us take the 100 yard range as an example:

The total drop  $D$  is found to average 3.2 inches (let's assume) out of the 5 shots. The net or "true" drop,  $d$ , is then 1.2 inches since  $h$  is 2.0 inches. Fig. 3 then allows you to find the average velocity for a given drop,  $d$ , at various ranges. The drop of 1.2 inches is .10-foot (divide 1.2 by 12). On fig. 3 this coincides at 100 yards (300 feet) with an average velocity of 2585 fps. Now plot this velocity on fig. 4 at the mid-range point of 50 yards. These results are then recorded, as in Table I. Set this table up so that entries can also be made for other ranges you are going to test. In this way you can keep your data straight in a "bookkeeping" form.

We now test our 30-06 at 200 yards

for 5 shots and find they average a total drop,  $D$ , of 11.6 inches or a true drop,  $d$ , of 9.6 inches again allowing for the scope height of 2.0 inches. This amounts to .80-ft. which on fig. 3 gives an average velocity over 200 yards of 2480 fps. The mid-range of 200 yards is 100 yards so we go to fig. 4 again and plot this average velocity at 100 yards. Again the data should be recorded in Table I.

Next, we fire 5 shots at 300 yards and find the average is a total drop,  $D$ , of 29.6 inches or a true drop,  $d$ , of 27.6 inches or 2.30 feet. On fig. 3 again the average velocity is 2375 fps. The mid-range at which the average velocity occurs is, of course, 150 yards and the velocity is again plotted on fig. 4. Record the data as in Table I as you go along with the tests.

Finally, in our example, we fire 5 shots at 400 yards which average a

total drop of 53 inches, a true drop of 51 inches with an average velocity of 2275 fps. which is plotted on fig. 4 at a mid-range of 200 yards.

We now have 4 test points on fig. 4, revealing the velocity of our 30-06 load between ranges of 50 and 200 yds. A solid line, or "curve," may be drawn through these points, as in fig. 4. This curve, always very shallow, is almost a straight line, so it's an easy matter to simply extend this curve to the left to get the estimated muzzle velocity at zero range. In our 30-06 example this turns out to be 2700 fps. The curve may also be extended out to longer ranges to get velocities out to about 400 yds. These extensions, or extrapolations, are shown by the dotted segments of the curve on fig. 4.

The "trajectory chronograph" is fantastically simple for the handloader-experimenter type of shooter who likes to tinker with scopes, targets and handloads—and who loves to work outdoors. There is no mystic ballistic data furnished or intended in this article—just remember that you do two basic things:

Measure actual bullet drop of the load you are testing.

Use this article to find the velocity that coincides with that bullet drop, and, by getting several drops at various ranges and their average velocities, by simple deduction you can estimate the muzzle velocity.

That's fundamentally all there is to it. Period, end of report. ●

Table I

Range/ft.	Range/yds.	h/in.	D/in.	d/in.	d/ft.	V*	M-R/yds.
300	100	2.0	3.2	1.2	.10	2585	50
600	200	2.0	11.6	9.6	.80	2480	100
900	300	2.0	29.6	27.6	2.30	2375	150
1200	400	2.0	53.0	51.0	4.25	2275	200

\*V — average velocity in feet per second

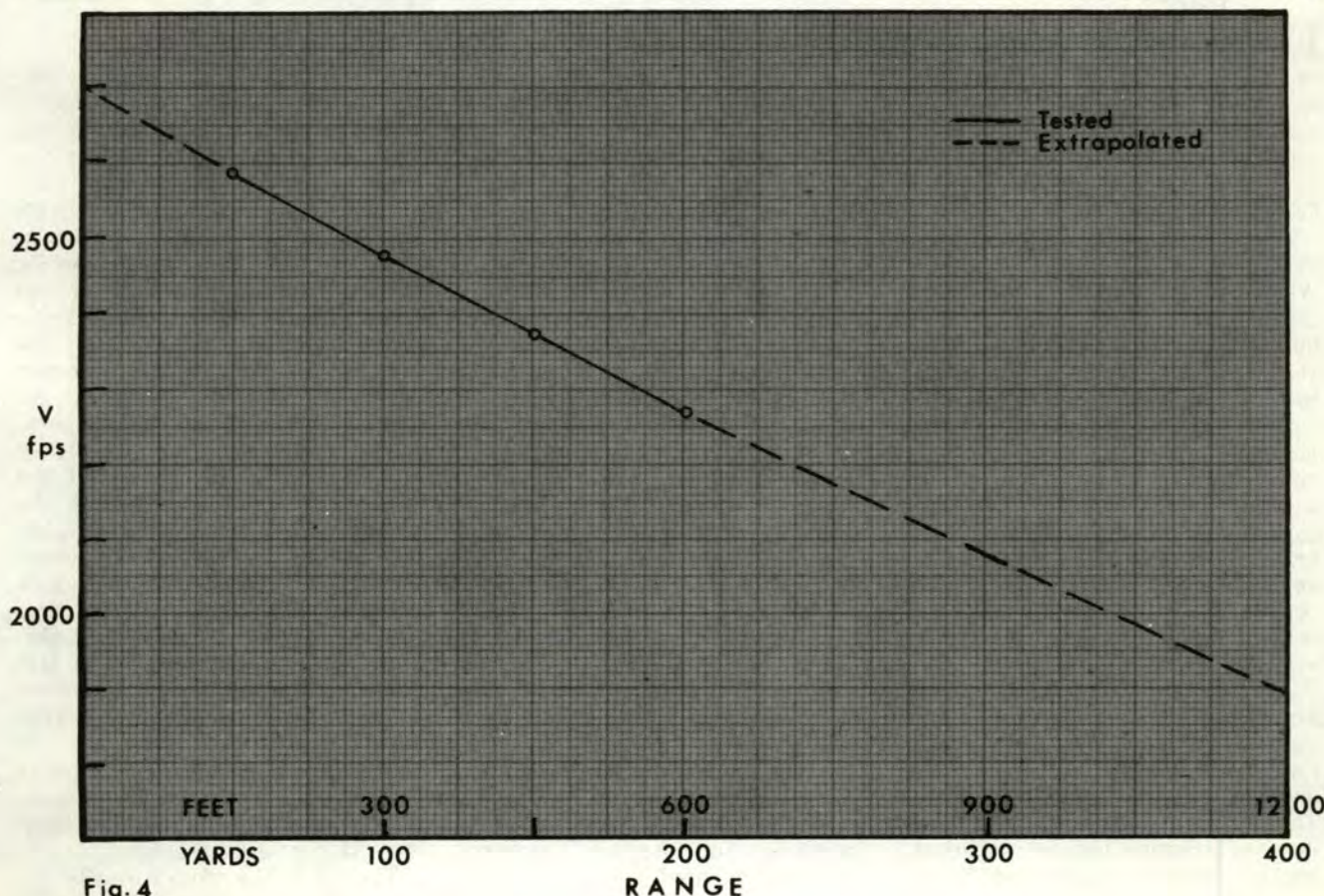


Fig. 4



# Reloading

## the

by



While field-testing the Weatherby 30-06 Vanguard rifle, Lachuk took this fine trophy "Silvertip" goat on Catalina Island, the range about 250 yards.

EVERYBODY owns at least *one* 30-06... don't they? Currently, I have four. Over the years, a dozen commercial '06 rifles have passed through my hands, plus as many more assorted Springfields and Enfields that I converted to sporters.

The 30-06 is America's most popular cartridge; it all began after World War I, and it continues to this day. A recent survey of deer hunters in Idaho showed 53% armed with 30-06s, outnumbering the runner-up cartridge two to one.

Skeptics may attribute this popularity solely to easy access to military rifles suitable for conversion to sporters, also wide availability of GI ammo and once-fired brass. Doubtless these factors had an influence, but the venerable "ought-six" has other, more valid reasons for its continued popularity at some 65 years of age.

Actually, the 30-06 is not as old as its chronological years might indicate. Allegedly senile and ready for the scrap heap, it is really entering its second childhood. Those Swiss doctors can do wonders, as Aristotle Onassis can attest, but the science of geriatrics is not

entirely unknown in the U.S. of A. Ammunition components makers here have been periodically injecting youth hormones into the aged '06, by way of new powders and primers, and bullets of improved shape and construction. Latest updating procedure was the introduction by various makers of 165-gr. expanding bullets, best all-round weight for the '06 case capacity.

That '06 case hasn't gained a single millimeter around the waist line, but fed modern propellants, it spews out those new jacketed pills with ever more enthusiasm. Even factory ammo has been subject to increased velocity from time to time, as older rifles that were suspected, rightly or not, of inherent weakness, were retired from the hunting scene.

Improved rifle actions have played an important role in re-energizing the aging '06. Latest addition to my 30-06 battery is a glittering new Weatherby Mark V. (Thereby hangs another reason for '06 popularity, simple *nostalgia*. I have more than my share of booming magnums, including a Weatherby 300, but I wanted the finest 30-06 I

could buy, to satisfy a decades-old promise that I made to myself.) Getting back to my point: the Mark V action easily digests loads that boost pressures from the present average of 50,000 psi to 54,000 psi, allowing increased velocity without added case capacity.

### Types of Rifles

As for rifle styles, name your preference. The '06 is available in action types from semi-auto to single shot. Every commercial gunmaker in the U.S., plus some abroad, chambers rifles for the '06; not out of sentiment, but because business remains brisk! Meanwhile, some "modern" cartridges that postdated the '06 have been quietly dropped by the riflemakers. Just try to buy a new factory-chambered 22 Hornet, 218 Bee, 219 Zipper, 220 Swift or 257 Roberts.

The 30-06 has a record of proven accuracy. It had the 1000-yard Wimbledon match sewed up for years on end. True, it's been lately edged out by various magnums, but only by two or three points. Granted—rifles are highly individualistic; I've had '06s that wouldn't stay on a coffee can lid at 100 yards, and others that put 10 shots under a silver dollar, but the average was all to the good. My current quartet all show X-ring potential, including the DCM as-issue, 2-groove Springfield that I'm keeping GI for *auld lang syne*.

The '06 is the most versatile, the



# the 30-06

## whys and the hows

JOHN LACHUK

**65 years old—or young—the ever-popular 30-06 is now eligible for retirement and Social Security. That's a step years away, though—the venerable and venerated ought-six will be with us far into the future, thanks be.**

best all-round cartridge yet developed. It may not make the best vermin round, yet it skewers squirrels neatly out to 200 yards with 110-gr. hollow points. It would not be my choice for stalking elephants, but Jack O'Connor—who's shot an elephant or two—once told me that he'd hunt all of Africa with the '06, without a qualm. W. D. M. "Karamojo" Bell killed over 1000 elephants with naught but a 7mm Mauser, a lesser cartridge than the still vigorous '06. Above all, the '06 excels in the middle

range of big game hunting. No animal walks the American continent that can't be taken with an '06.

As an added asset, recoil from the 30-06, even in modern lightweight rifles, is far from fierce, and shouldn't intimidate the tenderest torso.

To the reloader, the 30-06 offers unlimited flexibility. You can take all sorts of liberties with the untemperamental '06, and it chugs along unperturbed. The '06 case readily adapts to a wide spectrum

of powder burning rates, from Hercules 2400 to Hodgdon's 4831, and it handles any of the myriad 30-caliber bullets, small and tall, offered by modern bullet manufacturers. The game to be hunted dictates bullet weight and style, which in turn determines the required powder burning rate.

### Light Loads

My favorite squirrel loads are either 24 grains of 4227 or 22 grains of 2400, with Speer's 100-gr. half-jacketed "Plinkers." These chronograph 2165 fps and 2135 fps,

Two witnessed groups fired by Ferris Pindell at 100 yards from a 30-06 benchrest rifle, using Sierra bullets.





respectively. Speer's excellent *Re-loading Manual #7* lists much faster loads, but I find that accuracy deteriorates as velocity rises above 2200 fps. My Weatherby groups 5 of these medium velocity loads inside two inches at 100 yards consistently, with some groups near an inch. Out to 125 yards, the "Plinkers" bomb squirrels, chucks, rabbits, et al, almost as convincingly as a 220 Swift.

You can double your reach and really toss squirrels and chucks into lofty cartwheels, by raising bullet weight 10 grains, with Sierra hollow points, ahead of 53 grains of 3031, for about 3400 fps. This load is safer than a lot of others in rural areas because it disintegrates on contact rather than ricocheting through some farmer's window.

The 130-gr. Hornady Spire Point, loaded to 3300 fps with 55.3 grains of 4064, makes the '06 into an excellent killer of the bigger predators. Bobcats, coyotes and badgers give up to this combination without a whimper. Another explosive predator killer is the Speer 150-gr. flat point. Designed for 30-30 velocities (about 2400 fps), the relatively thin-jacketed slug literally blows up on contact, when accelerated to 3043 fps by 58 grains of Hodgdon's H-414.

Seekers after antelope meat and horns could do worse than load Norma's novel 130-gr. boat-tailed soft point, driven at 3280 fps by 57.5 grains of N-203. Sighted in at 200 yards, it rises just over an inch mid-range, drops just about 6 in-



Bottom is author's latest and finest 30-06, a Mark V Weatherby, stocked in finely figured walnut, with Redfield 4x scope in streamlined Conetrol bridge-style mount. Above is Weatherby's latest offering, the Vanguard rifle, offered first in 30-06 caliber. This rifle, a prototype tested by the author, has a new Weatherby variable scope, 3x-9x.



Three of the author's 30-06 rifles. Top is GI Springfield 1903-A3, as issued, with two groove barrel, and highly accurate! Middle is custom '06 on a Savage 110 action, the Apex match grade barrel and stock by Paul Wright, the scope a Leupold Vari-X II 2x-7x. Bottom is Savage 110-LH, with Leupold 4x scope in Leupold Detacho mount.

### 30-06 Loads—Vermin & Predators

Bullet	Powder/grs.	MV/fps	Pressure
Speer Plinker 100 gr.	4759/22	2294	
Sierra HP 110 gr.	BL-C(2)/56	3349	49,000
Sierra Spitzer 125 gr.	H-335/56	3300	49,000
Hornady Sp Pt 130 gr.	3031/52	3300	Maximum
same	H-380/58.9	3300	Maximum
Norma Se Pt SP BT 130 gr.	N-203/57.5	3280	47,000
Speer HP 130 gr.	4320/57	3234	Maximum
Speer FN 150 gr.	H-414/58	3043	Maximum

SP = Soft Point  
Sp Pt = Spire Point  
Se Pt = Semi Pointed

BN = Blunt Nose  
HP = Hollow Point  
BT = Boat-tail

FN = Flat Nose  
RN = Round Nose

ches at 300 yards. Retained velocity at 300 yards is still 2338 fps, energy 1578 foot pounds, more than Norma's 150-gr. soft point boat-tail at the same range. Norma quotes breech pressure at a modest 47,000 psi, indicating that a cautious increase in the load might be feasible.

Any of the fine 125- to 130-gr. bullets offered by Hornady, Norma, Sierra or Speer, put down thin-skinned game such as antelope, deer, sheep and goats, at medium ranges, with a suddenness that leaves you blinking. Mind you, these are not for bucking brush, and extreme range is necessarily circumscribed with these short, light bullets, sacrificed in deference to high initial velocity. Beyond 300 to 350 yards, they tend to fall off rather rapidly in both velocity and accuracy, and are wont to follow any fretful breeze that beckons,



victims of their own poor ballistic coefficient.

Ballistic coefficient? That's a value indicating a bullet's ability to overcome air resistance, arrived at by combining its sectional density (the ratio of the bullet's weight in pounds to the square of its diameter), with its coefficient of form. Given the same diameter, a heavy bullet retains velocity better than a light bullet, unless the heavy one happens to be blunt and the light one sharp pointed. A tapered base, or boat-tail, also contributes to velocity retention.

#### 150/165—Grain Bullets

Perhaps the best bullet weight for deer hunting is 150 grains. Ballistic coefficient for 30-caliber 150-gr. sharp-pointed bullets is markedly superior to 130-gr. slugs—.359 compared to .292 for Hornady Spire Points, .387 for Speer's spitzer opposed to .281 for their 130-gr. hollow point. I've shot several Utah mulies with Sierra 150-gr. soft points, ahead of 53/H-4895, for 3050 fps, and seen them drop like sash weights. One, crossing at a dead run was not lead enough. My shot hit behind the diaphragm, and the buck still dropped without

a quiver. Once I was forced to shoot through a rather thick bush. The bullet deflected downward, hitting the buck low in the chest as it faced me, making an entrance wound that would hold a derby hat. That deer never heard the shot that killed it!

Bullets of 165 grains now offered by Hornady, Sierra and Speer, represent the optimum all-round bullet weight for the '06. Ballistic coefficient for Hornady's 165-gr. Spire Point is .382. Loaded to 2900 fps, it retains better than 75% of its initial velocity at 300 yards, shading the 150-gr. by one percentage point. Hornady's 130-gr. SP sheds almost 30% of its fps by 300 yards, the 110-grain a full 33%.

In my experience 180-gr. bullets are too heavy in the '06 for deer-sized animals. They usually punch through and waste too much energy on thin air beyond the game. They lack the shock effect of lighter bullets, at higher velocity.'

Some of the reason can be read in the energy tables. Energy increases roughly with the square of velocity, but is directly proportional to bullet weight, throwing the advantage to increased velocity as opposed to added bullet weight.

Muzzle energy for the loads cited above are as follows: 110-gr. bullet at 3400 fps, 2818 foot pounds; 130-gr. at 3300 fps, 3138 ft. lbs.; 150-gr. at 3100, 3194; 165-gr. at 2900, 3081; and 180-gr. bullet at 2700 fps, 2914 ft. lbs.

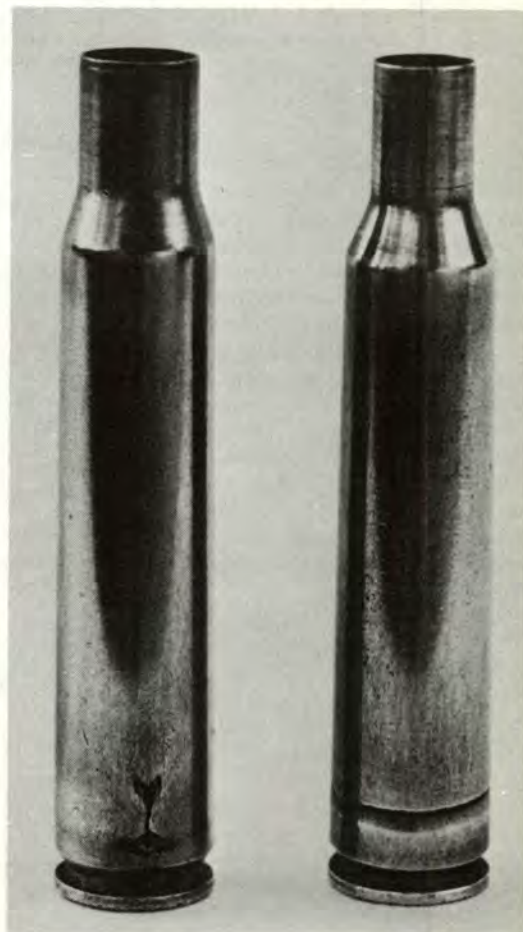
The edge appears to go to the 150-gr. slug, which sustains my own observations in the field. But energy figures alone don't explain the grenade-like explosiveness of light bullets at high velocity. I believe that such shorter bullets are over-stabilized by the normal 1 in 10 rifling twist of the 30-06, causing the relatively tender slugs to rupture suddenly, with the resultant "buzz saw" effect that shocks the animal's nervous system into oblivion, for quick, humane kills.

When someone talks to me of meat loss with high velocity loads, I point out that a 20% loss from ruining an entire shoulder can't compare with losing 100% because the deer runs off to die in vain.

I touted the '06 as the "do anything" cartridge. Well, it's just that! Loaded with Speer 200-gr. Spitzers at 2756 fps (from 63 grains of 4350), it's capable of downing Alaskan brownies or polar bears. Load-

The 30-06 is a high intensity cartridge. Don't let familiarity breed contempt. At left is a case split at the base and another nearly separated at the head.

The '06 and some of its more prominent competitors. Left to right: 7.62 NATO G1 round, 308 Winchester, 270 Winchester, 30-06, 300 Winchester Magnum.





ed with Hornady 220-gr. round nose soft points for 2600 fps ahead of 56.6 grains of 4831, it can handle African game of imposing bulk and bad temper. Topped with the Barnes 250-gr. soft point or solid, the '06 is capable of killing elephants, if the brain shot is used.

The 30-06 is a natural for shooting lead bullets, at paper targets or furred. Assets are economy and long barrel life, plus pleasant absence of recoil and noise.

Use a bullet alloy on the har

### 30-06 Loads—Saber-Toothed Tigers & Mastodons

Bullet	Powder/grs.	MV/fps
225-gr. Barnes Spitzer SP	4831/56.5	2480
250-gr. Barnes RN SP	4350/50	2370
250-gr. Barnes RN SP	4831/54	2430

### Lead Bullet Accuracy

Lead bullets provide better accuracy in the 06 when sized to .308" or .309", rather than the commonly recommended .311". The latter diameter requires a larger expanding button on the sizing die, to allow easy seating without distorting the bullet. In any case, chamfer the inside of the case mouth generously to avoid shaving lead as the bullet is seated.

Bullets should drop from the mould no more than .002" over



Sierra continues to add to their fine array of 30-caliber bullets, largely angled toward the 30-06. Their newest, and growing in popularity, is the 165-gr. boat-tailed Hollow Point, 4th from the left, which has proved deadly on all deer-sized animals because of its quick expansion and excellent retained weight after penetration. This bullet was developed from the 168-gr. International, second from right, and retains much of that match grade bullet's fine accuracy. Others, from left, are: 125-gr. Spitzer, 150-gr. Spitzer, 180-gr. boat-tailed Spitzer soft point, 220-gr. Round Nose and 190-gr. Matchking Hollow Point. At right two bullets by Colorado Custom Bullet Co., formerly Barnes: left the 225-gr. Spitzer Soft Point, last, a 250-gr. Round Nose Soft Point.

### 30-06 Loads—Goats, Sheep, Deer & Antelope

side to escape lead-lined bores. Linotype metal offers excellent results on target, makes gas-checked bullets suitable for velocities up to 2500 fps, without stripping in the lands. These are useful for hunting such *small* game as rabbits, squirrels, etc. I've seen such lead loads recommended for shooting deer, but when lead bullets are alloyed hard enough to withstand velocities above 2000 fps, they don't expand on larger game. Inevitably, this results in wounded animals escaping to die wasted. Don't hunt deer, or even predators, with anything but expanding bullets.

Linotype metal varies somewhat in composition, but a representative alloy is 4% tin, 12% antimony, 84% lead, for an average Brinell hardness of 22 and a melting point of 462°. This alloy, used by printers, is available at reasonable cost in almost any community. Efforts at economy by using scrap metals of unknown or doubtful composition, usually end in poor accuracy and sometimes a difficult cleaning job on a badly leaded bore.

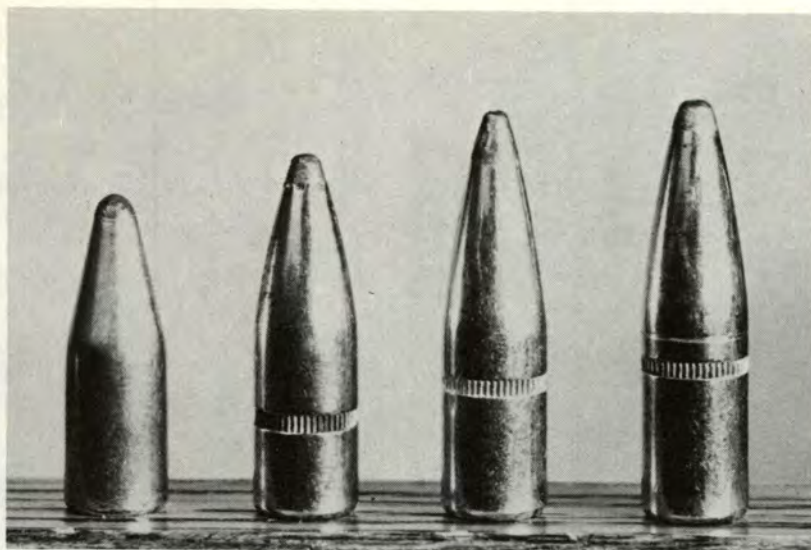
Bullet	Powder/grs.	MV/fps	Pressure
Hornady Sp Pt 150 gr.	4320/55	3100	Maximum
Norma Se Pt SP BT 150 gr.	N-203/54.7	2970	44,500
Nosler Spitzer SP 150 gr.	N-203/54.7	2970	44,500
Sierra Spitzer SP 150 gr.	H-4895/53	3050	Maximum
Speer Spitzer SP 150 gr.	4350/61	3043	Maximum
Hornady Sp Pt 150 gr.	H-450/61	2900	Maximum
same	4350/55.7	2900	Maximum
Nosler Spitzer SP 165 gr.	H-414/56	2899	48,700
Speer Spitzer SP 165 gr.	RL-21/55	2872	Maximum
same	4320/53	2919	Maximum
Sierra HP BT 165 gr.	4895/52	2900	Maximum
same	4064/51	2900	Maximum

SP = Soft Point  
Sp Pt = Spire Point  
Se Pt = Semi Pointed

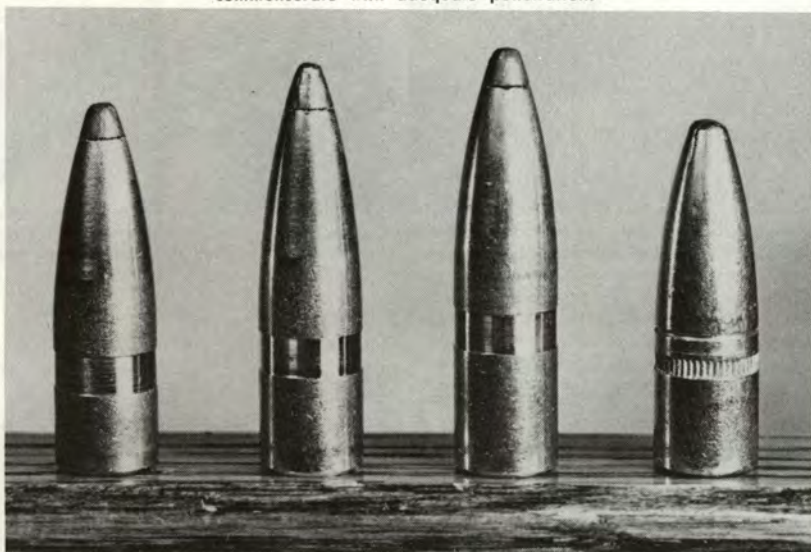
BN = Blunt Nose  
HP = Hollow Point  
BT = Boat-tail

FN = Flat Nose  
RN = Round Nose

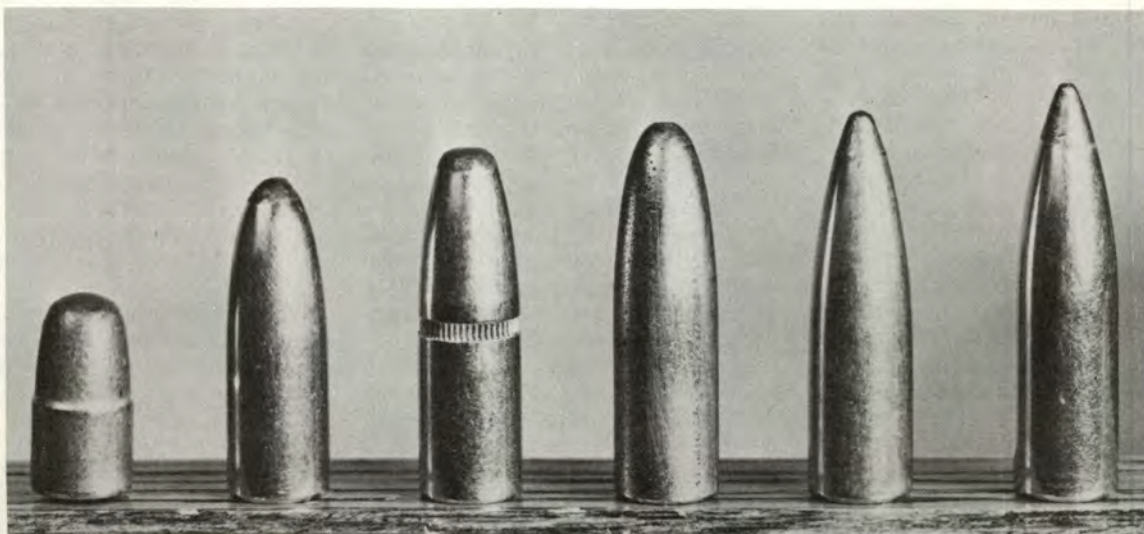




Hornady 30-cal. Spire Point bullets: 130-gr., 150-gr., 165-gr. and 180-gr. Hornady bullets are designed for quick expansion commensurate with adequate penetration.



From left, Nosler 30-cal. Spitzer bullets: 150-gr., 165-gr. and 180-gr. Last on right is Remington 150-gr. Core-Lokt.



Speer is a pioneer in bullet development, as reflected by the 100-gr. 30-cal. Plinkers, left and 200-gr. Spitzer, right. Between are: 150-gr. Round Nose, 170-gr. Flat Nose, 180-gr. Round Nose and 180-gr. Spitzer.

finished diameter, after sizing. Next to the mould itself the best investment you can make to obtain good accuracy is a quality sizer-lubricator. Lyman's new #450 tool is an example of effective design. The Saeco Lubri-Sizer is a super-strong tool, machined to precision smoothness. A form-fitting nose punch guides the bullets concentrically into the honed and hardened sizing die, with 7° tapered cone that gently swages the bullets to correct diameter, rather than shearing off metal. The Saeco Lubri-Sizer also features a unique gas check seater that speeds the job, and helps place gas checks squarely on the bullet bases, an important asset to accuracy. Saeco bullet lube is clean, and definitely contributes to good accuracy, as well.

The fact that Saeco products are again available in quantity is good news for lead bullet buffs. After a long dry spell, occasioned by defense contracts, Saeco now has a complete inventory of bullet moulds, electric lead furnaces, Lubri-Sizers and powder measures, ready for immediate shipment.

My own favorite lead bullet for the '06 is Saeco's 196-gr. gas-checked RG-4, with a two-diameter body that allows seating deep into the lands for greater accuracy. Five-shot one-inch groups at 100 yards are not uncommon with the RG-4, using either 18 grains of 2400 or 20 grains of H-4227, for some 1500 fps. You can boost that to 2000 fps with 34 grains of H-4895.

Lyman-Ideal offers a wide array of excellent bullet moulds for the '06. Among these is another inch-grouper, the 170-gr. #311291 (try



12 grains of H-4227), and the 165-gr. #311413, dead on chucks to 150 yards, using 24 grains of 2400. For more details on other bullets and loads, see Lyman's *Handbook*

### 30-06 Loads—Plinking & Small Game

Bullet	Powder/grs.	MV/fps
Lyman #311413		
165 gr.	2400/24	
same	4895/24	
Lyman #311291		
170 gr.	H-4227/12	
same	3031/28	
SAECO RG-4		
196 gr.	2400/18	1500
same	H-4227/20	1500
Speer Plinkers		
110 gr.	2400/22	2135
same	4227/24	2165
GI M-2 Ball		
152 gr., jkted.	4831/40	1560
same	4831/46	2000

of Cast Bullets,\* and the Lyman Reloading Handbook.

Lyman makes excellent gas checks to fit their own and other makes of cast bullets. Hornady also offers gas checks, his with the added advantage of a "crimp-on" feature that prevents them from stripping off the bullet in flight, upsetting the delicate balance necessary to best accuracy. Gas checks are required on any bullets driven in excess of 1500 or so fps, to avoid excessive leading, and to prevent heat fusing of the bullet base, leading to poor accuracy.

Before using lead bullets in your rifle, clean it thoroughly to remove metal fouling left by jacketed bullets. Also, remove leading from the bore before returning to the use of jacketed bullets. A bad case of leading that does not yield readily to a brass brush and powder solvent can sometimes be cured by firing several jacketed bullets. The lead "tins" itself to the jackets, as you can see by recovering one of them after firing. To maintain ultimate accuracy, clean the bore well and often when shooting lead bullets.

As a callow youth I used to stuff the void left in '06 cases by reduced loads with corn meal. It helped accuracy. Why, I didn't know. Since then, it has been convincingly demonstrated that small powder charges left to roam

*\*If you can find a copy! It is out of print. ED.*



Simplest reloading job yet, extracting bullets of GI ammo with RCBS bullet puller, then substituting commercial expanding bullets and new powder charges. The puller is also indicated if you get excess pressure from a given load, for you can break down the remaining rounds rather than risk "shooting them up."

around a cavernous case are capricious in their pressure, velocity and accuracy. Adding various fillers helps, but adds another reloading chore as well. Holding the rifle muzzle-up before firing each chambered round alleviates the problem, but this practice is a nuisance, if not actually dangerous.

#### Magnum Primers

Help came from an unexpected source. Magnum primers, designed by CCI to overcome ignition problems with full-capacity charges of hard-to-ignite, slow-burning powders in magnum cases, seem to be the answer. They reach out to the far corners of the sparsely-filled '06 case, firing every granule of powder into action, no matter where it hides. Pressure and velocity are constant, accuracy exemplary.

Note that with low pressure loads, any primer has a tendency to shorten the case slightly, introducing a headspace condition that could prove dangerous if the case were again used with maximum charges. Clearly mark and segregate all brass used for reduced charges.



Case life is greatly lengthened if inside mouth is slightly lubed to ease return passage over the expander button.

Magnum primers are an accuracy aid with full charges as well, especially with ball powders or such extruded powders as 4350 and 4831, powders heavily deterrent-coated to control burning rates. Improved accuracy results from greater uniformity in pressure and velocity. Pressure gun and chronograph tests demonstrate a dramatic decrease in the usual high and low swings of both figures. The average pressure level does rise slightly, dictating a nominal drop from any maximum load when changing from a standard primer to a magnum variety. However, a change of any component—primer, powder or bullet—in a given max load calls for a drop of 2 to 3 grains. You can work back up again until the optimum velocity-accuracy level is attained.

Watch for pressure signs—cratered or excessively flattened primers, difficult extraction, expanded primer pockets, etc. Remember, both brass and barrel last longer if you don't strain for that last 50 fps. The practical field effect in terms of killing power or added range is insignificant!

Loading the 30-06 for finest accuracy calls for utmost care in the





By using a good powder measure, such as the RCBS Uniflow, fine accuracy '06 can be had without resorting to weighing each charge. You'll need a scale, though, to set the measure correctly.

selection and handling of all components. Begin by using cases all of one brand. Some benchrest shooters weigh their cases, reject any markedly heavier or lighter than average. Some shooters drill flash holes *slightly* oversize, for the sake of uniformity. Weighing powder charges is an unnecessary tedium. Ball powders, such as H414 and H380, measure so precisely they'll not vary a tenth-grain, plus or minus, on the scale. My RCBS Uniflow powder measure can meter charges within a 2-tenths grain tolerance, even with extruded powders, when used with care.

#### Importance of Bullets

The most critical component is the bullet itself. Nearly all modern commercial bullets are superbly accurate. However, the best 30-06 groups I've seen were fired by Ferris Pindell, noted benchrest competitor, using 200-gr. hollow point bullets, swaged in dies of his own design and making. Five-shot, 100-yard groups measured .670", .532" and .527" *outside diameter!* That is .370", .232" and .227" on centers, as usually measured. That is bench rest accuracy from a 30 caliber.

#### 30-06 Loads—Bear, Elk & Moose

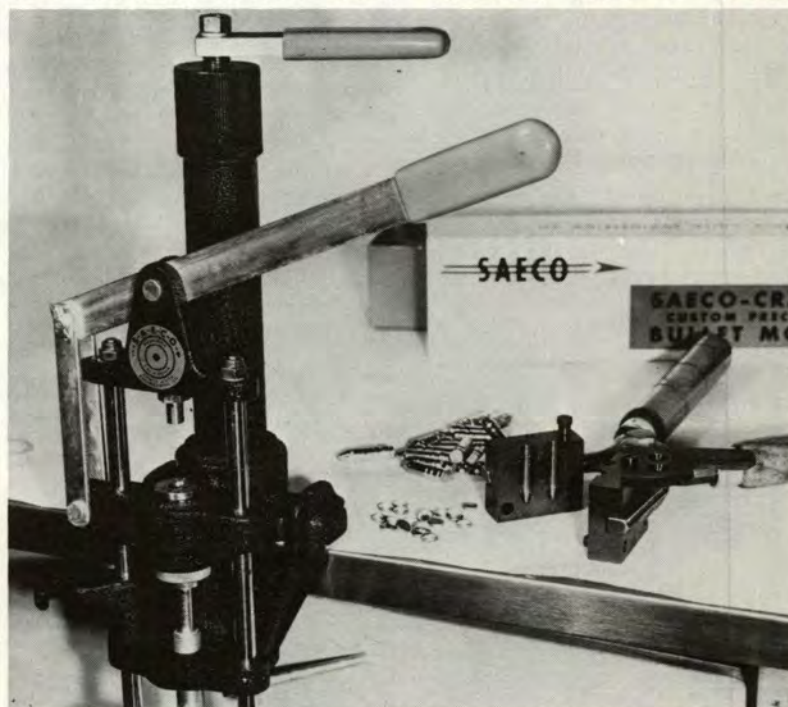
Bullet	Powders/grs.	MV/fps	Pressure
Hornady Sp Pt 180 gr.	3031/47.8	2800	Maximum
same	H-380/53.2	2800	Maximum
Norma Dual-Core Se Pt SP 180 gr.	4831/60	2737	46,600
Nosler Spitzer SP 180 gr.	H-380/51	2702	49,600
Sierra Spitzer SP BT 180 gr.	RL-21/52	2700	Maximum
Speer Spitzer SP 180 gr.	4320/51	2737	Maximum
Nosler BN SP 200 gr.	4831/59	2690	49,000
Speer Spitzer SP 200 gr.	H-450/58	2513	Maximum
Hornady RN SP 220 gr.	4350/55.4	2600	Maximum
Sierra RN SP 220 gr.	4831/57	2526	50,800

SP = Soft Point      BN = Blunt Nose      HP = Hollow Point  
Sp Pt = Spire Point      FN = Flat Nose      BT = Boat-tail  
Se Pt = Semi Pointed      RN = Round Nose

Some experts maintain that you can't get groups like this from any bore size over 6.5mm.

Pindell used a 48-pound rifle with laminated stock, Remington 700 action, Canjar set trigger, and Atkinson & Marquart stainless heavy

barrel, rifled one turn in eleven inches, scoped with a Redfield "3200" 24x. His load was 47 grains of 4350 and a Remington 9½ primer. Bullets were seated precisely .010" into the lands, a practice that apparently leads to spectacular



The 30-06 is a natural for lead bullet shooting, with a wide array of bullets available from Lyman-Ideal and SAECO. Shown here are SAECO Lubri-Sizer with gas-check seater, and SAECO-Cramer mould for excellent, accurate RG-4 bullet.



groups when coupled with modest loadings, but is erratic and even possibly unsafe with maximum loads. Ferris also turned his case necks to a thickness tolerance of plus or minus .0002", using another of his handy tools.

(As of this writing, Ferris has left Sierra Bullets, where he was head design engineer and diemaker, and moved to Indiana, where he plans to set up shop and sell bullet swaging dies, his precise case neck turner, and other accessories to super accuracy buffs and competition shooters.)

Any discussion of rifle accuracy inevitably leads to the dispute over full-length versus neck resizing of cases. I tried neck-sizing only some years back, and concluded from my own tests that it had little positive effect upon accuracy or case life. I now full-length resize as a matter of course. This allows complete interchangeability between my various rifles, and avoids the embarrassment of a stuck case or one that refuses to chamber at a crucial moment, usually when a buck is hightailing it over the horizon.

If you are prone to forget sizing lube, by all means invest in a good stuck-case remover, such as the RCBS kit, which includes a bit to drill a hole in the case head, plus a tap to thread the hole, and finally an Allen head screw and collar, to pull the case free from the die without damage. Using the wrong shellholder can result in a stuck case, too, if the holder is oversized enough to pull free from the case rim.

#### Handloading Tips

Avoid over-lubing, the common cause of oil dents around the case neck, where the excess oil is trapped. Your brass will last longer

#### LYMAN-Sierra Loads

Below are Lyman recommendations for 30-06 deer hunting loads using Sierra bullets. Best advice—begin with the starting load and work up to the maximum load to avoid overloading. Some rifles won't handle the maximum loads.

A. 150-gr. Jacketed Bullet—Sierra Spitzer SP. IMR 4064, 52.5 grs., 2915 fps, 47,200 CUP.

This is a near maximum load, therefore the starting load is IMR 4064, 48.0 grs., 2695 fps, 36,000 CUP.

B. 150-gr. Jacketed Bullet—Sierra Spitzer SP. Rx11, 50.0 grs., 2676 fps, 50,800 CUP.

This is a maximum load, therefore the starting load is Rx11, 45.0 grs., 2724 fps, 37,300 CUP.

C. 165-gr. Bullet—Sierra Boat-tail HP. IMR 4350, 52.0 grs., 2583 fps, 38,100 CUP.

D. 173-gr. Cast Lyman Bullet 311291. 2400, 20.0 grs., 1730 fps, 22,200 CUP.

E. 180-gr. Bullet—Sierra Spitzer Flat Base. IMR 4350, 50.0 grs., 2469 fps, 37,300 CUP.

if you lube the inside of the case necks very sparingly with an RCBS or Lyman nylon bristle brush, thus avoiding the customary strain when pulling the sized case back out of the die, over the neck-expanding plug.

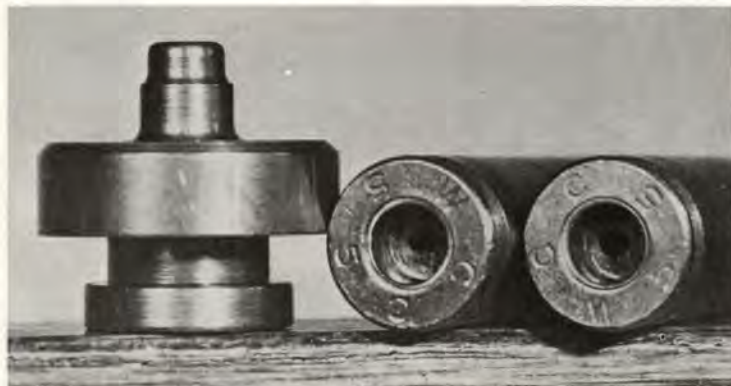
Case life of the '06 verges on the immortal. I ran up a total of 36 reloadings on one lot of Winchester-Western brass before I abandoned them, although they exhibit-

ed no outward signs of weakness. But there's no need to drag along with "tired brass" in an '06. GI cases are plentiful and cheap. They do call for a heavy duty decapping pin, to force spent primers past the crimp around the primer pockets. Before a new primer can be inserted, that crimp must be removed. I used to laboriously ream the crimp out with various devices, good and bad. Now I swage them out, with great speed and little effort, using the RCBS "Speedy Primer Pocket Swager," in Fred Huntington's "Rock Chucker" bench press, with its patented compound leverage and super-strong "O" conformation. If your 30-06 has a tight or loose chamber, Fred can make reloading dies to suit it. Send three fired cases to RCBS, Inc., Box 1919, Oroville, California 95965.

If you're lucky enough to acquire some GI *match* brass, you'll discover that the primer pockets aren't crimped, and you'll have some of the best cases made. The easiest reloading job I know is simply pulling 152-gr. solid point M-2 bullets from GI ball ammo, then replacing them with commercial soft points. Reloaded with 150-gr. soft points, you retain the original, rather modest velocity of 2805 fps. I've found it possible to substitute 165- or 180-gr. bullets without signs of excess pressure.

Before 1952, GI ammo had corrosive chlorate primers. The military clung to these primers until the newer non-corrosive types were proven capable of the decades-long shelf life required. If you shoot any of this ammo in your '06, clean immediately, if not sooner, with hot water and a little detergent, to prevent rusting of your bore by salt deposited there. I prefer to break this ammo down to its components and discard the primers.

Properly reloaded, one 30-06 can equal a whole battery of rifles, handling any game, from mouse to moose, with equal aplomb. You need only tailor your selection of bullets and loads to meet the requirements of game and terrain. My own system is to keep a few loaded rounds on the shelf for emergency trips, but most of my brass stands empty, sized and primed, awaiting the demands of my next hunt. I inventory various bullet weights and styles, and different powders to meet any requirement, thus avoiding wholesale lots of loaded ammo with all of the myriad bullet weights. ●



There's nothing wrong with plentiful GI brass that an RCBS primer pocket swage won't cure. Before and after cases show how crimp around primer pocket is rounded off by swage, in one easy operation.

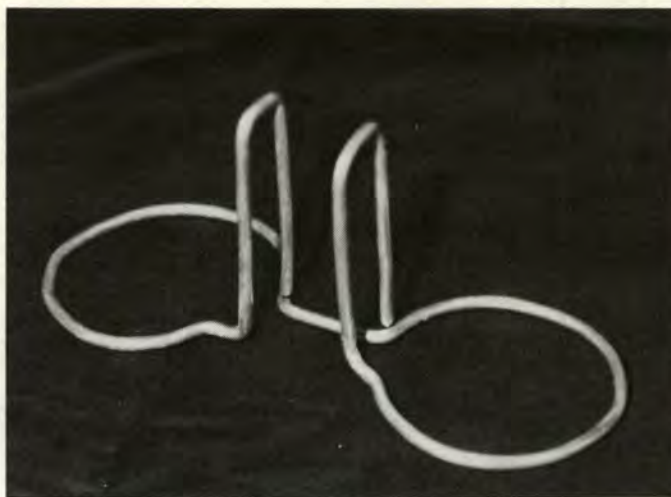


## Handy Twist

THE GIZMO pictured is a 20-round cartridge box holder—cardboard, plastic, whatever. It's handy on the bench—shooting or loading.

You can't buy this gadget anywhere, but it's easy to make. You'll need two pair of husky pliers and about 3 feet of heavy wire—#9 galvanized iron or an equivalent gauge in aluminum, which is easier to bend and also easier to un-bend if you goof.

There are no set dimensions for this thing, no standard pattern. Just go to it free-hand and, hopefully, you'll end up with the result shown. Start at the bottom of one of the uprights: up—across the top—down—around a 2-inch circle to form one of the feet—across under the bottom of the box—round the

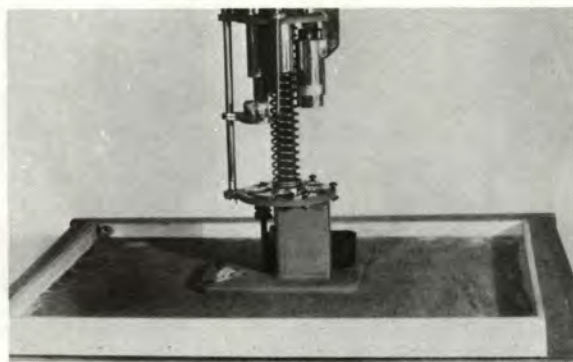


circle, forming the other foot—up, across and down for the other upright. Now clip off surplus wire,

true everything up, and you're done. Time: about five minutes, more or less. V. P. Kisner

Right above—The Handy Twist is easily made, does the job.

Right—Angled hole in left rear corner unloads spilled shot.



## Spill-Proofing A Shotshell Loader

MODERN SHOTSHELL loading equipment, remarkably efficient, is almost fool-proof. Theoretically, you should never spill a pinch of powder

or an ounce of shot.

Unhappily, practice often departs from theory, and it's a rare reloader who doesn't occasionally goof and dump powder, shot, or both all over the loading area. You can

minimize the virulence of these spills by putting a rimmed base under your loader.

Mine is  $\frac{3}{4}$ " plywood, 16" by 20", attached to the tool with screws. The rim, made from  $\frac{1}{4}$ " by  $1\frac{1}{2}$ " lattice strip (available at any lumber yard) is attached with glue and brads. This forms a fence  $\frac{3}{4}$ " high around the base. A wood plug, at one corner of this fence, closes a  $\frac{3}{8}$ " hole angled downward, to draw off spilled material into a container.

My MEC loader requires no upward pressure on the operating lever, so no base hold-down arrangement is needed. C-clamps will do that trick well on other presses.

My base doesn't prevent spills, but it takes most of the curse off them. V. P. Kisner

## Home-Grown Loading Blocks

METALLIC AMMO loaders need at least one loading block. Blocks are available commercially, wood or plastic, but if you like to make things you'll enjoy hand-crafting the wood types described.

Hardwood is best, but sound softwood is serviceable, say spruce 2x4s. Thickness? From  $\frac{1}{2}$ " (for such short cases as the 45 ACP) up to 2" for big magnums;  $\frac{3}{4}$ " is right for most calibers. Make  $\frac{1}{2}$ " holes for 30-06 size cartridges. For larger or smaller rounds, check head diameter and make the holes slightly larger. A piece of wood 4" by 9" will make a 40-hole block with a 10x4 hole arrangement. A piece 5"x11" makes a 60-hole 12x5, one 6"x9" makes a 60-holer 10x6.

Space holes  $\frac{3}{8}$ " on centers in both directions, marking locations on a grid of penciled or scribed lines. A

Three handmade loading blocks. Two of 60-holers  $\frac{3}{4}$ "-thick walnut, one from a spruce 2"x4", 40 holes.

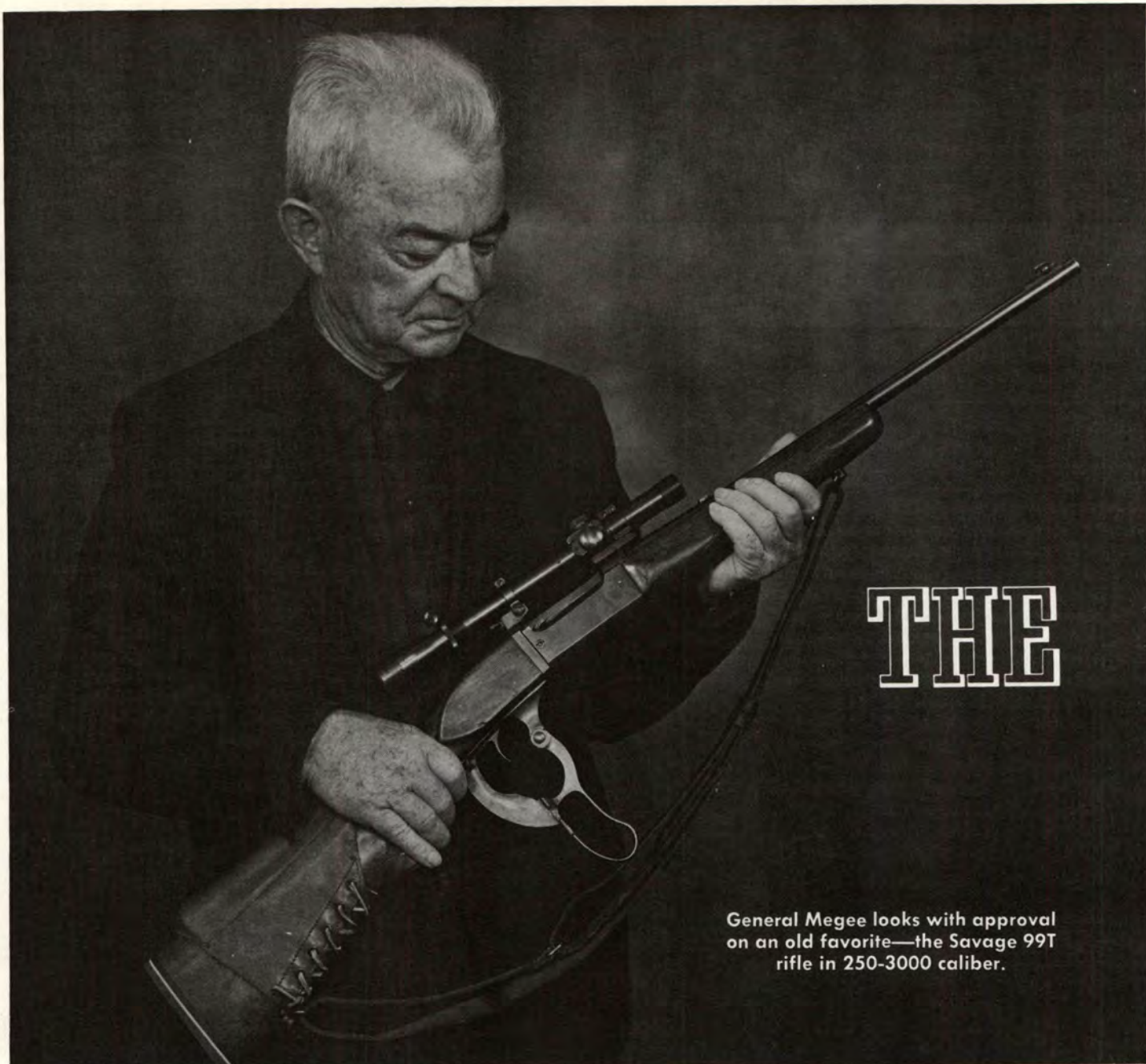


spade-type high-speed wood bit is best; the spur locates the holes exactly at the intersection of the lines. Keep your holes vertical, and run them through the block into a piece of scrap lumber to avoid excessive split-out. After drilling, glue a piece of Masonite to the bottom.

After the glue is dry, plane the Masonite edges down flush, if re-

quired, and clean up edges, ends and top. Sand all surfaces. Chamfer the holes slightly with a scrap of sandpaper over your fingertip. On hardwood a couple of coats of G-B Linspeed makes an excellent finish. On soft wood, two coats of shellac rubbed down with steel wool produce an excellent dirt- and oil-resistant finish. V. P. Kisner





# THE

General Megee looks with approval on an old favorite—the Savage 99T rifle in 250-3000 caliber.

**M**ORE THAN A half-century ago the Savage Arms Company presented to American riflemen a revolutionary new cartridge, so advanced in design and ballistic performance that it dominated the market in its particular field for some 40 years. Basically a reduced scale model of the 30-06 case necked down to 257 caliber, firing a pointed 87-gr. bullet at 3000 feet per second (fps), the new cartridge was named the 250-3000 Savage—a felicitous choice for the advertising profession. Furthermore it was chambered in the equally well designed and rugged Savage Model 1899 lever action rifle, already field tested for years in the 303 and 22 Hi-Power calibers and highly popular with hunter-riflemen. The new combination was an immediate major suc-

cess. It shot more accurately, with an appreciably flatter trajectory, than did any other commercial hunting rifle then on the market, and it retained this lead until the advent of Winchester's Model 54 bolt action rifle in 270 caliber more than a decade later.

The 250-3000 has always had—and deserved—a good press. Colonel Townsend Whelen, who did the first field testing of the new Savage cartridge, reported an average accuracy standard of 2.96" for a series of ten 10-shot groups fired from rest at 100 yards. This was then considered an excellent performance for a light hunting rifle fitted with aperture and bead sights. Whelen continued his interest in the 250-3000 cartridge, con-

sidering it an ideal choice for a combination deer, varmint, and small game rifle. He developed very accurate reduced loads for this caliber, and was probably the first to point out its exceptional versatility. According to his test report the original loading with the powders then available required a chamber pressure of some 50,000 pounds to produce the advertised muzzle velocity. Cases stretched so on firing that they could not be rechambered easily without full length resizing, and could not be reloaded satisfactorily with the hand tools then available. Whelen's authoritative report probably influenced the ammunition makers to seek more suitable powders, which eventually permitted a reduction in



**Down certainly, but not out, a 250-3000 Savage rifle—in one style of 99 or another—was General Megee's hunting partner for some 40 years. Today, though he finds the hills steeper and the trails longer, he'll have no other. *Semper Fidelis!***

# 250 SAVAGE REFUSES TO DIE

by VERNON E. MEGEE

chamber pressure to less than 45,000 pounds without loss of velocity.

The reputation of the 250-3000 cartridge was greatly enhanced by Roy Chapman Andrews, the Gobi Desert explorer who took a pair of Savage rifles in this caliber to Mongolia in 1921. His rather glowing reports of success with long range shooting at *Ovis Poli* and other indigenous fauna was of course exploited by Savage in a descriptive catalog slogan for the 250-3000: "Accurate over long and uncertain ranges." A few years later, in Peking, I met a former member of the Andrews expedition, a sharpshooting Marine, who verified the claim that game animals could be hit and killed with the diminutive 87-gr. spitzer bullet at ranges in excess of 300 yards.

## Early Popularity

Other well known big game hunters and outdoor writers, particularly those operating in the Western States and Northwestern Canada, reported favorably on Savage's new offering. The 250-3000 was used successfully on antelope, muledeer, sheep, goats, black bear, caribou—even on elk and moose. A few intrepid (and foolish) hunters tried it on grizzlies! As the years went by, however, and field experience accumulated, the 250-3000 settled into its proper niche as a superb deer and varmint rifle. Eastern woodchuck hunters were not slow to recognize the virtues of this nail-driving range stretcher. They were no doubt responsible for the

later advent of bolt action Savages, Winchesters, and custom Mausers chambered for the 250-3000 cartridge. While the bolt action rifles with heavier barrels were somewhat more accurate than the average Model 1899, the lever action rifle was largely responsible for the favorable image created in the minds of hunter-riflemen by the 250-3000 Savage. The exotic combination of rifle and cartridge exuded an aura of romance for impressionable young shooters.

While the 250-3000 was able to compete on at least even terms with its earlier major rival, the 257 Roberts, nominally more powerful but available only in bolt action rifles, the advent of the Model 88 Winchester chambered for the 243



cartridge put the classic 250 Savage (as it became known in later years) on the obsolescent list. Even Savage finally gave up on their long time favorite, chambered the Model 99 for the 243 and dropped the 250 from production in 1961. There are many shooters, however, of long experience, who are not convinced that the 243 is really the better choice. Perhaps my own rather extensive field and range experience with both calibers may lend some credence to this contrary opinion.

### My First 250 Savage

In 1929, while in Nicaragua, I ordered one of these long-coveted 250-3000 Savage rifles and 100 rounds of the then new Remington 87-gr. Kleanbore ammunition. Although I chose the take-down Model 99G, equipped with an auxiliary 410 shotgun barrel, I found the accuracy and stability of zero quite satisfactory—at least for the first 300 shots or so. I used this rifle mostly for shooting the large alligators which frequented the scalloped and marshy shoreline of Lake Managua. These leviathans were accustomed to sunning themselves

on the exposed points where they were most difficult to approach. Usually the stalk had to be made under cover of an adjacent point, rarely less than 200 yards from the target. I had previously hunted these 'gators with the Springfield, the Krag, and a Remington 7mm caliber, using altered military bullets. When hit through the body with one of these bullets the quarry would almost invariably make good an escape to deep water. None of these rifles could be shot accurately enough with open sights to make brain or spine shots regularly at the usual range offered.

After fitting a tang sight and carefully targeting the new Savage on the 200-yard range, I tackled the alligators again. The first shot from prone position across the mouth of a small bay took an unsuspecting big 'gator back of the eye and literally exploded his armored skull. He never even quivered. I waded over to marvel at the destruction wrought by such a tiny bullet—and in the enthusiasm of the moment I was ready to believe anything that Savage might publish relative to the killing power of the 250-3000.

Subsequent stories verified the claim of superior accuracy, flat trajectory, and lethal potential of this little high-speed bullet—so long as shots were confined to the brain or spinal area of the big amphibians. Body shots at whatever range proved quite ineffectual—I suspected that the light bullet simply blew up on the armored skin without penetration. However, with this outfit I found it comparatively easy to hit brain or neck up to 200 yards or so. I particularly recall the sensation of having the bullet arrive on target at the seemingly exact instant of trigger release.

I later used this rifle for California muledeer, but without comparable success. Most of my shots turned out to be against running targets on the far side of brushy canyons. The one buck which I was sure of having hit escaped in the twilight, spraying blood on both sides of the trail. A heavy rain that night washed out any chance of recovery, and somewhat dampened my ardor for the 250-3000 as a catch-as-catch-can deer rifle. I shifted to the 300 Savage as being more appropriate for California's thorny coastal ranges. However,



Deer hunting in Nicaragua in 1930. His Savage lever action 250-3000 stands between the author's knees. That slide action gun looks like a Model 12 Winchester.



This big alligator was killed in Managua about 1930 at some 200 yards. One shot from the 250-3000, with Remington's 87-gr. soft point, just behind the eye, did the trick.



## Comparative Range Performance 250 Savage vs. 243 Winchester

Rifles: Winchester M88 — 20" barrel, 8x telescopic sight. Savage M99T — 22" barrel, 8x telescopic sight.

Caliber	Load	average accuracy MOA		over-all	drop, 300 yds.
		200 yds.	300 yds.		
250 Sav:	Rem 100 SP	1.25	1.74	1.5	-6.75"
243 Win:	Rem 100 SPCL	0.84	1.18	1.01	-7.00"
250 Sav:	35/4320/100 Sptz.	1.18	1.05	1.02	-6.00"
243 Win:	38/4320/100 Sptz.	0.98	1.05	1.02	-7.00"
250 Sav:	36/4895/75 OP	1.38	1.33	1.36	-7.00"
243 Win:	41/4895/75 OP	1.24	0.98	1.11	-8.50"
		50 yds.	100 yds.		100 yds.
250 Sav:	12/R17/75 OP	0.73"	1.65"	1.56	-6.5"
243 Win:	12.5/R17/75 OP	1.12	1.35	1.79	-2.00" (neg. whip)

Avg. accuracy all loads: 250 Savage—1.36 MOA      243 Win.—1.24 MOA

Notes: Rifles sighted for 200 yards, full loads; 50 yards, reduced loads. Handloads chosen arbitrarily, not adjusted to rifles. Group averages are for three 3-shot groups with each full power load, two 5-shot groups for reduced loads, at each range. 300-yard impacts show less drop than expected from estimated velocities; 250 Savage registered less drop than expected from estimated velocities; 250 Savage registered less drop than did 243 Win—possibly due to consistent slight aiming error at longer range. Full load tests completed without cleaning rifles.

this experience merely points up one of the practical limitations of the fine 250 Savage.

My shooting notes of the period (early 1930s) show a number of 5-shot groups fired from field positions at various ranges, with aperture and gold bead hunting sights. At 200 yards all shots with factory ammunition, using both 87- and 100-gr. bullets, grouped within a 5-inch circle. While I did not handload in those days, I did try various chamber devices which permitted use of reduced loads for small game—none of which was notably accurate beyond 25 yards. Eventually this take-down rifle shot loose and would no longer hold its zero after frequent disassembly to permit use of the 410 gauge auxiliary barrel. It was disposed of to a more tolerant shooter who had been impressed with its performance on Ozark groundhogs.

### Handloading the 250

A few years later I picked up a standard Model 99 carbine in 250 Savage caliber, equipped with a Weaver 330 telescopic sight. Meanwhile I had taken up handloading. Now I was in position to really appreciate the virtues of this versatile caliber. According to my notes, this featherweight Savage turned in a group average (3-5 shots) of 1.67 MOA, fired from prone rest, with a variety of full and reduced loads. Performance at 50 yards with selected small game

loads was particularly impressive, even to the venerable Colonel Whelen who sometimes shot with us on the old Fairfax, Va., club range.

My next acquisition was the heavier Model 99R with 24" barrel and a 4-power telescope. I did a lot of shooting with this rifle, both on game and at target. My records show an average grouping ability of 1.37 MOA for a long series of range trials with assorted loads over a period of several years. This rifle was also used very successfully on Virginia woodchucks, later on Texas deer and turkey. With selected loads it could be depended on to keep the first three shots from a cold barrel close to MOA standard, and it reliably held its zero from day to day. Using the 100-gr. expanding bullet this rifle was highly reliable on deer up to 200 yards, at least; a shot through the chest area either dropped them in their tracks or after but a short convulsive run. Although somewhat heavy for the caliber this Model 99R rifle met all the requirements for a combination deer-varmint-small game arm, particularly for a left side shooter.

Of comparative interest, during this same more recent period, I was engaged in field testing the new Winchester Model 88 in 243 caliber. As a check on my field notes I recently ran some comparative range tests with the Savage Model 99T in 250-3000 caliber. See the Table for tabulated results.

### 250-3000 Versus the 243

While paper ballistics indicate a slight superiority for the 243 over the 250-3000, actual performance narrows this margin appreciably. For instance, the advertised velocity of 3070 for the 100-gr. 243 bullet ejected by 51,000 pounds of chamber pressure shrinks to a bare 2950 fps when fired in the 22" barrel of a standard hunting rifle. The Savage 250 caliber bullet of the same weight turns in an honest 2800 fps at only 44,000 pounds pressure. Admittedly, there remains a slight ballistic advantage for the smaller caliber over the longer ranges under windy conditions, particularly with the lighter bullets. As for killing power on medium game animals, I have been unable to detect any difference. Both calibers are deadly with proper bullets up to 250 yards; neither should be stretched much beyond that distance. If I had to make a choice I would probably take the 243 for long range varmint and antelope shooting, the 250 Savage for average deer hunting, for the casual turkey or large varmint and (with proper reduced loads), for small game shooting. Accuracy, trajectory, and killing power are so nearly identical under field conditions that any choice would have to be made on personal preference for a particular rifle.

Here again the honors are about even. In the lever actions, the more modern Winchester Model 88 has



a smoother head-locking action which favors the handloader; the Model 99 Savage is more compact, seemingly better balanced for quick shots, and lends itself easier to crisp trigger adjustment. Both rifles are exceptionally accurate with factory and handloaded ammunition

throughout a wide velocity range. For those who favor the short action bolt rifles there is really no choice between the two calibers.

### Cartridge Design

As for cartridge design, I find the 250 Savage superior by reason of

more optimum capacity for the caliber, the sharper shoulder and longer neck; all of which factors contribute to versatility in loading, efficient combustion of modern powders, and a potentially high degree of accuracy. As a matter of record, when chambered in heavy target

## Selected and Proven Loads for the 250-3000

Rifles: Savage 99 carb; 99R; 99T. Low power hunting scopes.

### Reduced Loads

No.	Powder/grs.	Bullet	Range, yds.	MOA, avg.	MV, est.	Remarks
1	5/Bullseye	60 Horn.	50	2.1	1800	squirrel load
2	6/Unique	60 Speer	50	1.45	1800	squirrel load
3	14.8/2400	75 g.c.	100	2.13	1800	squirrel load
4	16/2400	60 Speer	100	1.20	2400	mid-range target-varmint
5	16.6/2400	87 Sier.	100	1.17	2300	mid-range target-varmint
6	18/2400	75 Horn.	100	1.70	2500	mid-range target-varmint
7	16.5/4198	60 Horn.	100	1.30	1850	small game
8	21/4198	87 Sier.	100	1.62	2350	mid-range target-varmint
9	7/Red Dot	60 Horn.	100	1.35	1850	small game
10	7.5/Red Dot	60 Horn.	50	1.60	1850	small game
11	7.5/Red Dot	75 Horn.	50	2.03	1800	small game
12	7.5/Red Dot	86 Win SP	100	1.63	1650	small game
13	12/R17	60 Horn.	50	1.44	1800	small game
14	13/R17	75 Horn.	50	1.45	1800	small game
15	13/R17	86 Win SP	50	2.46	1700	small game (25-20HV ballistics)
16	9/7625	75 Sier.	50	1.36	1750	small game

### Full Loads

17	19.1/2400	87 Sier.	100	1.30	2500	mid-range target-varmint
18	20/2400	60 Speer	50	1.35	2600	mid-range target-varmint
19	35/4320	75 Horn.	100	1.25	2900	long-range varmint
20	36.4/4895	75 Horn.	200	1.38	3200	long-range varmint MAX
21	36.4/4895	75 Horn.	300	1.33	3200	long-range varmint MAX
22	34/4064	75 Horn.	100	1.45	2800	long-range varmint
23	29/4198	87 Horn.	100	1.94	2850	long-range varmint
24	34.5/4064	87 Horn.	100	1.30	2900	long-range varmint

### Deer Loads

25	31/3031	100 Speer	100	1.03	2650	mid-range deer
26	31.5/3031	100 Sier.	100	1.27	2700	mid-range deer
27	32.1/3031	100 Sier.	100	0.56	2750	mid-range deer (2 groups)
28	34/4064	100 Sier.	100	1.55	2850	300-yd. game
29	34.5/4064	100 Sier.	100	1.47	2900	300-yd. game
30	35/4064	100 Sier.	100	2.13	2950	300-yd. game MAX
31	35.1/4320	100 Sier.	100	1.36	2900	300-yd. game
32	35.1/4320	100 Sier.	200	1.38	2900	300-yd. game
33	35.1/4320	100 Sier.	300	1.24	2900	300-yd. game
34	36/4320	100 Sier.	100	1.55	3000	300-yd. game MAX
35	36/4320	100 Sier.	200	1.42	3000	300-yd. game MAX

### Factory Deer Loads

36	Winchester	100 ST	100	1.78	2820	
37	Winchester	100 ST	200	2.00	2820	
38	Peters	100 Ptd	100	1.40	2820	
39	Peters	100 Ptd	200	1.79	2820	

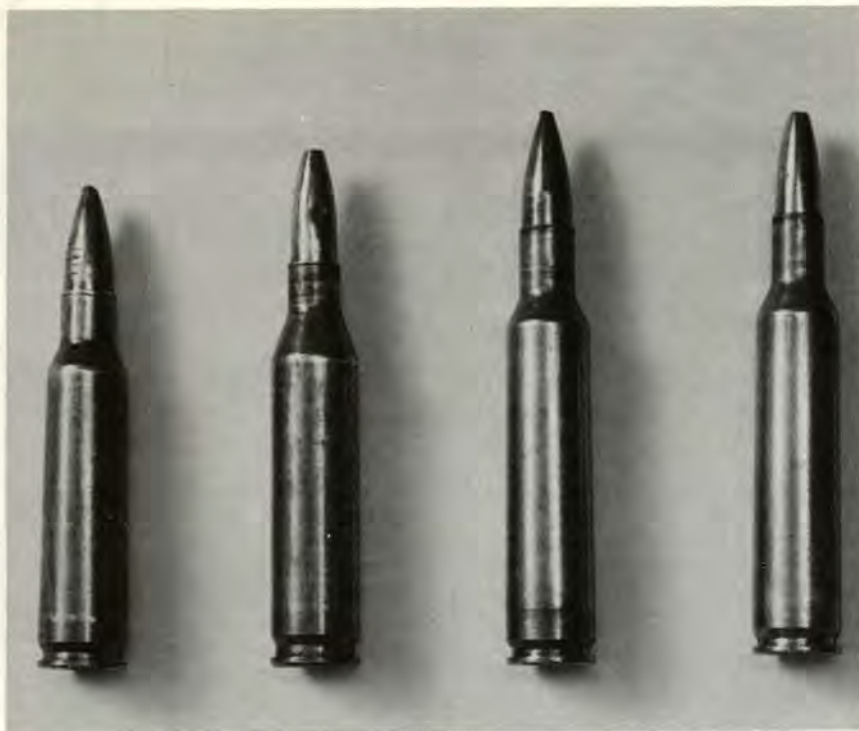
Notes: Test groups fired with 8x target scope averaged only about 10% smaller than these shown.

Averages shown for a varying number of 3- and 5-shot groups.

No appreciable difference with various primers. No appreciable difference among the three M99 rifles.

g.c. = gas-checked bullets





The 250-3000 and some rivals. From left—250, 243, 257 and 6mm, all handloaded.

rifles, the 250 Savage cartridge has won many bench rest matches.

The 250 Savage has a further advantage over the 243 for the handloader by reason of the larger assortment of jacketed and cast bullets available. This is particularly evident in the field of reduced loads for short range varmint and small game shooting. I find the 86-gr. jacketed soft point bullet made for the 25-20 caliber, loaded to about 1700 fps, superior for this purpose to any bullet available in 243 caliber.

Case stretching is no great problem with modern Model 99 actions when pressure is held below 45,000 lbs. For casual target shooting with the 250-3000 neck sizing will usually suffice for three or four firings; but for hunting purposes with full power loads it is advisable to resize the cases full length and trim necks to insure smooth rapid fire action.

### 250, 257 and 25-06.

Comparing the 250 Savage cartridge with the larger 257 Roberts and the new 25-06 is also an interesting exercise in ballistic theory. According to the Speer and Hornady tables, the maximum loading for the 100-gr. bullet in 250 Savage (bolt action, 24" barrel) develops 3100 fps. The 257 Roberts pushes 3200 fps and the 25-06 barely passes 3300 fps with the

same bullet. In terms of maximum effective range (at the point where delivered energy drops below 1000 pounds) the 250 Savage will do at 380 yards what the 257 Roberts will accomplish at 415 yards, and the smaller cartridge actually falls no more than 75 yards behind the big 25-06 case. Considering the proportionally greater dispersion and wind drift at the longer range, the effective differential on varmint sized targets would be scarcely 50 yards. At 400 yards, the difference in drop from 200-yard zero sighting measures only 3.92" in favor of the 25-06. To obtain this small advantage over the 250 Savage we must burn 15 grains more powder and endure considerably more recoil and muzzle blast.

Only with the heavier (115-120-gr.) bullets do the 257 Roberts and the 25-06 show practical superiority over the smaller 250 cartridge. With bullets of 100 grains or less the 250 Savage may actually be the better choice, since its standard rifling twist of 1-14 is better calculated to shoot the lighter bullets with superior accuracy, although this slow twist will not handle bullets heavier than 100 grains. Due to smaller case capacity the 250 Savage is also the more efficient for reduced loads. Another very desirable characteristic of this cartridge is the tendency to print the different bullet weights at the same point of impact when loaded

to any given pressure level. In view of the above advantages, easily demonstrated at the bench, owners or potential owners of good 250 Savage rifles might well wish to reassess the comparative performance of larger and louder cartridges of quarter-inch bore.

### New Savage M1899

While new factory rifles in 250 Savage caliber have been off the market for the past 10 years, good used ones have been much in demand and the ammunition has continued to sell. Only recently has Savage decided to reintroduce this caliber in the new Model 1899A lever action rifle "in response to popular demand." Possibly a short action bolt rifle will also be chambered for the 250-3000 (Savage has returned to the original caliber designation as part of the reincarnation).

While I have not had the opportunity to field test the new Savage offering, I would expect it to perform as well as the older models. I recently ran a series of range tests with the old Model 1899T, using modern 250 Savage ammunition. This model has a short, stiff (20") barrel, which I have found to be very accurate. Using Peters 100-gr. ammunition out of the box, this 4x scope-sighted carbine averaged 1.3" for a series of 5-shot groups at 100 yards range, fired from bench rest. Subsequent tests with selected handloads confirmed this excellent accuracy and stability of impact. This light and handy version of the model 1899 Savage lends itself well to saddle scabbard and jeep rack (as does its modern counterpart). It bids fair to become, once again, my favorite rifle for the field shooting that I can still manage to do.

Thus I have come full circle—after 40 years—on my choice of a deer-varmint-small game rifle. Now that the hills have become steeper and the trails longer, even a half-pound less weight on the shoulder became significant. When this advantage may be had without sacrifice of accuracy or adequate power, and without penalty of excessive recoil and muzzle blast, heavier rifles are apt to be left in the cabinet when the hill country deer and turkey season opens. To kindred elderly shooters of like mind, to the ladies, and to the adolescent hunters (in Texas, deer hunting is a family ritual), the classic 250-3000 can be most highly recommended. ●



Dimensions checked by Hal Mallet of H.M. Tool Co.

Dimensions checked by Hal Mallet of H.M. Tool Co.

186 HANDLOADER'S DIGEST



**M**ODERN FACTORY ammunition, superb in performance, is designed to function in many types of rifles. It cannot, however, give maximum accuracy in all rifles because of the many different designs, manufacturing tolerances, etc., which are used to produce these rifle variations. Even two firearms made from the same tooling, ostensibly identical, will shoot slightly differently, for there are none *exactly* alike. Thus the op-

er offering 6 bullets. If you tested each of these components with only 5 powder charges (starting full charge and reducing each load 2.0 grains), you'd have to load and test fire  $4 \times 4 \times 4 \times 4 \times 6 \times 5 = 7,680$  rounds! Finding a few accurate loads for your favorite rifle by the usual trial-and-error approach is obviously ridiculous, and it is apparent that a practicable method of component selection is highly desirable.

agree with that finding, but it can be clearly demonstrated that bullet quality is of paramount importance. The main problem, then, becomes one of finding that bullet which will shoot best in your rifle. Unfortunately, the only known way to determine that is to test fire several different bullets in your rifle. So the first step towards maximum accuracy is to decide which type of bullet you want to develop a load for and obtain this bullet

# Three Steps to Practical Accuracy

by **M. H. McCLUNG**

**A systematic method of handloading to improve rifle performance**

timum accuracy of an individual rifle can only be obtained by ammunition custom made for that rifle.

Making custom ammunition is safe, enjoyable, and inexpensive. High quality handloads can be produced today for about one-third the cost of factory rounds and, in addition, endless variations are possible. For example, consider a 30-caliber cartridge with 4 available brands of primers, cases, bullets, and powders, with each bulletmak-

## Bullet Most Important

In an article called "Factors in Accuracy" by George L. Jacobsen (*The American Rifleman* July, 1958), the author convincingly shows that bullet quality is by far the most important factor in accuracy. He wrote that at least 90% of potential accuracy is established by the bullet and he offered a great deal of data from Frankford Arsenal on cartridge components. Not all authorities will

from several different manufacturers.

The second step towards practical accuracy is to test fire the selected bullet type. Maximum accuracy does not necessarily occur at maximum-usable powder charges, therefore reduced loads must be tried. To do this, prepare handloads using bullets from various manufacturers and with powder charges reduced in definite steps from maximum charges listed in the loading



A place to shoot is the second of two requirements needed to derive the best practical accuracy of which any rifle or cartridge is capable. Safety rules are important and good records are mandatory. All test firing was conducted by the author at the 200-yard Capitol City Rifle Club range east of Lansing, Mich.





Violent deformation occurred with all bullets and with all charges tested, reduced or not. The bullets shown were recovered from soft earth behind the target immediately after firing. Cartridges in the background hold, from left—Hornady, Remington, Sierra, Speer and Winchester bullets.

tables. If you have no idea of where your rifle's best accuracy is, then you might start with 90%, 80%, and 70% of maximum-usable charges—or even to 100% if your conditions permit. Fire 8 rounds with each bullet, but load 10 rounds, for reasons that will appear later.

Third, test various powders using only that bullet which performed best in the previous step. Study your targets to determine which bullet gave best results. Now make new handloads using only this bullet, but this time use several different kinds of powder. 8 rounds should be tested for each bullet-powder combination. Before describing an actual test procedure, a few general comments about handloads and shooting may be in order.

### Other Shooting Factors

Loading data and procedures are explained in standard reloading handbooks which are commercially available. Some of these handbooks recommend specific powders for accuracy so these should be tried. If none is recommended, learn the characteristics of available powders and choose one which will leave minimum air space within the case. Weighing, or measuring, the pow-

der to a tolerance of  $\pm 0.2$ -gr. is sufficiently adequate. Never exceed the maximum powder charges shown in the tables. Primers and cases have only a slight effect on accuracy, but reliability is important so choose well-known brands and seat them carefully; make certain that the flash hole and pocket are clean. Cases from different makers should not be mixed. Don't use cases for full charges after they have been used for greatly reduced or "ultra light" charges. Be as consistent and uniform as possible during all reloading operations.

Check your shooting area for safety, of course, and that the backstop is adequate. All firing must be from rest position. Feeding each round into the rifle one at a time may help you get better accuracy, and it will slow down your rate of fire. Let at least one minute elapse between shots. Positioning the powder in the case by elevating the muzzle vertically just prior before shooting can also help.

Because the bore fouling of one bullet or powder type may not be compatible with others, clean the barrel between the 8-shot strings. Since such cleaning will leave the bore in a moist or otherwise non-normal shooting state, fire a couple

of rounds through the barrel to condition it. Use the same load you're about to test, of course, which means that you should load 10, not 8, of each trial combination.

Keeping accurate records is mandatory, and a good way to do this is simply to retain your paper targets. Label each target with pertinent data, that is, rifle description, bullet type and weight, powder type and weight, primer, case, distance fired, wind and light conditions, date, etc. Record these data near the bullet group, then cut this portion of the target out, discarding the remainder, so that your record keeping won't become cumbersome.

### Test of Method

Some years ago I bought a pre-1964 Winchester Model 70 featherweight 308, adding a sling and recoil pad. It is now scoped with a Leupold 3x9 variable in a Bausch & Lomb Trophy mount.

**Selecting Bullets** Since little information is available on lightweight 30-cal. ammunition I arbitrarily chose to develop a varmint class cartridge. My initial tests were with the 110-gr. Hornady RN, 110-gr. Remington RN, 110-gr. Sierra HP, 100-gr. Speer Plinker and the 110-gr. Winchester Spire Point.



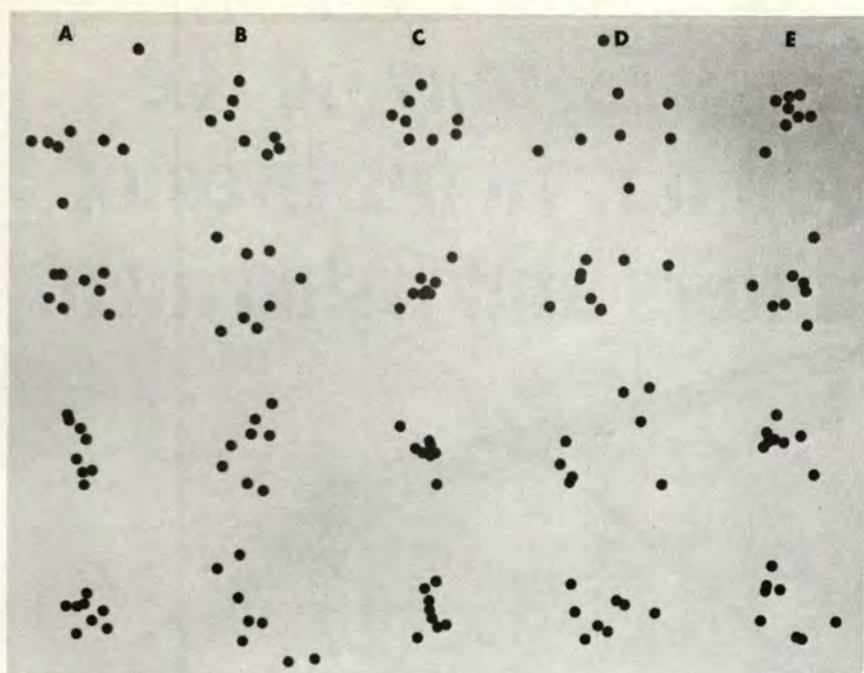


Fig. A. 8-shot 200-yd. groups, various bullets tested. The vertical rows, from left—Hornady 110-gr. RN(A), Remington 110-gr. RN(B), Sierra 110-gr. HP(C), Speer 100-gr. Plinker(D) and Winchester 110-gr. Spire Pt(E). While all bullets but Remington gave at least one good group, Sierras were most consistent, in this rifle, of the 5 makes/types shot.

Table 1 Various Bullets

4198 — % of Full Charge				
Bullet/grs.	100	90	80	70
Horn. 110 RN	41.0	36.9	32.8	28.7
Rem. 110 RN	41.0	36.9	32.8	28.7
Sierra 110 HP	41.0	36.9	32.8	28.7
Win. 110 Sp.P	41.0	36.9	32.8	28.7
Speer 100 Pkr	38.0	34.2	30.4	26.6

The loads in Table 1 were fired from bench rest at 200 yards, the wind calm, the scope at 9x. Windage and elevation adjustments of the scope were untouched during testing so that size and shape of groups could be compared. (See Fig. A.)

#### Best Bullet vs Various Powders

The target in Fig. A revealed that the 110-gr. Sierra HP gave the best overall performance, in this rifle, of the bullets tested. The 90% and 80% powder charges each placed 6 of the 8 bullets very close together, so other handloads were prepared using the 110-gr. Sierra bullets, the same Winchester cases, and Remington 9½ primers. See Table 2.

Table 2

#### Sierra 110 HP vs Various Powders

% of Full Charge	Powder/Grains			
	3031	4198	Rel. 7	H380
95	45.6	38.9	42.7	47.5
90	43.2	36.9	40.5	45.0
85	40.8	34.8	38.2	42.5
80	38.4	32.8	36.0	40.0
75	36.0	30.7	33.7	37.5

This final 200-yard test firing produced the results shown in Fig. B. Thus by loading and firing only 320 rounds, I know that my rifle is capable of 2" groups at 200 yards with the 110-gr. Sierra HP bullets using 40.8 grains of Dupont IMR 3031 powder and Winchester cases with Remington 9½ primers. By this same method you may improve the performance of your favorite rifle with more or less than 320 rounds, depending on how many bullets and powders you decide upon. This procedure may be helpful whether you want to test one bullet or many, but obviously the more components you evaluate the better. Eight-shot strings are recommended regardless of the number or kinds of components you decide to test. ●

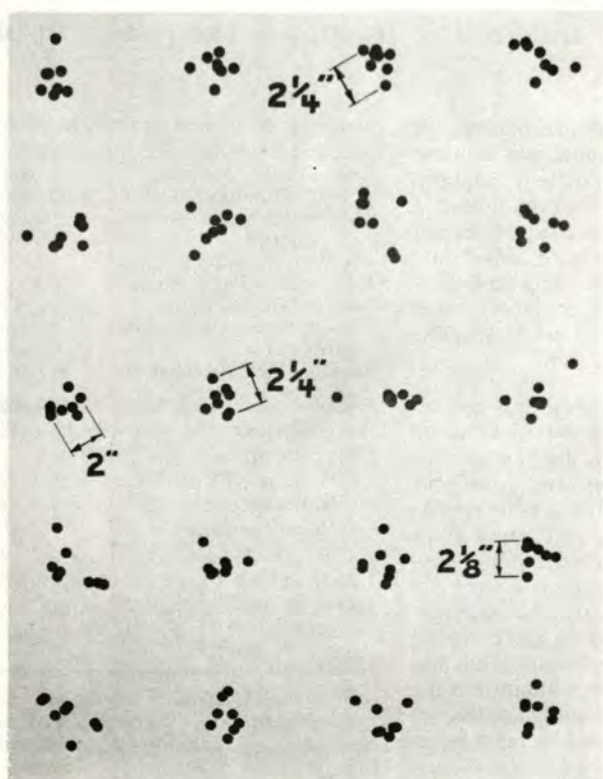


Fig. B. The final 200-yard test firing produced these groups with the loads described in Table 2. All groups shot with 110-gr. Sierra HPs, and with the loads shown in the table. More than half the groups shown are 3" or less on centers, good accuracy from a light-weight 30-caliber sporting rifle. All rifles, of course, are different but the 3 step procedure described provides a way to "home in" on efficient handloads to bring out, practically, the best accuracy that your rifle is capable of producing—whatever that might be.

**Bullet Test** Standard handbook dope shows that IMR 4198 is a fairly fast-burning powder, one suitable for light bullets and reduced loading in the 308. Forty handloads were pre-

pared for each of the 5 bullets, using Winchester cases and Remington 9½ primers. Eight rounds for record were fired with each combination, and the results appear in Table 1.



# National Hunting and Fishing Day, September 23, 1972, may be the most important day in the lives of 55 million hunters and fishermen.



Every hunting, fishing and conservation club in America is being asked to hold an **OPEN HOUSE** for the public, to dramatize sportsmen's contributions to conservation and to introduce the public to outdoor skills.

**National Hunting and Fishing Day** officially recognizes the role of America's sportsmen in conservation and outdoor recreation. Resolutions now in Congress not only establish NHF Day, but ask hunters and anglers to lead the public in a rededication to the conservation and respectful use of our wildlife and natural resources. Your sportsmen's club should take the leadership in your community by holding an **OPEN HOUSE** which shows your friends and neighbors what sportsmen are doing for conservation . . . and have done for the past 70 years.

**Open House** can win new friends for conservation and introduce youngsters to shooting and fishing. No one can do more for hunting and fishing than you, working in your own community on a friendly person-to-person level with your neighbors and business associates. By helping your sportsmen's club organize an **OPEN HOUSE**, you could show exhibits and movies about the sportsman's outstanding contributions to conservation to many new people. You and your club can set up skill centers for young people and their parents to participate in shooting, archery, casting and camping . . . really show them what goes on at a sportsman's club and how much fun it is. It's an ideal time to teach them that the American sportsman is the best friend fish and wildlife ever had. An **OPEN HOUSE** might also be used to raise funds for a conservation project with a turkey shoot or casting game. Civic leaders will be glad to provide valuable support, and you might well get a newspaper or broadcasting station to co-sponsor **OPEN HOUSE**. National Hunting and Fishing Day, along with state proclamations by all 50 governors, will help get publicity for your role as a sportsman in conservation. Imagine what will be done when clubs like yours hold successful **OPEN HOUSES** all over the country on National Hunting and Fishing Day!

## You'll be supported by these important organizations:

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Sport Fishing Institute	Manufacturers Association
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Outdoor Writers Association	Foundation
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American Fisheries Society	Commissioners
National Conservation	Izaak Walton League of America
Committee of Boy Scouts	National Sporting Goods
of America	Association
National Rifle Association	Keep America Beautiful, Inc.

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- . . . and more.

Conservation needs more friends. Tell some of yours all about it on National Hunting and Fishing Day. Use the coupon below to obtain your copy of the **OPEN HOUSE Action Manual**.

Enclosed is \$1.00. Please send your Open House Action Manual that tells me how my club can tie in with National Hunting and Fishing Day, September 23, 1972.

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6th EDITION — PART 1

TOOLS AND ACCESSORIES FOR  
**METALLIC**  
**CARTRIDGES**





## Notes on Presses . . .

Presses, like other pieces of machinery, are designed to work within certain limits. The largest and strongest presses will handle any job, from neck sizing the 22 Hornet up to swaging 375 caliber bullets. Before buying a press the novice should keep in mind that, as his knowledge of handloading increases, so will his desire to reload additional cartridges. He should try to anticipate his future requirements—it will save him money in the end.

The handgun shooter, loading for himself only, cannot go wrong buying a Pacific, Lyman, C-H "C" type or some similar press. All handle handgun ammunition

with ease, of course, as well as rifle cartridges. The Lyman #310 tool, the old reliable, also handles both types of ammunition. These are sturdy but not fast tools. After a few months though, suppose our handgunner decides to handload ammo for several friends. In that case his original choice of a press may not be adequate for a larger volume of business handloading.

Or, let's assume instead that he moves on to bullet swaging. Can his original press handle bullet-swaging pressures?

All these things should be carefully thought out before buying any handload-

ing press. It will save time, breakage and money. In any case, it is better to buy just a little stronger press than your present needs call for.

On the other hand, the shooter who travels, who moves and lives, perhaps, in a confined space or the man who does not do much shooting would be wise to purchase a small, light tool—say the Lee (rifle or shotgun), the Lyman 310 or the Pak-Tool Hand Loader, one of the finest small portable tools. Using this tool a man can sit in his car, canoe or on a log in the woods and reload cartridges with accuracy and dependability.

### AMMO-LOAD Reloading Machine

Weighing 228 lbs., this electrically powered machine can produce 5000 completed rounds per hour. Delivered ready to operate with 5 bullet and 5 primer tubes, it comes complete for one caliber. Change to another caliber takes about one hour, and the machine can be leased. Unit is available from Automatic Reloading Equipment Co. . . . . **\$4875.00**

Automatic primer tube filler . . . **\$450.00**



### Brown BAIR III

Press is the rugged H-type and is a three-station tool permitting a full set of dies to be installed for greater speed or progressive reloading. Price includes primer seating punches, feed tubes for both sizes of primers, and automatic priming system. . . . . **\$71.50**

Brown Bair and Cub package includes auto-primer system, three shell holder heads and die set of your choice. **\$94.00**



### Kodiak BAIR

This "D" press exposes the entire front of the press for easy access from either side. Compound leverage eases work load, especially desirable when bullet swaging. Built-in primer trap and automatic primer feed. Takes all standard  $\frac{7}{8}$ -14 dies and removable shell holder heads. . . **\$74.50**

Kodiak Bair and Cub package includes tool, shell holder head and set of dies of your choice (specify) . . . . . **\$86.00**



### Grizzly BAIR

A sturdy "C" press capable of all reloading chores including bullet swaging. 15 lbs. of hi-density annealed cast iron are used in the frame with all bearing surfaces hardened and precision ground for sleek smooth action. Takes standard  $\frac{7}{8}$ -14 dies and removable shell holder heads. Three bolt holes provided to attach press to the bench. . . . . **\$37.50**

Grizzly Bair and Cub package includes basic tool, removable shell holder and a die set of your choice (specify) . . **\$50.50**

Grizzly Bair primer catcher. . . . **\$2.20**



### BONANZA 68

Press is O-type offering ample power for loading, case forming and bullet swaging. Frame and lever are castings; linkage pins are hardened and ground. Standard removable shell holder heads and  $\frac{7}{8}$ -14 dies are easily installed. Press operates on downstroke only, but handle stops in up or down position. Co-Ax priming device moves on a common axis within the ram, seats to a uniform depth and punch can be changed without tools. Spent primers can be collected behind the ram. Packaged with ram, priming device with large and small punches and shell holder of your choice. . . . . **\$31.55**





### BONANZA CO-AX Press

Coaxial design for powerful leverage and true alignment. Dies quickly snap-in, handle moves 180 degrees. Floating guide rods reduce friction and wear. Takes standard  $\frac{7}{8}$ -14 dies and removable shell holder heads. Suitable for case forming and bullet swaging. .... **\$59.95**

As shown with spent primer catcher, universal self-acting shell holder and overhead priming assembly. .... **\$68.45**

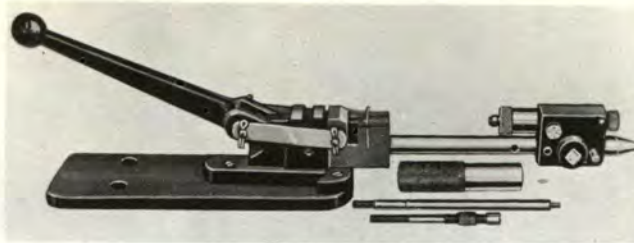


### C-H "Champion" Heavy-Weight

A very heavy-duty O-type press with a ram 1.185" in diameter. Press is drilled to allow spent primers and debris fall through. Takes universal shell holders and is threaded  $\frac{7}{8}$ -14 for standard dies. Well suited for case forming and bullet swaging operations. Solid steel handle. Toggle is designed so that it "breaks" slightly over top dead center for extreme leverage.

Price, including universal primer arm and shell holder head .... **\$69.50**

Price complete with one set of standard dies .... **\$79.50**



### BELDING & MULL Model 28 Reloading Tool

The B&M Model 28 is one of the oldest tools on the market. It neck sizes only, producing excellent ammunition. Complete with standard bullet seating parts for any popular caliber. For ammunition not needing crimp. .... **\$29.50**

Model 26 hand bullet seater. ... **\$5.75**

Model 28 for ammunition needing crimp .... **\$31.50**



### C-H 204 Cast Iron Press

Heavy (11½ lb.) C-type press reinforced for bullet swaging and case forming, it is massive enough to resist distortion under normal operation. Up- or downstroke operation, accepts standard removable shell holder heads and C-type rams. Press complete with handle, toggle, universal shell holder ram, shell holder, universal priming arm. .... **\$24.50**

Press complete with one set of standard dies. .... **\$34.50**

### C-H 205 Cast Iron "O" Press

A Heavy-duty O-type press, handle and frame offset to right for more hand room in the working area. Performs all reloading and bullet swaging operations. Takes standard removable shell holder heads and C-type rams. Cast iron construction. Press with handle, toggle, shell holder, primer arm. .... **\$29.95**

Press complete with one set of standard dies. .... **\$47.95**



### C-H 333 3-Station "H" Press

A heavy (12 lb.) H-type press that allows either two or three die sets to be positioned and left in place during reloading operations. Special bearing surfaces make for smooth operations and allow needed "feel" for primer seating. Performs every reloading operation; handle is offset and comes with the primer catcher. Price with three rams, three shell holder heads, one primer arm (specify large or small), primer catcher .... **\$49.50**

Extra primer arm .... **\$2.00**

Shell holder heads .... **\$2.50**



### CAMDEX Reloading Machine

This electrically operated loading machine can produce 2400 completed rounds per hour. It is a cam operated index loader that comes with a T-C resizing die, a "Fail Safe" primer control system and an automatic inspection system for powder deviations. Machine comes ready to operate with conversion kits available to load any center fire pistol caliber and several rifle calibers. A lease plan is available from the manufacturer .... **\$3975.00**





EAGLE



HERTER'S M81



HERKNER



HERTER'S M234

### EAGLE Cobra 3 in 1 Press

Cast aluminum alloy, lightweight (6½ lb.) double C-type press is designed for heavy duty. Three mounting holes in the pre-stressed base and down-stroke operation make it suitable for bullet swaging, case forming and reloading. Price includes ram and priming arm. .... **\$26.95**

With shell holder head, Eagle Blood case-lube, one set of rifle or pistol dies, priming arm and ram. .... **\$42.50**

### HERTER'S Model 81 Super

In effect, two Model 3 Herter tools combined. Strong enough for all reloading or swaging: will resize two cases at once. Comes with two shell holders and primer arm ..... **\$44.47**

### HERTER'S 234 Super Turret

Identical to Super M3 except for a heavy duty 6-station turret. A round can be completely reloaded without removing the case from the shell holder.

Indexing of the die plate is on the turret lathe principle, insuring correct alignment. 5 stations take standard ⅝-14 dies, the 6th is tapped 1¼-18 to accommodate Herter's shotshell dies. Supplied with ⅝-14 or ⅝-30 (Ideal) adaptors so that the 6th station may also be used for rifle and pistol dies. With shell holder and primer arm ..... **\$46.47**



W.H. ENGLISH

### HERTER'S Super M3 Press

Heavy semi-alloyed steel frame with 2" I-beam type webbing provides ample strength for all reloading operations and bullet swaging.

Threaded for 1¼-18 shotshell dies and furnished with choice of ⅝-14 or ⅝-30 inserts for metallic cartridges. 3½" stroke adequate for all magnum cases. Takes only Herter's removable shell holder heads.

With shell holder and primer arm (give types wanted) ..... **\$18.97**

### W. H. ENGLISH Pak-Tool

Designed for the handloader who lacks room or facilities for a bench tool, it's ideal for the bench-rest shooter, the varmint hunter, the man back in the bush or the rifleman who likes to load at the shooting range.

The leverage of the Pak-Tool makes full length sizing of such cartridges as the 357 and 44 Magnums possible. For rifle cartridges the Pak-Tool neck sizes only. The Pak-Tool is 100% straight line in all operations. Price complete for one standard rifle caliber. .... **\$29.50**

Handgun calibers. .... **\$34.50**



HERTER'S O

### HERKNER Champ Heavy Duty Press

A massive (15¼ lbs.) tool that features short or long stroke for extra power; up-or downstroke; heat-treated pins and link block, plus a lifetime guarantee. Price includes primer arm and shell holder and primer catcher ..... **\$18.75**

### HERTER'S Model "O" Press

Heavy duty O-type press for all reloading operations and bullet swaging. Stroke may be shortened, for swaging bullets, to 2½" by shifting toggle linkage. Tool steel ram 1.180" in diameter, screw-locked detachable shell holder heads. Threaded for standard ⅝-14 dies. With shell holder and primer arm ..... **\$44.47**

### HERTER'S Model U3 Super

Heavy-duty U-type press that has an O-frame plus a triple web C-frame made as one. Semi-steel alloy frame, extra large piston ram 1.180" in diameter with 3½" stroke. Shell holders lock into position with set screw. Tapped for all ⅝-14 dies. Press is suitable for all reloading operations including swaging. Comes complete with primer arm and shell holder (specify sizes) ..... **\$22.47**



## HERTER'S Hand Loading Tool

A simple, low-cost, portable tool for reloading rifle and pistol cartridges. Complete for one caliber, only a soft hammer or mallet and components required to produce ammunition. Available in most popular rifle calibers, instructions and charge table are included ..... **\$7.89**



## HOLLYWOOD "Senior" Turret Tool

Same superb quality and features as the regular "Senior" except has 3-position turret head. Holes in turret may be had tapped  $1\frac{1}{2}$ " or  $\frac{7}{8}$ " or with 4 of each. Height 15", weight 47 lbs. stripped. Comes complete with one  $\frac{1}{2}$ " die shell holder bushing, turret indexing handle, and one  $\frac{5}{8}$ " tie-down rod for swaging. ... **\$99.50**  
Primer Rods, small or large. .... **\$5.25**  
Shell holders. .... **\$4.00**



HOLLYWOOD TURRET



HOLLYWOOD SR.

## HOLLYWOOD "Senior" Reloading Tool

A massive (43 lbs. stripped) tool with leverage and bearing surfaces ample for the most efficient operation in reloading cartridges or swaging bullets. The castings are heat treated Meehanite. Precision ground  $2\frac{1}{2}$ " pillar, in one-piece construction with base. Operating handle of  $\frac{3}{4}$ " steel 15" long gives tremendous leverage and ease of operation with a downward stroke for case sizing or bullet swaging.  $\frac{5}{8}$ " steel tie-down rod furnished for added strength when swaging bullets.

Heavy steel toggle and camming arms held by  $\frac{1}{2}$ " steel pins in reamed holes. Extra holes are drilled for greater leverage in bullet swaging.

The  $1\frac{1}{2}$ " steel die bushing takes standard  $\frac{7}{8}$ -14 dies; when bushing is removed it allows the tool to accept Hollywood shot-shell dies. .... **\$75.00**



LACHMILLER M400



LACHMILLER 707

## LACHMILLER Model 400 Press

A heavy duty reloading tool made from the finest materials. The main casting is completely machined in one fixture without removal, thus insuring correct alignment of all parts. Die station threaded  $1\frac{1}{4}$ -18 for shotshell loading;  $\frac{7}{8}$ -14 adapter is furnished to handle standard reloading and swaging dies. Downstroke operation.

Included is a primer catcher (this tool does not re-prime) and one shell holder (state caliber). .... **\$37.50**

## LACHMILLER Olympian 707 Press

The double angles of this open-frame design give easy access to the shell holder while offering maximum strength and virtual elimination of springing. Made of semi-steel, this 10 lb. press accepts all standard primer arms, rams and shell holders, (not included). .... **\$19.95**



## LEE Target Model Loader

Designed with the bench rest shooter in mind, this simple, economical tool loads target-quality ammunition at less than the cost of a conventional loading press. The loader features neck line reaming, positive straightline bullet seating, micrometer depth bullet seating. Set includes primer pocket cleaner, chamfer tool, case trimmer, Lee priming tool, neck reamer, bullet seater. All that's needed are the components. All parts are fully guaranteed and unit is available for most popular rifle calibers. Price, complete ..... **\$24.95**





### LEE LOADER Hand Loading Tool

The simplest, most economical tool available, it consists of a few dies to be used with a mallet or soft hammer for resizing, bullet seating and priming. Powder charges are measured with a charge cup. All parts of the Lee Loader are fully guaranteed and will be replaced free of charge if they break or prove defective in normal usage. Available for most popular rifle and pistol cartridges. .... **\$9.95**

### LYMAN Spartan Press

Identical to the Spar-T but has only one die station. Ram, \$3.50. Shell holder, \$2.50. Priming arm, \$3.25. Price of tool stripped. .... **\$17.50**

Spartan Auto-Primer Feed. Comes with both large and small primer tubes; also fits Pacific, C-H and RCBS Jr. .... **\$7.50**



SPARTAN



### LYMAN No. 310 Tool

Reloads pistol or rifle cartridges. A low-cost portable tool for smaller-quantity reloaders and those who want a compact and handy reloading outfit. An adjustable extractor hook and the Adapter Die let many rimmed or rimless cases be processed in the same handles. Price includes dies, etc. .... **\$18.50**

### LYMAN Spar-T Turret Press

Combines fast "turret-loading" with the strength and simplicity of the popular "C" press. Frame and 6-station turret are high-silicon iron castings. Verti-Lock Turret secured to frame by heavy duty  $\frac{3}{4}$ " steel stud provides positive stop, audible click indexing.

Turret locks rigidly for swaging; powerful leverage (25 to 1); up- or downstroke operation. Alignment ramp positions shell holder at top of stroke. .... **\$34.00**

Extras, needed: Ram, \$3.50, shell holder (specify caliber), \$2.50, priming arm, \$3.25.

All-American dies (specify caliber): Standard: **\$12.50**; Deluxe: **\$14.50**

Optional equipment: Spar-T auto. primer feed (as shown) .... **\$7.50**

55 powder measure (as shown) **\$19.50**

SPAR-T



ALL-AMERICAN



### LYMAN All-American Turret Press

Heavy-duty turret press for all rifle and handgun reloading operations. Faster than with any single station tool. 4-station turret takes standard  $\frac{7}{8}$ -14 dies. Can be set up with 3-die set and Lyman 55 powder measure or two 2-die sets. Up- or downstroke operation. Lyman's push-button, semi-automatic primer feed available at extra cost. .... **\$59.50**

### MINNESOTA SHOOTERS SUPPLY Heavy Duty "C" Press

This press, made of semi-alloyed steel, is guaranteed to full length resize, to reform cases and swage bullets with ease and precision. It features quick-removable shell holders, an automatic ram lock to keep the lever upright and straight line primer seating. Any  $\frac{7}{8}$ -14 dies can be used, and a  $\frac{5}{8}$ -30 insert can be had for Ideal dies. Price, stripped ..... **\$12.65**

The MSS 2C press is identical except it has swinging arm primer device **\$13.95**



MSS



## PACIFIC Pakit Tool

A handy, pocketable handloading tool offering true in-line neck sizing and bullet seating—built-in provision for crimping. Priming, sizing and seating are all done by a positive screw action—no hammer is needed. Specify caliber ..... **\$9.95**

Pakit reloading set includes Mesur-Kit —only components are needed to make ammo ..... **\$18.00**

PAKIT



MULTI-POWER

## PACIFIC Multi-Power "C" Press

This heavy-duty O-type press of high-density annealed iron is suitable for all reloading and case forming operations. Swinging toggle multiplies leverage. All bearing surfaces are hardened and ground—links are of steel for maximum strength. Takes standard  $\frac{7}{8}$ -14 dies and snap-in shell holder heads (not included). Comes with priming arm ..... **\$48.00**

Multi-Power "C" reloading set includes press, primer catcher, set of dies and shell holder head (specify) and Pacific Reloading Manual ..... **\$66.00**

## PACIFIC Power "C" Press

Does all reloading jobs, including full length sizing and case forming. Offset handle locks in "up" position—downstroke operation only. Takes standard snap-in shell holder heads and  $\frac{7}{8}$ -14 dies (not included). Comes with priming arm ..... **\$30.00**

Power "C" reloading set includes press, primer catcher, set of dies and shell holder head (specify) and Pacific Reloading Manual ..... **\$48.00**

RCBS ROCK CHUCKER



POWER C

## PHELPS Turret Reloaders

A finished round of 38 Special ammo is produced every time the press handle is pulled. Occupies little bench space yet can make 1000 rounds per hour with accessory auto shell turning plate and case feeder. Consistent powder charges independent of magazine column height. Other built-in safety devices prevent double-charging, primerless cases, etc. Comes with carboloy dies, transparent powder magazine, 100 primer pickup and primer flipper. State bullet type and powder charge when ordering. .... **\$252.50**

Automatic shell turning plate. **\$37.50**

Case feeder. .... **\$39.50**



PHELPS TURRET

## PHELPS Deluxe Turret Reloaders

Same features and construction as standard Turret Reloaders but loads other handgun calibers with interchangeable accessory tool heads. These tool heads are quickly and easily changed—each has complete set of carboloy dies and 100-primer pickup. 45 ACP tool heads are supplied with taper crimp die at no extra cost. Uses the same auto shell turning plate and case feeder as their standard model (extra). .... **\$287.50**

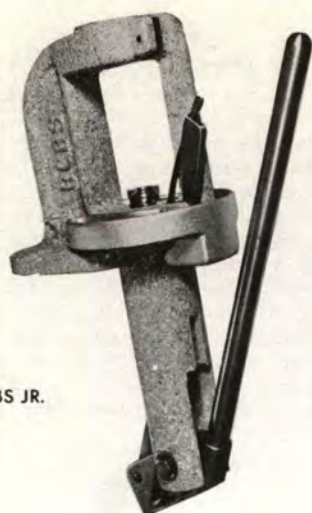
Extra Tool Head for either 38 Special or 45 ACP. .... **\$97.50**

## RCBS Rock Chucker Press

Using the familiar RCBS Block "O" frame design to reduce springing and allow plenty of room to process cartridges up to the magnums, the Rock Chucker, with down-stroke compound leverage system, eases reloading chores. This 20 lb. press comes with removable "snap-action" shell holder head. .... **\$54.00**

Rock Chucker Combo includes rifle or pistol dies (specify caliber) primer arm, primer catcher and poly-bottle of case lube. .... **\$64.50**





RCBS JR.

### RCBS Model "Jr" Press

Rugged "O"-frame design resists springing. Changes to up- or down-stroke in minutes—nothing extra to buy. Standard  $\frac{7}{8}$ -14 dies. Ample leverage to do all reloading and case forming. .... **\$33.00**

Reloader Special—includes: RCBS "Jr" Press, primer catcher, removable head type shell holder, universal primer arm, one set of RCBS dies, plus free RCBS resizing lubricant. Available in most popular calibers. Specify caliber. Regular \$48 value. .... **\$43.50**



RUHR-AMERICAN M6

### RUHR-AMERICAN Model 6 Press

Heavy cast iron "C" frame, tapped for  $1\frac{1}{8}$ -18 shotshell dies; insert furnished for  $\frac{7}{8}$ -14 dies. Shell holder locks into ram head with two set screws (tolerance for alignment with die). Ram is  $1\frac{1}{4}$ " diam. with  $3\frac{1}{2}$ " stroke. Downstroke operation. Press comes with primer arm of choice, less dies ..... **\$18.97**

### RUHR-AMERICAN Model 66 Magnum Press

Similar to M6 except: fitted with two shell holders and two die stations for simultaneous sizing/seating operations. Uses  $\frac{7}{8}$ -14 dies. Works on downstroke. (Not Illus.) ..... **\$44.47**



### REDDING-HUNTER No. 24 E-Z "C" Press

The toggle linkage of this ferrous alloy press makes it an "easy" to use tool. Ram has extra long bearing surface for better alignment and long wear, can be changed for up- or down-stroke motion. Uses standard  $\frac{7}{8}$ -14 dies, snap-in shell holders and \$7.50 No. 19-T auto-primer feed (not included). .... **\$34.50**



### REDDING No. 7 Standard "C" Press

Made from ASTM #30 ferrous alloy, has a  $3\frac{1}{2}$ " stroke, will accept Redding auto primer feed and spent primer catcher. Up- or downstroke operation. Performs all reloading operations, including full length resizing and case reforming. Mounting bolts supplied.

Press complete including handle, linkage, ram, frame and primer arm. **\$23.50**

Kit form includes press, shell holder, case lube, and one set of dies. .. **\$36.50**

Shell holders, universal. .... **\$2.50**

Primer arm, universal type. .... **\$3.50**

Dies, most calibers. .... **\$13.50**



### REDDING-HUNTER No. 25 Turret Press

Machined ferrous alloy castings and toggle leverage system combine with a 4- or 6-station turret head for increased ease and speed in reloading metallic cases. Up- or down-stroke operation without strain or movement of the turret. Ram uses standard shell holders. Turret accepts  $\frac{7}{8}$ -14 dies. Complete with one 4 or 6-hole turret. .... **\$49.50**

Extra turrets. .... **\$12.50**



### SAECO Match-Precision Reloader

Its rugged cast iron frame is made with the usual SAECO quality and precision. Threaded  $\frac{7}{8}$ -14 to accept standard dies, this press has an adjustable ram stop and lock which permit the use of the shorter and more economical SAECO Stubby Dies. Requires special SAECO shell holder.

Comes with Stubby Die set, shell holder, primer punch and extension tube. **\$34.75**

Shell Holders. .... **\$2.50**

Primer Punches. .... **\$1.00**

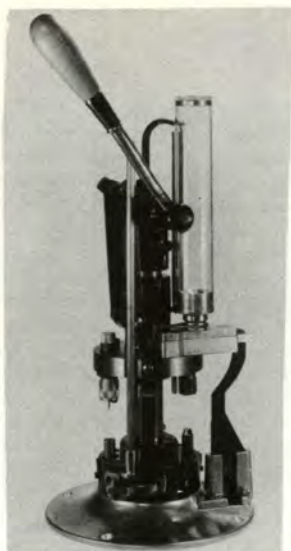


## STAR Progressive Reloader

Designed for fast, efficient reloading of 38 Special cartridges, this tool is unsurpassed in stability of continuous operation by any loader in the field. The non-adjustable powder carrier will throw as accurate a charge as can be metered, and all tools and dies are adjustably mounted in the tool head, performing their operations simultaneously. With each stroke of the operating lever, a loaded round is accurately completed.

Drilled and tapped for quick installation of the Hulme Automatic Case Feeder (described elsewhere). . . . . **\$270.00**

Complete for 38 Special with Lifetyme Carbide Dies. . . . . **\$280.00**



## STAR Universal Progressive Reloader

Handles all popular handgun calibers (38 Spl. and 45 ACP parts in stock), including 30 Carb., 357 and 44 Magnums; 44 Spl., 45 Auto Rim, 45 Colt. Same otherwise as the regular Star.

When ordering, specify powder charge and type, primer make, and send sample bullet. If no bullet is available, give complete description or catalog number. (Not illus.) . . . . . **\$310.00**

With Lifetyme Carbide Die. . . **\$320.00**

Extra tool head for one caliber with steel resizing die. . . . . **\$100.00**

With Lifetyme Carbide Die. . . **\$110.00**



TEXAN 256



TEXAN 301

## TEXAN 301-H3 Press

Heavy duty H-type press has wide access area for easy case handling. Strong 3-column design reduces springing to a minimum. Powerful leverage makes this press suitable for all reloading, case forming and bullet swaging operations. A complete 7/8-14 three-die set may be set up simultaneously—uses H-type rams and universal shell holders. Base is drilled for bench mounting. Price is for stripped tool except for universal priming arm and 3 rams. . . . . **\$69.95**



## TEXAN Loadmaster Model 101 T-II

7-station turret can take dies for 3 different calibers plus powder measure. Rugged 2-column press, long stroke. Reloads the big magnums, swages bullets. . . **\$82.00**

Model T-II complete with auto primer feed, universal ram and one shell holder head. . . . . **\$99.50**

Auto primer feed separately. . **\$22.50**

## TEXAN 256 Double "C" Press

Broached ASTM #30 ferrous alloy casting of double "C" design for strength without adding weight or bulk. One-piece off-set handle and toggle system gives more working room. Accepts standard 7/8-14 dies and snap-in shell holder heads. Comes complete with universal ram and primer arm. . . . . **\$29.95**



## TEXAN Model 156 Press

Loads all popular calibers including magnums; swages bullets. Features: alignment collar supports ram, keeps it true; frame bored and broached for precise alignment of ram with die; quick change to up- or downstroke. With primer arm and shell holder. . . . . **\$24.50**

Extra shell holders. . . . . **\$2.50**

Primer arm. . . . . **\$3.00**

Dies (per set). . . . . **\$15.00**



## Notes on Dies for Metallic Cartridges . . .

Rifle dies usually come in sets of two. The first deprimers, resizes. The second die seats the bullet and in some types also crimps the case mouth into the cannelure ring in the bullet. An example of this is the 30-30 Winchester. This cartridge is usually carried in a tubular magazine so that pressure is constantly exerted against the nose of the bullet. As a result, the bullet must be solidly crimped to keep it from pushing back into the case. Recoil can also cause the bullet to be pushed back into the case in some instances.

There are also handgun dies in sets of two that work the same as rifle dies. The seater die of these sets is invariably a crimping die also. Nowadays, for im-

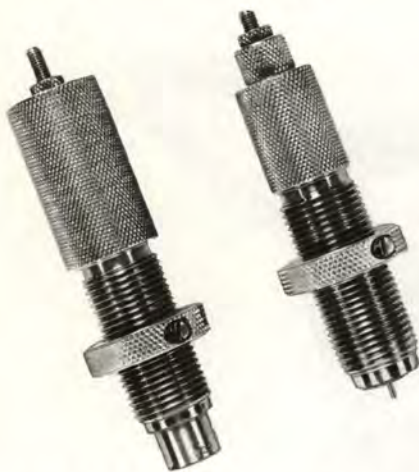
proved load quality, many handgun die sets consist of 3 or 4 dies. In these the first die simply resizes the case. The second die deprimers and expands the mouth of the case. The third die seats and crimps the bullet. In the four-die set the third die merely seats the bullet and the fourth die crimps the case mouth into the bullet. For the best and most accurate ammunition, it is always advisable to seat the bullet in one operation, then crimp the bullet in a second operation.

For the man who reloads thousands of cases a year, a sizing die with a carbide insert is the type he needs. This ring of extremely hard tungsten carbide will resize a half-million cases before any wear

shows! Ordinary steel dies won't, generally, process a third this many. Furthermore, cases don't have to be cleaned when using carbide dies. Dirty cases won't scratch the dies nor will the dies scratch the cases. Instead, the cases come out highly polished.

Some manufacturers offer presses that will use only their dies. When buying replacement dies always be certain that you specify the press in which the dies are to be used. Lyman and SAECO are two firms that offer special-size dies.

Some dies are chrome-plated, some are not. If proper case lubrication is used there is little difference between the life of these two types of dies.



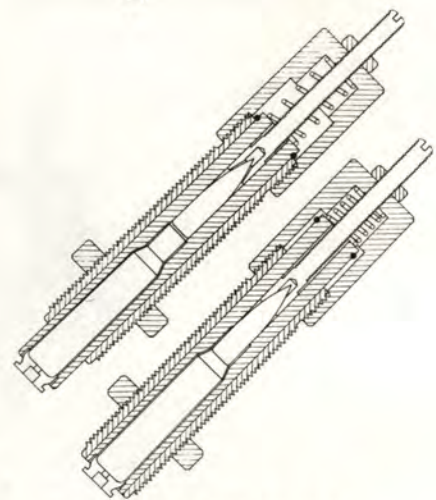
### BONANZA Co-Ax Dies

Made of hardened and polished steel. Expander button is located high on the decapping stem, thus it expands the neck while the latter is still partly in the sizing position. Much less effort is needed, another feature. Seating die features optional crimp. All dies  $\frac{7}{8}$ -14 with split locking ring. Available for most rifle and pistol calibers. . . . . \$15.00



### BELMONT Quick-Change Inserts

For use with presses having 1 $\frac{1}{4}$ -18 threaded die stations. Bushing screws into press, dies screw into inserts. The die/insert slides into bushing and is locked by a half-turn. Insert for  $\frac{7}{8}$ -14 or  $\frac{7}{8}$ -30 dies. Price includes bushing and two inserts, complete . . . . . \$7.50  
Extra inserts . . . . . \$2.00



### BONANZA Co-Ax Bench Rest Dies

Case is supported full length in seating die. Inner sleeve holds case and bullet concentric, while outer sleeve seats bullet. Coaxial design simulates hand-seater efficiency but functions in a press. Seating die is not hardened and does not crimp. Sizing die same as Co-Ax Die. Usable in most presses, these dies are available in 16 rifle sizes. . . . . \$16.50



### BAIR Precision Dies

Standard  $\frac{7}{8}$ -14 dies, carefully reamed, hardened by the carbon nitrate process to a Rockwell "C" 60 rating, and polished. 2-die rifle and 3-die pistol are standard sets.

3-die rifle sets. . . . . \$23.00  
3-die pistol set. . . . . \$15.00

### BELDING & MULL M26 Bullet Seater

Straight line, adjustable hand-type seater; crimps bullets in. Available for most popular calibers. (Not illus.) . . . . \$5.75  
M28 Imp. (for B&M press; does not crimp). . . . . \$2.50  
Expanding plug and neck die. . . \$3.60  
Bullet seater and plunger. . . . \$3.75  
Items above are for the B&M M28 loading tool.



### C-H 2-Die Rifle Set

Made of chrome-plated steel with a super-hard finish, C-H dies are available for over 500 cartridges. They fit all tools having a  $\frac{7}{8}$ -14 thread. . . . . \$12.50  
3-die rifle set (includes the C-H neck sizing die). . . . . \$16.95



## C-H "Pro-Hex" Dies

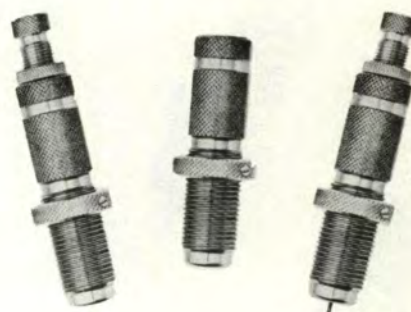
Of all steel construction, the "hex" shape allows the dies to be tightened into the press using a wrench—no pliers. These 2-die sets come with a Tungsten Carbide expander ball to eliminate lubricating the inside of the case necks. Heavy duty decapping pin. Dies are satin finished with no chrome plated parts. Available in most popular rifle calibers and packaged in a plastic compartment box ..... **\$16.95**  
Carbide expander ball ..... **\$5.50**



PRO-HEX

## C-H 3-Die Pistol Set

3-die pistol sets eliminate many of the problems resulting from non-uniform cases or instances of varying wall thickness. These sets are available for all straight walled pistol cases. All C-H dies are made of steel, heat treated and satin finished. .... **\$13.50**



C-H

## J. DEWEY "K-O" Neck Sizing Die

This benchrest quality NS die is of the drive-in type and also serves as a primer decapper. Decapper rod is included. Die is custom made and four fired cases are required. Cases should be of the style being shot (reamed or neck turned) to assure proper fit and dimensions ..... **\$10.00**



J. DEWEY

## J. DEWEY Straight Line Seater

Straight line operation, this seater has a large square base to prevent tipping while in operation. Seating stems are carefully fitted to the lapped stem hole. Tool supports the neck and the base of the case in the die before the bullet is pressed into the neck. A firm push with the palm of the hand is all that is needed to seat the bullet. Complete ..... **\$20.00**



EAGLE

## EAGLE Reloading Dies

Eagle dies feature a different type of internal surface finish that prevents rust and works with die lubricant to eliminate stuck cases. Finish is guaranteed against peeling or flaking. Standard  $\frac{1}{8}$ -14 thread. Decapping and seating stems have hex heads for quick, easy adjustment. Available for popular rifle and pistol calibers. Die mounting bracket included. .... **\$15.00**





HART



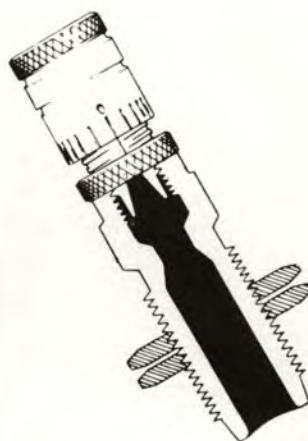
ECHO



HART



HERTER MARK I DIES



HERTER PRO MATCH DIES



HERTER MARK III DIES

## HERTER'S Automatic Dies

These two-die rifle sets have floating inner sleeves that align the case within the die—helping to produce concentric ammunition. Seating die is cut away so bullet can be seen. Dies are easily converted to another caliber with size die insert (\$2.76), decap unit (\$1.19) and seating insert (\$1.69). Both full-length and necksize-only dies are available for 22 popular rifle calibers and 22 Jet ..... **\$9.29**

## HERTER'S Mark I Dies

Standard  $\frac{1}{8}$ -14 thread, chrome plated. Bullet seating stems for any shape bullet. Extra wide knurled lock rings plus 2 extra decapping pins.

All Mark I dies are non-crimp except 45-70, 348 Win., 32 Win., 35 Rem., Carbine and handgun calibers. Crimp type dies can be backed off if crimping is not desired. Three die sets have bell-type expander.

2-Die sets ..... **\$6.89**  
3-Die sets ..... **\$8.89**

## HART Bullet Seater

Designed with the precision handloader/shooter in mind, this straight line bullet seater is adjustable for depth and is available for 222 Rem., 222 Magnum, 6x47, 308, 25-06 and 6mm Rem. The body, base and head are all made of stainless steel ..... **\$18.00**

## HART Sizing Die

Made of hardened steel, this die for the precision loader/shooter, is of the drive-in/drive-out type and is available in 222 Rem., 222 Mag., 6x47, 308, 25-06 and 6mm Rem. The knock-out rod decaps the case at the same time ..... **\$35.00**

## HERTER'S Mark III Dies

Threaded  $\frac{1}{8}$ -14, these include decapping and expanding units and feature visible bullet seating. Available in 30-06, 300 Sav., 308, 270, 243, 244, 303 Br., 6.5x55, 8x57, 222 Rem., 222 Rem. Mag., 284 Win., 300 7mm Mag. and 300 Weatherby calibers, these dies neck size only. Choice of expander nipple for lead or jacketed bullets ..... **\$7.39**

## HERTER'S Pro Match Dies

Like Mark I dies except: micrometer-type bullet seating stem which allows recording of settings. Double lock rings. Universal seating stems (except in 38 Spl. and 45 ACP; these have stems for RN or WC bullets). All are non-crimp except 45 ACP, 38 Spl. and 30-30. Crimp dies can be backed off if crimping not desired. 3-die sets have bell-type expander.

2-Die sets ..... **\$10.57**  
3-Die sets ..... **\$12.67**

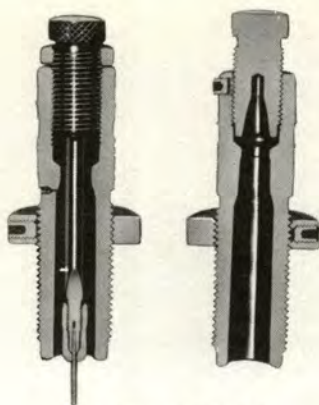
## HERKNER Echo Dies

Echo dies feature piloted seater plugs and open-end construction which permits removal of all parts through the top of the die. Thus, seating assemblies can be interchanged without altering settings. All die surfaces highly polished. No chrome-plating.  $\frac{1}{8}$ -14 thread. Double lock rings (two spanner wrenches furnished). 2-die rifle sets (69 calibers from 17 Javelina to 458), 3-die handgun sets ..... **\$7.25**





LIFETIME DIES



HOLLYWOOD DIES



LACHMILLER DIES

### LIFETIME Carbide Dies

Unconditionally guaranteed for 200,000 rounds, no lubrication is required, and dirty cases come out of the die with a polished, burnished appearance. They are made in  $\frac{7}{8}$ -14 thread for Star-Phelps tools, and can be had on special order for any press. .... **\$22.50**

### HOLLYWOOD 2-Die Sets

Precision made and finished. Standard  $\frac{7}{8}$ -14 thread. Seating dies are hardened like the sizing dies, important when loading crimped shells, as the crimping section of the die receives the most wear. Lock rings are  $1\frac{1}{2}$ " in diameter, with Allen type set screws. .... **\$13.50 to \$17.50**

Special dies ( $1\frac{1}{2}$ " threads to fit Hollywood Senior and Turret tools) made for such loads as 50-cal. MG, 416 Rigby, 500 Jeffery, 505 Gibbs, 577, 600 Nitro Express, etc. .... **\$35.00**

Special shell holders are available (specify caliber). .... **\$6.00**

### LACHMILLER 2-Die Set

Made of high grade steel only—no aluminum or alloy parts. Sizing dies are heat treated and lapped to a mirror finish. See die and shell holder chart for available calibers.  $\frac{7}{8}$ -14 thread. .... **\$13.50**  
3-die set. .... **\$13.50**

### LYMAN Tru-Line Jr. Dies

For reloading bottleneck rifle cartridges (neck sizing only) with Lyman Tru-Line Jr. press (adaptable to  $\frac{7}{8}$ -14 tools).

Full length sizes all handgun cartridges, plus 221, 22H, 218, 222, 222 Mag., 25-20, 223, 256, 30 M1, 32-20, 38-40, 44-40. **\$9.00**  
3-die set (handgun cartridges). . . **\$9.00**  
Full length resizing die. .... **\$5.00**  
Adapter,  $\frac{7}{8}$ -14. .... **\$1.00**

### LYMAN Ideal Dies

For #310 tong tool, either rifle or handgun. Neck sizes only. 6-piece set. Available for all popular calibers. Useable in  $\frac{7}{8}$ -14 threaded presses with adaptor. . **\$12.50**

### LYMAN $\frac{7}{8}$ -14 Dies

Deluxe type for bottleneck rifle cartridges with jacketed bullets. Full length resizer and P-A (precision alignment) bullet seater. 2-die set. .... **\$14.50**

3-die pistol set (includes Tungsten Carbide sizer, 2-step neck expander and seater). .... **\$22.00**

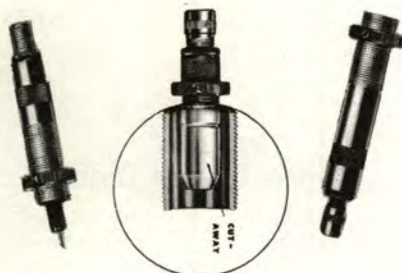
Standard 2-die rifle set. .... **\$12.50**

Standard 3-die rifle set. .... **\$14.00**

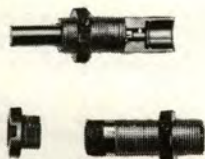
Standard 3-die pistol set. .... **\$14.00**

Two-step "M" neck expanding die for cast rifle bullets. .... **\$3.75**

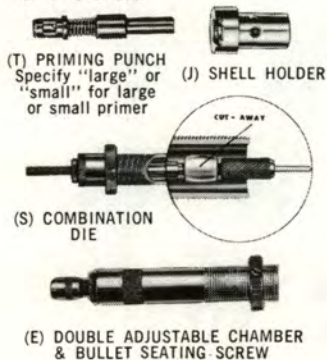
Precision Alignment seating die, with sliding inner sleeve. .... **\$7.00**



IDEAL DIES



#### For Rifle Cases



TRU-LINE JR. DIES



LYMAN DE LUXE AND T-C DIES

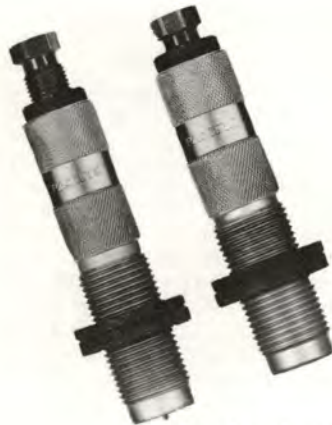




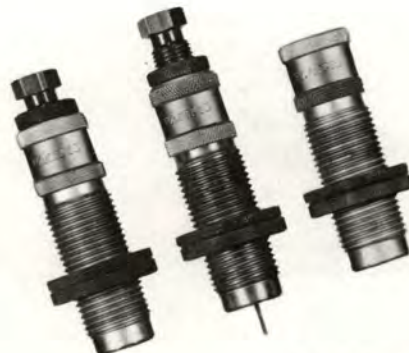
MSS 3-DIE SET



MSS BYSTROM



PACIFIC DURACHROME



PACIFIC DURACHROME

## LYMAN T-C Pistol Die

Tungsten carbide resizing and decapping die for 38 S&W (fits 38 ACP and 38 Super); 38 Spl. (fits 357 Mag.); 41 Mag.; 44 Spl. (fits 44 Mag.); 45 ACP, 45 Colt. **\$14.00**

## Minnesota Shooters Supply

Standard  $\frac{7}{8}$ -14 dies, hardened and chrome-plated. Heavy duty decapping stems, collet-type decapping pin locknut. Rounded expander plugs prevent shaving of necks. Universal seating stem in rifle calibers, RN or WC in handgun. Seating dies have built-in crimper for calibers normally requiring it. Jacketed bullet expander plug furnished unless otherwise specified. These 2-die sets available in all popular factory calibers and many wildcats ..... **\$4.49**

## MSS 3-Die Pistol Set

Includes steel dummy cartridge for setting-up seating die. Seating stems for both RN and WC bullets. Hardened steel. Available in 9mm Luger, 38 Spl., 357 Mag., 44 Spl., 44 Mag., 45 ACP and 45 Long Colt ..... **\$5.95**

## MSS Expander Die

Designed to serve as the third die of a 3-die set for handgun cartridges. In use, remove decapping rod assembly from sizing die and use in this expander die. Made only in 38 Spl., 357 Magnum, 9mm Luger, 45 ACP, 45 Long Colt, 44 Spl. and Magnum ..... **\$1.75**

## MSS Bystrom-Quality Dies

Similar to MSS regular die sets in form and calibers. Held to closest practicable tolerances and hand polished. 2 hex lock-nuts ..... **\$7.95**

## PACIFIC Durachrome Dies

Guaranteed for life. Heavy duty solid steel spindles with collet-type hex nuts to insure accurate alignment. Standard  $\frac{7}{8}$ -14 thread with steel lock rings. Adjustable crimper. Chrome plated finish. Cavities are polished after heat treating. Packed in plastic compartmented box with sizing lube and spare decapping pin.

2- or 3-die rifle set ..... **\$15.00**  
3-die pistol set ..... **\$15.00**  
3-die pistol set with carbide sizer **\$30.00**  
Carbide pistol sizing die only . **\$19.50**





PERFECTION  
CARBOLOY

## PERFECTION Carboloy Resizing Die

Custom reloaders and police departments report more than 1 million cases resized with one of these dies without loss of non-galling quality. They size even the dirtiest cases with a high polish—no scratch or gall marks. Size alignment and performance is guaranteed. Does not remove all of the flare from case mouth—makes bullet seating easier. Available in 38 Spl. and 45 ACP, threaded  $\frac{7}{8}$ -14. Other sizes available on special order. **\$22.50**

## RCBS 2-, 3-, 4-Die Sets

RCBS dies are manufactured to close tolerances on turret lathes (not on screw machines) and hand polished before and after heat treating. Threaded  $\frac{7}{8}$ -14. Decapping stems in calibers above 264 (6.5mm) are heavy-duty type. Seating dies have a built-in crimping which can be used at the operator's discretion. Special dies are available for semi-automatic rifles which require minimum-dimension cartridges for reliable functioning.

Four types of die sets are available: standard 2-die for bottle-neck rifle and handgun calibers, 3- and 4-die for handgun calibers, and a somewhat different 3-die set for straight-side rifle calibers, such as the old black powder numbers. **\$15.00 to \$37.50**

3-die set with RCBS tungsten carbide sizer. **\$30.00**  
4-die pistol set. **\$21.00**  
4-die set with RCBS tungsten carbide sizer. **\$37.50**

## RCBS Case Forming Dies

RCBS has long produced dies for forming hard-to-get cases from available brass. Prices vary, depending on the job to be done and the number of dies required. Making 22-250 cases from 30-06 brass, for instance, requires 4 dies, a reamer and an expander, at a cost of \$37.50. Dies not cataloged will be furnished on special order.



REDDING



REDCO



RCBS 3-DIE

## RCBS Neck Reamer Die Set

A  $\frac{7}{8}$ -14 die holds case securely by the neck while a piloted reamer is run in to remove excess metal, producing uniform, concentric walls. Ideal for reducing neck thickness resulting from repeated firing, also for producing correct neck wall thickness when forming cases from GI or other brass. Necessary in many case forming jobs and supplied on order with forming die sets.

Reamer only. **\$9.00**  
Reamer die only. **\$7.50**



## RCBS Die Box

Made of durable, green impact plastic this box will store any 2- or 3-die set and protect it from dust and dirt. Label on end of box for identification, another inside the lid to list pet loads for the dies. **.90¢**

## REDCO M-600 Universal S&C Die

One die accepts 10 interchangeable bullet retaining sleeves and 2 seating pins permitting it to seat and crimp all cases from 22- thru 35-caliber. Threaded  $\frac{7}{8}$ -14 for use in most presses. Bullet is inserted into retaining sleeve through cut-away wall of die and is held in alignment until case makes contact. Seating depth is adjustable. Price complete for one caliber, specify **\$12.95**

Extra retaining sleeves, per caliber, (specify) **\$2.50**

Extra seating pins; Small-22 to 280, Large-30 to 35 caliber (specify) **\$1.50**

## REDDING Model 10 Dies

Made from alloy steels properly hardened, ground, and finished, optically inspected and fully guaranteed. Available in usual calibers, singly, and in two die rifle and three die pistol sets.  $\frac{7}{8}$ -14 thread. (Not illus.). **\$13.50**

## RUHR-AMERICAN Mark II Dies

Heat treated finish,  $\frac{7}{8}$ -14 thread. Vent holes drilled before dies are reamed to prevent burring. Expander dimensions held to .0001". Seating stems for any shape bullet. Most popular calibers. (Not illus.) **\$8.89**

Mark III dies, same except neck size only **\$7.39**





WEATHERBY DIE



VICKERMAN SEATER



WILSON SEATER



SAECO STUBBIES

### SAECO Stubby Dies

For use in SAECO Match-Precision Press. Rifle dies neck size only, thus may be used with many different cartridges of the same caliber. Available in 22, 6mm, 25, 6.5mm, 270, 7mm, 30, 30-30 (thinner neck wall than larger 30-cal. cases), 8mm, 338. Expander-decapper and bullet seating stem included.

Handgun sets have full length resizers, function identically to "3-die pistol sets." Bullet seating stems available for RN and WC bullets. In 38 Spl., 357 Mag., 41 Mag., 44 Spl., 44 Mag., 45 ACP, 45 Colt. **\$9.50**

### WEATHERBY Loading Dies

Bullet is introduced into the sliding bullet guide in the cut-away at the side of the die. This insures alignment of the bullet and cartridge case during the bullet seating operation. Visual observation also simplifies bullet seating to the proper depth.  $\frac{3}{8}$ -14 thread.

3-piece set (includes neck sizing sleeve) in 270, 30-06 and all Weatherby Magnum cal. except 224, 378 and 460. . . . **\$17.50**

2-piece set, in 270, 30-06 and all Weatherby cal. . . . **\$13.50**

To neck size, a neck sizing sleeve is inserted into the bullet seating die. Not available for 224, 378 or 460 Weatherby Magnum. . . . **\$4.00**

Extra seating inserts, Weatherby calibers. . . . **\$2.00**

Universal bullet seating die. . . . **\$7.00**



TEXAN

### WILSON Sizers and Seaters Straight Line Full Length Resizing Dies

These dies place no strain on case rim, and correct headspace is assured at all times.

As regularly furnished, dies are adjusted to produce a resized case correct for rifles of normal headspace. A die for a rifle having less or more than normal headspace can be made (\$1.00 extra) if the customer will mail in several fired cases from his rifle.

Available in all popular calibers, including wildcats. . . . **\$9.00**

### TEXAN Micro-Bore Dies

Precision bored special alloy steel dies are hardened and lapped. Double hex-nut permits die adjustment to be secured with wrench. Standard  $\frac{3}{8}$ -14 thread to fit most presses. Available as 2-die rifle and 3-die pistol sets for most calibers. . . . **\$13.50**



WILSON F.L. SIZER

### WILSON Chamber Type Bullet Seaters

The case is aligned and supported by the chamber section from start to finish of seating, while the bullet is aligned and seated by the close-fitting plunger in the bore section. With this chamber type seater, the case is all the way "home" before any movement of the bullet takes place.

Seaters are available in all popular calibers. . . . **\$16.25**

### VICKERMAN Bullet Seaters

Straight line bullet seating, for finest accuracy. Made in 14 sizes, 22 to 458. Each will seat bullets for all cartridges in that size. Example: 22-cal. size will seat bullets for the 22 Hornet, 218 Bee, 219 Zipper, 22 Varminter, 220 Swift and any wildcat using .223" or .224" bullets. Standard  $\frac{3}{8}$ -14 thread. . . . **\$13.50**

Shell holder extensions are needed for the shorter cases. Example: 30-cal. size seats bullets in 30-40, 30-06, 300 Magnum, 30 Newton and 30-cal. wildcats. For the shorter 30-30 an extension shell holder is needed. One extension furnished with each 22, 25 and 6mm seater. Specify size needed.

Adjustments for seating depth easily made.

Shell Holder Extensions. . . . **\$1.25**





### Shell Holders and Rams\*

Make	Holder		Ram		Tools Fitted	Notes	Holder		Ram	
	C	H	C	H			C	H	C	H
Bair	x		x		Most C	Held by set screw.	\$2.50		\$5.00	
Bonanza	x		x		Most C	Snap-in action.	2.50			
C-H	x	x	x	x	Most H & C	Held by spring clip, relieved for primer clearance. Floating shell holder action.	2.50	\$2.50	3.50	\$2.50
Eagle	x	x	x		Most H & C	Permalube finishes shell holder.	2.50	2.75	3.75	
Echo	x		x		Most C types	Threaded head holders, 35 sizes. Special ram to fit standard RCBS and old Echo A, \$3.60.	2.50			
Herter	x		x		Herter only	Threaded holder fits M9 tool; slotted style fits M3, 81, 234, 9A, U3, 03, 0 Super and 3A Super.	.99		2.19	
Hollywood	Special				Most C types	Universal cartridge holder.	.99			
	Special				H'wood only	Order by caliber. Fit H'wood turret and standard presses. Price complete.		6.00		
Lachmiller	x	x	x		Most H & C	210 holder fits LEC ram; 206 fits C-H, etc.; 400 fits LEC 100 and 400 tools.	2.50	3.00	3.50	
Lyman	x	x	x	x	See notes	Solid H type (J) fits Lyman Turret and Tru-Line; C-type fits Spartan, Spar-T, Pacific, etc.	2.50		3.50	
McLean	Special				Most all	Universal cartridge holder.	6.00			
MSS	x		x		MSS only	Threaded. Specify cal. and MSS tool.	1.00		N.A.	
Pacific	x		x		Most C types	One-piece holder/ram also available for C tools, \$4.50.	2.50		3.50	
RCBS	x	x	x	x	Most H & C	Heavy duty style for bullet making, A2 or C press, \$4.50. Special ram required for A2, \$3.60. Head extension for all rams, \$3.00.	2.40	2.40	3.60	2.40
Redding	x		x		Most C types	Snap-in spring action holder. Supersedes M11, which fitted only Redding M7 press. Ram price includes upper and lower links.	2.50			
Texan	x	x	x	x	Most H & C	Holders available in 13 head sizes.	2.50	2.50	3.50	2.50
SAECO	x		x		SAECO only	Holders available in 21 head sizes to fit most popular cartridges.	2.50		N.A.	
Shoffstall	Special				All	Universal 3-jaw, spring-loaded, self-centering chuck handles all centerfire cases from Hornet to 45-70.	15.00	15.00		

\*All holders are detachable-head type except as mentioned in notes.



# Shell Holder and Die Chart

This chart lists over 100 of the more popular commercial and wildcat cartridges. The number or symbol above the diagonal line is the manufacturer's shell holder designation. Where no number or symbol is shown in the chart (but where die sets are indicated), order the shell holder by caliber.

The number or symbol below the diagonal line (or in some cases alone in the box) shows that the manufacturer has die sets available for that caliber. Where an X is shown, the die set contains two dies; where the die set contains 3 dies, this number is shown.

This chart is, of necessity, incomplete. Most die manufacturers are constantly adding new calibers, particularly

in the wildcat field. RCBS and C-H can supply hundreds of sizes not shown here due to space limitations. Write them about dies not listed. Weatherby can supply dies for his line of cartridges, plus 270 and 30-06. Shoffstall will make his universal shell holder to fit any tool.

Herter's shell holders as listed here fit their presses only. However, they also supply conventional interchangeable heads.

SAECO Stubby and Lyman 310 dies neck size only. The Stubby dies (sizer, seater and extensions) of a given caliber load all cartridges of that caliber (i.e., 22 dies load Hornet, Bee, Zipper, etc.); only exception is in 30 caliber, where the 30-30 requires special dies.

Caliber	Lyman															
	Bonanza	RCBS	Pacific/Bair	Lachmiller	310	Tru-Line	All American	C-H	Hollywood	Herter's	SAECO	Echo	MSS	Redding	Texan	Eagle
218 Bee		1/X	7/X	3/X	/X	10/X	10/X	3/X	/X	11/X	1/	9/	11/X	3/X	3/	3/X
219 Donaldson		2/X	2/X	2/X	/X	6/X	6/X	2/X	/X	2/X	2/	3/	2/	2/X	2/	2/X
219 Zipper		2/X	2/X	2/X	/X	6/X	6/X	2/X	/X	2/X	2/	3/	2/X	2/X	2/X	2/X
219 Zipper Imp.		2/X	2/X	2/X		6/X	6/X	2/X	/X	2/X	2/	3/	2/	2/	2/	2/
22 Hornet		12/X	3/X	/X	/X	4/X	4/X	/X	/X	4/X	12/	7/X	4/X	14/X		/X
22 K-Hornet		12/X	3/X	/X	/X	4/X	4/X	/X	/X	4/X	12/	7/	4/X	14/X		/X
22 R2 Lovell		10/X	/X	/X	/X	19/X	19/X	/X	/X	13/	10/	17/	13/		3/	
22 Hi Power		2/X	2/X	2/X	/X	6/X	6/X	2/X	/X			3/	2/	2/X	2/	2/X
22-250		3/X	1/X	1/X	/X	2/X	2/X	1/X	/X	1/X	3/	1/	1/X	1/X	1/X	1/X
222 Rem.		10/X	16/X	222/X	/X	26/X	26/X	/X	/X	5/X	10/	14/	5/X	10/X	222	222
222 Rem. Mag.		10/X	16/X	222/X	/X	26/X	26/X	15/X	/X	5/X	10/		5/X	10/X	222	222
224 Weatherby		27/X	17/X	224/X	/X	3/X	3/X	/X		28/				6/X		/X
225 Win.		11/X	18/X	4/X	/X	5/X	5/X	1/X		26/X	11/	5/	6/	4/X	1/X	1/X
220 Swift		11/X	4/X	4/X	/X	5/X	5/X	4/X	/X	26/X	11/	5/	6/X	4/X	4/X	4/X
220 Rocket		11/X	4/X	4/		5/	5/	4/X		26/			6/	4/	4/	4/
240 Weatherby		3/X	1/		/X	2/X	2/X	1/		1/	3/	1/	1/	1/	1/	1/
243 Win.		3/X	1/X	1/X	/X	2/X	2/X	1/X	/X	21/X	3/	1/X	1/X	1/X	1/X	1/X
244 Rem.		3/X	1/X	1/X	/X	2/X	2/X	1/X	/X	1/X	3/	1/	1/X	1/X	1/X	1/X
6mm Rem.		3/X	1/X	1/X	/X	2/X	2/X	1/X	/X	1/X	3/	1/	1/X	1/X	1/X	1/X
6mm—250		3/X	1/	1/		2/	2/	1/X		1/	3/	1/	1/	1/	1/	1/
6mm—270		3/X	1/	1/		2/	2/	1/X		1/	3/	1/	1/	1/	1/	1/
6mm—06		3/X	1/	1/		2/	2/	1/X		1/	3/	1/	1/	1/	1/X	1/X
6mmX61 SH		4/X	5/	6/		13/	13/	6/X		18/	4/	25/	18/	6/	6/	6/
25 Krag		7/X	11/	8/		7/	7/	8/X	/X	3/	7/X	8/	3/	8/	8/	8/
25 Rem.		19/X	12/X	5/X	/X	15/X	15/X	5/X	/X	9/	19/	19/	5/X	5/X	5/	5/X
25-20 Single Shot		10/X				19/		/X	/X	13/	19/	19/	13/		3/X	
25-20 WCF		1/X	7/X	3/X	/X	10/X	10/X	3/X	/X	11/X	10/	9/	3/X	3/X		3/X
25-06		3/X	1/X	1/X	/X	2/X	2/X	1/X	/X	1/X	1/	1/	1/X	1/X	1/X	5/X
250 Donaldson		3/X	1/X	1/X		2/	2/	1/X	/X	1/	1/	1/	1/	1/	1/X	1/X
250 Savage		3/X	1/X	1/X	/X	2/X	2/X	1/X	/X	1/X	3/	1/	1/X	1/X	1/X	1/X
257 Roberts		3-11/X	1/X	1/X	/X	8/X	8/X	1/X	/X	1/X	3-11/	4/	1/X	1/X	1/X	1/X
257 Weatherby		4/X	5/X	6/X	/X	13/X	13/X	6/X	/X	8/	4/	6/	8/	6/X	6/X	6/X
256 Newton		3/X	1/	1/		2/	2/	1/X	/X	1/	1/	1/	1/	1/	1/X	1/
6.5X54 MS		9/X	/X	1/	/X	28/X	28/X	2/X	/X		9/X	24/	1/	12/X	1/	/X
6.5 Jap		2/X	4/X	1/X	/X	2/X	2/X	/X	/X	26/X		23/	6/X	4/X	4/	/X
6.5X53		9/X		1/	/X	28/X	28/X	2/X	/X		9/	5/	1/	12/	1/	1/
6.5X53R		7/X	13/X	8/		7/	7/	8/X	/X	3/	7/		3/	8/	8/	8/
6.5X55		2/X	2/X	2/X	/X	27/X	27/X	13/X	/X	21/X	2/	3/	/X	1/X	2/	4/X
6.5X57		11/X	1/X	6/X		5/	5/	1/X	/X	26/	11/	25/	1/X	4/X	1/X	1/X
6.5 Rem. Mag.		4/X	5/X	6/X	/X	13/X	13/X	6/	/X	8/X	4/	6/	8/	6/X	6/	6/
264 Win. Mag.		5/X	5/X	6/X	/X	13/X	13/X	6/X	/X	8/X	4/	25/	8/X	6/X	6/X	6/X
270 Win.		3/X	1/X	1/X	/X	2/X	2/X	1/X	/X	1/X	3/	1/	1/X	1/X	1/X	1/X
270 Weatherby		4/X	5/X	6/X	/X	13/X	13/X	6/X	/X	8/X	4/	25/	8/	6/X	6/X	6/X
7X61 SH		4/X	5/X	6/X	/X	13/X	13/X	6/X	/X	18/	4/X	25/	18/	6/X	6/X	6/X
7mm Weatherby		4/X	5/X	6/	/X	13/X	13/X	6/X		18/	4/	6/	8/	6/X	6/X	6/X



Caliber	Bonanza	RCBS	Pacific/Bair	Lachmiller	310	Tru-Line	All American	C-H	Hollywood	Herter's	SAECO	Echo	MSS	Redding	Texan	Eagle
7X57	3-11/X	1/X	1/X	/X	2/X	2/X	1/X	/X	1/X	3-11/	1/	1/X	1/X	1/X	1/X	1/X
7mm-06	3/X	1/X	1/X		2/	2/	1/X		1/	1/	1/	1/	1/	1/	1/	1/
7mm Rem. Mag.	4/X	5/X	6/X	/X	13/X	13/X	6/X	/X	8/X	4/	6/	8/X	6/X	6/X	6/X	6/X
7.7 Jap	2/X	1/X	1/X	/X	2/X	2/X	1/X	/X	26/X	2/	1/	6/X	1/X	1/X	1/X	1/X
7.62 Russ.	13/X	23/X	/X	/X	17/X	17/X	/X	/X	7/	13/	17/	7/	15/X	7.62		7.62
280 Rem.	3/X	1/X	1/X	/X	2/X	2/X	1/X	/X	1/X	3/	1/	1/X	1/X	1/X	1/X	1/X
284 Win.	3/X	3/X	1/X	/X	2/X	2/X	1/X		1/X	3/	1/	1/	1/X	1/X	1/X	4/X
30 Rem.	19/X	12/X	5/X	/X	6-15/X	6-15/X	5/X	/X	9/	19/X	19/	9/X	5/X	5/X	5/X	5/X
30 M1 Carbine	17/3	22/3	/3	/X	19/X	19/X	/X	/X	15/3	17/	21/	15/X	22/3	/X		/X
30-30 WCF	2/X	2/X	2/X	/X	6-15/X	6-15/X	2/X	/X	2/X	2/X	3/	2/X	2/X	2/X	2/X	2/X
30-40 Krag	7/X	11/X	8/X	/X	7/X	7/X	8/X	/X	3/X	7/	8/	3/X	8/X	8/X	8/X	8/X
30-06	3/X	1/X	1/X	/X	2/X	2/X	1/X	/X	1/X	3/	1/	1/X	1/X	1/X	1/X	1/X
300 Sav.	3/X	1/X	1/X	/X	2/X	2/X	1/X	/X	1/X	3/	1/	1/X	1/X	1/X	1/X	1/X
300 H&H	4/X	5/X	6/X	/X	13/X	13/X	6/X	/X	8/X	4/	6/	8/X	6/X	6/X	6/X	6/X
300 Weatherby	4/X	5/X	6/X	/X	13/X	13/X	6/X	/X	18/X	4/	25/	8/	6/X	6/X	6/X	6/X
300 Win. Mag.	4/X	5/X	6/X	/X	13/X	13/X	6/X		8/X	4/	6/	8/	6/X	6/X	6/X	6/X
303 British	7/X	11/X	8/X	/X	7/X	7/X	8/X	/X	3/X	7/	8/	3/X	8/X	8/X	8/X	8/X
303 Sav.	2/X	2/X	2/X	/X	7/X	7/X	2/X	/X	3/	2/	5/		21/X	/X		/X
308 Win.	3/X	1/X	1/X	/X	2/X	2/X	1/X	/X	21/X	3/	1/	1/X	1/X	1/X	1/X	1/X
308 Norma Mag.	4/X	5/X	6/X	/X	13/X	13/X	6/X		8/X	4/	6/	8/X	6/X	6/X	6/X	6/X
32 Rem.	19/X	12/X	/X	/X	6/X	6/X	5/X	/X	9/	19/	19/	9/	5/	5/X	5/X	5/X
32 Win. Spec.	2/X	2/X	2/X	/X	6/X	6/X	2/X	/X	2/X	2/	3/	2/X	2/X	2/X	2/X	2/X
32-20 WCF	1/3	7/3	3/3	/X	10/X	10/X	3/X	/X	11/3	1/3	9/		3/3	3/X	3/X	3/X
32-40 WCF	2/X	2/X	2/	/X	6/X	6/X	2/X	/X	2/	2/	3/	2/	2/X	2/X	2/X	2/X
8mmX57	3/X	1/X	1/X	/X	2/X	2/X	1/X	/X	1/X	3/X	1/	1/X	1/X	1/X	1/X	1/X
8mmX56 M.S.	3/X	1/X	1/		2/	2/	1/X	/X	1/	2/	1/		1/X	1/		
8mmX57R	4/X	13/X	7/X		13/	13/	6/X	/X	3/	4/	6/					
33 Win.	14/X	14/X		/X	17/X	17/X	/X	/X	7/	14/	18/	14/	18/X	/X		/X
338 Win.	4/X	5/X	6/X	/X	13/X	13/X	6/X	/X	8/X	4/X	6/	8/X	6/X	6/X	6/X	6/X
340 Weatherby	4/X	5/	6/	/X	13/X	13/X	6/X		18/	4/	6/	8/	6/	6/	6/	6/X
348 Win.	5/X	25/X	/X		18/	18/X	/X	/X	14/X	5/	15/	14/X	20/X	348		348
35 Whelen	3/X	1/X	1/X		2/	2/	1/X	/X	1/X	3/	1/	1/	1/	1/X	1/X	1/X
35 Rem.	9/X	26/X	1/X	/X	2/X	2/X	14/X	/X	1/X	9/	1/	1/	1/X	1/	/X	/X
35 Win.	7/3	11/	8/	/X	7/3	7/3	8/X	/X	3/	7/	8/	3/	8/X	8/X	8/X	8/X
350 Rem. Mag.	4/X	5/X	6/X	/X	13/X	13/X	6/X		8/X	4/	6/	8/	6/X	6/	6/	6/
351 Win. S.L.	19/3	12/	/X	/X	6/3	6/3	5/X	/X	9/	19/	19/	9/	5/X	5/X	5/X	5/X
358 Win.	3/X	1/X	1/X	/X	2/X	2/X	1/X	/X	21/X	3/	1/	1/X	1/X	1/X	1/X	1/X
358 Norma Mag.	4/X	5/X	6/	/X	13/X	13/X	6/X	/X	3/	4/	6/	8/	6/X	6/X	6/X	6/X
9.3X72R	2/3	2/	2/		6/	6/	2/		2/	2/	1/	2/	2/	2/	2/	2/
38-55	2/3	2/	2/X	/X	6/X	6/X	2/X	/X	2/	2/	3/	2/	2/X	2/X	2/X	2/X
38-56	14/X				17/	17/	/X	/X	7/	14/	18/	7/				
375 H&H	4/X	5/X	6/X	/X	13/X	13/X	6/X	/X	8/X	4/	6/	8/	6/X	6/X	6/X	6/X
378 Weatherby	14/X				17/	17/X	/X	/X	7/	14/	18/	7/	18/X		378	
405 Win.	7/3	11/	8/	/X	7/X	7/X	8/X	/X	3/	7/	8/	3/	8/3	8/	405	
11mm (.43 Mauser)	15/X	2/		/X	20/3	20/3	6/X	/X		15/	26/		16/X			
444 Marlin	28/3	27/3	9/3	/X	14B/3	14B/3	8/X		28/3				19/X		8/X	
45-70	14/3	14/3	/3	/X	17/X	17/X	/X	/X	7/3	14/	18/	7/X	18/3		/X	
45-90	14/X			/X	17/X	17/X	/X	/X	7/	14/	18/	7/	18/			
458 Win. Mag.	4/3	5/3	6/	/X	13/X	13/X	6/X	/X	8/3	4/	6/	8/X	6/X	6/	6/X	
460 Weatherby	14/X				17/	17/X	/X		7/	14/	18/	7/	18/			
<b>HANDGUNS</b>																
22 Rem. Jet	6/X	6/3	12/X	/X	1/X	1/X	12/3		6/X	6/	2/	26/X	12/X	12/X	12/X	12/X
221 Rem. Fire Ball	10/X	16/X	222/X	/X	26/X	26/X	12/3		5/X	10/X	14/X		10/X	15/X		
256 Win. Mag.	6/X	6/X	12/X	/X	1/X	1/X	12/3		6/X	6/	2/	26/X	12/X	12/X	12/X	12/X
30 Luger	16/X	8/X	10/X	/X	12/3	12/3	/3		19/	16/	11/		13/3	11/X	/X	/X
32 Colt	10/3			/X	1/3	1/3	10/3	/X	25/			25/	10/3	10/3	10/3	10/3
32 ACP	17/3			/X	19/3	19/3	19/3	/X	5/	17/	21/		10/3	10/	/X	/X
32 S&W	1/3	1/	3/	/X	9/3	9/3	10/3	/X	25/	1/	10/		10/3	10/3	10/3	10/3
32-20 WCF	1/3	1/3	3/3	/X	10/3	10/3	19/X	/X	25/3	1/	10/		10/3	10/	10/	10/
38 Special	6/3	6/3	12/X	/X	1/3	1/3	12/3	/X	6/3	6/X	2/	26/X	12/3	12/3	12/3	12/3
357 Mag.	6/3	6/3	12/X	/X	1/3	1/3	12/3	/X	6/3	6/X	2/	26/X	12/3	12/3	12/3	12/3
38 Auto.	1/3	1/	5/X	/X	12/3	12/3	10/	/X	25/	1/	10/		11/3	/3		/3
38 S&W	6/3	6/3	12/X	/X	21/3	21/3	/3	/X	6/	6/	2/	26/	12/3	12/	/3	/3
380 Auto.	10/3	/3	5/X	/X	12/3	12/3	/3	/X	25/	10/	11/		10/3	/3		/3
38-40 WCF	4/3	9/3	9/3	/X	14B/3	14B/3	9/3	/X	23/	4/	13/	23/	9/3	9/3		9/3
9mm Luger	16/3	8/3	10/3	/X	12/3	12/3	/3	/X	19/3	16/	11/	19/X	13/3	/3		/3
41 Mag.	30/3	29/3	2/3	/X	30/3	30/3		/3	/3				21/3	/3		/3
44 Spec. & Mag.	18/3	11/3	8/X	/X	7/3	7/3	8/3	/X	22/3	18/X	8/	22/X	8/3	8/3	8/3	8/3
44 S&W Russ.	7/3	11/	8/X	/X	7/3	7/3	8/3	/X	22/	7/	8/	22/	8/3	8/3	8/3	8/3
44-40 WCF	4/3	9/3	9/3	/X	14B/3	14B/3	9/3	/X	23/3	4/	13/	23/	9/3	9/3	9/3	9/3
45 ACP	3/3	1/3	1/X	/X	2/3	2/3	1/3	/X	1/3	3/X	1/	1/X	1/3	1/3	1/3	1/3
45 Auto. Rim	8/3	31/3	12/X	/X	14A/3	14A/3	/3	/X	24/	8/	22/	24/X	17/3		45AR	45AR
45 Colt	20/3	32/3	12/X	/X	11/3	11/3	/3	/X	23/3	20/X	12/	23/X	19/3		45LC	45LC
455 Webley & Colt	4/3	9/	9/	/X	14B/3	14B/3	/3	/X	8/	4/	13/		9/3		455W	455W



## Notes on Powder Measures . . .

The powder measure is a distinct help in speeding up the reloading operation. Throwing loads accurate enough for most hunting purposes, they should not, however, be relied on when loading near-maximum or maximum charges. In any case, the powder measure must always be used in conjunction with an accurate powder scale, using the scale to check the accuracy of the first charge thrown and spot checking subsequent charges as the reloading operation continues. An inexpen-

sive (\$2.50 or so) set of *gram* weights will check your grain scale for accuracy.

Variations in charges thrown will depend on several factors, among them amount of powder in the hopper, size of powder grains and ability of the operator. Many measures have built-in baffles in the hopper to maintain a more even pressure on the powder going into the charge tube, but even with these it is wise not to let the powder level get too low, causing a decrease in pressure on the powder. In any

powder measure there is a slicing action on the powder as it is metered into the charge tube. In cutting the coarser powders the attendant slight jarring of the measure may result in a charge variance of 3 to 4 tenths of a grain. A precise, consistent operator will get less of a variation of powder charges — he will work the handle with the same speed and force, drop the knocker (if measure is so equipped) or gently rap the charge tube to settle the powder down into the metering chamber.



**BAIR  
Micro-Measure**

A micrometer adjusting screw permits the operator to record settings for reference and quick set-up. Large reservoir has a baffle to equalize powder pressure for more accurate charges. Wing nut fastens measure to base plate, which is mounted to the bench. Charges up to 100 grains can be thrown, visible through the plastic drop tube (two included) . . . . . **\$24.00**

**BAIR  
Pistol Measure**

Visible drop tube fits all cases. Wing nut fastens measure to a bench-mounted base plate. Price includes one fixed charge rotor (specify weight and powder). **\$15.50**

Extra rotor (specify weight and powder type) . . . . . **\$3.50**



**BONANZA "Bulls-Eye"  
Pistol Powder Measure**

Body of this measure is machined from steel. Rotors are machined from hard brass, drilled for charges of Hercules Bullseye Pistol Powder. Large capacity reservoir; contour of the measure will accept all pistol case sizes. Measure may be mounted to the bench and easily removed for operation with a reloading block. Price, complete with attaching bracket and choice of rotor . . . . . **\$14.95**

Extra charge rotors in following grain weights: 2.5, 2.7, 3, 3.5, 4, 4.5, 5.3, 5.5, 8.4 (for Hercules Bullseye Powder) . . . **\$1.50**

Extra rotor (blank with pilot hole) **\$1.50**



**BONANZA**

**BONANZA  
Bench Rest Measure**

The large plastic hopper may also be used as powder and shot funnel, and the lid is a primer turner. Easily read vernier on handle can be set by pouring a weighed charge into hopper. Adjustable for charges from 2½ grains of Bullseye to 95 grains of 4350. Minimal powder shearing. Hopper is quickly emptied by removing the charge bar. Two drop-tubes are supplied. . . . . **\$22.50**

Long drop tube . . . . . **\$2.50**

**EAGLE  
2 in 1 Powder Measure**

Delivers exceptionally uniform charges by use of a coaxial vernier type measuring tube. Threaded ⅜-14 for press mounting, this unit is supplied with two transparent drop tubes for all calibers from 22 to large-bore. Comes without stand. . . . . **\$26.95**

A #0 tube for 17 cal. and a #4 tube with outside taper for shotshells are available. Stand . . . . . **\$5.50**





HOLLYWOOD



BELDING & MULL

### HOLLYWOOD Micrometer Measure

Adjustable from  $2\frac{1}{2}$  grains of Bullseye to 93 grains of 4350. Disc baffle helps assure constant powder pressure on metering chamber. Hard-coated conical bearing surfaces for precise powder cutoff. Threaded  $\frac{7}{8}$ -14 to fit many presses; large lock ring secures measure to tool. Integral thumbscrew bracket for bench mounting. One drop tube (22-270 or 7mm-45) supplied. .... **\$33.00**

Extra drop tubes, **\$1.50**, special long shotshell drop tube ..... **\$2.50**

### BELDING & MULL Visible Powder Measure

The B&M measure feeds powder from the main hopper into a secondary reservoir as needed. Movement of the operating handle then fills the separate charge tube. With this method, powder density in the lower reservoir is near constant; this is believed to aid loading uniformity. **\$20.00**

With micrometer charge tube **\$22.00**  
Extra charge tubes, standard ... **\$3.00**  
Extra magnum charge tubes ... **\$3.50**  
Micrometer charge tubes ..... **\$4.75**  
Micrometer magnum tubes ..... **\$5.50**



HERTER M65



HERN R M45

### HERTER'S Model 65 Measure

Powder chamber loads and dumps in an absolutely vertical position. Maximum charge possible is 65 grains of IMR 4350. Dial lets you select any powder charge desired with no adjusting necessary.

Unit comes complete with drop nozzle for all sizes of rifle, pistol and shotgun cartridges ..... **\$16.97**

### HERTER'S M45 Deluxe Measure

Powder chamber dumps in a near vertical position. Built-in knocker. Micrometer adjustments. Powder chamber is  $\frac{3}{8}$ " diameter and the powder drum  $1\frac{1}{2}$ " diameter. Two integral baffles prevent powder from packing. Bench stand and tubes included with the measure ..... **\$14.47**  
"C" clamp adaptor for bench mounting the measure ..... **\$1.29**



LEE ULTRA  
ACCURATE



HERTER M40

### LACHMILLER Ultra-Accurate

This measure, which is designed for greatest accuracy, will throw 2.7 grains of Bullseye to 87 grains of 4350 using only one drum. A numbered metering screw makes returning to a desired charge very easy. Body casting is open in the front and powder may be seen as it drops. Hopper holds 1 lb. of powder. Two drop tubes are supplied with the measure. .... **\$24.95**

Stand for above ..... **\$4.95**

### HERTER'S Model 40 Measure

Powder hopper and drop tube are offset at a 45 degree angle. Drum is  $1\frac{1}{4}$ " in diameter. Micrometer powder chamber adjustment lets charges as little as  $\frac{1}{20}$  grain be thrown. Maximum charge is 75 grains of IMR 4064. Measure is furnished with a bench mounting stand and is also threaded  $\frac{7}{8}$ -14 allowing it to be mounted on a press. Can be converted to left-hand operation. Supplied with four different size drop tubes for loading 22 up to shotgun sizes. Price complete ..... **\$13.47**



## PACIFIC Deluxe Measure

Throws up to 100 grains per charge. All parts are precision finished. Equipped with large capacity powder hopper and micrometer adjusting screw for recording settings. Two plastic drop tubes included (22-30 cal. and 30-45 cal.) ..... **\$24.00**  
Extra drum (specify rifle or pistol) **\$7.50**



PACIFIC DELUXE



MSS

## MSS Powder Measure

Double baffles in the clear plastic hopper keep the powder level and volume in the secondary chamber uniform and of near constant density. The long, narrow powder chamber permits a small cut off diameter—an aid to accuracy.

Empties in seconds, all steel parts are chromed, the design allows the drop tubes (2 furnished) to clear the bench. .. **\$8.75**

## PONSNESS-WARREN Shot Baffles

These shot baffles assure a constant weight of one inch of shot over the shot bushing at all times, giving greater accuracy to the loads thrown and reduces the number of cut or deformed shot **\$1.50**

## LACHMILLER Pistol Powder Measure

A fixed-cavity drum utilizing inserts to reduce cavity to required charge of Bullseye or 2400. Will throw from 2 to 9 grains of Bullseye by ½-grain steps, 9 to 24 grains 2400 by 1-grain steps. Inserts held in place by a set screw; easily changed. Large, clear hopper, hard anodized body, all-caliber drop tube. .... **\$11.95**  
Extra insert ..... **\$1.50**  
Extra drum (without insert) .... **\$3.00**



LEC



OHAUS

## OHAUS Du-O-Measure

The single precision fitted steel drum contains two separate metering cavities for rifle or pistol charges. Selection of either cavity is made by placement of a lock screw. Conversion takes a matter of seconds. Cavity and body edges are honed and cut through coarse grained powders. All settings are made by micrometer-type adjustments. One pound reservoir with quick dump feature. Threaded ⅝-14, measure can be mounted on a press or to the bench. Comes complete with two drop tubes to accommodate all metallic cartridges, 22 through 45 caliber and a mounting bracket ..... **\$31.95**

## LYMAN No. 55 Measure

Calibrated slides and micrometer screws offer precise adjustments. Threaded drop tubes (large and small), and integral knocker are included. Stem is threaded for Lyman (and other) press mounting convenience. .... **\$19.50**  
1-lb. reservoir, extra ..... **\$3.00**  
Adapter for turret mounting ... **\$1.00**



LYMAN

## NORMINGTON Powder Baffles

A powder or shot measure accessory, these baffles maintain a 1" column above the measuring chamber. Charge weight is maintained within ⅓-grain—hopper level being unimportant. Specify measure when ordering. .... **\$1.50**



LEE

## LEE Powder Measure Kit

Contains 13 individual powder dippers and a slide rule chart listing 48 different powders. These are the simplest of the measuring devices; not recommended for maximum loads. Over 897 loads listed with the kit. .... **\$3.95**





RCBS

## RCBS Uniflow Measure

Big acrylic hopper. Measuring cylinders are ground and honed, have calibrated screw to record settings. Big cyl. holds to 110 grains of 4350; small one up to 60 grs. 4350 (specify which). Shank has  $\frac{7}{8}$ -14 thread. Stand plate, 2 drop tubes, included. .... **\$22.50**

With both cylinders ..... **\$27.90**

Stand (extra) ..... **\$6.00**



## PACIFIC Mesur-Kit

This simple measure screws onto powder can. Adjustable tube has graduations for easy set-up. Springloaded charge arm drops powder instantly—no bridging or clogging problems. Chart to set tube for more than 1000 loads included ... **\$8.50**

## PACIFIC Pistol Measure

This measure is designed primarily for pistol powders. The charge bar has interchangeable bushings that provide a wide range of charges. Price includes measure stand ..... **\$14.00**

Extra bushings ..... **\$1.50**



TEXAN

## No. 219 Measure

Micrometer adjustable flat drum measures all powders from small pistol to full rifle charges with accuracy. Added features are a built-in trickler, bench stand and optional  $\frac{7}{8}$ -14 adaptor for mounting directly on a press. .... **\$24.50**

Threaded Adaptor (not included) **\$2.75**

## REDDING #4 Standard Measure

Capacity from 0 to 100 grains. Powder pours directly from chrome-plated, adjustable and removable metering chamber into cartridge case. Includes mounting bracket. .... **\$12.50**

## REDDING #3 Master Measure

Measures charges from  $\frac{1}{2}$  to 100 grains. Micrometer-set measuring chamber has a lock screw (chart shows normal range of charges and setting to be used); large-capacity reservoir of transparent plastic, easily attached and removed, as is drop tube (takes 22 to 600 cal.). The drum, closely fitted to eliminate jamming by fine-grain powder, is easily removed. Critical areas are chrome-plated. .... **\$21.00**

Model 6 bench stand ..... **\$5.00**



PACIFIC



REDDING #4



## SAECO M-S Powder Measure

The Micro-Setting drum with click-dial adjustment is variable from 2 grains of Bullseye to 95 grains of 4350; it is ground undersize, hard chrome-plated slightly oversize, then finish ground to dimension within .0003". The inside bore is honed to a mirror finish and fitted to the drum to within .00006". .... **\$24.50**

For bench stand shown, add .... **\$4.00**





### HERTER'S Precision Powder Dripper

A tool for adding the last few kernels of powder to the powder scale pan. All steel construction, it is heavy enough to resist tipping .....\$2.37



### EAGLE Cobra

Just rotate the knob and powder trickles from the Cobra's mouth into the pan of your scale. Large capacity hopper and heavy metal base. ....\$3.75



### RCBS Powder Trickler

Very useful when weighing charges. Simply set measure to throw an underweight charge, then feed just enough powder to balance the scale with this handy device. ....\$3.60

### LYMAN "Little Grain" Dribbler

Allows exactness with a minimum of effort. Features a large reservoir, ideal height and an over-sized base to reduce the chances of tipping .....\$3.00



### OHAUS Powder Trickler

Featuring a large aluminum reservoir and heavy steel tip-resistant base, this unit provides the finger tip control necessary when adding small quantities of powder to the scale pan .....\$3.50



### BAIR Powder Dribbler

Adjust your powder measure to throw a slightly underweight charge. Use this tool to add powder, a granule at a time, until the exact weight is achieved. A necessity when loading for best accuracy or maximum loads. ....\$3.50



### BONANZA "Big Red" Trickler

Companion tool for the Bonanza powder and bullet scale, this handy item brings underweight charges up to proper reading by adding a few granules of powder at a time. Two piece construction. Ballast may be added for stability ...\$3.25



### REDDING Little Kernel

A companion to the Redding powder measure and scale, this trickler will add the necessary few kernels of powder when loading maximum or highest accuracy ammunition. ....\$3.50



### SAS Little Dripper

A finger-operated small powder hopper which adds a kernel or two of powder onto the scale pan. By setting the measure to throw slightly light charges, they can be brought to proper weight quickly with this handy item .....\$1.25



### C-H Powder Dripper

For use with most scales, a twist of the knob will dispense one kernel at a time to bring charge weights up to specifications. Has an extra large square base to minimize tipping. Base insert furnished allowing ballast to be added for additional stability .....\$2.45



## Notes on Powder and Shot Measuring:

One of the most important phases of shotshell reloading is the complete understanding of shot and powder measurement. Shot loading is simple if the hand-loader will follow the recommended charges in the various manuals.

In the case of powder charges, there is some misunderstanding about the meaning of "drams equivalent" and "bulk" and "dense" powders. Let's consider these.

Bulk powders were smokeless powders of a chemical composition which allowed them to be loaded "bulk for bulk"—that is, volumetrically equal—with black powder. This simplified reloading during the transition period between the black powder and smokeless powder eras. The last of these is Du Pont Bulk, but it is *not* a 100% bulk powder. According to the manufacturer, it produces about twice the chamber pressure of an equal amount of black powder. This should be kept in mind.

Dense powders, simply, are those (smokeless powders) which, because of their chemical makeup, have a higher specific gravity and deliver a greater amount of energy than an equal weight of bulk or black powder. They *dare not* be loaded

"bulk for bulk" with black powder as they create much higher pressures.

Drams equivalent. As explained by Du Pont, "a dram is a measure used for black powder and is normally used as a volume measure (although strictly speaking it is a weight measure equivalent to 1/16 oz. or 1/256 lb.). A certain dram charge of black powder imparts a certain velocity to a given weight of shot. For example, three drams of black powder with 1½ oz. of shot in 12 gauge gives about 1200 fps muzzle velocity. When the change to smokeless powder was made, the dram equivalent designation was used as a measure of the approximate power of the load *regardless of the actual powder charge*. For example, in 12 gauge, a 3 dram equivalent load with 1½ oz. shot gives a muzzle velocity of about 1200 fps. A method was devised to relate velocity and shot weight of commercial loads to the dram equivalent system, but modern loadings depart from the system in a number of instances."

"Some shooters mistakenly believe a low dram equivalent is synonymous with low pressure. This is not so, as all modern shotshells regardless of dram equivalent

marking, gauge, brand, powder or shot charge are loaded to approximately the same pressure level. Therefore, those who attach significance to the term 'dram equivalent' in respect to chamber pressure are in error."

*Many people—particularly owners of damascus-barrel guns—think that Skeet and trap loads are low pressure shells because of their relatively light shot charges, but the reverse is true; these are among the highest pressure loads available and should not be used in guns of questionable strength.—Ed.*

"The main problem is that people still confuse a 'dram equivalent' designation with a 'dram measure' of powder and this may be serious in the case of modern fast shotshell powders. Taking the density of black and smokeless powders into account, a volumetric 3-dram measure of such modern fast powders is approximately 40 grains (where a grain equals 1/7000 lb.) or about a double charge."

With this understood, any of the powder and shot measures, be they the simple dipper or mechanical measures, will do a good accurate job.



HERTER'S POWDER/SHOT MEASURE

### HERTER'S Powder/Shot Measure

Fully adjustable within a wide range of loads, this is the measure used on Herter's M72 loader. Powder and shot are thrown alternately with a to-and-fro movement of the lever; if desired, only one hopper may be filled. Comes with a bench stand and is also threaded 7/8-14 for mounting on loading tools ..... \$15.97

### HERTER'S Powder-Shot Dipper

Fully adjustable for both powder and shot, the settings of this solid aluminum measure may be firmly locked. This dipper NOT intended for dense smokeless powders ..... \$1.79

### HOLLYWOOD Shot Measure

Identical to the Hollywood powder measure except for having a patented tapered lead on the drum cavity's cutting edge. The wedging action of this lead displaces pellets, does not cut or deform them. Throws accurate charges of all shot sizes up to BB; maximum is 2½ oz. #9 shot. Furnished with flat bar and lock nut for attachment to bench or tool head, base is threaded 7/8-14 for use in most popular presses ..... \$33.00



HOLLYWOOD SHOT MEASURE



## Notes on Powder Scales . . .

Powder scales are probably the single most important tool in the handloader's kit. So many cartridges are today loaded to near-maximum that it is important to know precisely what the powder charge is. A few grains over may cause severe damage to the firearm and to the shooter.

Powder scales vary greatly in both price and quality. Generally, you get what you pay for, but some quite inexpensive models do an adequate job. The critical parts of

a scale are the knife edges and the bearing surfaces that these knife edges rest upon. They must be hardened and ground correctly, then polished. Keep them clean and free of rust, but don't use an ordinary oil. A siliconized fluid will work fine, in most cases.

Powder scales that have graduated beams with sliding adjustments must have these beams properly machined, calibrated and checked, otherwise incorrect

readings will result. Notches should be deep enough that the sliding weights will not easily be moved by accident.

Precision weights are available so that any scale can be checked to make certain the marked weights are correct. Once this zero is known, the scales may be used with complete confidence. Many scales have one or more built-in levels and/or leveling screws. Most scales must be level or they won't give the correct reading.

### BAIR Magna Damp

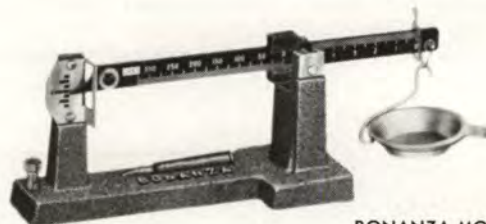
Magnetic damper speeds weighing of charges up to maximum capacity of 509.9 grains. Accurate to within  $\frac{1}{10}$ -grain, the black anodized beam has large white numbers for easy readability. . . . . **\$19.50**



BAIR MAGNA DAMP

### BONANZA Model C

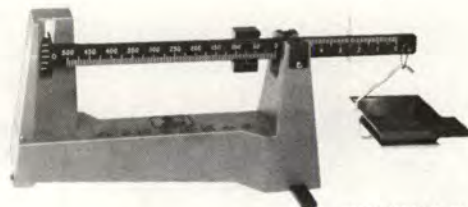
This scale features a beam made of "Marlon-Lexan", a non-conductive, non-magnetic material, allowing the beam to be free from static electricity. Scale is accurate to  $\frac{1}{10}$  grain and sensitivity is guaranteed to  $\frac{1}{20}$  grain with a capacity of 330 grains. For weighing both powder and bullets. This scale does not have an oil or magnetic damping device. Has a leveling screw for convenient zeroing. Price, complete . . . . . **\$11.95**



BONANZA MODEL C

### BONANZA Model M

Scale has a big 505 grain capacity for weighing powder, shot and bullets. Ounces to grains conversion scale cast into the base. Tempered stainless steel poise. The agate "V" bearings minimize friction for more accurate readings. Beam and pan are made from "Lexan" while base is moulded from Cycloc. Three point suspension, guaranteed accurate to  $\frac{1}{10}$ -grain. Magnetically damped for quick, true readings . . . . . **\$17.50**



BONANZA MODEL M

### C-H Powder and Bullet Scale

This scale features a chrome plated brass beam, graduated in 10 grain and  $\frac{1}{10}$ -grain increments. The pan has a convenient pouring spout and there is a leveling screw on the base. All metal construction. Scale has a maximum capacity of 360 grains **\$12.95**



C-H

### HERTER'S Model 2

Scale has three level adjustment screws; two for cross level, one for zero. Beam lift saves wear on knife edge bearings when scale is not in use. 325-grain capacity with  $\frac{1}{20}$  grain accuracy. Chrome plated brass beam clearly graduated. Has Herter's instant reading stabilizer for quick weight readings . . . **\$11.67**

Clear plastic dust cover for scales . . . . . **\$1.98**



HERTER 2

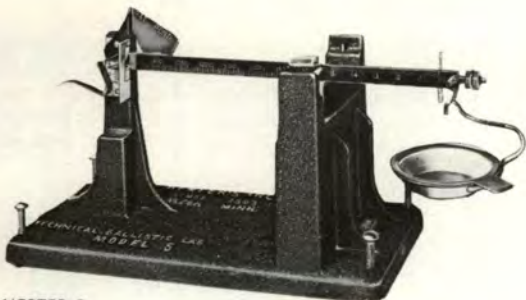




HERTER B

## HERTER'S Model B Stabilized

325-grain capacity, accurate to  $\frac{1}{10}$  grain. Has three rubber mounted level adjustment screws; built-in precision cross level and safety beam lift to lift the knife edge off the scale bearings when not in use. Has Herter's instant stabilizer to give readings at the touch of a finger ..... **\$11.67**



HERTER 5

## HERTER'S Model 5

This scale has a torsion wire balance at the fulcrum of the beam, replacing the usual knife edges. Four leveling screws are included, as well as a cross-level.  $\frac{1}{20}$  grain accuracy.

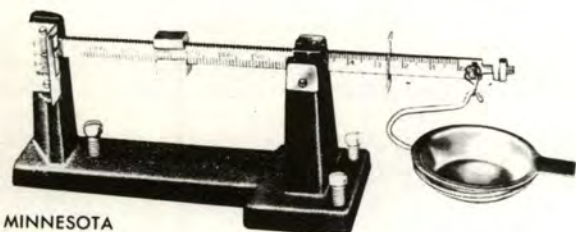
The frame is rubber mounted and a patented stabilizer at the pointer end gives correct readings with a finger touch. 325 grain capacity; built-in oil damper; chromed brass beam carries sharp divisions and colored numerals ..... **\$15.67**



HERTER MS-4

## HERTER'S MS4

The heavy die-cast base of this scale has two level adjusting-screws with rubber feet. Clearly graduated beam has replaceable swivel bearings. Accuracy of  $\frac{1}{20}$  grain, maximum capacity 500 grains. A copper insert in a magnetic field is used as a damper on this model ..... **\$13.67**



MINNESOTA

## MINNESOTA SHOOTERS SUPPLY

Precision made with lock beam design and  $\frac{1}{10}$  grain over-under graduations under pointer. Capacity 325 grains, sensitivity  $\frac{1}{20}$  grain. .... **\$6.95**



OHAUS 5-0-5

## OHAUS 5-0-5 Scale

This scale features a three poise system. Calibrations on the left side of the beam are in full 10 grain increments with widely spaced deep beam notches. Two small poises on the right side of the beam adjust from 0.1 to 10 grains. Scale is magnetically damped; self-aligning agate bearings support the hardened steel beam pivots with a guaranteed sensitivity of  $\frac{1}{10}$  grain. Maximum capacity is 511 grains and the scale has an improved leveling leg for perfect zero ..... **\$17.50**



OHAUS 10-10

## OHAUS 10-10 Scale

This scale has all the features of the 5-10 scale but has the added features of increased capacity and portability. When the attachment weight is added to the beam, the capacity increases to 1,010 grains without any loss of sensitivity. Has micrometer poise, approach to weight system, agate bearings. When not in use, die cast base holds the scale components and converts into a dust proof carrying case. Anti-tip pan design guards against tipping when weight is placed off center. Price complete **\$24.75**





OHAUS 304

## OHAUS 304 Dial-O-Grain

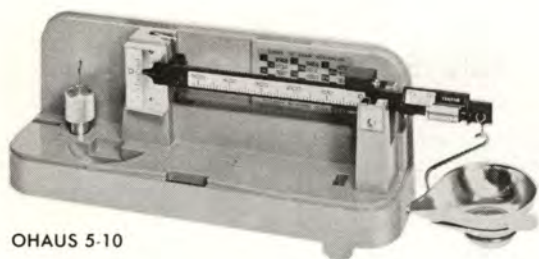
A laboratory quality scale designed for the serious reloader. Scale has a 1,110 grain capacity and its features include hardened steel knives and polished agate bearings, magnetic damping, oversized pan, extra-stable die cast base, and powder trickler. As in fine laboratory instruments, the dial is engraved with increment values from 1.10 grain to 10 grains ..... **\$59.95**



OHAUS 314

## OHAUS MODEL 314

This scale, one of the most expensive powder-bullet scales on the market, has several exclusive features. Capacity is 1110 grains, sensitivity  $\frac{1}{10}$ -grain. Beam is duralumin alloy and the knife edges ride in agate bearings. A spirit level allows precise alignment. .... **\$44.50**



OHAUS 5-10

## OHAUS 5-10 Scale

This scale features both a micrometer poise and approach to weight systems for maximum accuracy and speed. Base is die cast with large leveling leg for stability. Pan is of the anti-tip design. Scale is magnetic damping and utilizes self-aligning agate bearings. Guaranteed sensitivity of  $\frac{1}{10}$  grain. Left side of beam is graduated in full 10 grain increments while the right side of the beam features a micrometer poise adjustable from  $\frac{1}{10}$  grain to 10 grains. Approach to weight system alerts user to beam movement before the pointer reaches the zero scale. Big 510 grain capacity ..... **\$19.50**



PACIFIC DELUXE

## PACIFIC Deluxe

A single beam balance with three counterpoises and built-in oil reservoir for damping if desired. A  $\frac{1}{10}$ -grain over-under scale is fitted at the pointer end of the beam to simplify sorting bullets, etc. Capacity, 500 grains. Two adjustable legs for leveling. Bubble level built into base. Choice of magnetic or oil damping system (specify) ..... **\$20.00**



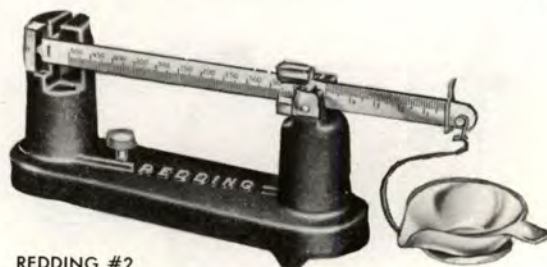
REDDING #1-A

## REDDING Standard No. 1

Gunmetal Blue-black beam is clearly graduated, has a total capacity of 380 grains.  $\frac{1}{10}$ -grain over-under scale allows checking of variations without re-adjustment of counterpoises.

Self-aligning bearings hardened and honed to eliminate rubbing and side friction, built-in leveling screw and an integral oil reservoir. .... **\$15.00**

Master No. 2. Similar in functioning to the Redding No. 1 scale, but with 505-grain capacity, magnetic damping and a more streamlined appearance. .... **\$18.50**



REDDING #2



## RCBS Powder Scale

Rugged, compact and engineered to weigh powder or bullets within its  $\frac{1}{10}$ - to 505-grain capacity. Magnetically damped beam has large, easy-to-read white numerals and rides on precision ground bearings. Heavy cast base has leveling screw and is finished in RCBS green. . . . . **\$19.95**

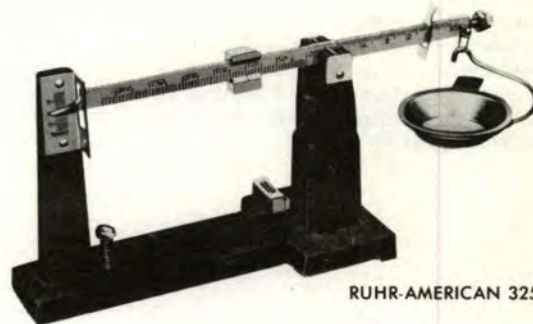


RCBS

## RUHR-AMERICAN Model 325

Capacity, 325 grains. Chrome-plated, hand ground beam, with built-in lifter to protect knife edge when not in use. Scale has oilwell damper, two leveling screws, integral cross-level. . . . **\$11.67**

Model 325A. Similar to M325 but has 3 rubber-tipped leveling screws and a mechanical damper. 325-gr. capacity . . . **\$12.75**



RUHR-AMERICAN 325

## TEXAN No. 304

Using the same beam balance as the No. 257, this scale has a heavier base and magnetic damping for the beam. All other features are identical. . . . . **\$18.95**

As shown, with powder funnel and holder . . . . . **\$20.95**



TEXAN 257

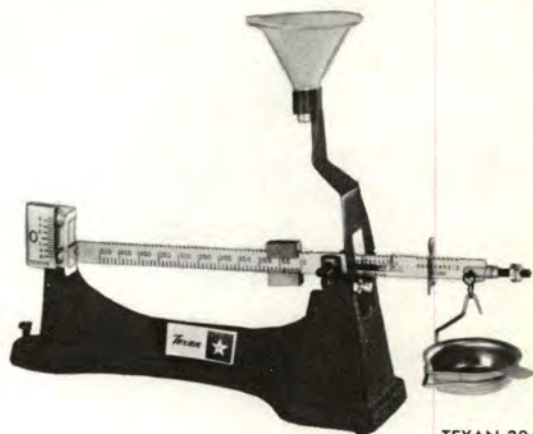
## TEXAN No. 257

The beam of this scale, graduated to read from  $\frac{1}{10}$  to 500 grains, has hardened knife-edge fulcrum points, permanent counterpoises and is oil-damped. The large-capacity pan has a spout which permits pouring powder into cases without use of a funnel. . . . . **\$16.95**

## WEBSTER Model RS

Using the substitution mode, this scale is oil damped (optional) and has a weighing capacity of over 500 grains. Beam reads out in  $\frac{1}{10}$ -grain increments, and a sensitivity adjustment is provided. A 60-grain weight set is included with the scale. . . . . **\$10.95**

Model RSS. Like the Model RS but over 100-grain capacity for shotshell loaders. Includes additional 2-oz. weight set . **\$15.00**



TEXAN 304

## WEBSTER Model RW-1

360-grain capacity in divisions of  $\frac{1}{10}$ -grain, three permanently attached weights, each having a graduated and notched portion of the beam.

Aluminum alloy beam has large, deep notches which retain the weights at their proper setting with reasonable care when weighing. Should a weight jump a notch it is much more quickly detected. . . . . **\$16.50**

Model RW-5. Like the RW-1 but has larger 500-grain capacity. . . . . **\$16.50**



WEBSTER RW-5



WEBSTER RW-1



## Notes on Priming and Priming Tools ...

Often great care is exercised in selecting uniform cases and weighing charges and bullets, but priming is done by many without much thought. Yet uniform seating of primers is essential for best accuracy. Poor alignment with the pocket can result in the pellet of priming compound being cracked as the primer is forced into place. Excessive seating pressure can produce the same result. Variation in seating depth can induce ignition and velocity errors that result in less accuracy.

All these factors can be controlled if one takes the time to do so. Priming as a separate step after resizing allows more attention to the "feel" of the primer going into

the pocket. Cases in which primers enter with too much or too little pressure can then be segregated and used for plinking or other not-so-important shooting. The heavy, powerful linkages on many presses prevent one from sensitively feeling the primer enter its pocket. Use of separate priming tools, such as the Lachmiller, the Simmons or Shoffstall, is desirable for that reason.

Many priming arms and punches are said to be adjustable for seating depth. In a sense they are, but the case is supported by the front face of its rim during priming. This means that seating depth will vary as much from case to case as does the rim

thickness. In rimmed cases, this dimension will vary as much as .006" to .008", and even more in some rimless and belted cartridges. Unless primer seating depth is controlled by the rear face of the case head, adjustment of the priming punch itself really doesn't accomplish much toward uniformity. A case with a thin rim will usually have a shallowly seated primer, while a thick rim will produce a deeply seated one.

We now have a sensitive priming tool that locks the case firmly, allowing uniform primer seating if primer pockets are of equal depth. See the Nuler on the next page; a fine tool.



### BONANZA Co-Ax Primer Seater

Three eccentric discs act as a universal shell holder, and align cases for co-axial seating. An additional set of discs permit rimmed cases to be primed (extra). Tray formed base quickly charges the gravity feed primer tube with about 40 primers. Handles all calibers from 222 to 458. Comes with one set of discs (rim or rimless), one universal primer tube and one primer rod (specify large or small) **\$19.95**

Universal primer tube ..... **1.50**



### GUN CLINIC Precision Priming Tool

A semi-automatic tool for repriming cases as a separate operation. A sliding cradle carried on two ground-steel bars presses the case over the primer. Primers feed automatically into the head by means of a slide. A vertical magazine holds approximately 50 large rifle primers. Shell-holder plates are replaceable and each is machined for two calibers. Primer seating depth is adjustable. .... **\$28.80**



### LACHMILLER Priming Tool

Permits priming cases as separate operation. A stop controls seating depth. Low mechanical advantage gives sensitive "feel." ..... **\$8.95**

Required extras needed are:

Shell holder ..... **2.80**

Primer rod ..... **1.20**

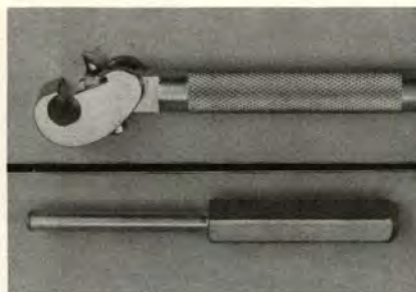
Adapter kit for use with your shell holder heads. #1 for Lachmiller or Lyman, #2 for RCBS, #3 for Pacific (specify). **\$5.95**





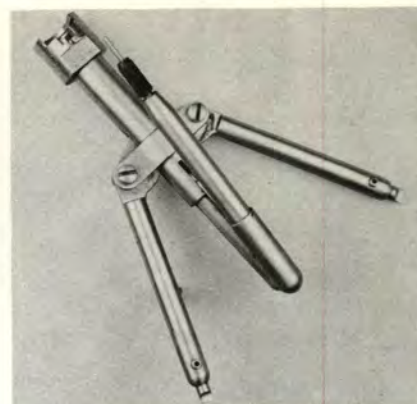
### SHOFFSTALL Primer Seater

Three-jaw universal shell holder handles all size cases. Primer tube holds 70-90 primers, depending on size. Tubes and other parts for .175" and .210" primers included. .... **\$30.00**



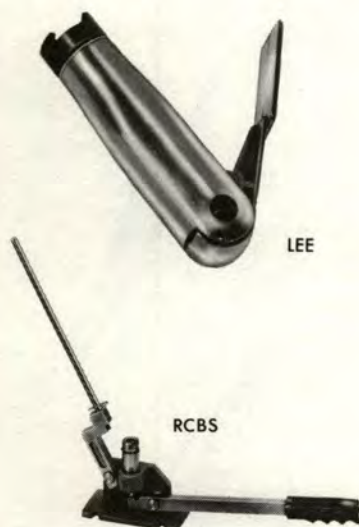
### LACHMILLER Berdan Depriming Tool

Handles a wide range of Berdan primed cases, such as the 8mm Rimless, 6.5mm Mannlicher-Schoenauer, and 11.7mm Rimmed. Offers a dry method of removing about 200 Berdan primers per hour. Comes with instructions. .... **\$7.50**



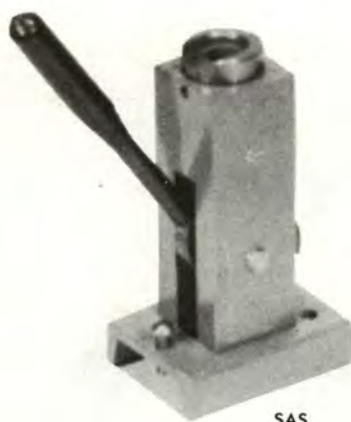
### JERRY SIMMONS Priming Tool

Reproduction of the famous Pope re- and decapper, improved by Simmons with detachable heads. Available for 28-30, 30-06, 32-40, 45-70, etc. Decapper also, and cleans .175" and .210" pockets. . **\$25.00**  
Extra heads ..... **\$3.50**  
Extra decapping rods ..... **\$2.00**



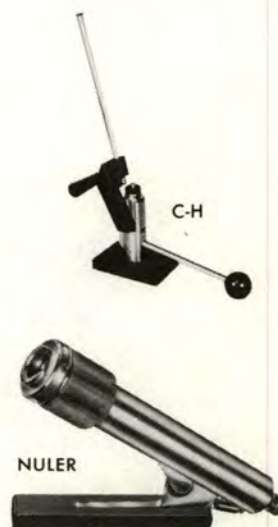
### LEE Priming Tool

Thumb pressure seats the primer with a "feel." Small enough to be pocketable, yet delivers primer seating qualities sought by precision shooters. .... **\$2.45**  
Additional shell holders ..... **\$1.50**



### SAS Primer Seater

A straight line primer seater designed to seat both large and small primers. Unit comes complete with a universal type shell holder which will accept cases in all calibers. May be attached to the bench for shop work. Turning a screw releases the unit so it can be taken into the field to be used as a hand tool ..... **\$12.50**



### C-H Priming Tool

This priming tool is eccentric cam actuated for positive primer seating. Gives necessary feel. Unit comes complete with both large and small primer tubes, less the shell holder head ..... **\$19.95**

### RCBS Priming Tool

The single stage leverage system gives user plenty of "feel" when seating primers. Tool permits a visual check of each primer pocket before seating the primer. Primers are fed through the RCBS automatic primer feed. Primer rod assemblies furnished with tool all use large and small rifle and pistol primers. Tool, less shell holder ..... **\$24.95**

### HART Primer Seater

Intended primarily for the benchrest shooters/reloaders, this tool is a compact, short-lever primer seater that handles both large and small primers through the use of an adaptor. Seating depth is fixed and primers cannot be crushed by this tool. Price complete ..... **\$42.50**

### NULER Priming Tool

This tool seats primers to a uniform depth and is adjustable for primer punch travel. Special shell holders (interchangeable) screw down on the main body to eliminate case cocking. Leverage is low, assuring plenty of necessary "feel" in operation. .... **\$26.50**  
Extra shell holders, each ..... **\$2.50**  
Extra decap rods ..... **\$1.00**



## J. DEWEY "Baby Crocogator"

This hand-held tool has diamond-shaped teeth on both ends (one end for large primer pockets, the other for small). Scours out powder residue without enlarging the primer pocket. Tool is made of hardened steel .....\$2.75

## HERTER'S GLH Brush Type Cleaner

A sturdy brass brush that will clean out primer pockets thoroughly, but will not cut, bend or enlarge them. Available for both large and small primers .....70¢

## KUHARSKY BROS. Primer Pocket Cleaner

Fine steel wire brush scrubs pockets quickly, leaves them clean and bright. For use in any motor or hand driven chuck. Specify large or small primer size. \$1.00



KUHARSKY



HERTER

## FORSTER Primer Pocket Cleaner

A scraper-type tool that mounts on the cutter bar of the Precision Case Trimmer to remove powder residue quickly and easily without removing any metal. Available in .210 or .175 size. ....\$2.00  
Extra cleaner .....\$1.00

## HERTER'S Primer Pocket Cleaner

Made of hardened and ground die steel, simply rotating this tool in the primer pocket will remove burrs and foreign matter. Tool is made for small and large primers .....87¢

## LEE Primer Pocket Cleaner

Hand held tool for scraping residue from the primer pocket without damaging the pocket or flash hole. Available for either large or small primers .....49¢



RCBS



DEWEY



LOOS



LEE



FORSTER



HERTER



KUHARSKY



MSS

## KUHARSKY BROS. Pedestal Crank

Designed especially for use with the Kuharsky wire brush cleaner, it fastens easily to a bench, taking the place of costly power equipment. Crank only. ....\$3.95

## LEE Primer Pocket Cleaner

A fast and easy method of cleaning the primer pocket and flash hole without damaging them. One quick push does the job in the same fashion as a "Yankee" screwdriver. Available for large and small primers (specify) .....\$1.98

## RCBS Primer Pocket Cleaner

A slight twist and the primer pocket is cleaned with this tool. Machined blade reverses on a pivot to change pocket size. Handle may be used with RCBS case-neck brush .....\$3.00

## HERTER'S GLH Pedestal Crank

Attached to your bench, this tool will rapidly clean primer pockets or deburr cases with appropriate accessories \$3.29

Primer pocket brush (specify large or small) .....70¢  
Outside deburring cutter .....98¢  
Inside deburring cutter .....98¢

## MSS Primer Pocket Cleaner

Hardened and ground to exacting specifications, this rotary scraping tool quickly and easily cleans the primer pocket. Made in .210" and .175". Specify size desired .....95¢

## J.T. LOOS Primer Pocket Cleaners

Wire bristles encased in a plastic sleeve for either large or small primers. One of each size is supplied. As wire wears, plastic sleeve can be trimmed back exposing more bristles. Can be used in a drill press or hand held. Two cleaners (large and small) .....\$1.00



## BAIR Auto Primer Feed

Feeds primers to the press automatically, eliminating unnecessary handling. Saves time and effort. Comes complete with two large capacity tubes, fits most "C" presses. ....\$7.50

## BAIR C-Press Priming Arm

Seats all types of primers with no extras to buy. Equipped with large and small cups and punches. Arm is made from long wearing high grade steel, blued. ...\$3.50

## C-H Universal Primer Arms

Furnished with 4 seating punches, springs, etc., everything needed to seat all metallic case primers. For most C-type presses .....\$3.00

H-Tool type .....\$4.00

For Model 333 press .....\$2.00

## RCBS Auto Primer Feed

Feeds primers one at a time into the sleeve of the primer arm. Designed for use with RCBS Jr press but will work on most C-type presses. Furnished with tubes for both large and small size primers. \$7.50

## ECHO Adjustable Primer Arm

Arm is made with a threaded shank having a small hexagon hole in the lower end of the shank. Seater plug is adjustable for seating depth through the use of a small hex wrench. Arm has built-in retaining spring. Primer cup fits large and small primers .....\$2.50

## REDDING Primer Arm Assembly #9

Conventional "C" press design, complete with all parts for proper seating of large and small primers, flat or crowned. Used on Redding Standard Press. \$3.50

No. 8 Primer Arm Assembly for use with Model 24 E-Z "C" or Model 25 Turret Press .....\$3.50

## RCBS Universal Primer Arm

Designed for use with RCBS Jr and most "C" type presses. Interchangeable primer plugs and sleeves fit all sizes of primers. ....\$3.60

Primer plug sleeve .....\$0.60

Primer plug .....\$0.60



BAIR



BAIR



PACIFIC



## HERTER'S Universal Primer Arm

Made for presses other than Herter's own, these arms have a flat return spring and come with large and small, flat and round primer pins, and large and small primer cups. Complete .....\$2.59

## HERTER'S Accessories

Automatic Primer Feed for Models 3, 81 and 234 tools speeds up reloading, is positive in function, and will not jam or hang-up. Specify either small or large primer tubes .....\$6.59

Extra primer tube .....\$0.59

Bushing for Lyman dies .....\$0.85

## HERTER'S Primer Arm Assembly

Designed for use only on Herter's Model 3, 81, 3A, 03, U3, "O" Super and 234 Super Reloading tools. Comes complete for either large or small primers for rifle or pistol (specify) .....\$1.97

## HERTER'S Auto Primer Feed

Unit mounts to the body of the die being used. Mounting is adjustable in relation to the primer arm. Can be mounted to Herter's or most other dies. Available for either large or small primers (specify) \$6.59

Extra primer tubes (large or small, specify) .....\$1.59

## HERTER'S Primer Catcher

Designed for use on Herter's reloading tools, this unit is made of heavy formed steel and fits in place with no machine work necessary. Locks in place with the primer arm bolt .....\$1.37

## PACIFIC Primer Catcher

Deep-welled and wide-faced to catch all primers and prevent them from bouncing out. Made of durable plastic .....\$2.00

## REDDING Auto Primer Feed

Attaches to Redding Standard "C" press. Complete with both large and small diameter primer tubes and primer turner box. ....\$6.50

For model 24 and 25 press .....\$7.50



## PACIFIC Auto Primer Feed

Saves time, labor, and eliminates undesirable handling of primers with oily fingers, which might cause misfires. Fits most C-presses. Specify large or small primers .....\$6.00

## LACHMILLER Universal Primer Arm

Fits most C-type presses—Olympian, Lyman Spartan, RCBS, etc. The priming arm comes with the necessary parts to seat all sizes and shapes of primers.\$3.00

## LYMAN Auto Primer Feed

For Spartan press. Does away with individual handling of primers. Comes with tubes for large and small primers. \$7.50  
For AA turret press .....\$9.50

## RCBS Primer Catcher

Attaches quickly without screws. For RCBS Jr and Pacific Super Presses.\$2.40

## REDDING Primer Catcher

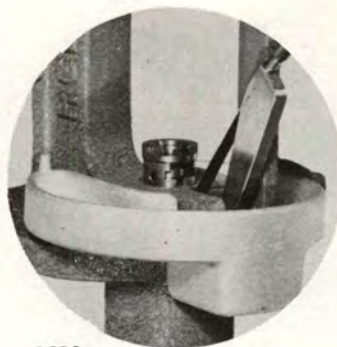
Designed for the Redding Standard "C" press. Eliminates the dropping of spent primers to the floor. ....\$2.00

## ECHO Auto Primer Feed

An accessory item to be used on the Echo "Champ" loading tool. Design follows the conventional pattern but has improved cut-off pin and spring for more positive action. Comes complete with two tubes for large and small primers.\$5.50

## TEXAN C-Type Primer Arm

Designed for use with the Texan No. 156 and No. 256 "C" presses. Primer arm will fit most standard "C" presses of other manufacture .....\$3.00



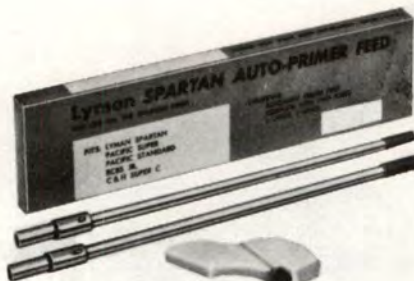
RCBS



PACIFIC



ECHO



LYMAN



EAGLE

## EAGLE Universal Primer Arm

Complete with sleeves and pins to seat small and large primers, this unit fits most "C" presses. May be used with the Lyman Spar-T auto primer feed. ....\$3.50



ECHO

## ECHO Primer Catcher

This unit will hold several hundred spent primers before it requires emptying. It is made of a tough, leather-like synthetic, won't crack or break. Self-attaching, no springs, screws or rubber bands to hold it in place .....\$1.50



## Notes on Case Mouth Trimmers ...

Repeated firings cause brass to flow forward—more pronounced in some calibers than others—and this excess length must be trimmed. Unless such cases are trimmed, chambering effort may be increased, case mouths may wedge into throats and higher pressures result because of lessened neck clearance.

Case trimmers run from hand-held types for minimum, in-the-field brass cutting to "file-type" dies to miniature lathe-style devices.

### BAIR Case Trimmer

Fully adjustable for all cartridge lengths, this tool uses your removable shell holder head and the pilots are interchangeable for other calibers. Handle may be removed and a 1/4-inch drill substituted for power trimming. Unit comes complete with one pilot (specify). .... **\$19.50**

Extra pilots ..... **80¢**

### BAIR File Trimmer and Case Former

Made of hardened steel, a fine file is used to trim case to the proper length. Available in most popular calibers, this die may also be used for case forming operations. .... **\$7.00**

### BONANZA Case Trimmer

Using a pilot and mandrel system, this tool trims cases to size without chattering. Four-bladed cutter can be resharpened at the factory. Mandrel for the primer pocket reverses so that all Boxer-primed cases can be trimmed. Two screw holes provided for mounting. .... **\$14.95**

Extra pilots (state caliber) ..... **\$.50**

Cutter sharpening (exchange) .. **\$1.00**

### C-H Model 325 Case Trimmer

Base is made from a heavy casting and can be mounted on the bench. Uses the shell holder from your reloading press. Case is inserted into the shell holder head and locked into place with a slight turn of the shaft. Cutter is tungsten carbide that trims and deburrs the case. Trimmer comes complete with one shell holder and pilot ..... **\$24.95**

Extra pilots ..... **\$1.00**

Extra shell holder head ..... **\$2.50**



BONANZA



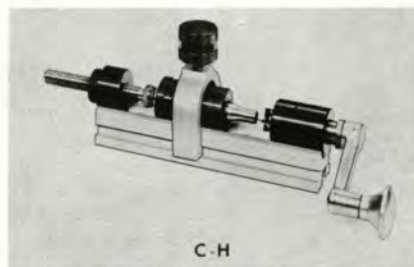
BAIR



BAIR

### FORSTER Neck Reamer

Mounted in the Forster case trimmer, this tool removes excess brass from inside case necks. Available in: 17 (requires 17 cal. cutter shaft), 224, 243, 257, 263, 277, 284, 308, 311, 323, 338, 348, 358, 375, 410, 432, 458 and .238". The staggered teeth cut smoothly, and are ground to .002"-.003" over max. bullet diameter. Give cartridge and caliber. .... **\$5.50**



C-H

### C-H File and Trim Die

For shortening case neck length, these dies are hardened so they will not be affected by filing or a fine tooth hack saw used in the operation. Available for most popular rifle calibers ..... **\$6.00**

FORSTER OUTSIDE NECK TURNER

### C-H Case Trimmer

A clamp locks case holder in position, eliminates danger of cutting fingers. Insures uniformity from 22 cal. through 45 cal., either rifle or handgun cases. Price includes one case holder. .... **\$13.50**

Extra case holders ..... **\$1.50**

### FORSTER Outside Neck Turner

The necessary clearance of .002" to .003" cannot be maintained between case and chamber neck when repeated firing thickens brass, or when cases are formed from heavier brass. This tool removes the excess metal from the outside of the necks by passing the neck between a hardened pilot and a carbide cutter. The operation is identical in principle to that of lathe-turning on a mandrel. The process produces very uniform neck thickness. Must be used on the frame of the basic Forster case trimmer. Only a new pilot is needed to change caliber. Available in diameters .200", .224", .243", .257", .263", .277", .284", .308", .311", .323", .333", .338", .358", .375". Price does not include Case Trimmer. .... **\$10.75**

Extra pilots ..... **\$1.75**





FORSTER POWER TRIMMER



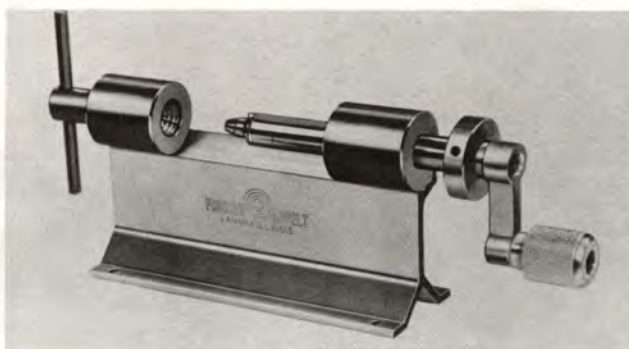
LEE



HERTER



J. DEWEY



FORSTER CASE TRIMMER



J. DEWEY

### LEE Case Trimmer

A simple hand tool that automatically trims cases to proper length. Price is complete for one caliber. .... **\$2.95**

Extra pilot and shell holder to change caliber ..... **\$1.70**

### FORSTER Precision Case Trimmer

Hardened and ground cutter shaft has four staggered cutting teeth for smooth, chatterless cutting. Collet holds case without any end movement. All cases cut to same length even if head diameter varies. Stop collar features a fine adjustment screw. .... **\$14.95**

Extra pilots (state cal.) ..... **.60**

Extra collets (state cal.) ..... **\$2.50**

Extra cutters ..... **\$4.50**

### HERTER'S Precision Case Trimmer

Hardened cutter shaft has four cutting teeth for fast, smooth cut. Case length set by a stop collar; there is also a fine adjustment screw. Complete for one caliber, specify ..... **\$10.49**

Extra pilot (specify cal.) ..... **.30**

Extra collet (specify cal.) ..... **\$1.49**

### Check Chart of Forster and Herter Collets

Forster and Herter collets have three steps and each collet will handle the popular cartridge cases shown in the following tabulation:

#1 COLLET—30-06, 6.5mm 243, 264, 270, 308, 338, 358, 401 & 458 Win.; 250 & 300 Sav.; 222, 222 Mag., 244, 35 & 44 Mag. Rem.; 22 Var.; 22-250, 220 Swift, 22 Lovell; 6mm; 243 RCBS; 257 Roberts; 250-3000; 25 Souper; 25-06; 6.5mm Dutch; 6.5x57 Mauser; 6.5mm Jap; 6.5 Mannlicher; 256 Newton; 270 Gibbs; 250, 270, 300 & 375 Weatherby; 7 x 57 Mauser; 7mm Gradle; 7mm Ackley; 7mm Mashburn; 7x61 S&H, 7x64; 276; 30 & 35 Newton; 300 & 375 Mag.; 303 British; 32 S&W Long; 8x57 & 8x57 JR; 8x60; 35 Whelen; 375-06; 375 Barnes; 38-40; 395-400; 41 Colt; 44 S&W Spec.; 45 ACP; 45 Long Colt; 450 Watts; 45-70.

#2 COLLET—22 Hornet; 22K-H, 218 Bee & M-Bee; 219 Zipper & Wasp; 22 Sav.; 22/30-30; 6mm/30-30; 25-20; 25-35; 25 Rem.; 30-30; 30 Rem.; 303 Sav; 32-20; 7.7mm Jap; 9mm Luger; 38 Colt Super; 45 Long Colt.

#3 COLLET—22 Hornet; 22K Hornet; any Krag case; 30 Carbine; 38 Spec.; 357 Magnum; 35 Win.

In addition, Forster-Appelt has a special collet to take 33 Win., 348 Win., 45-70, 45-90.

### HERTER'S File Type Trimmer

For trimming and case forming. A fine grade file will not scratch the hardened surfaces. Available in most calibers. Fits 7/8-14 presses ..... **\$2.37**

### FORSTER Power Case Trimmer

Permits use of electric drill press for trimming cases. Accurately lined up by means of a furnished line-up bar. Non-chattering cutter comes with choice of 1/4" or 3/8" shank. Price includes one collet and pilot. .... **\$12.50**

### J. DEWEY "Little Shaver" Neck Turning Tools

Accurately turns cartridges from 17 to 30 caliber with the changing of a properly sized mandrel to fit the case neck. The hardened cutter is fully adjustable for cutting depth. Four fired cases necessary when ordering this tool. Complete with mandrel for one caliber ..... **\$19.75**

Clamp for holding the cartridge case during the turning operation ..... **\$3.00**



## LACHMILLER File and Trim Die

To trim cases to minimum length or for case forming, this die is hardened to eliminate damage sometimes caused by the file. For cases shorter than 1.9" a shell holder extension is needed. Fits most presses with  $\frac{7}{8}$ -14 threads and removable shell holder rams. .... **\$5.95**

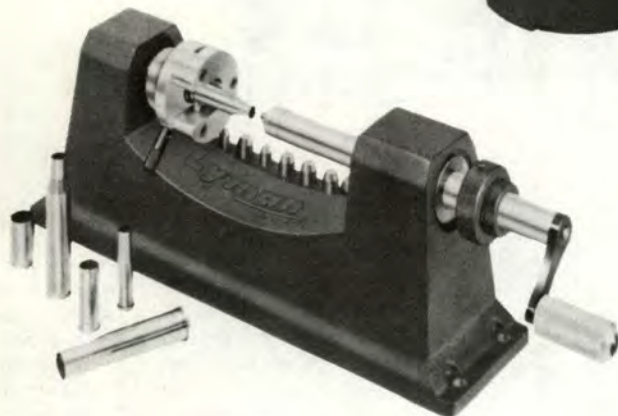
LACHMILLER



## LYMAN Universal Case Trimmer

This simple, yet efficient, trimmer has a chuck head that accepts all metallic rifle or pistol cases, regardless of rim thickness. To change calibers, simply change the inexpensive case head pilot. Cutter has coarse and fine cutting adjustments and rides on an oil impregnated bronze bearing. Cast base can be mounted to bench. Complete trimmer with one pilot (specify caliber) .... **\$23.00**  
Extra pilots (specify) .... **\$1.00**  
Replacement cutter head ..... **\$2.00**

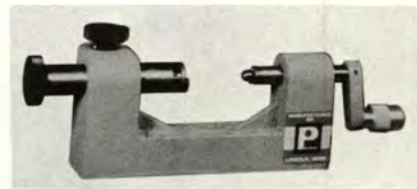
LYMAN



LYMAN

## LACHMILLER Case Trimmer

Trimmer can be operated either manually or electrically through the use of a conversion kit. Centerless ground shafts are mated to the main bearings by honing for perfect alignment between collet and pilot. Fine adjustments in length can be made easily. Collets and pilots are made of special steel and heat treated ... **\$19.95**  
Kit to convert trimmer to electrical operation ..... **\$4.95**



PACIFIC



PACIFIC FILE

## LYMAN Universal Drill Press Trimmer

The universal chuck head bolts to your drill press. By mounting the cutter head and case head pilot to your drill chuck, you can process large quantities of cases accurately. Price complete ..... **\$15.00**

## RCBS File Type Trimmer

Quickly trims cases to exact length by filing off any portion of the case above the die. Hardened to withstand the roughest use. Standard  $\frac{7}{8}$ "-14 thread. Available in all calibers with over-all case length of 0.875" or more. Cases measuring shorter than 1.70" require an extension on shell holder. .... **\$7.50**

## RCBS Extension for File Type Case Trimmer

Extension is used to gain the extra length necessary when using the RCBS File Type Case Trimmer for cases with over-all length of 0.875" to 1.700". **\$3.00**

## PACIFIC File Trimmer and Case Former

For trimming and case forming. A fine grade file will not scratch the hardened surfaces. Available in most calibers. Fits  $\frac{7}{8}$ -14 presses ..... **\$7.50**



## PACIFIC Case Trimmer

Uses regular removable shell holder heads instead of collets, and is adjustable for any length case. Also attaches to a  $\frac{1}{4}$ " drill for use as a power trimmer. Extra shell holder heads (\$2.50) and pilots (75¢) are quickly installed ..... **\$19.00**





REDCO



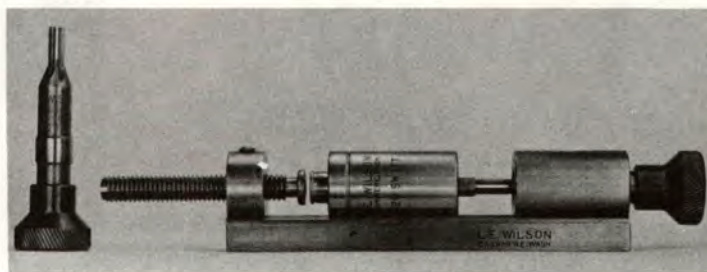
LYMAN



REDDING



ZIMMERMAN



WILSON

### LYMAN Case Mouth Reamer

Wood-handled tool. Quickly removes inside burr but does not cut outside of case neck. .... **\$3.50**

### REDDING Master Case Trimmer

A fast, easy-to-operate tool that trims and chamfers in one pass any caliber rifle or handgun case. Spindle design permits all operations to be done with the handle of the tool; after insertion of case, a ¼-turn clockwise locks case; handle is then palmed toward cutter and rotated clockwise to cut; handle is withdrawn to remove case neck from pilot; then ¼-turn counterclockwise releases case. Pilots (\$1.00 each) always remain in correct alignment with collet. .... **\$14.50**

### TEXAN Case Trimmer

Collet-type case trimmer, adjustable for case length, holds case firmly for accurate trimming. Four holes in base for bench mounting. Extra pilots (50¢) and collets (\$2.50) are quickly changed. .... **\$11.90**



TEXAN

### REDCO M-700 Universal Case Trimmer

Ten interchangeable neck adapters (75¢ each) permit all cases from 22 through 35 caliber to be trimmed in your press. Die is threaded ⅞x14 and is adjustable for trim length—short 22 cal. cases require shell holder extension. Cutter forms slight bevel inside case mouth for easy bullet seating. Price is complete for one caliber, specify ..... **\$12.95**

### WILSON Inside Neck Reamer

Used with the Wilson case trimmer, and made in popular calibers from 22 to 458. The case trimmer keeps the base correctly aligned while this reamer is run into the neck to remove excess metal, reducing wall thickness. Price, reamer and handle only ..... **\$8.00**  
Complete with trimmer base . **\$16.95**

### WILSON Universal Case Trimmer

This simple, rugged tool is one of the oldest trimmers on the market, and it does excellent work. While slower in use than most collet types, it has all the speed really needed. Cases are held by the body, not the rim, producing truly square mouths; needs no pilots. Hardened shell holders, available in most popular calibers, will accept more than one caliber where body diameter and taper are similar. Because of case expansion, holders for lever action rifle calibers are furnished in 2 sizes—fired and unfired cases. Fired case size will be furnished unless otherwise specified. This trimmer is used as the basis for other Wilson accessories. Instructions and a table of cartridge case lengths accompany each trimmer. For rifle calibers . **\$15.85**  
Pistol calibers ..... **\$16.30**  
Extra shellholder; rifle, **\$1.90**; special rifle, **\$3.25**; pistol ..... **\$2.45**

### ZIMMERMAN Case Trimmer

This simple tool trims cases to correct length automatically. Tungsten carbide cutter and pilot are pre-set and act as a gauge. Unit comes complete with shell holder cup for one size of rimless cartridge from 222 to 35 Rem. .... **\$3.95**  
Rimmed, magnum or pistol cases, 218 Bee to 375 H&H ..... **\$4.25**  
Extra pilot-cutters to change cal. **\$2.00**  
Extra cup shell holder ..... **.75**  
Magnum cup shell holder ..... **\$1.00**



## Notes on Chamfering Tools ...

A case after trimming often shows a burred or roughened mouth, both inside and out. Chamfering tools remove these burrs and also cone the inside of the mouth, making for easier bullet seating. Many handloaders chamfer the inside of their untrimmed cases for the latter reason.

The tools mentioned here are all of

hardened steel, precision ground to give clean cutting without chattering. They are knurled or relieved for easy gripping and most have a center pin to keep case aligned during outside deburring. All sporting caliber cases can be processed with these tools. For best results, apply only light pressure; these are not designed to shorten cases materially, but to smooth

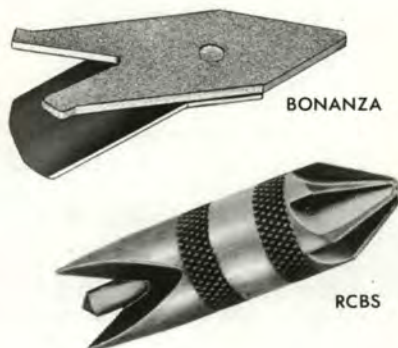
them.

The C-H tool has tungsten carbide cutting surfaces for lifetime use, accounting for its higher price. However, it's unlikely that the average reloader will ever wear out any of these tools, no matter how inexpensive. The Lyman tool chamfers the inside of the case mouth only; it has a full-size wooden hand grip.

### B-SQUARE Chamfering and Deburring Lathe

Hand-cranked lathe holds standard chamfering/deburring hand tools. Use of this lathe reduces chatter produced by hand-held tools. May also be used to remove crimp from primer pocket of military brass when fitted with accessory reamer.

Accessory reamer (state .175" or .210" diameter) .....\$4.95  
.....\$3.50



### CHAMFERING TOOLS

B-Square .....	\$3.50
Bair .....	4.00
Bonanza Cricket .....	1.50
C-H (tungsten carbide) .....	4.95
Forster-Appelt .....	2.95
Herter .....	1.69
Lee .....	.95
Lyman .....	3.00
Minnesota Shooters Supply .....	1.25
Pacific Gun Sight .....	4.00
RCBS .....	3.60
Texan .....	3.00
Wilson .....	3.65
Wilson, 17 cal. ....	3.90

## Notes on Case and Die Lubricants ...

It is practically impossible to resize fired cases full length without proper lubrication. Some of the smaller handgun calibers may work all right that way, but even there you are courting a stuck case and short die life unless you use carbide dies—these will handle even dirty cases! To do the job properly, the lubricant must have a high film strength under pressure. Ordinary oils and greases do not work well.

More than one stuck case has resulted from the use of the family can of oil.

Many commercial sizing lubricants do a fine job. Today, virtually all reloading tool manufacturers offer one under their own trade names at a reasonable price. One such product sold specifically for reloading use is Molykote Type U, which is particularly good. There are also dry lubes, such as Motor Mica anti-friction com-

pound. Probably oldest in use and still one of the best is common anhydrous lanolin, available from many local drugstores. Green soap also works well!

Whatever lube is used, it must be applied sparingly. Any excess is forced to collect between case and die, and it may form unsightly dents in the case. Harmless unless very large, the dents are a sign of sloppy work.

### BAIR Case Lube

A liquid case lubricant to ease sizing and eliminate stuck cases. Comes in unbreakable 2-oz. bottle with spout tip 75¢

### CLENZOIL

Metallic cartridge cases and jackets for swaging may be lubricated with a tiny amount of this formula. Prevents rust and may be used as a superior gun oil also. One pint. ....\$3.25

### BONANZA Case Sizing Lube

A high pressure lubricant to adhere to cases when forced into the sizing die. Makes resizing easier and saves equipment. Comes in 2-oz. plastic bottle ..75¢



### C-H Die Lube

A liquid designed for lubricating dies and full length case sizing. 2-oz. bottle.75¢

### EAGLE Blood

A liquid die lubricant recommended when resizing metallic cases. 2 oz. poly bottle. ....75¢







PACIFIC



LYMAN



PONSNESS-WARREN

### PONSNESS-WARREN S.T.O.S.

A grease-type lubricant recommended for reloading equipment, as a case sizing lubricant, and for use on firearms. Has a tackiness to it which creates a self-coating friction-free surface. A clear, completely safe grease. 4-oz. jars .....\$2.95



RCBS

### HERTER'S Perfect Lubricant

Specifically formulated for handloaders, it prevents sticking of cases in sizing dies. Jar .....49¢

### HERTER'S White Graphite

Use for lubricating the expander nipple on dies. Eliminates possible grabbing. Gives uniform expansion of the necks. Comes in one-ounce squeeze bottle . . 39¢

### LYMAN Size-Ezy Grease

A high-pressure lubricant for metallic case sizing. Its use insures smooth, effortless operation of sizing dies. Tubes. . 75¢

### MOTOR MICA Compound

A clean, white, dry lubricant, long used by industry for deep drawing. A small amount eases resizing, reduces die wear. 1 lb. (postpaid). ....\$3.15

### MOLYKOTE Type U

A light film on the cartridge case insures ease of resizing, no sticking of case in die, easy extraction. Handy tube ..... 50¢

### PACIFIC Case Sizing Lube

A clean, clear liquid lubricant that stays on the case during the entire sizing operation. 2 oz. plastic bottle ..... 50¢

### REDDING #21 Case Lube

Compounded to eliminate stuck cases and pulled rims. Prolongs life of the dies and makes reforming easier. 2-oz. plastic bottle ..... 75¢

### RCBS Resizing Lubricant

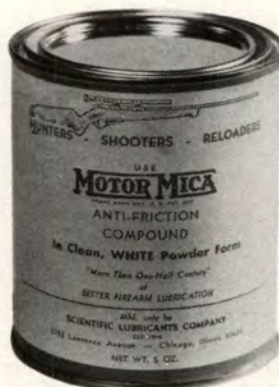
Easily applied with the RCBS Case Lube Pad or with the fingers. Comes in ¼-lb. tube. .... 75¢

### TEXAN Die Lube

Specially formulated lubricant to make sizing easier and more efficient. Exacting companion to Texan Micro-Bore dies. 2-oz. bottle ..... 75¢



REDDING



MOTOR-MICA



TEXAN



## Primer Pocket Tools for G.I. Brass

Frankford Arsenal and other 30-06 G.I. brass have the primers heavily crimped in. Because ordinary decapping pins may bend or break under the strain of removing such primers, extra sturdy "punch and base" sets are available from several tool makers.

Because these G.I.-brass tools are fast and handy, many shooters use them in preference to other decapping means. Primer pockets, for one thing, are easily inspected, cleaned or gauged.

FORSTER



### BAIR Primer Pocket Reamer

This tool may be hand held to remove the crimp from the primer pocket of military brass. Available for .210" or .175" pockets (specify). .....\$3.50

### C-H Primer Pocket Swager

Removes G.I. crimp but no brass, and is used in conjunction with C-H Heavy Duty Decapper. For large primers only. \$4.00

### EAGLE Primer Pocket Swage

Production type swage removes crimp from GI brass and leaves primer pockets round for easy reloading. Tool is complete with swaging anvil, knock-out sleeve, punch holder and form punch to swage pockets (.175" and .210" sizes) in most presses accepting 7/16-14 dies. .... \$10.00



C-H



LEC

### C-H G.I. Decapper/Swager

Does good job of decapping and primer pocket swaging of G.I. cases. Two positions; one for decapping and the other for swaging the crimp from the primer pocket. Large primer size only. ....\$5.95

### FORSTER Primer Pocket Tool

Will remove most, if not all, of the crimp in military brass, making it easy to seat new primers. Can be used with either Forster case trimmer. Price includes center. ....\$5.00  
Chamfering tool only .....\$4.00

### LACHMILLER Primer Pocket Swage

Forms the primer pocket to correct size, removes the crimp and puts a radius on the edge of the primer pocket. Threaded 7/16-14 for use in many loading tools.\$6.95



BAIR

C-H



LACHMILLER

### HERTER'S Primer Pocket Swaging Die

For swaging the primer pocket on G.I. brass. This die fits all tools threaded 7/16-14. Swaging head is made to the rim dimension of a 30-06 or 308 shell holder and is hardened with the swaging nipple ground to exact dimension to properly swage out the crimp without distorting the pocket. Price complete .....\$2.97  
Replacement swaging head ..... 47c

### WILSON Punch and Base Sets

The punch, an insert with spherical end, is made of SAE 50100 steel heat treated to Rc 60-64 for maximum strength. The case hardened base, recessed at the top to support the case head, is counterbored at the bottom to collect the driven-out primers. Punches and bases available in nearly all popular calibers. ....\$2.95  
Punch only .....\$2.15



EAGLE



## LACHMILLER Punch-Base Set

For removing crimped-in primers from 30-06 GI brass. Base is case hardened, recessed at top for case support and counter-bored beneath to collect the removed primers. .... **\$3.00**

## LACHMILLER Small Primer Pocket Swage

For use in any press with  $\frac{13}{16}$ " ram, this swage removes crimp from 9mm Luger, 30 M1 carbine and 223 Rem. military brass. .... **\$6.95**

## LEE Decapper and Base

For removing crimped-in primers from G.I. brass, this tool is guaranteed unbreakable. A simple yet efficient unit that is necessary for working with this type of brass. .... **\$2.45**

## LYMAN Primer Pocket Reamer

Hand-held tool that removes crimp burr from GI 45, 38 or 30-cal. cases. Specify large or small primer. .... **\$3.00**

## MSS Crimp Removing Die

A fast, accurate means of removing the G. I. crimp. Internal mandrel (usable in any standard  $\frac{7}{8}$ "-14 die) supports the case during swaging; hardened swaging head fits 30-06 shell holder. Possible distortion of rim is eliminated. .... **\$2.97**



WILSON

HERTER

LACHMILLER

PACIFIC

RCBS SPEEDY

LACHMILLER

## WILSON Primer Pocket Reamer

Designed for use in the Wilson Case Trimmer, the trimmer acts as a jig for obtaining correct alignment between cartridge case and reamer, and provides firm support during reaming.

By the time the reamer contacts the bottom of the pocket, the outside corner is rounded for easy insertion of the new primer. Since the reamer stops cutting when it hits the bottom of the pocket (no pounding or forcing is used), the flash hole is undamaged and the smooth, neat, properly shaped primer hole insures correct seating of primers. Case trimmer is not included. Reamer and handle only **\$7.00**

Reamer complete for most popular rifle calibers ..... **\$15.95**  
Pistol calibers ..... **\$16.45**

## PACIFIC Primer Pocket Reamer

This hand-held tool quickly and easily removes the primer pocket crimp from military brass. Available for both large or small primer size, specify ..... **\$3.00**

## HERTER'S Primer Pocket Reamer

Hand-held, hardened and ground tool steel primer pocket reamer. Performs quickly and efficiently ..... **\$1.39**

## RCBS Speedy P-P Swager

Designed for use in presses accepting  $\frac{7}{8}$ "-14 dies and removable shell holder heads. Removes the crimp found in GI brass; two units are available, for either large or small primers. .... **\$6.00**

"Combo" unit for both large and small primers ..... **\$8.50**  
A-2 case stripper washer (extra) .30

HERTER





## Notes on Case Gauges ...

Few beginners realize it, but one of the most important tools a reloader can have is an accurate case length gauge. Made in various designs, many of these are simply measuring devices of the Go-No Go type. Their purpose is to tell the reloader if the over-all length of a fired case exceeds the

allowable maximum. If it does, it must be trimmed, for chambering a too-long case jams it into the rear of the lands, crimping it on the bullet's ogive and leaving no clearance for expansion on firing—therefore boosting the pressure to dangerous levels.

Some combination gauges, such as the Wilson and Forster, also measure head to shoulder length, thus indicate headspace condition and show whether a case has been altered by a sizing die. All in all, these are very useful and important items reloaders should have.



BROWN



BONANZA

### BROWN PRECISION Little Wiggler

This tool is used to measure runout of cartridge cases or completed rounds and neck-wall thickness. Cartridge or case is held between two universal mandrels (17 to 375 cal.); rotation shows variations on 1½" dial indicator. Ammo not concentric can usually be straightened using small jack located on the base ..... **\$39.95**

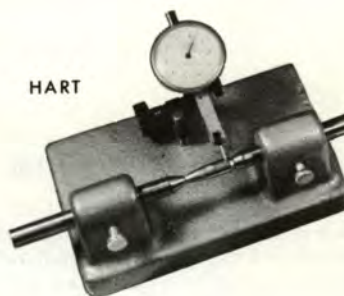
Large stainless steel mandrel ... **\$1.50**  
Spring modification for 375 Mag. cartridge case ..... **\$1.50**

### B-SQUARE Bullet Spinner Gauge

All machined rigid frame with cup-centers. Centers may be adjusted to check bullet run-out at any location. Tool is furnished with .0001" dial indicator. Price, complete ..... **\$44.95**

### B-SQUARE Case Thickness Gauge

Precision, all-machined, with heat treated ground steel arbor. The mar proof hold downs keep the case against the arbor for measuring by the .0005" dial indicator. Price, with indicator ..... **\$37.95**



HART



DEWEY

### J. Dewey Bullet Spinner

Although uniform in weight and diameter, bullets will not shoot with utmost accuracy if their bases are not true. This gauge measures run-out of all bullets from 22 to 30 caliber with an accuracy of .0001 inch. Price with .0001" dial indicator mounted ..... **\$89.00**

### THE FERGUSON'S "Combo-Check"

This instrument is primarily intended for the serious bench rest shooter and varmint shooter. It checks bullet run-out and finished cartridge concentricity in one tool. Price includes the tool and dial indicator ..... **\$65.00**

### B-SQUARE Cartridge Spinner Gauge

This tool measures either bullet or case neck run-out, relative to case body. An adjustable stop allows any part of the bullet or case neck to be checked. Comes complete with precision .0005" dial indicator ..... **\$34.95**



FORSTER

### BONANZA Co-Ax Indicator

Designed to show the degree of concentricity between case and bullet, this device can show misalignment of .0005". The cartridge is held against a recessed adjustable rod by a spring loaded plunger; the case head, held in a "V" block, is rotated by finger pressure. Price less dial indicator. .... **\$8.95**

Dial Indicator only ..... **\$19.50**

### FORSTER Combination Case and Headspace Gauge

Measures head to shoulder length (headspace) as well as over-all length. Available in most popular calibers, including many popular wildcats and belted magnums. .... **\$4.95**

### HART Bullet Spinner

Designed to reveal runout of as little as .0001" on bullets, flat-base or boat-tail—from 22 through 30 cal. Heavy base is made of fine-grained cast iron. Price includes precision dial indicator. . . **\$52.95**  
Walnut finished storage box .... **\$7.00**





HERTER

### HERTER'S Micrometer Case Gauge

The built-in micrometer head and three ground blocks permit this instrument to measure all cases up to 3 inches in length. A table of case lengths for most popular calibers is included ..... **\$16.49**

### HERTER'S Flash-Hole Gauge

This stepped, multi-diameter gauge gives you a direct reading of the flash-hole size of any pistol or rifle cartridge **\$2.97**

### HERTER'S Cartridge Case Gauge

An accurate multiple case gauge. Measures most popular calibers from short handgun cases up through the 375 Magnum ..... **\$1.98**

### HERTER'S Bullet Seating Gauge

Similar in form to the Case Gauge, this tool is made to give optimum bullet seating depth by measuring over-all cartridge length. Made to be used with popular rifle calibers ..... **\$1.49**



LACHMILLER



HERTER



McK & H



LOCK'S

### HERTER'S Cartridge Case Gauge

Checks both over-all length, to determine if neck trimming is necessary, and head-to-shoulder length to indicate if case headspace has been altered in sizing. Available in most popular calibers **\$3.19**  
Belted cases ..... **\$3.19**

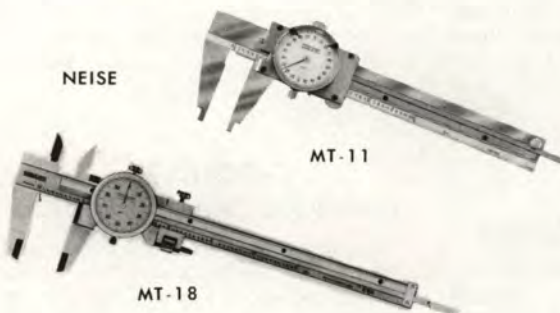
### LACHMILLER Universal Case Gauge

An upright tube and base with a movable spacer which positions a top plate. Spacers available for most popular cases; easily changed. The top plate has Go and No Go steps .010" apart. .... **\$4.95**  
Extra spacers ..... **95¢**



### LYMAN Reloader's Caliper

Accuracy of this tool is to .015". Gives direct inside, outside, depth and stop measuring. Easy-to-read calibrations. Caliper comes complete with instructions. **\$4.00**



NEISE

MT-11

MT-18



NEISE

### KARL A. NEISE MT-18

A micro-screw adjustment, replacing the usual thumb roller, allows very fine adjustments to be made to this 6" dial caliper. Indicator is divided into .001" increments with a red dot accurately spotted between each division—each dot showing .0005"—variations to .00025" may be discerned. An ideal tool for measuring jacketed bullets—faster than a mike. .... **\$37.00**

Other sizes available; 4"—**\$27.00** 8"—**\$53.90** and a 10"—**\$61.95**

### KARL A. NEISE MT-6

This micrometer will measure 0-1" by .0001". Spindle and anvil are oversize and carbide faced. A ratchet is built-in for better feel and a simple locking lever permits one-hand operation. .200" Neo-Ball is included for curved work. .... **\$15.25**

### KARL A. NEISE MT-11

An adjustable dial caliper with a maximum capacity of 4" and reading to .001". Useful for inside, outside and depth measurements. Adjustable tolerance indicators on dial permit this caliper to be used as a go no-go gauge for measuring over-all case length. .... **\$23.70**

MT-11 6" dial caliper ..... **\$33.75**



HERTER





OHAUS



PLUM CITY



YORK CANTRELL



R-A GAUGE



WILSON CASE GAUGE



ZENITH MIKE

### B.T. REYNOLDS Bullet Gauge

This gauge is a sturdy (.062" thick) piece of stainless steel containing 16 precision-made holes for checking bullet diameters. Holes are sized 223, 224, 243, 257, 264, 277, 284, 308, 311, 323, 338, 348, 358, 375, 429, and 458. Price complete .....\$4.75

### LOCK'S Combination Gauge

Two-step gauge to measure maximum case length and over-all cartridge length. Each gauge is cut for a specific caliber and is non-adjustable. Made of 1/8" flat ground steel. Specify cartridge when ordering tool ..... \$5.00

### OHAUS Case Length Gauge

Made of durable plastic, this inexpensive yet accurate vernier caliper measures overall case length. All calibrations are easy to read for quick reference. Comes with complete instructions plus a wall chart showing maximum and trim-to-length for 120 popular cartridges . \$1.95

### RUHR-AMERICAN Case Gauge

One-piece plated metallic gauge for checking case length of cartridges from the 45 ACP to the 375 Mag. ....\$1.98

### McKILLEN & HEYER Case Length Gauge

A multiple-case gauge, hard chrome-plated, for measuring fired and sized cartridge cases.

Calibers are marked in raised letters for ease of reading. Shows most popular calibers. ....\$5.25

### PLUM CITY Bullet Alignment Gauge

This gauge accurately measures the alignment (concentricity) of completed cartridges. It is designed to be used with the same dial indicator as used on the Plum City case neck gauge. Price, complete with dial indicator ..... \$28.50

Price without dial indicator .. \$16.50

### WILSON Cartridge Case Gauge

An invaluable gauge for checking case cone-to-head and over-all length. Each end has both steps milled at one pass for greater accuracy. They are also useful in setting the case trimmer or—its most important function—in setting up any adjustable resizing die. All popular calibers, including many wildcats. ....\$7.00

New is the Wilson Adjustable Case Gauge for all belted magnums (except Weatherby 378 and 460) ..... \$10.00  
Straight Taper rifle case gauge . \$4.00

### PLUM CITY Case-Neck Gauge

Two spring-loaded stabilizer arms press case neck tightly against a hardened steel spindle. As case is rotated, dial indicator shows variation of wall thickness to .001" or less. Price includes dial indicator gauge. .... \$29.50

### YORK-CANTRELL PSIA

The first system which will measure absolute pressure of handloads fired in your rifle, at a price which the average hand-loader and small club can afford. Specially prepared cases, available for most calibers are loaded and fired. After case has cooled, its sensor is measured by the electronic gauge shown. Two scales are provided, both pistol and rifle pressures can be measured, and a chart relating psia to crusher-gauge figures is printed in the instruction book. Additional cases are available from the manufacturer (specify caliber) Complete ..... \$295.00

### ZENITH Primer Mike

A dependable micrometer depth gauge that takes all the guess work out of primer seating. Eliminates improperly seated or high primers. Graduated in thousandths of an inch, with primer depth indicated by a plus (high) or minus (low) reading. \$8.50



## Notes on Bullet Pullers ...

An efficient means of pulling a quantity of bullets from loaded ammunition can often produce quite a saving in one's shooting. Most often, surplus or new DCM military ammunition is the target for pulling. Bullets can easily be pulled and replaced with hunting types. This practice is ordinarily safe so long as bullets of equal or less weight than the originals are used. If

heavier bullets are desired, then powder charges must be reduced or another powder used.

One may also acquire a windfall of cheap or free ammunition which is of no use in its original loading. Pulling the bullets and salvaging the other components can save money.

Most pullers use a simple screw-actuat-

ed collet to hold the bullet while the case is drawn off it. This type does not mark bullets and is probably the best choice for general use, even though separate collets are required for each caliber. Semi-automatic types are very fast, but do mark or indent the bullet, making them of little use for reloading. For only occasional use the inertia type is the best choice.



BONANZA "A"

### BAIR Bullet Puller

A chrome-plated tool that fits any press with  $\frac{1}{8}$ -14 threads. New collet design maintains even pressure, will not mar or scratch bullet. Comes with one collet (specify caliber). ....\$9.00

Extra collets, each (specify). ....\$3.90

### BONANZA "A" Bullet Puller

Designed specifically for the Co-Ax press, this tool has flexible jaws which close on the bullet automatically. Bullets do not become egg-shaped and are reusable. Available in 22, 243, 25, 264, 270, 284, 30 and 32 caliber. ....\$2.50

Model B. Same as Model A, but for use in presses with  $\frac{1}{8}$ -14 threads ....\$3.50

### C-H DIE CO. Bullet Puller

C-H puller has positive die-locking action, removes bullet without damage. Heavy-duty handle fully adjustable for ease of operation. Hex locking nut prevents twisting during operation. Price includes one collet. ....\$4.95

Extra collet (most popular calibers available) ....\$1.50

### EAGLE Bullet Puller

A single-stroke collet type tool which will pull all bullets from 22 thru 45 cal. using only three interchangeable collets. Collet No. 1 for 22 to 30 cal., No. 2 for 7.7 to 35 cal. or No. 3 for 44 and 45 cal. One collet is included. ....\$10.00

Extra collets ....\$3.50



BONANZA "B"

### FORSTER Bullet Puller

Has standard  $\frac{1}{8}$ -14 threads to fit most reloading tools. Made of steel throughout and designed to tighten the grip on the bullet as pulling pressure is increased. Collets available for 22, 6mm (243-244), 25, 6.5mm, 270, 7mm (280 Rem.), 30, 303, 8mm (32), 358, 357, 45 ACP. Comes with one collet (specify) ....\$5.25

Extra collets ....\$1.75

### HERTER'S "F" Bullet Puller

This tool, the Model F, features a hardened steel collet that tightens its grip on the bullet as pull is exerted. Threaded  $\frac{1}{8}$ -14, it comes with one collet ....\$3.97

Extra collets, 22 to 375 cal. ....\$1.27

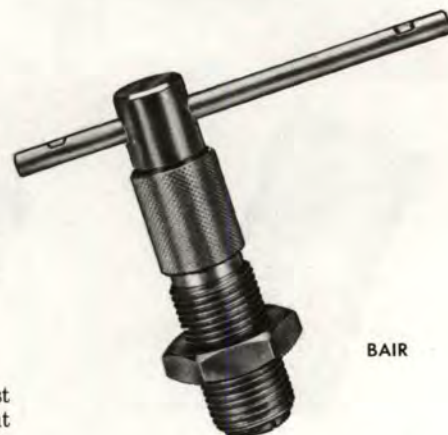
### HERTER'S "H" Bullet Puller

Hardened and ground collets will not mark or damage bullets; chrome-plated body, knurled and threaded  $\frac{1}{8}$ -14 to fit standard presses. One collet is included. ....\$3.79

Extra collets, 22 to 35 cal. ....\$1.39

### KEXPLORE Bullet Puller

The Inertia Bullet Puller removes bullets without distorting cases. Does not damage soft lead bullets or lose any powder. Handles cartridges from the Hornet through the 45-70 and most magnums. *For use with centerfire cartridges only* \$7.70



BAIR



EAGLE

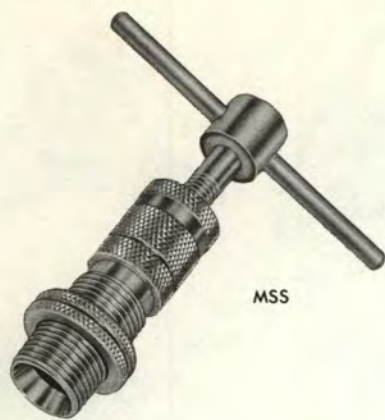


KEXPLORE

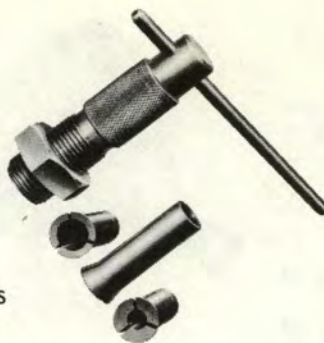


FORSTER





MSS



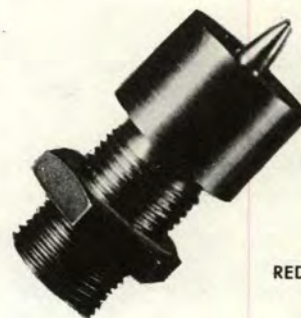
RCBS



SAS



QUINETICS



REDCO



LYMAN



TEXAN



LACHMILLER

### MSS Bullet Puller

Collets are hardened and ground. They grip any shape jacketed bullet without damage. Collets available in all popular calibers. Price includes one collet **\$3.98**  
Extra collets ..... **\$1.00**

### LACHMILLER Ball-Bearing Bullet Puller

Quick, positive action does not mark the bullet and does not turn the case in the shell holder when tightening the collet. One collet included. .... **\$6.50**  
Extra collets ..... **\$1.50**

### LYMAN Bullet Puller

Removes bullets from 22 to 45 cal. centerfire cases without damaging case or bullet, even those made of soft lead. This hammer type tool is quick and simple to use and all salvaged components are reusable. .... **\$7.70**

### RCBS Bullet Puller

Usable in all presses with  $\frac{1}{8}$ -14 thread. Working like a draw-in collet chuck on a lathe, the internally machined collets pull any length bullets quickly and easily without damage to them. .... **\$7.00**  
Extra collets ..... **\$3.25**

### QUINETICS Inertia Bullet Puller

This inertia-type puller features a three-jawed chuck assembly that grips the cartridge quickly and efficiently, allowing speed in operation. User pushes round into the chuck, twist-tightens the cap and raps unit to pull bullet. Handles most cartridges from 22 to 458 Win. Mag., centerfire only ..... **\$9.95**

### REDCO M800 Bullet Puller

The first high-speed tool of its kind, the Model 800 is threaded  $\frac{1}{8}$ -14 for standard presses. Pulls 22 to 35 cal. bullets where other pullers may fail, but may mar them slightly ..... **\$9.95**

### SAS Bullet Puller

A simple spring-steel block with holes for 6.5, 7 and 8 mm, plus 30 cal. bullets that can be used with most presses. Run loaded round up through die hole; drop correct hole over bullet; squeeze tool handles; reverse press handle movement pulls case off the bullet. Special hole sizes may be ordered. .... **\$5.95**

### TEXAN Bullet Puller

Collet design produces even pressure on circumference of bullet, releases bullet promptly when tension is off. Will not mar or scratch bullets. Standard  $\frac{1}{8}$ -14 thread. All popular calibers. .... **\$5.25**  
Extra collets ..... **\$1.75**



## Notes on Powder Funnels ...

A handy accessory for the reloader, the powder funnel provides a means of easy transfer of powder from the scale pan. These universal funnels have tapered shell feed tubes that accommodate all cases from the 22's through 45-70.

**Bair** Aluminum; spill-proof .....\$1.20

**Bonanza** Clear plastic .....\$1.00  
With long drop tube .....\$2.50

**Bonanza** Powder and shot funnel, large size, clear plastic .....\$2.00

**C-H** Clear, anti-static plastic .....75¢

**Flambeau** Anti-static treated to eliminate clinging powder grains. Large flange serves as handle .....75¢

**Fitz** Amm-O-Cone—Fluorescent red plastic .....99¢

**Guns** Clear, transparent plastic ...\$1.00

**Herter** Clear View—Transparent tenite plastic .....42¢

**Lyman** Clear, transparent plastic ..\$1.00

**MSS** Clear, durable plastic .....45¢

**MTM** Clear, transparent plastic ....75¢

**Ohaus** Plastic, universal tube ....\$1.00

**Pacific** Aluminum; spill-proof spout\$1.00

**RCBS** Fluorescent green tenite, anti-static treated. Square lips prevent rolling\$1.20

**RCBS** 17 Caliber .....\$2.40

**Texan** Bright yellow luminescent plastic in two sizes—264 and under, 270 and over. Each .....50¢



PACIFIC



HERTER



FITZ



BAIR



BONANZA



RCBS



BONANZA



MTM FUNNEL



OHAUS

## MTM Adapto Powder Funnel

A unique five-in-one funnel with interchangeable adapter tubes to provide an exact fit for all cartridge sizes and to make loading easier. Four different tubes are supplied to fit cartridges ranging from 17 cal. to 45 cal. Eliminates powder build-up around case necks .....\$1.89

## RCBS Powder Measure Stand

Bolted to your loading bench edge or a wooden platform, this stand provides plenty of room for loading block or powder scale. Made of aluminum alloy, in RCBS green, for powder measures with standard 7/8-14 threaded drop-tube .....\$6.00



C-H

## C-H Powder Measure Stand

Stand can be bolted to the bench or secured with "C" clamps. Will accommodate any measure with 7/8-14 threads. It is made at a convenient height for charging cases .....\$3.50



OHAUS

## OHAUS Powder Measure Stand

A tough aluminum casting which mounts to the bench top. Threaded 7/8-14, it may be used with either the Ohaus Du-O-Measure or other measures threaded same .....\$6.95



## Miscellany for Handloaders ...

Gadgets to lure the reloader are numerous indeed! Just about as many, if not more, have appeared and then disappeared. Some of the accessories available are worthwhile, even—to those ammo makers who load in quantity or who are concerned with ultra-precision cartridges—a real necessity. At the other extreme, of course, are items you can well do without, maybe, but you will have to decide that for yourself. In between there are small tools of real utility, products which can be helpful to you or not, as your personal needs—or fancied needs—demand.

Further on, in various other divisions, you'll find additional notes.

### AUTO-LOAD Cartridge Case Tumbler

Two barrels clean and polish brass or loaded rounds. Perforated drum removes debris from empties — paneled drum removes discoloration and lubricants, making like-new cartridge cases. Unit is powered by 1/8 H.P. motor. .... **\$450.00**

### BAIR Case Lube Pad

Use of the pad speeds the case lubrication operation. Saturate the pad with case lube and roll the cases across the pad to pick up the lubricant ..... **\$2.80**

### BAIR Primer Tube Filler

Turning the dial of this tool fills primer tubes or hands you primers right side up, one at a time. Plastic hopper takes a full box of primers and will not drop a primer in the inverted position. .... **\$7.50**

### B-SQUARE Model AR-12 Tumbler

A large capacity tumbler that can handle over 200 cases at one time. Uses four bags of polishing media that lasts indefinitely. Comes with a moulded all rubber barrel that is quiet in operation and is guaranteed for five years ..... **\$34.95**

### BONANZA Case Graphiter

Made of impact resistant plastic, this unit has three brushes to lubricate the mouth of any case from 17 to 35 cal. (other brushes 30¢). Cover is supplied to keep graphite in and dust and grit out. **\$3.00**



BAIR

### BONANZA Case Conditioner Kit

Kit contains all the necessary equipment and lubricant to properly lubricate metallic cases before resizing. Contains Bonanza Case Lube, pad, Bonanza Case Graphiter, Bonanza Case Sizing Lubricant, and the Bonanza Cricket combination tool for deburring and cleaning primer pockets. Kit complete ..... **\$6.95**

### BONANZA Case Lube Pad

This Bonanza pad applies just the right amount of lube to the cases. Too much lube causes dents and malformations to the cases. A quick roll over the foam pad puts on a thin layer of lubricant .. **\$2.25**

BIRCHWOOD CASEY



### BONANZA Primer Turner

The cover of the Bonanza powder measure serves as a primer turning plate. Made of unbreakable plastic, it is helpful in loading automatic primer tubes. May be had separately ..... **75¢**

BONANZA



### B-SQUARE Stuck Case Puller

Easily removes stuck cases from the sizing dies. To use, drill and tap the primer hole, screw the die part way into the press. Place the washer over the hole and insert the screw into the case. Turn the screw with the wrench and pull the case free. Complete ..... **\$3.95**

B-SQUARE



### BIRCHWOOD CASEY Case Cleaner

A liquid chemical formula for cleaning and restoring the brass to the original natural finish. Does not etch the metal and is easy to use. No harmful fumes or offending odors and will not stain hands or clothing. 3-oz. bottle ..... **\$1.75**





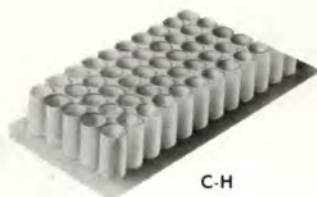
BONANZA

### BAIR Primer Turner

Made of unbreakable plastic, this accessory saves much time when charging primer feed tubes. Primers are turned base-up when lid is replaced and flipped over ..... **\$1.20**

### BONANZA Die Box

Box provides a safe, dust-free and dry storage for your dies while not in use. Each box has a moisture absorbent disc to prevent rust and the inside lid provides tips and suggestions to questions or problems regarding reloading. Made of high impact plastic ..... **65¢**



C-H

### C-H Loading Block

Holds 60 cartridges for easy reloading. Comes in black, white, red and blue—handy for the reloader who works up cases for different loads, etc. Holes are  $\frac{15}{16}$ " deep. Not large enough for 45-70 or 348; but holds all sizes up to 375 H&H ..... **95¢**



FLAMBEAU

### FORSTER Hollow Pointer

An accessory for the Forster Power Case Trimmer. Available in either  $\frac{1}{16}$ " or  $\frac{1}{8}$ " drill size. Complete with guide bushing and drill for any caliber rifle or pistol cartridge. .... **\$4.95**  
Extra drills (state size wanted). **\$1.60**

### FLAMBEAU Twin-60 Loading Block

One side holds 60 cases from 30-06 through belted H&H head size. When flipped over, the same block accommodates the smaller head sizes. Bright yellow. .... **\$1.69**



COLE

### B-SQUARE Neckers

These are special spacers to be placed under your full length resizing dies to allow them to neck size only without changing the adjustment lock nut. Set the dies permanently for full length resizing. No need to change the lock nut for neck sizing. Complete ..... **\$1.00**

### B-SQUARE Model A-1 Tumbler

An inexpensive case tumbler that will polish over a box of rifle empties at one time. Uses only one bag of polishing media that lasts almost indefinitely. Comes with a replaceable one quart can (paint can). Tumbler and can ..... **\$19.95**  
Brass polishing media, 1 pound **\$1.95**



FORSTER



ECHO

### ECHO Wedge Tie Bar

The Echo Wedge Tie Bar reinforces the "C" frame for heavy case forming and bullet swaging operations. .... **\$2.50**  
No. 1 Tie Bar fits Echo B and C, Pacific and older B models.  
No. 2, early Echo A and C-H models.

### ECHO Stuck Case Remover

A simple, sure way to remove a stuck case from a sizing die. It takes only a few minutes to drill and tap a hole in the bottom of the case and "jack" it out with the screw and wrench supplied. Price complete ..... **\$1.85**



FORSTER

### FORSTER Bullet Nose Trimmer

Removes the point from 30-06 military bullets prior to hollow-pointing; cuts noses square and to uniform length. Complete with guide bushing and cutter. Trimmer is used with a drill press. .... **\$4.75**

### FORSTER Hollow Pointer for Pistol Cartridges

Used on the Forster Precision Case Trimmer, this tool hollow-points factory or handloaded pistol cartridges only—assembled rounds with lead bullet in case. Available for 38 Spl., 357 Magnum, 44 Spl., 44 Magnum, 45 Long Colt or 45 ACP. Only the guide bushing is changed to handle a different cartridge. .... **\$4.95**  
Guide bushings only. .... **\$3.35**  
Extra drill only. .... **\$1.60**



## FITZ Flipper

Made of high-impact Fitz Duramite in brilliant red color. Flips all sizes of rifle or pistol primers base up or base down **99¢**



## HERTER'S Cartridge Tray

Molded plastic loading block, unaffected by lubricants, holds 60 cartridges in an upright position for efficient loading and handling. This rack is light, compact and sturdy. Comes in either red or white. **69¢**

## HERTER'S Case Lubricator

A neat, efficient method of lubricating pistol and rifle cases for full or neck sizing. Turn the shell once around the felt liner for a thin coating of lubricant. Bolts to the press or bench **\$3.50**

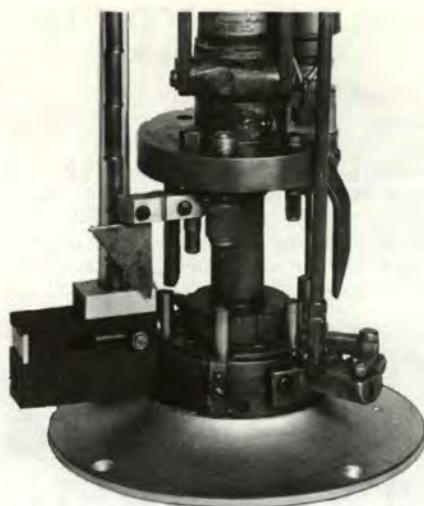
## HERTER'S Die Box

Made of unbreakable translucent plastic, this box stores any two-die sets, protects them from dust and dirt. Boxes can be caliber-marked for easy location. Price each **35¢**



## HERTER'S Shell Extractor

This tool removes stuck cases from the sizing die. Drill case head with drill supplied and extract cartridge with self-tapping T-handle wrench. Extractor, complete **\$1.79**



## HULME Automatic Case Feeder

Installed on the Star or Phelps reloader it expedites the feeding of empty cases, eliminating the individual handling of the case during the reloading cycle.

Mark III available only for the Star Universal Progressive loader and made in two models.

Mark III, complete for 38 ACP, 38 Spl., 44 Spl., 45 Auto Rim and 45 ACP. **\$46.85**

Mark IIIA, complete for 38 ACP, 357 Mag., 41 Mag., 44 Mag., 45 Colt, 45 Auto Rim, 45 ACP and 30 Carbine. **\$47.85**

Extra magazine tube. **\$2.55**  
All models will handle the 41 Magnum cases without alteration.

Extra selector plates. **\$7.60**

Extra cam and bracket. **\$7.60**

Magazine guide spring. **\$.65**

Extra magazine tube. **\$2.55**

Note: Star and Phelps tools made before 1959 require drilling and tapping for installation of the Hulme Case Feeder. If your tool is not already tapped, Hulme will include a drill jig. Tap and drill set available at **\$5.00**



## MTM CASE-GARD 150 Loading Tray

Holds all cartridges for reloading. Front side has large and small openings (50 each) for cartridges from 17 cal. to 458 Win. Reverse side has holes for 45 and 9mm pistol cases. Made of durable polypropylene **\$1.69**

## GOERG Hollow Pointer

Puts hollow point into bullets to control expansion. Made for 38 Spl., 357 Mag., 41, 44 Spl., 44 Mag. and 45 Colt. Works only on loaded cartridges. **\$6.95**



## LEE Case Spinner

To be used with the Lee Trimmer Shell Holder. Shank fits 1/4 inch drill chucks. Spins cases for trimming, chamfering and polishing. All operations can be done without removing the shell or stopping the tool. Complete **58¢**

## HERTER'S Case Lube Pad

Case lubricant is applied to the pad and the cases are simply rolled over it, picking up the right amount of lubricant for smooth resizing. **97¢**

## HODGDON Case Cleaner

A mild, acidic solution is diluted with water for soaking or tumbling dirty cases. Cleans brass bright and shiny without etching. Four-ounce bottle cleans hundreds of cases. **\$1.75**



## MSS Shell Extractor

Offers a safe, fast method of removing a broken cartridge case from a resizing die. Supplied with hex wrench, #7 drill, 1/4-20 tap **\$2.05**  
Without drill and tap **\$.95**



## OHAUS Universal Scale Cover

Made of durable vinyl, this cover was designed for the Ohaus 5-0-5 scale, but it may be used with other popular models. Protects the scale from dirt and foreign matter .....\$1.50

## RCBS Wedge Block

Lets the RCBS "Jr" Press tilt back at slight angle. Mounts between press and bench. ....\$2.40



RCBS



## RCBS Primer Tray

Designed to position primers anvil side up for fast, easy handling and insertion into the primer arm sleeve. Also can be used to load the automatic primer feed tubes by positioning primers with anvil side down. Tray holds 100 primers. Sturdy plastic .....\$1.00

## LYMAN Case Lube Kit

A complete kit for efficient case lubrication. Includes Lyman's improved resizing lubricant, a case lubricating pad, and a handle with three interchangeable brushes covering every caliber for inside neck lubrication .....\$4.95

## RCBS Case Lube Pad

For lubricating cases or bullet jackets before sizing or forming. A thin coating of lubricant is applied to the pad and cases are then rolled across it to pick up lubricant. ....\$3.00

Case lube kit contains pad, 2-oz. tube of lubricant and case neck brush (specify caliber). ....\$5.00

## SIL'S GUN PRODUCTS K-Spinner Mk-II

Used to clean cartridge cases, the K-Spinner is a caliber-size mandrel used in an electric drill chuck. To use, a pad dabbed with K-Kleen (4 oz. \$1.50) is held against the resized spinning case. Removes all foreign material and polishes. Cases can be slipped on and off with drill running. Specify caliber when ordering. ....\$1.75



RCBS

## RCBS Stuck Case Remover

This Williams-type device removes stuck cases from sizing dies quickly and efficiently. Case head is drilled and tapped, stuck case remover is placed over die and hex head screw is turned with wrench until case pulls free. Comes complete with drill, tap and wrench. ...\$4.50

## RCBS DiRak

A convenient storage rack for up to 13 dies and 8 shell holders. Formed of heavy-gauge sheet metal in green crackle finish, this rack either sits on the bench or may be screwed to a wall—DiRaks may be joined for greater capacity. ....\$6.00

## OHAUS Loading Block

Made of unbreakable moulded plastic, this block fits all metallic cartridge cases. Flip over design allows for a full range of hole variations. 80 cavities on one side, 40 on the other, of 3 different depths and diameters to accommodate all cases\$1.69

## TEXAN Case Lube Pad

A fast, easy way to lubricate cases and get the right amount of lube for easy operations .....\$2.29

## PACIFIC Primer Turner

Made of plastic, it permits easy primer handling. After picking up all of the base down primers, merely replace lid and flip over .....\$1.00



PACIFIC



PACIFIC

## RCBS Case Neck Brush

For lubricating inside of case neck before sizing. Nylon bristles withstand years of service. 22, 6mm, 270, 30, 35 and 45 calibers. ....\$1.45  
Extra Brushes. ....45¢

## PACIFIC Case Cleaner

Each Like-Nu 6 oz. bottle will clean and bleach 200 30-06 size cases if used full strength. When used in the Pacific Tumbler this 6 oz. bottle will handle 600 30-06 size cases. ....\$1.50

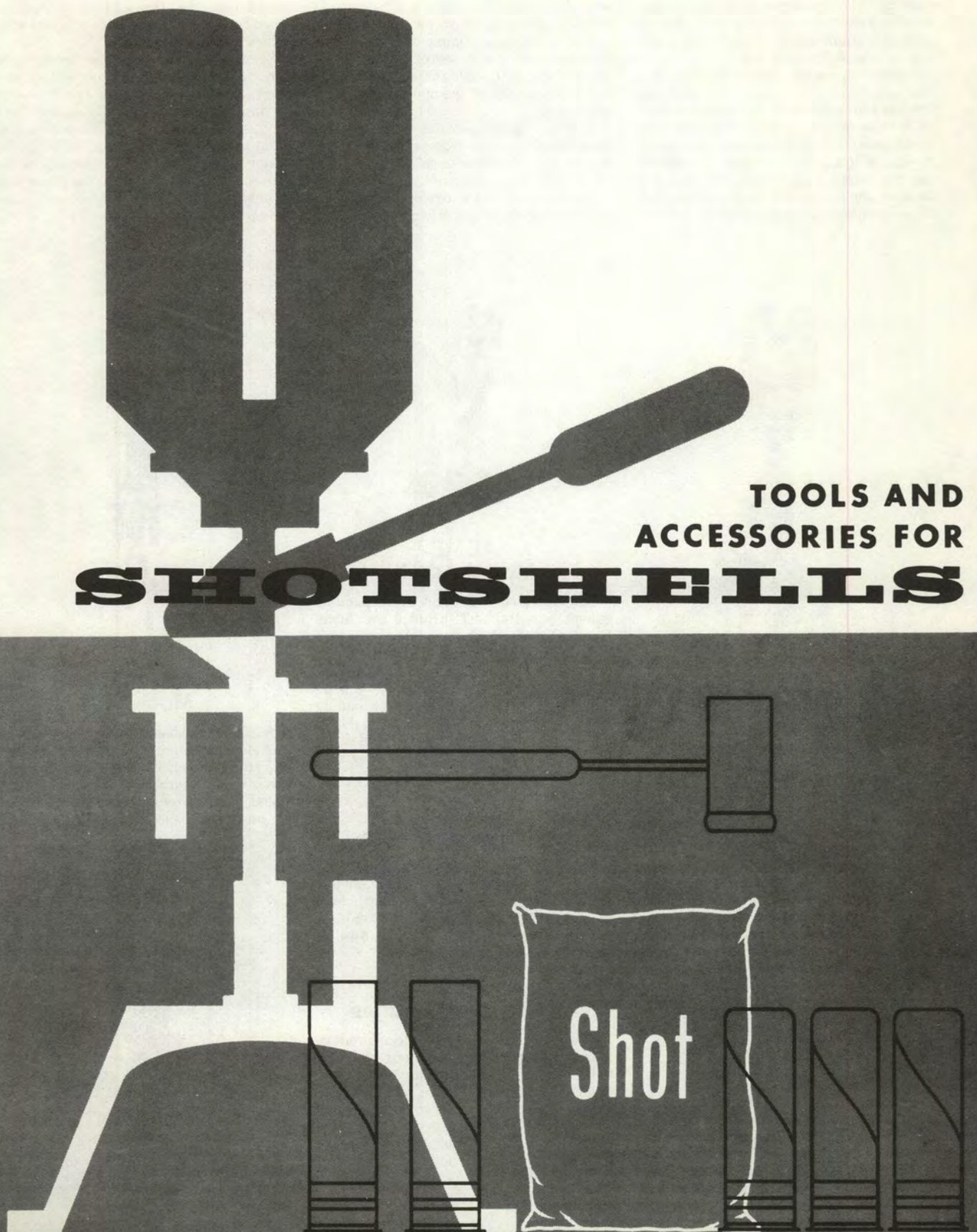
## TSI 400 Ammo Brass Cleaner

A safe non-polluting, non-flammable ammo cleaner that is instant-acting. No rubbing or wire-brushing necessary. A dip process that leaves brass shining and reduces the need for future cleaning. Comes in pint, quart and gallon containers. Pint .....\$2.98  
Quarts .....\$5.00  
Gallons .....\$15.00



6th EDITION — PART 2

TOOLS AND  
ACCESSORIES FOR  
**SHOTSHELLS**





## Notes on Shotshell Presses . . .

In the selection of a shotshell press the handloader may choose a tool that will produce handloads at rates from 10-20 per hour to 500 or more per hour, that range in price from \$10 to \$400 and more. He can make adequate match grade target loads—whatever suits his fancy.

Simpler types of shotshell tools—like the Lee—offer the occasional shotgun shooter the opportunity to reload his cases with little outlay of cash. It takes a bit more time and effort with these tools as compared to the skeet or trap shooter using the latest progressive tool, and the finished shells may not have the fine look of a commercially loaded shell, but his

loads will do the job that he wants done.

The careful operator of a modern progressive tool can be assured of reloads second to none. His shells will be consistent performers at the traps or in the field, will have the clean crimp and smooth body of commercial loads; best of all, he'll have made them with little more than the up and down stroke of the operating handle of his tool.

Between these two extremes are the many single station presses originally designed for reloading metallic cartridges, which will take shotshell dies and do a relatively slow but entirely adequate job of reloading shotshells. Then there are the

multi-station tools that range in efficiency—as well as price—from those using dip-pers for shot and powder measuring to the near-progressive types which charge the cases from shot and powder hoppers with a flick of the charge bar.

Select a press in the price bracket you can afford that has features that you want. Don't expect a lower price press to do things beyond its capabilities, and don't buy a \$300 automatic loader unless you want to reload hundreds of shells. In the majority of the presses, the quality of the finished shell is inherent in the press, and is only varied by the competence of the operator.



ACE I

### ACME Model Ace I

The Ace I shotshell press features a quick change die set and comes complete and ready to load your choice of two gauges. Price includes the Ace measure with 12 bushings and 6 and 8 point star crimpers. There are no bars to buy with this machine . . . . . **\$89.95**



GLACIER BAIR

### BAIR Cat All Standard Gauges

This is a low-cost single stage press for loading all standard gauges. High and low brass cases of all kinds are efficiently handled with a minimum of effort. Complete for one gauge . . . . . **\$44.95**

### Glacier BAIR All Standard Gauges

The experienced reloader can produce more than 250 rounds per hour with this tool. Reloads paper or plastic shells without changing dies. Visible wad pressure gauge eliminates guesswork. All operations end on complete stop. Positive charge bar—pull out for powder, push in for shot, powder and shot bushings cannot be reversed. . . . . **\$109.50**  
Extra charge bar bushings . . . **\$1.50**  
Extra die set . . . . . **\$29.50**



ACE II

### ACME Model Ace II

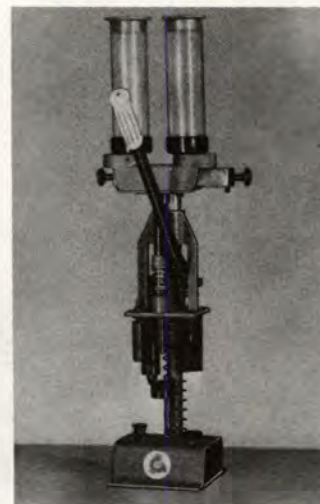
The Ace II is furnished in all popular gauges (specify) and includes the Acme Hydraulic Shell Former, Ace measure with 12 bushings and 6 and 8 point star crimpers. The shell former is an electrically operated unit that reforms shells without damage to the casing. Makes loading plastic shells faster, wad insertion easier and crimping better. Price complete to load one gauge . . . . . **\$79.95**



MODEL 59

### ACME Model 59

A substantial basic shotshell loader that includes the Ace measure with 5 bushings and star crimper. It loads plastic or paper shells with uniformity and a fair degree of speed at an economical price. Complete for one gauge (specify) . . . . . **\$59.95**



BAIR CAT



## Polar BAIR All Standard Gauges

A semi-automatic tool which can produce up to 600 completed rounds per hour, either plastic or paper cases without changing dies. "Tilt-Top" feature allows charge bar bushings to be changed at any time. Wad pressure is fully adjustable and visible indicator helps operator produce consistent ammunition. Automatic primer feed (included) holds 100 primers. Complete for one gauge. .... **\$169.50**

Extra charge bar bushings. .... **\$1.50**

Extra die set. .... **\$39.50**



POLAR BAIR

## Honey BAIR All Standard Gauges

Capable of reloading 225 paper or plastic rounds per hour, this lightweight compact press yet offers sufficient leverage for easy operation. Positive rod ejection drives case from the nylon-bushed size die. Easily removable hoppers rotate ¼ turn to stop powder/shot flow and tapered sides permit stacking. Fully adjustable wad pressure, with indicator, and built-in primer catcher are other features. Complete for one gauge. .... **\$67.50**

Extra charge bar for bushings .. **\$1.50**

Extra die set .. **\$27.50**

Automatic primer feed kit ... **\$19.50**



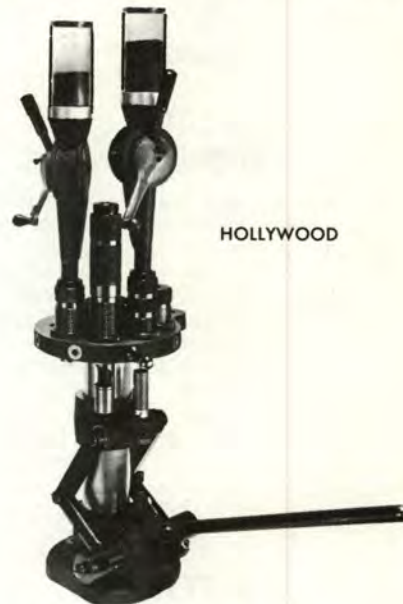
HONEY BAIR

## HOLLYWOOD Senior Turret

Loads 200 shotshells or more per hour, and is rugged enough for metallic case full-length resizing and bullet swaging in any caliber. Turret head has 8 stations, tapped for 1½" die sets or in combination of 1½" and ⅞" for both metallic and shotshell dies. Shotshell set includes Hollywood shotshell dies, powder and shot measures, shell holder, etc. Price upon request

Hollywood Shotshell set ..... **\$60.00**

Dies for another gauge ..... **\$37.50**



HOLLYWOOD

HERTER 390



## HERTER'S Pro Model 390

A (55-lb.) semi-automatic, progressive tool made of cast iron and steel. Powder and shot are loaded automatically. 500 or more shells an hour can be completed. Reconditions cases. Available for any standard 12 gauge load, either paper or plastic ..... **\$87.50**

Extra charge bars ..... **\$2.97**

Powder or shot bushing ..... **79¢**

HERTER 18



## HERTER'S Model 18

Heavy steel base of this press can be mounted on a 12"x18" board and used anywhere, no bench being required. A 4-station head rotates to perform reloading operations, while the shell remains stationary in the press. Both 2¼ and 3" hulls, plastic and paper, can be loaded. Plastic powder and shot bottle lift off and push-through charge bar uses inexpensive inserts (79¢ each). Available in 12, 16 or 20 gauge ..... **\$39.97**

Conversion to another gauge ... **\$4.97**

HERTER  
SIX GRAND



## HERTER'S Model Six Grand

This single stage shotshell loader is lightweight and portable. Has an adjustable mouth shell reconditioning station, adjustable wad feed, steel charge bars with interchangeable inserts for shot and powder, double toggle linkage, primer catcher and is of all steel girder type frame. Available in 10, 12, 16, 20, 28, or 410. Price, complete ..... **\$44.97**

Conversion kit to change loader from one gauge to another ..... **\$9.95**





### HERTER'S Model 90

This progressive 6-station loading tool features plastic shot and powder bottles with screw-off tops for easy filling, heavy steel top frame is steady with no wobbling. Loads both paper and plastic shells 2 3/4" and 3". Fully adjustable automatic wad pressure stop, and floating automatic wad guide. Comes complete with charge bars and insert and can be clamped to the bench or bolted down for rigidity. Complete for 12, 16 or 20 gauge .... **\$47.95**

Model 90 Conversion kit for changing from one gauge to another. Specify crimp starter type ..... **\$9.49**

### HERTER'S Pro Model 72

A heavy tool capable of loading 200 shells per hour. Powder and shot are thrown from a rotary cylinder measure. A pressure gauge controls wad force, while the shot measure is adjustable for the shot size in use.

The crimp die forms a positive radius for easy feeding in pump and auto shotguns. Available in 12, 16 or 20 gauge (specify) ..... **\$64.97**

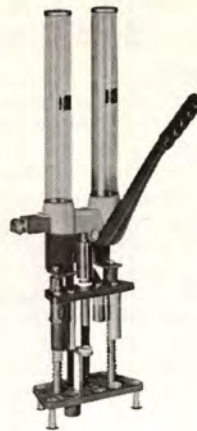
Without measures ..... **\$51.47**

M72 conversion kits, any gauge **\$9.97**

Primer converter kit ..... **\$3.79**



HERTER 72



LACHMILLER

### LACHMILLER Model L1000

This in-line shotshell loader has only 5 stations and requires only 12 seconds per shell. Anodized slide bar uses quick change inserts, sized shell is mechanically ejected, integral wad guide. Powder, wads and shot are all inserted at the third station without moving the shell. Uses the same change dies, crimping heads and spring fingers as the Super Jet model. Comes complete ..... **\$69.95**

### LACHMILLER Super Jet 10, 12, 16, 20, 28 gauge

A machined 5-station tool for reloading both paper and plastic shells. All operations end on a positive stop; resizing is accomplished as final stage to prevent crimping from bulging cases. All popular gauges, including magnum lengths. Die head slides on oiled bronze bearings. Loads up to 150 rounds per hour. Furnished with mounting bolts and all items needed to load either paper or plastic shells. .... **\$69.95**

Complete, 10 mag., 28 or 410 ga. (2 1/2" or 3") ..... **\$64.50**



LACHMILLER



HERTER HAND TOOL

### HERTER'S Hand Loading Tool

Costing only slightly more than a box of shotshells, this simple tool will produce good looking as well as good shooting ammunition. Kit comes complete with an adjustable shot measure and a powder measure of your choice. All you need to produce loaded shells are components, a soft mallet and some time. This tool does not produce finished shotshells as rapidly as a press, but is handy for those with only limited space or who load in the field .... **\$7.93**

### LYMAN Easy Shotshell Loader

Produces a loaded round with 5 handle strokes. Easily and quickly converted from one gauge to another, and can be set up to produce folded, roll or bevel crimp for paper, plastic or metal shells. Available in 10, 12, 16, 20, 28 and 410 gauge. Handles all case lengths. Regular dies load and fold crimp both paper and plastic cases. .... **\$49.50**

410 Easy Loader ..... **\$54.50**

Roll Crimp model. Similar to Easy, loads 10, 12, 16, 20, 28 and 410 bore, roll crimp only ..... **\$58.50**

Adjustable charge bar ..... **\$10.50**



LYMAN



## MEC Versamec 700

Has same features as MEC 600 Jr. plus the Platform Cam which provides a longer ejection stroke at the resize station, and the Pro-Check which programs the charge bar and wad guide. No adjustments or part changes are required for different brass length. Quickly changes from 6 or 8 point plastic crimp spinner to the smooth cone for fired paper shells. Available in 12, 16, 20, 28 or 410 gauge ..... **\$82.50**  
10 gauge reloader available at extra cost.

Optional primer feed ..... **\$15.95**

## HYDramec



## HYDramec SUPER 600 Hydraulic Shotshell Loader All Standard Gauges

Latest of the MEC line, this is essentially the MEC 600 adapted to hydraulic power operation. The Hydramec is installed on a special base containing a hydraulic actuating cylinder connected to a foot-pedal-operated electrically driven gear pump. Up to 800 rounds per hour can be loaded with this tool. Operates on 110V household current. .... **\$385.00**  
Hydra MEC 650 ..... **\$396.00**  
Hydraulic unit only ..... **\$266.20**

## MEC SUPER 600 All Standard Gauges

A progressive tool which can turn out 400 to 600 plastics—even more paper shells—per hour. Uses a circular 6-station shell plate, indexed manually. A completed shell with each stroke. Primer feed is automatic, as is charging with powder and shot. Crimp is formed by a 2-stage cam-operated die. .... **\$132.00**  
MEC 650, same as above but handles 3" shells ..... **\$143.00**

## MEC 600 JR All Standard Gauges

A single stage tool that has many features of the automated MEC 600, including the 600's cam-actuated crimper. Produces loads equal in quality to the 600, but at a slower rate. Press is fitted with Spindex Crimp Head. .... **\$72.00**  
MEC Primer Feed ..... **\$15.95**

## PACIFIC DL-366 Loader

A new progressive tool that loads up to 600 shells per hour. "Tip-Top" hoppers permit easy changing of shot, powder, and charging bars. Loads all shells, accommodates all size primers. Wads and primers are inserted directly into the loader. Not available for 10 gauge ..... **\$189.00**  
Charge bar bushings ..... **\$1.50**  
Die set (any gauge, specify) .. **\$44.00**

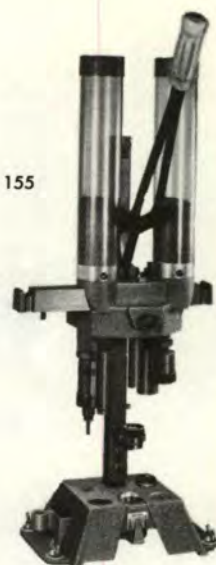
## PACIFIC DL-155 Loader 12, 12 Mag., 16, 20, 20 Mag., 28 and 410 gauge

This loader sizes head and rim of cases before loading and the rest of the case after. Loads over 200 shells per hour and turns out a shell that functions in all types of actions. Complete with automatic primer feed ..... **\$84.00**  
Die set (specify gauge) ..... **\$24.00**  
Charge bar bushings ..... **\$1.50**

## PACIFIC DL-266 Loader

Over 250 uniform rounds can be reloaded per hour. All operations end on a complete stop. Charge bar is of the positive action type. Available in 12, 12 Mag., 16, 20, 20 Mag., 28 ..... **\$129.50**  
DL-266 die set (specify) ..... **\$25.00**  
Charge bar bushing (not included with die set) ..... **\$1.50**

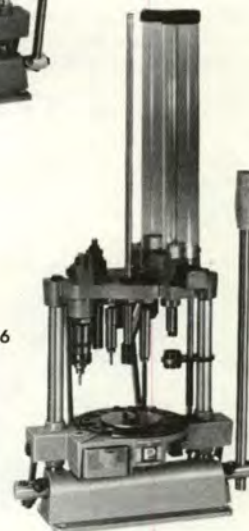
PACIFIC 155



PACIFIC 266



PACIFIC 366



VERSAMEC





PONSNESS 600

### PONSNESS-WARREN Mult-O-Matic 600

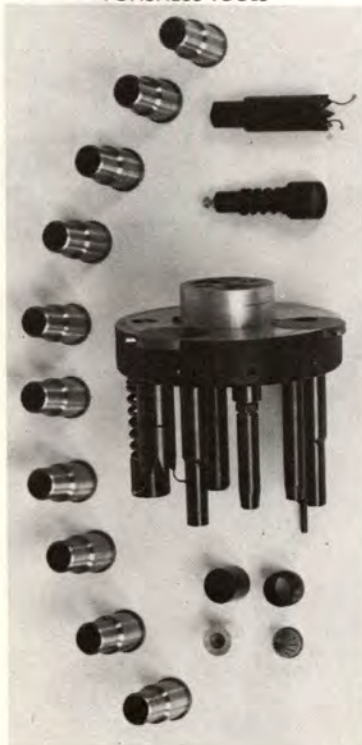
Designed for the trap and Skeet shooters, this machine gives high production rate and versatility. Each shell is contained in its own full length resizing die through the entire reloading operation. One operator can load up to 500 rounds per hour. Additional tooling sets available in all standard gauges and can be installed in 10 minutes. Complete in 12, 16 or 20 gauge with 8 or 6 point crimp starter (specify) ..... **\$289.50**

28 or 410 gauge with 6 point crimp starter ..... **\$319.50**

Additional tool sets (12, 16 or 20 gauge, specify) ..... **\$109.50**

Additional tool sets (28 and 410 gauge, specify) ..... **\$129.50**

PONSNESS TOOLS



PONSNESS 800-B

### PONSNESS 800-B Size-O-Matic Loader

A semi-automatic progressive loading tool: handles both paper and plastic shells, new or fired. Cases are resized full length and remain in the sizing die through all operations. Eight such dies are permanently assembled to the die cylinder which indexes automatically to position shells for each operation. A cam-operated carrier receives and positions wads for seating. Wad pressure is adjustable from 10 to 130 pounds. Powder and shot measures can be shut off or emptied at any time without disassembly. Operating handle can be positioned on either side.

With a helper available to keep components moving, up to 700 rounds per hour can be loaded. 12 or 20 gauge .. **\$449.00**

28 or 410 gauge ..... **\$498.00**

PONSNESS 375



### PONSNESS M375 Du-O-Matic

A single stage tool requiring only 4 moves to produce a loaded shell. Change gauges in 5 minutes. No crimp starter needed for paper cases. Price complete for one gauge ..... **\$119.50**

Conversion unit (12, 16, 20, 28, 410 gauge) ..... **\$39.50**

Crimp starter (6 or 8 point) .. **\$12.00**

Bushing (shot or powder) ..... **\$1.50**

### SWANSON Safari Loader

An unusually simple shotshell loading press that produces entirely satisfactory results with both paper and plastic cases. Available for 12-ga. only, it comes with all dies, powder and shot dippers... **\$19.95**

LEE



### LEE Loader

Wads, sizes and crimps in one continuous operation. Set includes powder and shot measures, decapper, capper, wadding tool, resizer, crimper and instructions. Guaranteed never to wear out or break through normal use. .... **\$9.95**

Available in 10, 12, 16, 20, 410; also 3", 12, 20 and 410.

10 ga., 3½" Magnum ..... **\$11.95**



SWANSON



# REDDING



## REDDING-HUNTER Model 16 Loader

The integral powder and shot measures hinge forward for easy changing of the containers. Replaceable bushings for the various powder and shot charges, and a universal type power die that provides the proper wad seating pressure for any load without adjustment is standard. The 5 die stations are well-spaced to provide plenty of operating room.

Price, including shot and powder measures, dies, bushings and Redding-Hunter crimp starter. .... **\$56.00**  
 410 or 28 ga. M16 ..... **\$60.00**  
 All standard ga. dies ..... **\$18.00**  
 410 or 28 ga. dies ..... **\$22.00**  
 Bushings (each) ..... **\$1.00**  
 Crimp starter ..... **\$4.50**

## RUHR-AMERICAN Model 37

Alloy steel frame, adjustable rotary cylinder-type measure for powder and shot. Baffle-type powder hopper. Up stroke operation. 6-star crimp for paper shells, 8-star for plastic. Specify choice. 12, 16, 20 gauges ..... **\$64.97**

# RUHR-AMERICAN



# TEXAN



## TEXAN Model S.T.

A sturdy shotshell press available in all popular gauges. Features include automatic shot, powder and primer dispensing that function only when the shell is in position to receive them. Automatic indexing of the shell holder plate advances the shells through all loading stations. Operator motion consists of inserting case, wad and pulling the handle for one completed shell.

12, 16 or 20 gauge ..... **\$179.95**  
 28 or 410 gauge ..... **\$184.95**

## TEXAN Model MIIA

A 10-station automatic turret tool, massive and heavy, that reloads 200 shells without refilling, delivers a loaded shell with every pull of the handle. Available in 12, 16, 20, 28 and 410. Price without accessories ..... **\$199.50**

Price with primer feed, shell ejector cam, shell catcher and 8-point crimp starter ..... **\$249.50**  
 Automatic primer feed ..... **\$39.95**  
 Conversion kits ..... **\$32.50**

# TEXAN



## TEXAN Model FW

Available in 12, 16, 20, 28 or 410, the FW resizes for high or low brass without adjustment. Wad guide automatically lowers and raises for easy and fast insertion of wads. Crimp starter seeks out original fold for perfect crimps. Nylon wad guide fingers, double column design for rigidity and strength and accuracy. Quick changing of powder and shot without bar changes plus easy conversion to other gauges.

12, 16 or 20 gauge ..... **\$74.95**  
 28 or 410 gauge ..... **\$79.95**  
 Primer feed ..... **\$14.95**

## TEXAN Model L.T.

An economy reloader that features the double column design for strength and rigidity. Resizes for high or low brass without adjustment and uses the interchangeable shot and powder bushings for load selection. Crimp starter seeks out the original fold for perfect crimps. Available in 12, 16, 20, 28 or 410.

12, 16 or 20 gauge ..... **\$39.95**  
 28 or 410 gauge ..... **\$44.95**

# TEXAN



# TEXAN





## Notes on Shotshell Loading Dies ...

Shotshell dies are designed to perform the following operations: decapping and recapping; seating wads under proper pressure; sizing and crimping. Provisions for inserting powder and shot charges must also be made, but this is not a function of the die set. Sequence of the operations may vary somewhat, depending upon the dies and press used. All shotshell presses as such in this volume perform the

above operations with dies designed specifically for the individual presses. Their dies will not usually interchange. Other shotshell dies shown in this section are made for use in standard metallic reloading presses which can be converted to shotshell use if their die station(s) is threaded 1¼-18, the standard for this kind of shotshell die. This allows, perhaps, the conversion of one's existing press to shot-

shell use at a saving, compared with buying a separate press. Unless one plans on loading a great many shells in a short time, this is usually the most practical approach. Loading will be slow unless a turret type press is used, but the speed will be adequate for the average hunter. Loads produced in this manner can be fully equal in quality to those from a shotshell press, and of greater variety.



HERTER



LACHMILLER JET



HOLLYWOOD

### BAIR Star Crimper

Available in 6- or 8-point style, the crimp starter acts with the regular crimping die. This die is used to start the crimp on plastic or new paper cases. Specify gauge. .... **\$3.00**

### BAIR Floating Crimp Starter

Free-floating crimp starter head aligns automatically with folds in shell mouth. Available for 6 or 8 segments in 12, 16 and 20 gauge; 6 segments only in 28 and 410. Specify gauge and segments when ordering. .... **\$5.00**  
Floating head only. .... **\$1.00**

### HERTER'S Perfect Shotshell Dies

All loading operations are completed within this single die—adjustable for 2¾" or 3" cases, automatic wad seating pressures, full length sizing within the die body and a floating star crimp head. ¼-18 thread fits Herter's Model 3, 81 and 234 and other tools .... **\$15.39**  
Shell holder for 12, 16 or 20 gauge, each .... **99¢**  
Die conversion kit, to change to another gauge .... **\$9.95**

### LACHMILLER Base Resizer

The Base Resizer die, made for all Super Jet shotshell tools, reconditions the brass head, reducing it to original factory dimensions. .... **\$12.95**



### LACHMILLER Jet Size Die

This die is made for use in the Lachmiller Super Jet press and sizes the finished round in the last station. Shells sized with this die function in all guns. Available in 12 or 20 gauge only. .... **\$6.00**

### HERTER'S Crimp Starter

This self aligning crimp starter is free floating on the tool station as it aligns itself to start the crimp. Can also be locked in place to be used as a standard fixed crimp starter. Comes in all popular gauges and 6 or 8 point or cone (specify) . **\$2.39**

### HERTER'S Wad Starter

A die body, brass spring fingers and cap, the same wad guide used on Herter's shotshell tools. 12, 16, or 20 gauge .... **\$2.39**  
Brass spring fingers (stage gauge) . **.29**

### HOLLYWOOD Shotshell Dies

Intended for use only in the various Hollywood presses; standard equipment in the big Hollywood automatic tool. A complete die is furnished for each operation so that no changing of parts is required. The complete set can be installed in the Hollywood Senior Turret tool. Well finished and polished, available in gauges 410 through 10 for paper, plastic or metal shells. .... **\$60.00**  
Conversion kit .... **\$37.50**





REDDING



PONSNESSE-WARREN



LYMAN



MEC



LACHMILLER

### LYMAN Roll Crimper Head

With drill press adapter. For roll crimping shotshells. Mounts in any drill press. Specify 10, 12, 16, 20, 410 or 12 gauge for rifled slugs. .... **\$4.00**

### LYMAN Roll Crimper Head

For roll crimping shotshells. This head also works on rifled slugs and mounts in any drill press. Specify 10, 12, 16, 20, 28, or 410 ..... **\$5.00**

### PONSNESSE-WARREN Crimp Starters

Six and eight point crimp starters are ball bearing lined and have an automatic pick-up to assure perfect crimp alignment.

Crimp starter complete (8 or 6 point) specify ..... **\$12.00**  
Crimp Starter Head (8 or 6 point) **\$6.00**

### HERTER'S Plastic Crimp Starter

This plastic crimp starter is for use in all Herter's or other hand type loading tools without the bolt in the rear. Quickly adapted for use on shotshell presses requiring a crimp starter with a bolt in the rear such as MEC and certain Herter's models. 6 or 8 point or cone ..... **\$1.39**

### LYMAN Easy Crimp Starter

Required when fold crimping plastic (except Winchester AA) or new paper shells on the Easy Reloader, this crimp starter is self-aligning. It meshes to the existing fold creases in the case mouth; no manual alignment necessary.

12, 16 or 20 gauge (one 6 and one 8 fold starter head). .... **\$7.00**

All standard gauges (one 6 fold starter head). .... **\$4.00**

### MEC Spindex Crimp Head

An 8-point crimp starter which rotates as it adjusts itself to the original creases in the case mouth. No indexing is required, yet a neat tight crimp is assured every time. Can be installed on MEC 600 and 650 presses (specify gauge). .... **\$4.50**

### PONSNESSE-WARREN Paper Crimp Assembly

This conversion kit is intended for shooters who reload paper shells predominately. The standard crimp assembly on Ponsness-Warren tools is primarily for plastic shells. This assembly can be installed in a matter of minutes. Specify gauge ..... **\$8.50**

### LEE Star Crimper

This starting die is made of unbreakable nylon, and can be used on all plastic or unfired paper shells. Available for 8-point crimping of 12 or 20 gauge, 6-point 12, 16 or 20 gauge shells, specify. .... **95¢**

### LACHMILLER Super Jet Crimp Head

Reforms grooves of original crimp perfectly. This unit fits all Super Jet tools; 6 or 8 point form in 12, 16, 20 or 28 gauge, specify. .... **\$3.75**

### REDDING MODEL 23 Star Crimp Starter

This self indexing Star Crimp Starter attaches to the No. 16 shotshell reloader and is available in 6 or 8 points. Specify gauge and number of points ..... **\$4.50**

### REDDING Model 17 Shotshell Dies

Available in 12, 16, 20, 28 and 410 gauges, these dies consist of a decap rod, rammer tube, wad guide assembly, reloading die, crimp die assembly, pushout rod, resizing die and a resize pressure pad.

12, 16 or 20 gauge ..... **\$18.00**  
28 or 410 gauge ..... **\$22.00**



## Miscellany for Handloaders ...

Gadgets to lure the reloader are numerous indeed! Just about as many, if not more, have appeared and then disappeared. Some of the accessories available are worthwhile, even—to those ammo makers who load in quantity or who are concerned with ultra-precision cartridges—a real necessity. At the other extreme, of course, are items you can well do without, maybe, but you will have to decide that for yourself. In between there are small tools of real utility, products which can be helpful to you or not, as your personal needs—or fancied needs—demand.

Further on, in various other divisions, you'll find additional notes.



BRENNEKE



FORSTER-APPELT



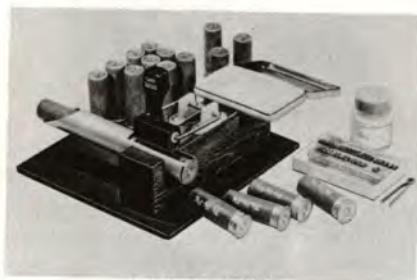
ACME



HANDI-BIN



CHELL-CHOP'R



D & D MARKER



### BRENNEKE Rifled Shotgun Slug

Designed for shotgun hunting of big game, the Brenneke slug can be used in any shotgun regardless of choking. Wad and slug are joined together forming a long projectile for improved ballistic performance. Weight is comparable to a standard field load of shot. Available from Stoeger in 12, 16 or 20 gauge.

Per 10 .....\$3.50

### CONTAINER DEV. CO. Handi-Bin

Modified polypropylene hopper front assembly and storage bins. One-piece construction in various colors and sizes. Won't rust; resists oil, water and many chemicals. Stackable. Racks, rotary assemblies, bench mounts, floor stands and trucks. Write for prices.

### CHELLIFE Chell-Chop'r

For trimming case mouths of 12 gauge shotshells using a double edge razor blade for the cutter. Easily replaceable blade. Made of corrosion resistant materials. Cuts paper or plastic cases .....\$5.95



HERTER

### D&D CO. M1000 Shotshell Marker

For marking load data on paper, plastic or metal shotshells, 28 gauge through 10 gauge magnum. Unit comes complete with ink, ink pad and rubber type. \$14.95

### FORSTER-APPELT Therm-O-Matic

A thermostatically controlled electric shotshell former, essentially for plastic shotshells. Temperature adjustable for plastic or paper cases. Can be used to iron out poor crimps by removing only the shot from loaded shells. Used on paper tubes, additional wax can be applied to strengthen the new crimp. Operates on standard household current. Available in 12 gauge only. ....\$10.95

### HERTER'S Wad Column Gauge

A direct reading gauge which determines correct wad column height after powder is in shell. Adjustable for any shot charge .....\$1.63

### ACME Hydraulic Shell Former

An electrically operated shell former that reforms shells without damaging the casing (plastic or paper). It reconditions the casings and gives an extended life. Allows easier insertion of wads or shot containers. Complete .....\$15.00

### ANDERSON Shotshell Trimmer

Trims all paper or plastic shells by simply changing dowels. Uses standard razor blades (one supplied). Case mouths are cut cleanly and exactly to the length desired. ....\$8.50

10, 12, 16, 20 and 410 ga. dowels. \$1.00

### BALLE BLONDEAU Shotgun Slug

This unique slug is of solid steel and is available in 12, 16 and 20 gauge. Gives exceptional accuracy and penetration on game. Few ricochets are had as the slug goes through obstacles. Sold in boxes of 10 slugs each. Available from Michaels Antiques .....\$3.50





### HERTER'S Electric Shell Former

This 115 V unit reforms and stiffens bent or weathered shells, redistributes the wax and may be used to seal the crimp also. Unit available in 12, 16 or 20 gauge.....**\$3.69**

### HERTER'S Wad Cutter

For those wishing to cut their own filler wads and over shot wads. Wads can be cut from cardboard, cork sheeting, gasket material and even old hair-type carped padding. Cutter is machined from tool steel and hardened. Tapered bore allows cut wads to be ejected freely. A light blow with a mallet is all that's needed to cut the wads. Available in 12, 16 and 20 gauge (specify) .....**\$2.19**

### JASCO Shell Caddy

A 50-shell, 1-piece, molded block that holds shotgun shell sizes from 10 to 410. Made of durable, oil-resistant, high-impact plastic, in natural white color.**\$2.25**

### LACHMILLER Shell Saver

Constructed like a loading press, this tool resizes case head and brings rim to correct diameter and thickness. It also decaps, flattens head, reseats base wad and resizes shell body. Shells are pulled from die by a collet, not by the usual shell holder. Complete for 12, 16 or 20 ga. (specify). ..... **\$37.50**  
Complete for 28 or 410. .... **\$39.95**  
Conversion kit 12, 16 or 20. .... **\$9.95**  
Conversion kit 28 or 410. .... **\$12.40**

### LEE Wad Guide

Moulded of a new polycarbonate material that makes wad starting easy in all types of shells. Guaranteed for two years. In 12, 16 and 20 gauge. .... **95¢**



JASCO



LYMAN



LYMAN



MEC DISPENSER



LYMAN



HERTER



### LEE Wad Guide Fingers

These replacement wad guide fingers are designed for all presses using the MEC type guides. Available in 12 or 20 gauge only, the fingers come packed two per package ..... **75¢**

### LYMAN Powder Bars

Designed for the Easy Shotshell Reloader, it replaces the standard powder slide and allows you to adjust your loader for any normal shotshell charge, for any shotshell powder. Micrometer adjusting knob. No extra bushings needed ..... **\$11.00**

### LYMAN Adjustable Dipper

This adjustable powder and shot dipper measures black powder in drams and measures lead and copperized shot in ounces. *Not for use with progressive burning smokeless powders* ..... **\$3.00**

### LYMAN Spring Fingers

Replacement spring fingers to fit the wad chamber of the Lyman Easy Shotshell reloader. Available in all gauges (specify) ..... **75¢**

### LYMAN Easy Shotshell Trimmer

Cuts off worn case mouth, ready for roll crimping. The cutting wheel trims the case to pre-set length. Available in 10, 12, 16, 20, 28, 410 gauge. .... **\$9.00**  
Extra mandrel. .... **\$1.50**

### MEC E-Z Wad Dispenser

This large-capacity, twin-hopper bin presents a wad supply conveniently to the reloader. As wads are taken from below, more drop by gravity from the supply above. .... **\$11.00**





MEC

### MEC Primer Tube Filler

A box of shotshell primers is inverted in the flat tray of this unit, the flared end of a primer tube is inserted in the clip at one corner of the tray. Primers are guided into the tube by means of a small metal rake supplied. ....\$2.80

### MEC Case Conditioner

Completely resizes case head, restores headspace and irons out case mouth, making it possible to reload any case, including the plastics. All gauges. ....\$33.00  
Dies. ....\$8.20

### MEC E-Z Pak

The easy way to pack shotshells. As each shell is reloaded, they're placed in this device as if they were being placed in the box. After each 25 shells, the original box is slipped over E-Z Pak which is then turned upside down and removed. Available in all gauges except 10 .....\$2.20

### TEXAN Shotshell Conditioner

Plastic or paper shotshell cases can be completely reconditioned with this tool. One pull of the handle resizes both the body and brass head, also irons walls of paper shells for renewed life with optional heating element (\$6.00 extra). Complete for 12, 16 or 20 gauge (specify). . . \$26.50  
28 or 410 gauge. ....\$28.50

### MEYER BROS. Shotgun Slugs

Three grooves cut from the hollow point outward allow the slug to break into three parts, causing great tissue damage and concussion. Fine slug accuracy can be expected if loaded according to instructions. Graphite impregnated to prevent leading of the bore. 12 or 16 gauge.

Box of 50 .....\$4.85



WHIT



VITT SLUG



MEYER

### NORMINGTON Powder Baffles

The accuracy of powder and shot charges thrown by your equipment is guaranteed to .2-grain with these baffles that allow the same weight of powder on top of the bar or bushing at all times, regardless of the depth of powder in the reservoir. Two types in five different sizes for powder bottles and powder and shot tubes.

For powder bottles only (Style B) \$2.50  
For both powder and shot tubes (Style A) .....\$1.50

### PACIFIC Primer Tube Filler

A fast and simple way to load primer tubes for shotshell presses—just turn the dial of this plastic device and the tube is filled. Will not drop primer with base inverted .....\$8.00

### PONSNESS-WARREN Wad Guide Fingers

Replacement wad guide fingers adaptable to most reloading tools and available in 12, 16, 20, 28, and 410 gauge. These fingers accommodate all wads and assure exact wad seating. Specify gauge. \$1.00

### MEC Electric Shell Former

Tests paper cases for blow-out at the brass and reshapes and reconditions the shell for easy insertion of wads. Makes it possible to re-use shells that might otherwise be discarded. Price includes bracket for bench mounting .....\$5.50



NORMINGTON



TEXAN

### TEXAN Crimp Starters

These crimp starters are for crimping both paper and plastic shells and are available in both 6 or 8 point versions, for all Texan shotshell presses. Specify gauge and number of points .....\$5.50  
Model D-II and A-II swing-type crimp starter .....\$5.00

### VITT Aerodynamic Shotgun Slug

Modified and improved from of the old reliable Brenneke slug. The high, thin, helical ribs tightly fit the bore for accuracy, but because they are thin and soft they pass through the tightest choke with complete safety.

For complete descriptive literature and prices, write to George N. Vitt.

Box of 25, 12 ga. only. ....\$5.00

### WHIT'S Rotary Shotgun Ironer

Hardened tool steel device, carrying a 1/4" shaft for motor or drill press mounting, quickly restores shells to usefulness. Also for cleaning or re-paraffining case mouths. All gauges except 410 ....\$6.95



6th EDITION—PART 3

TOOLS AND  
ACCESSORIES FOR  
**BULLET  
SWAGING**





## Notes on Bullet Swaging Presses ...

Swaging lead cores or slugs into bullets requires tremendous pressure, therefore presses for such use must be rigid, sturdy and with sufficient leverage to adequately cold form the lead.

Many of the more substantial presses available are adequate for swaging half-jacket pistol and rifle bullets, but only the

more solid tools designed for heavy-duty work should be used for the swaging of *full jacket* rifle bullets because of the force required.

The handloader who now owns a press of sturdy construction may purchase bullet swaging dies for use in his press. Those who don't own a strong enough press, or

who don't want to disturb their dies, should get a separate press for bullet swaging. The big advantage of the presses shown here, designed for bullet swaging only, is that they may be set up and used whenever the need arises without the bothersome task of removing the reloading dies, inserting the swaging dies, etc.

### C-H Cannelure Tool

This cannellure tool is of all steel construction and allows the operator to give his bullets factory-quality cannellures. The tool features positive adjustments for both location and depth of the groove **\$14.95**

### SAS Mity-Mite Swage Press

Designed only for bullet making, the M-M press has ultra-short ram movement and great mechanical advantage. The press lies on the bench, so bullet fall is short, no catcher being needed. All calibers to 458. Price with one set of dies, any caliber **\$85.00**



C-H



SAS

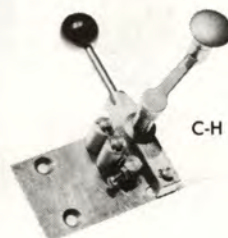
### C-H Swage-O-Matic

Self-ejecting bullet swaging tool for making half-jacketed or three-quarter-jacket bullets. Simple die adjustment allows change to any bullet weight desired. Press comes complete with die for one caliber and bullet punch style only **\$33.00**

Dies for other calibers **\$9.00**

Bullet nose punches **\$5.00**

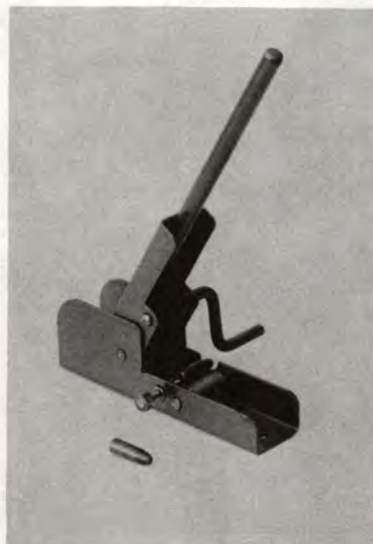
Hollow point punches **\$7.50**



C-H

### SAS Cannelure Tool

Designed for grooving (cannelluring) all bullets, jacketed and lead, this tool also can be used for crimping handgun cases after bullet seating **\$12.50**



SAS

### HERTER'S 9 Ton Bullet Maker

Designed for bullet making only, this press is machined from solid steel and has an extra large short-stroke steel ram. Dies are adjustable and use 1/2- or 3/4-jackets or gas checks. Press may be mounted to bench or block of wood. Horizontal operation makes bullet fall short, no catcher being needed.

Complete with bullet die and nose punch shape desired. For handgun or 30 cal. rifle **\$26.97**



HERTER

### HERTER'S Bullet Groover

This tool makes two or three lubricating grooves in case, swaged lead or 1/2- and 3/4-jacketed bullets. Handles all bullets from 38 thru 45 caliber without additional accessories **\$6.99**



HERTER 9-TON



## Notes on Bullet Swaging Dies ...

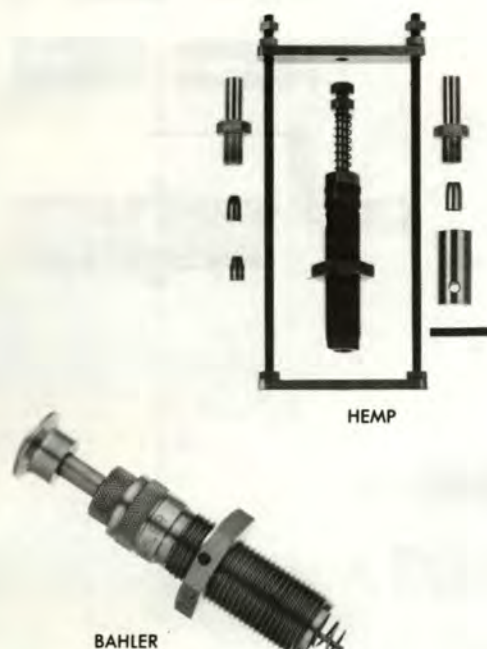
Bullet swaging dies are the keystone to the successful production of lead core, cold formed bullets. In selecting the correct dies the handloader should first decide what type of bullets he wants to make, and for what purpose. It would be foolish to buy expensive dies if the bullets were to be used only for plinking, but it would also be foolish for the perfectionist, the competitive target shooter or the person who wants to produce great quantities of bullets to expect the lower priced dies to perform to his expectations.

Your  $\frac{7}{8}$ -14 press, even if stout enough for bullet swaging operations, won't take dies made for the various specialized bullet making presses such as the SAS Mity-Mite, C-H Swage-O-Matic, etc. These dies, made specifically for their own presses, won't perform well, if at all, with the standard reloading tool.

All of the dies on the following pages will produce quite uniform half-jacket pistol or rifle bullets. The quality and degree of uniformity of the bullets made will depend on the workmanship, design and

manufacturing tolerances of the press and dies in use. These qualities cannot be as high in mass-produced dies as in hand-honed and fitted ones; after all, they sell for a fraction of the cost of the others.

The operator is also important in the final quality of the finished bullet. A properly adjusted die that bleeds off just enough lead to assure you of a dense, completely filled bullet, but not enough to cause excessive pressure on the tool and dies, will produce a clean, uniform bullet, properly formed.



### CLYMER Swaging Dies

Dies are threaded  $\frac{7}{8}$ -14 for standard presses and heat treated to 52-55 Rockwell, then honed to a micro finish. Available in 30 cal. (.308-.309) rifle and 38, 44, 45 caliber pistol solid nose punch styles, semi-wad cutter, round nose and conical. Additional punches are available. Adjustable for any bullet weight. Complete **\$18.95**  
Nose punches **\$4.75**

### BAHLER Swaging Dies

These self ejecting dies will work only in the RCBS Rock Chucker press. Any weight bullet can be made. For half and three-quarter jackets. Any nose shape desired (specify).

Die set for solid nose **\$60.00**  
Die set for hollow points **\$65.00**  
17 caliber dies, from **\$150.00**



### HEMP'S Swage Dies

Custom made swaging dies for rifle and pistol bullets, correctly heat treated, precision lapped and finished. Made to standard dimensions or your own, these  $\frac{7}{8}$ -14 dies are usable in any heavy duty press. Bullet weight is adjustable.

Handgun die sets:  
Standard  $\frac{7}{8}$ -14. **\$57.85**  
Production  $\frac{7}{8}$ -14. **\$77.50**  
Production dies for RCBS A-2, Lachmiller or other presses with  $1\frac{1}{4}$ -18 thread holes. **\$85.00**  
Handgun HP punch (extra). **\$ 9.50**  
Rifle bullet dies for use in  $1\frac{1}{2}$ -18 thread Hollywood Senior press. **\$79.85**  
Same, for use in  $\frac{7}{8}$ -14 presses. **\$84.75**  
SP die and bullet holder makes Spitzer or RN bullets from HPs. **\$7.50**  
Jacket and/or bullet size-down die and punch. **\$10.50**  
Collet type crimp groove die and point closer. **\$17.50**  
Extra collets for above. **\$7.50**  
De-head die and punch unit for 22 LR hulls. **\$10.50**



### C-H Bullet Swaging Dies

These dies are for making  $\frac{3}{4}$ -jacket bullets for pistols. Available in: 38, 41, 44 and 45 calibers. Any bullet weight desired is possible. Dies, complete **\$9.00**  
Bullet nose punches **\$5.00**  
Hollow point punches **\$7.50**

### HOLLYWOOD Bullet Dies

Guaranteed to swage uniform, precision bullets in the Hollywood press, these 2-piece dies will produce thousands of accurate bullets.

The nose forming piece is top-vented to carry away the bleed-off from pistol bullets and permit the escape of air trapped in the point of the rifle nose-die. Extra parts are available to change nose style. Write for prices on all popular calibers.

Pistol dies. **\$39.50**  
Rifle dies. **\$47.50**



## HERTER'S Pistol & Rifle Dies

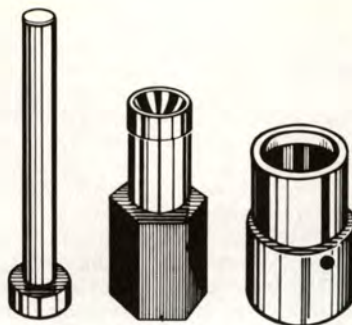
Made for use in Herter's 9 Ton Bullet Maker press only, these are available in 38, 44, 45 ACP and 45 Colt handgun calibers and in 30-cal. rifle dies ..... **\$6.29**

Extra bullet nose punches (add 70¢ for HP) ..... **\$3.19**

## HERTER'S Pistol & Rifle Dies

Simple adjustment permits any normal weight bullet. To change nose styles, only different nose punches are needed. Available in 38, 401, 44, 45 ACP and 45 Colt handgun calibers and in 22, 6mm and 30 cal. rifle. Hollow point dies not available. Dies fit all 7/8-14 presses and make 1/2 or 3/4 jacket bullets ..... **\$7.69**

Extra bullet nose punches ..... **\$1.97**



HERTER



LLF

## L.L.F. Die Shop

These dies fit nearly all presses suitable for bullet swaging. Adjustable for desired bullet weight, bullets are automatically ejected after forming. Available from 17 to 333 caliber including the metrics. When ordering, give make and model of press, brand of jackets to be used and caliber. Complete set of rifle dies. .... **\$62.50**

Parts required to change to another caliber. .... **\$52.50**

Bullet swage die (to change bullet shape). .... **\$27.50**

Core seating punch (for different brands of jackets). .... **\$ 4.00**

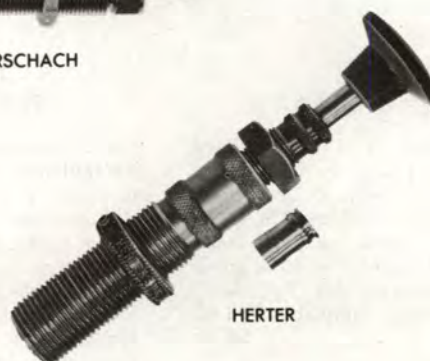


RORSCHACH

## RORSCHACH Bullet Making Dies

A precision made 3-die set of premium grade tool steel, hardened to reduce friction and wear. These are of the insert type—inserts are screwed into a single larger die body—and fit presses threaded 7/8-14. Complete set contains die body core former, core seater and bullet swaging inserts, punch holder, tube of lubricant and comprehensive instructions. ... **\$200.00**

Automatic ejector assembly. ... **\$30.00**



HERTER

## TNT Bullet Swaging Dies

Made by Independent Machine and Gun Co., these dies swage jacketed bullets in one stroke. Dies are available in 224, 243, 257, 277, 284 and 308 with spitzer soft point form—284 and 308 in round nose also. Threaded 7/8-14 for use in most presses, dies are adjustable for desired bullet weight. .... **\$67.50**

## SIMONSON Bullet Swaging Dies

Made to order only. B&A type 3-die sets in .224", .243" and .308" may be had in 6 or 7 caliber ogives. An ejector frame with ram adaptor for the RCBS A-2 press included. .... **\$300.00**

## SAS Swaging Dies

Designed to make full jacket rifle bullets in all calibers, the dies screw directly into the reloading press. No special ram, ejector or adaptor is necessary. Dies available in all calibers and some different bullet designs. Each die is complete with no interchanging of parts necessary. Specify type of press in which dies will be used.

Handgun swage dies ..... **\$14.50**

Rifle swage dies ..... **\$24.50**



## Notes on Lead Wire ...

The lead wire used in bullet swaging should be, usually, of the highest quality pure soft lead. Alloys are generally too hard for the average swaging operation, but there are some that will swage satisfactorily in heavy duty presses. For all practical purposes, pure soft lead is the best and easiest to use.

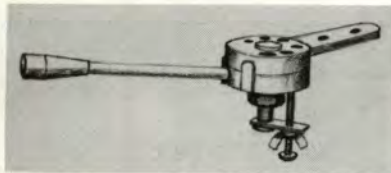
Pure lead will flow and yet stay in one

piece, whereas harder lead alloys tend to shatter or disintegrate. Pure lead bullets have unsurpassed shocking power, and when combined with copper jackets to permit high velocities, make deadly missiles.

The following companies offer lead wire in the following standard sizes for bullet swaging:  $\frac{1}{8}$ " for the 17 cal.,  $\frac{3}{16}$ ",  $\frac{1}{4}$ ",  $\frac{1}{2}$ ",  $\frac{3}{8}$ ",  $\frac{5}{16}$ ",  $\frac{3}{4}$ ",  $\frac{7}{8}$ ",  $1\frac{1}{8}$ ",  $1\frac{1}{4}$ ",  $1\frac{1}{2}$ ",  $1\frac{3}{4}$ ",  $2$ ",  $2\frac{1}{4}$ ",  $2\frac{1}{2}$ ",  $2\frac{3}{4}$ ",  $3$ ",  $3\frac{1}{4}$ ",  $3\frac{1}{2}$ ",  $3\frac{3}{4}$ ",  $4$ ",  $4\frac{1}{4}$ ",  $4\frac{1}{2}$ ",  $4\frac{3}{4}$ ",  $5$ ",  $5\frac{1}{4}$ ",  $5\frac{1}{2}$ ",  $5\frac{3}{4}$ ",  $6$ ",  $6\frac{1}{4}$ ",  $6\frac{1}{2}$ ",  $6\frac{3}{4}$ ",  $7$ ",  $7\frac{1}{4}$ ",  $7\frac{1}{2}$ ",  $7\frac{3}{4}$ ",  $8$ ",  $8\frac{1}{4}$ ",  $8\frac{1}{2}$ ",  $8\frac{3}{4}$ ",  $9$ ",  $9\frac{1}{4}$ ",  $9\frac{1}{2}$ ",  $9\frac{3}{4}$ ",  $10$ ",  $10\frac{1}{4}$ ",  $10\frac{1}{2}$ ",  $10\frac{3}{4}$ ",  $11$ ",  $11\frac{1}{4}$ ",  $11\frac{1}{2}$ ",  $11\frac{3}{4}$ ",  $12$ ",  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This wire is

available in 20, 25, 100 and 250-lb. spools, and in some instances in straight cut lengths.

Lead prices fluctuate quite often, and for that reason we cannot show retail prices. Contact your local dealer or write direct for current price sheet. Because of the high shipping cost we suggest you order from the company nearest you.



COATS



C-H

### C-H Core Cutter

A scissors-type cutter of all steel construction with a rubber handle to eliminate hand fatigue. Drilled for bench mounting and fully adjustable for weight of cores cut. Complete .....\$7.50

### LESTER COATS Core Cutter

This lead wire cutter has six apertures drilled and reamed to accept wire sizes normally used in swaging bullets. All cutting surfaces are finely machined. Each aperture is fully adjustable for any desired bullet weight. Tension on the two cutting surfaces is adjustable. Cutter, complete .....\$15.00

### CLYMER Lead Wire Cutter

A scissors-type cutter that cuts three sizes of wire:  $\frac{3}{16}$ ",  $\frac{1}{4}$ " and  $\frac{5}{16}$ ". Adjustable for weights. A sturdy, economical tool. Complete .....\$14.95

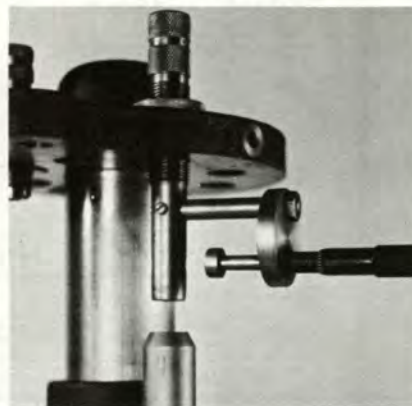
Anchor Alloys, Inc.  
966 Meeker Ave.  
Brooklyn, N.Y. 11222

National Lead Co.  
111 Broadway  
New York 6, N.Y.

Division Lead Co.  
7742 W. 61st Place  
Summit, Illinois

Rochester Lead Works  
76 Anderson Ave.  
Rochester, N.Y. 14607

HOLLYWOOD CUTTER



### HEMP'S Lead Wire Cutter

Cuts 1-diameter lead wire with .1-.2 gr. accuracy. Made for  $\frac{3}{16}$ ",  $\frac{1}{4}$ ",  $\frac{5}{16}$ " and  $\frac{3}{8}$ " wire. ....\$16.50

### HOLLYWOOD Core Cutter

An improved lead core cutter for use on the Hollywood Senior or Super tool, with ample power to cut alloy wire. Handles all sizes from  $\frac{3}{16}$ " to 45 caliber. Adjustable for core length.

Available with micrometer adjustment in place of standard stop screw. Lengths and weights of cut cores may be recorded for future use. Prices available upon request.

HERTER CUTTER



CLYMER

### HERTER'S Model 30 Lead Core Cutter

Made of cast iron and tool steel, this cutter has a micrometer adjustment for weight and length of core. Choice of cutter size .....\$13.59  
Extra cutters .....\$1.39

### HERTER'S Model 29 Wire Cutter

This all steel scissors-type lead wire cutter cuts the wire to the right lengths for pistol or rifle bullets. Fully adjustable for weight of the cores. Efficient and economical .....\$7.29

### L.L.F. Lead Wire Cutter






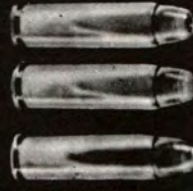


A well-made tool for all sizes of lead wire. Adjustable stop to control length of cut core. ....\$15.00



# SUPER VEL CARTRIDGE CORP.

SHELBYVILLE, IND. 46176

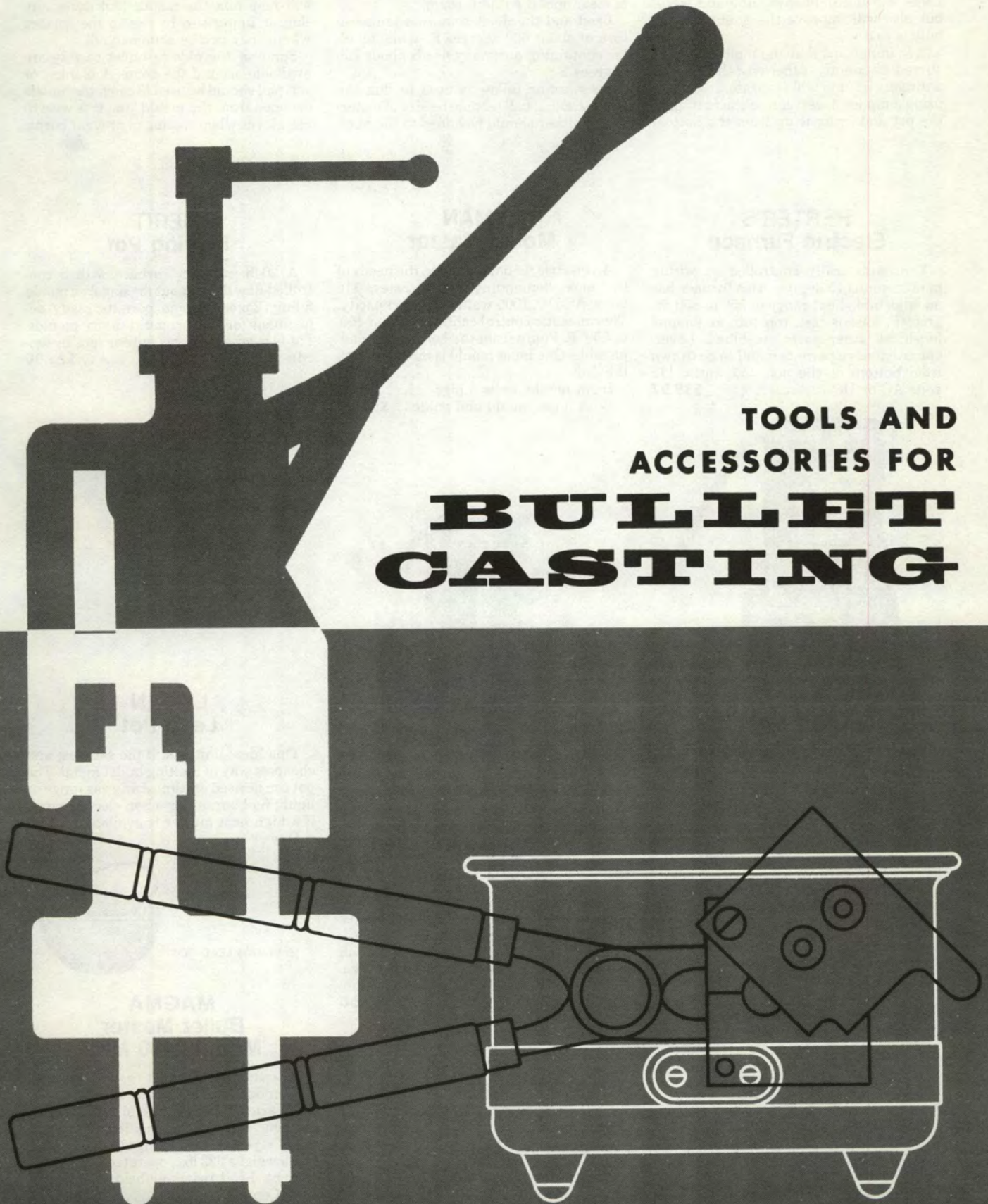
## CENTERFIRE HANDGUN BALLISTICS

	CAT. NO.		BULLET		VELOCITY—F.P.S.		ENERGL - FT. LBS.		BBL		
			WT. in GRS	STYLE	MUZZLE	50 YDS	MUZZLE	50 YDS			
 .380 ACP	380JHP	88		JHP	1065	940	227	172	4"		
 9mm LUGER	9JHP	90		JHP	1485	1290	441	332	5"		
	9JSP	112		JSP	1330	1205	439	361	5"		
 .38 SPL. POLICE	38JHP	110		JHP	1370	1240	458	375	6"		
	38JSP	110		JSP	1370	1245	458	380	6"		
 .38 SPL. INT'L POLICE	38SWC	158		SWC-lead	855	755	256	199	6"		
	38KSWC	158		SWC-kopperkote	1100	995	423	346	6"		
 .38 SPL. "MATCH"	38HBWC	147		HBWC	775	680	196	149	6"		
 .357 MAGNUM	357JHP	110		JHP	1690	1485	697	539	6"		
	357JSP	110		JSP	1690	1490	697	544	6"		
	35737JSP	137		JSP	1620	1440	796	630	6"		
 .45 ACP	45JHP	190		JHP	1060	965	473	391	5"		
 .44 MAGNUM	44JHP	180		JHP	1995	1825	1591	1330	8 $\frac{3}{8}$ "		
	44JSP	180		JSP	1995	1835	1591	1340	8 $\frac{3}{8}$ "		
					MUZZLE	100 YDS	200 YDS	MUZZLE	100 YDS	200 YDS	BBL
44 Magnum	44JHP	180		JHP	2250	1620	1170	2025	1050	550	18"
Carbine Ballistics	44JSP	180		JSP							



**6th EDITION — PART 4**

**TOOLS AND  
ACCESSORIES FOR  
BULLET  
CASTING**





## Notes on Furnaces & Pots ...

Satisfactory bullet casting may be done with gas-heated lead pots, but electric furnaces will not only save time and labor, but also will improve the quality of the bullets cast.

It is important that the molten lead be stirred frequently, otherwise the tin and antimony (if any) will separate. If you are using a dipper, insert it into the bottom of the pot and bring it up from the bottom

with the opening up. This not only keeps the mixture stirred, but gives you a ladle of clean metal without scum.

Lead and tin alloys require a temperature of about 600 degrees F., while an alloy containing antimony needs about 750 degrees F.

Beeswax or tallow is used to flux the alloy. A small ball (about the size of a marble) of either should be added to the heat-

ed alloy, mixed in, and if it does not ignite by itself, it should be lit with a match. This will help mix the metals and cause any slag or impurities to rise to the surface where they can be skimmed off.

Some of the aids to bullet casting are available around the home. A blanket or soft pad should be used to catch the bullets dropped from the mould, and it is wise to use gloves when casting to prevent burns.

### HERTER'S Electric Furnace

Thermostatically controlled to within plus or minus 15 degrees, this furnace has an adjustable heat range of 450 to 850 degrees F. Base is cast iron with an enamel finish; all other parts are blued. Lever-operated valve permits metal to be drawn from bottom of the pot. 750 watts, 115 volts AC or DC ..... **\$39.97**



HERTER

### LEE Lead Pot

This drawn steel pot holds four pounds of lead. The flat bottom makes it quite stable and provides good contact with the heat supply ..... **\$1.48**



LACHMILLER

### LACHMILLER Melting Pot

Made of cast iron with integral pouring spout and holding lip, this lead pot is easy to grip. May be used to alloy bullet metal before casting into ingots or bullets (with a dipper). Price ..... **\$2.50**

### LYMAN Mould Master

An electric furnace equal to the needs of the most demanding bullet caster. 115 volts, AC-DC, 1000 watts, 11 lbs. capacity. Thermostatic control calibrated from 450° to 850° F. Pours from the bottom; flow adjustable. One ingot mould is included with the unit. .... **\$45.75**

Ingot mould, casts 4 pigs ..... **\$2.00**

With ingot mould and guide .. **\$51.00**



LYMAN M-M & MOULD GUIDE

### LYMAN Mould Guide

Installs on Lyman or SAECO bottom pouring electric casting furnaces. Makes precise positioning of mould beneath pouring spout easy. Usable with all moulds up to and including 4-cavity size. Guide is fully adjustable for easy positioning. .... **\$7.50**

### LEE Lead Ladle

A convenient size ladle for bullet casting. Works equally well for right or left handers. Handy for skimming and stirring the metal ..... **\$1.48**

### MERIT Melting Pot

A 20-lb. capacity furnace with a controlled-flow downspout for slag-free mould filling. 2-piece design permits ready adjustment for bigger, multi-cavity moulds. Pot is used over a gas burner (not included). .... **\$25.00**



MERIT

### LYMAN Lead Pot

This Ideal unit is still the simplest and cheapest way of melting bullet metal. The pot can be used on almost any gas range or liquid fuel burner, or on an electric range if a high heat burner is available. **\$2.50**  
Dipper ..... **\$2.00**



LYMAN LEAD POT

### MAGMA Bullet Master Model 2400 MK2

This automated bullet casting machine can produce bullets of any caliber in the small arms field in excess of 2,000 rounds per hour. Uses most standard cavities and bullet styles can be changed quickly. Machine weighs 222 lbs., operated by 220 volt current. Lead reservoir holds 100 lbs. of lead. Complete ..... **\$1495.00**



## OHAUS Lead Dipper

This tool features an extra long handle and an ovaled spout contoured exactly to the sprue opening. The cup-shaped open top of the dipper allows for easy scooping and stirring of the bullet alloy .... **\$2.00**

## OHAUS Ingot Mould

A heavy duty iron mould which forms four easy-to-use ingots. Excellent for preparing alloys for future use and easy handling ..... **\$2.00**

## OHAUS Lead Pot

This pot holds approximately 10 pounds of bullet alloy and is ideal for casting or blending metals. Flat, anti-tip bottom, pouring spout, bale handle, lifter. . **\$2.50**

## POTTER Lead Kettle

Has a broad flat base to prevent tipping and for maximum heating area over a gas or coal stove. Holding 16 lbs. of lead, this kettle has two removable wooden handles for convenience in handling. .... **\$9.00**

Ingot mould (7 oz.) **\$1.85** (9 oz.) **\$2.25**

## POTTER Electric Furnaces Model C

Holds 3½ lbs., draws about 350 watts at 110-120 volts, and is suitable for 1- or 2-cavity moulds. .... **\$28.00**

### Model D

For 3-6 cavity moulds. 9-lb. capacity, dual-heat, 750 watts. .... **\$38.00**

### Model E

Has two heating elements—300 watt for single cavity moulds, the other 400 watts for 2- or 3-cavity moulds. .... **\$32.00**

### Model H

16-lb furnace with dual temperature ranges; 900 watts. Made of aluminum to prevent rust. .... **\$46.00**

## POTTER Lead Tester

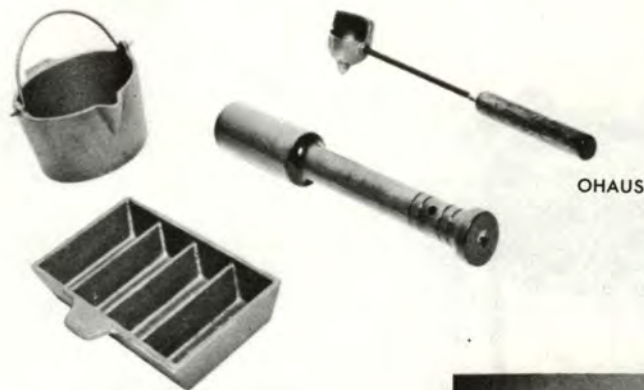
This instrument measures the hardness of the bullet alloy by forcing a small steel ball into the metal. The depth to which the ball penetrates is indicated on a scale calibrated in terms of hardness. .... **\$35.00**

## OHAUS Mould Mallet

This mallet is recommended for use when opening and closing the mould blocks and cutting sprues. The dense hardwood mallet is contoured for maximum efficiency and convenience ..... **\$2.49**

## OHAUS Propane Melting Unit

A practical, economical alternative to electric furnaces. Consists of a cast iron trivet that holds a lead pot and a steel wire form that fits all home-use propane torches. This unit is able to melt 6 lbs. of lino-type alloy in 10 minutes. Trivet and torch stand ..... **\$4.95**



OHAUS



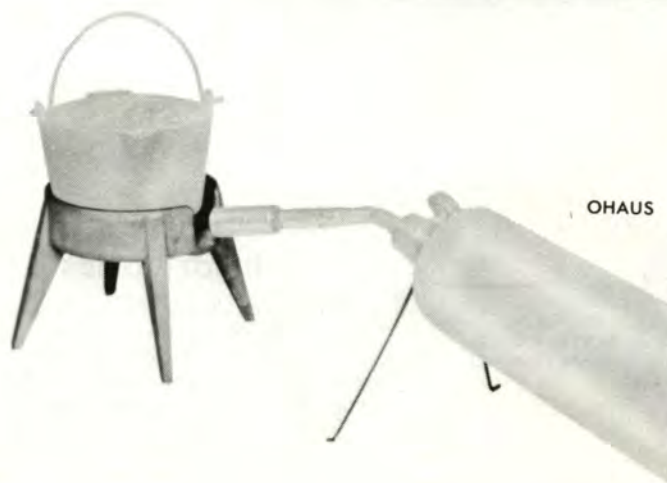
POTTER TESTER



POTTER KETTLE



POTTER D



OHAUS





SAECO HARDNESS TESTER



SAECO 24



SAECO 31 T-U



SAECO UTILITY



POTTER ELECTRIC ALLOY FURNACE

### POTTER Ingot Moulds

These moulds cast six ingots each and are available in three different ingot weights. Made of iron, the moulds are guaranteed and quite handy to have on hand when extra ingots are needed.

7 ounce ingot mould .....\$1.85  
9 ounce ingot mould .....\$2.25  
1½ pound ingot mould .....\$4.50

### SAECO Utility Furnace

Similar to the SAECO Model T31 electric furnace except it does not come with heat baffle and thermostat. Complete with ingot mould. .... \$24.50

### SAECO Thermo-Utility Furnace

An electric 110V AC-DC lead pot with a 20-lb. capacity, the Model T31 furnace features a bottom heat baffle, a heavy-duty cord and a 450°-850° thermostat. Complete with one ingot mould. .... \$36.50

### SAECO Lead Hardness Tester

Permits the handloader to accurately measure the hardness of his cast bullets. Tool is 6" long and 1" in diameter. Operates by measuring the penetration produced by applying a force of known magnitude to an indenter. Relative hardness of the bullet is read off the vernier scale which registers depth of the impression. Allows the reloader to achieve the hardness he desires. .... \$28.50

### SAECO Model 24 Electric Furnace

A large capacity, thermostatically controlled furnace, fully guaranteed for one year. Maintains desired temperature within plus or minus 20° F. from 450° F. to 805° F. Bottom pour type; rate of lead flow is controllable. Operating handle remains cool during casting operation. 11 lbs. capacity, 1000 watt, 110-115 volts AC-DC. Ingot mould, casting four 1-lb. pigs, is furnished with the furnace. .... \$44.50

### POTTER Electric Furnace

Designed to melt tin and/or antimony alloys, this furnace holds 16 lbs. and draws 900 watts at 110-120 volts.

Equipped with a spout for pouring into ingot moulds, it has two wooden handles for convenience and leverage. It can also be used as a lead pot for dip-casting bullets. .... \$28.60

### HART Rawhide Mallet

A handy and extremely useful tool for the reloader and bullet caster. The rawhide does not mar tools in any way, yet gives enough striking force to get the job done .....\$2.25

### HERTER'S Lead Ladle

This cast iron lead ladle has a 3½" diameter head with an 11" handle. Ideal for stirring and skimming lead as well as pouring lead into the moulds ....\$2.19



## Notes on Moulds . . .

Cast bullets that do not perform accurately may have some internal defect that causes instability in flight. These defects may not be noticeable when weighing and sorting the bullets after casting, so every precaution should be taken to prevent them while casting.

The alignment of the two blocks is a critical factor in proper bullet casting. Extreme care should be taken that the mould is not dropped or hit with any force. The sprue cutter should be rapped only with a plastic or wood mallet—never steel! All moulds must be properly broken-in to do

the best job of casting. After 100 or so bullets are cast, your mould will be putting out better bullets—or it should!

The first 10 or 12 bullets cast from a cold mould should be discarded—it takes at least that length of time for a mould to reach the proper temperature for accurate casting. If the bullet comes out of the mould with wrinkles or open spaces, the mould (or the lead) is too cold. Frosted bullets mean too hot a temperature, though the effect is harmless. Wait long enough for the bullet to harden before cutting off the sprue; cutting the sprue too

soon results in a deformed base.

Lead should be poured into the mould slowly to permit the air in the mould cavity to escape, thus preventing air pockets.

The oil or grease on a new mould will not permit good bullets to be cast until the lube is burned away. Solvent or thinner can be helpful in removing this grease, and the newer mould-release fluids are good.

When you are through casting, leave a bullet in the cavity—this will help prevent rusting, thus eliminating the need to regrease the cavity.



H & G 10-CAVITY

### HENSLEY & GIBBS Handgun Bullet Moulds

Made to give years of service. Many styles and weights available in 38, 44 and 45; any popular bullet weight and style made to order. Specify sized diameter of bullet and make of size when ordering. Moulds come complete with handles.

4-cavity: \$29.50 6-cavity ..... \$47.50  
10-cavity (8 in 44 or 45) ..... \$75.00

### OHAUS Bullet Moulds

Mould blocks are made of malleable iron allowing the sprue cutter to be hardened and sharpened. Tungsten carbide tooling is used to cut the cavity. Blocks are vented over the entire bullet surface to release trapped air. Alignment pins are hardened for durability. Handles have extra long wood sheaths and are completely interchangeable between Ohaus blocks.

Single cavity, plain or gas check, less handles ..... \$10.00  
Single cavity, hollow base mould, less handles ..... \$14.00  
Double cavity, plain or gas check, less handles ..... \$13.50  
Four cavity, plain or gas check, less handles ..... \$21.95  
Handles ..... \$4.95



OHAUS



OHAUS



LYMAN  
SLUG  
MOULD



LEE

### LEE Bullet Moulds

These moulds have aluminum blocks that heat up faster and cool quicker. Moulds are substantially lighter than conventional steel types and can be pre-heated in molten lead without damage. Blocks are well vented reducing voids, and since lead won't stick to the aluminum, there is no "soldering" the blocks. Steel mould clamps with wood handles are light and the handles stay cool during casting operations. Available in 44 popular pistol sizes. Complete, blocks and handles ..... \$8.98

Blocks only ..... \$6.98  
Handles only ..... \$3.50

### LYMAN Shotgun Slug Mould

Casts unrifled, hollow base slugs in 12, 16, 20 or 410. Lyman recommends these be shot as cast, as extensive tests indicate slugs are not rotated by rifling grooves but travel head-on in the manner of a shuttlecock because the greater mass is in the front of the projectile. Complete with handles ..... \$18.50  
Slug mould block only ..... \$14.00





SAECO



SAECO

### LYMAN Ideal Moulds

Made in single, double and 4-cavity types; available in over 800 bullet and ball styles. Precision machined and finished.

Single cavity complete .....	\$14.50
Single cavity blocks .....	\$10.00
Hollow Point or H. Base, add ...	\$4.00
2-cavity, complete .....	\$18.00
2-cavity, blocks .....	\$13.50
4-cavity, complete .....	\$27.00
4-cavity, blocks .....	\$22.00



LYMAN 4-CAVITY



LYMAN

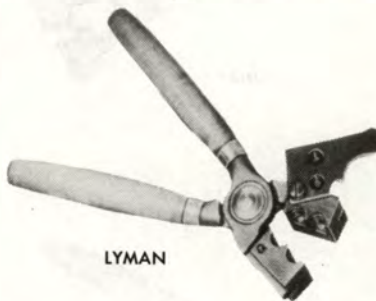


SAECO

### HERTER'S Slug Mould

For greatest economy, slugs may be cast from scrap lead and swaged or cannellured and lubricated into bullets. Available in most popular calibers. Price less handle is .....

Slug mould with handle ..... \$12.48



LYMAN

### SAECO Bullet Moulds

Cavities of SAECO moulds are held to close tolerances. Bullets as cast require minimum sizing. Malleable iron handles are machined and assembled in pairs for precise alignment. Wood grips. Pistol moulds are 1-2-3-4-cavity, rifle moulds 1- and 2-cavity. Moulds, complete with handles:

Single cavity .....	\$18.50
Four cavity .....	\$33.50
Single cavity blocks .....	\$13.50
Handles only .....	\$6.50

### LACHMILLER Bullet Moulds

Lachmiller Eng. Co. (LEC) now offers a wide range of bullet moulds. Write them for 1972 price list and specifications.

Double cavity complete .....	\$17.50
Double cavity blocks .....	\$13.00
Three cavity complete .....	\$19.50
Three cavity blocks .....	\$15.00
Handles only .....	\$4.50



LACHMILLER



SAECO 3-CAVITY



## Notes on Lubri-Sizers & Lubricants .....

To be truly accurate, cast bullets are usually sized (forced through a die to bring diameter down to correct measurement), though some bullets shoot well "as cast." The combination tools shown on the following pages do this easily and quickly, and at the same time force a lubricant into the grooves of the bullet.

All lead alloy unjacketed bullets must be lubricated to prevent leading of the bore. Bullet lubricants should not only be able to lubricate properly at high temperatures, they should maintain this property in storage and must not melt in hot climates.

Operated properly, that is, maintaining the proper pressure on the lubricant and hesitating for a moment at the bottom of the downstroke to permit the lubricant to flow into all of the bullet grooves, these tools will help make your bullets more ac-

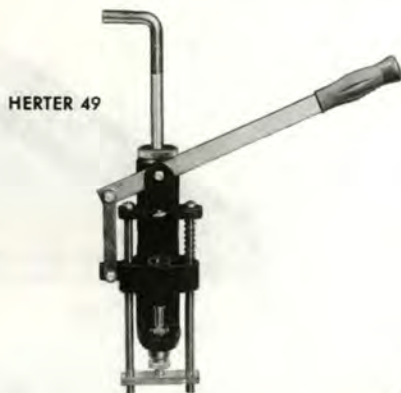
curate, and they will also insure a minimum of bore leading.

Adequate bullet sizing can also be done with the simple bullet sizing die put out by Lyman for their 310 tool. In this case the bullets may be lubricated by placing them base down into a shallow pan of melted lubricant. The excess lube is then removed using their Kake-Kutter.

Your sizing die-cast bullet combination should, ideally, be one in which a minimum amount of lead is removed. In other words, let your lube-sizer remove only a thousandth or two from the bullet diameter. When you size away too much lead you decrease the lube capacity of the grooves, make the lead area in contact with the bore greater, and you'll have to exert more effort, too, in doing the sizing-lubing. Regardless of the tool type used, care must be exercised in selecting dies.

Bullet concentricity must be maintained. If all, or most of, the diameter reduction is on one side, the bullet's balance will be impaired, reducing its accuracy. Correctly designed dies contain a cylindrical cavity large enough to accept the as-cast bullet. A gradual, highly polished taper connects this portion to another cylinder of the diameter to which the bullet is to be sized. Both cylinders must be concentric. In this type of die the bullet is smoothly swaged to the correct diameter without loss of weight or concentricity.

Some older dies have a very short taper, or even an abrupt shoulder, connecting the two diameters. They simply shear excess metal off the bullet, usually more on one side than the other, producing a poorly balanced, inaccurate bullet. Casting is hot work—don't waste it by poor lubricating and sizing.



### HERTER'S No. 47 Lubricator & Sizer

Made of tool steel, this unit mounts in the die hole of most standard presses. Finger pressure sizes and lubricates cast or swaged lead bullets. Available in 38 Spec., 357 Mag., 401 Herter Mag., 44 Spec and Mag., 45 ACP or 45 Long Colt. (specify). Uses 1" solid bars of lubricant. Comes complete for one caliber ..... **\$12.49**

To convert to another caliber ... **\$5.77**

### HERTER'S No. 49 Lubricator and Sizer

Made entirely of steel, this tool can lube, size and seat gas checks all in the same operation. Dies, available in most sizes from .224" to .4575", are easily and quickly changed. Comes complete with dies for one caliber and bullet nose shape **\$26.97**

To convert to another caliber ... **\$3.29**

### HERTER'S Bullet Master Lubri-Sizer

Same as above but with springloaded lubricant reservoir ..... **\$30.47**



HERTER 47

### LYMAN 450 Lubricator and Sizer

The short stroke, power link leverage of this tool sizes, lubes and seats gas checks with little effort. Large C-type iron-steel cast frame is line bored for best die alignment. Adaptable to all bullets by changing sizing dies. Price less dies. .... **\$26.00**

### LYMAN Lubricating & Sizing Die Sets

These current "G", "H" and "I" dies feature a precisely controlled entering taper, a smooth concentric bore, and dimensions held to minimum tolerances, and a grease-sealing O-ring that means clean bullet bases.

Made in over 80 sizes from .222" to .580".  
..... **\$8.75**  
"G" top punch. .... **\$2.25**  
"H" and "I" assembly. .... **\$6.50**



LYMAN 450



PHELPS

### PHELPS Lubricator & Sizer

Designed for quantity production of pistol bullets this tool uses the "straight-through" method of sizing and lubing. Bullets are inserted base down—gas check affixed—and one stroke of the handle sizes, lubes, crimps gas check and delivers a processed bullet below the die. Two turns of the lube reservoir handle sufficient for 100 rounds—1000 to 1200 per hour are possible. Tool is equipped with hardened and honed dies that are easily removed with die puller included. **\$55.00**  
Extra die. .... **\$7.00**  
Extra bullet punch. .... **\$2.00**



## STAR Automatic Lubricator & Resizer

This lubricator, substantially and carefully built, is accurate and positive in its operations. A storage pressure system is used in the grease reservoir, which feeds the grease to a high-pressure pump. This forces the lubricant into the grooves of the bullet. The bullet is then forced through the die by the entering of the next one. One setting of the pressure screw greases from 100 to 200 bullets. The bullets are forced through the die, are processed about three times as fast as in the ordinary lubricator.

This item is equipped with hardened dies and is adaptable to any caliber.

Give bullet number (Lyman, SAECO or Hensley & Gibbs) and size of die wanted, or send sample bullet and state size of die wanted. .... **\$52.50**



STAR

## LACHMILLER Lube-A-Matic

This lubricator-sizer automatically controls lubricant pressure and feeds grease into the bullet grooves. Pressure is controlled with each stroke of the operating handle. Unit has finger tip adjustments for controlling depth of sizing for various bullets. Uses either Lube-A-Matic or Lyman dies. Price without dies ..... **\$24.95**

Lube-A-Matic dies available in most popular sizes ..... **\$6.00**

Top punches ..... **\$2.25**



SAECO

## SAECO Lubri-Sizer

An improved version of the famous original SAECO Lubri-Sizer. It features a spring loaded grease reservoir; special independent double "C" clamp for bench mounting—no clamping strain on the frame; ground parallel rods to assure absolute alignment and bullet concentricity. A gas check seating unit is supplied with the tool. .... **\$36.00**

Dies are hardened, then honed to a mirror finish to precise dimensions. Working tolerances are only .0002". Available in 31 sizes from 2240" to 4580". Inside punches and lock rings are fitted to and included with all dies.

SAECO Lubri-Sizer die..... **\$6.50**

Extra top punch (specify nose style needed). .... **\$2.50**

Double "C" clamp. .... **\$4.00**

## LEE Resizer and Punch

A quick and easy way of accurately resizing the bullets after lubricating. Generous taper leading to resize portion permits resizing without lead shaving. Order by bullet diameter ..... **\$3.98**

## Bullet Lubes and Dies

### LYMAN Ideal Kake Cutter Bullet Sizing Die

Together, these two tools form a simple setup for lubricating and sizing cast bullets. Relatively slow, they still meet many reloaders' requirements as they can produce bullets as accurate as more expensive tools. A set of Ideal tong tool handles is required for use with the sizing die.

Bullet Sizing Die. .... **\$5.00**

Kake Cutter. .... **\$1.50**



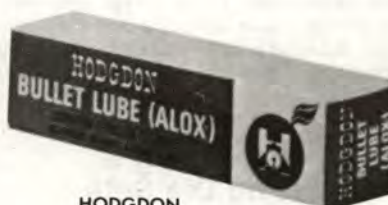
LYMAN 310 TOOL  
BULLET SIZE DIE



LYMAN KAKE CUTTER

### COOPER-WOODWARD Perfect Lube

Made in hollow or solid sticks, this lube works in any lubricating machine. Performs equally well in cold or hot weather because of its minimum contraction and high melting point ..... **80¢**



HODGDON

### HODGDON Bullet Lube (Alox)

This high quality bullet lube gives increased accuracy and higher lead bullet velocity without leading. A mixture of pure beeswax and Alox 2138F. Available in hollow sticks only. Per stick ..... **75¢**

### JAVELINA Super Bullet Lube

A blend of Alox 2138F and pure beeswax (50/50). Warm weather will cause sticks to soften but mix will not separate. Available as solid or hollow sticks .. **85¢**

### GREEN BAY MoS<sub>2</sub>

A cast bullet lubricant containing molybdenum disulfide (moly) that fills the bullet pores, reducing both friction and leading. Stiff consistency makes lube work without smearing yet adheres firmly. High melting point prevents running and melting. Solid or hollow sticks each .. **70¢**



LEE



## HERTER'S Graphite & Silicone

A combination of silicone and colloidal graphite designed to stay in the bullet grooves. Will not dry out, crumble or affect the powder charge. Lubes available in hollow or solid 1" sticks ..... **63¢**

## LEE Lub Cutter

Aluminum cutter neatly wedges the lubricant away from the bullets, leaving holes in the lubricant for placement of the next batch of bullets and eliminating the need to re-melt the lubricant ..... **\$1.48**

## LYMAN Bullet Lubricant

The oldest such lubricant on the market and an excellent all-purpose formula. Available in solid or hollow sticks .. **75¢**  
Lyman graphite ..... **\$1.00**

## LYMAN Deluxe Bullet Lubricant

This Deluxe lubricant is manufactured to the N.R.A. formula of Alox Compound and Pure Yellow Beeswax. Improves accuracy and prevents leading at the higher velocities. Moulded to fit the Lyman Model 450 sizer/lubricator. Per stick .. **\$1.25**

## MIRROR-LUBE

Its lubricating qualities are not affected by weather conditions. Works well with rifle or pistol bullets, and can be stored indefinitely without separation of ingredients. Solid or hollow sticks ..... **70¢**

## MICRO-LUBE

Formulated for both rifles and handguns, this lube is not sticky, will not gum or separate in your tools. Long storage life, heat and cold resistant. Complete satisfaction guaranteed by the maker, Micro Shooters Supply.

Solid or Hollow sticks ..... **60¢**  
X500, super refined ..... **75¢**

## LYMAN Ideal Lubricant

This cast bullet lubricant increases accuracy and eliminates barrel leading. Sticks of this lube are moulded to fit the Lyman 450 sizer/lubricator ..... **75¢**

LYMAN



LEE

## PHELPS Bullet Lube

Proprietary compound made by well-known tool maker and recommended for use in his machines. Machine rest tested formula is colorless, non-sticky and adheres to bullet grooves. Per stick ... **65¢**

## SAS Bullet Lubricant

This is a dip-type lubricant. A small quantity is poured over the bullets. Surplus is drained off and bullets left to air-dry. Drying time is about fifteen minutes, leaving a good coating of a universal-type lubricant ..... **\$2.50**

## SAECO Bullet Lubricant

This cast bullet lubricant is low in residue, will not separate under heat or pressure, and keeps barrels bright and lead free. This lube also makes an excellent lead fluxing agent. Available in both hollow or solid sticks. Per stick ..... **75¢**

SAECO





## Notes on Jackets and Gas Checks ...

Ballistic performance with lead rifle bullets is limited. If an attempt is made to drive them fast, they often leave lead deposits in the bore—an inconvenience. Sometimes the base itself melts because of high powder combustion temperature. Both affect accuracy to a very noticeable extent.

To avoid these and other faults, a copper or alloy envelope called a jacket is added to part or most of the lead bullet. Being of harder, more durable material, this eliminates the barrel leading problem, as it prevents lead-to-bore contact. These

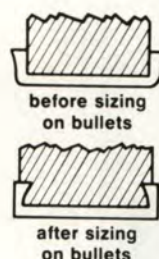
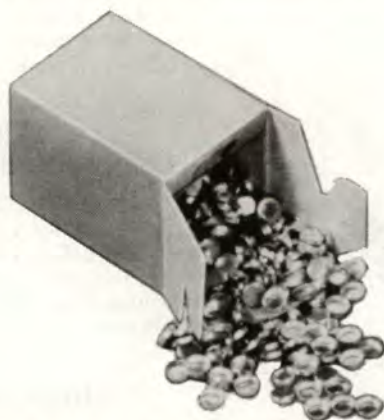
jackets permit driving the bullet to the highest velocity practicable.

Jacketed rifle bullets have been factory manufactured for at least a century, but only since WWII have they been commonly made by handloaders using home-shop swaging tools. Several companies offer bullet-making dies for use in heavy-duty loading presses, while others sell jackets and lead wire for cores.

Commercial jacket material is usually gilding metal (a zinc-copper alloy), rather than pure copper, which sometimes causes fouling. Uniformity in length,

weight, mouth concentricity, wall thickness, etc., are necessary for top results. Cores are normally of pure lead; occasionally a small amount of antimony is permitted.

A desire for high velocity and the success of the swaging dies for rifle bullets caused a similar interest in handgun bullet swaging. The addition of 1/2- and 3/4-jackets—in effect, lengthened gas checks—gives them benefits similar to the rifle versions although the possibility of leading is not completely eliminated so long as any lead touches the bore.



HORNADY

### GILDING METAL JACKETS Rifle and Handgun

Make	Cal.	Description	Per M
Babler	17	N.A.	\$12.50
	38	1/2-Jacket	10.00
	38	3/4-Jacket	12.50
	44	1/2-Jacket	10.00
Herter	38	.281 Inch	5.97
	401	.281	7.97
	44	.250	8.29
	45	.281	8.29
	22	.172	5.47
	243	.281	5.47
	30	.312	6.47
SAS	22	.705	13.50
	243	.880	15.00
	25	.975	16.00
	30	1.100	18.50
	38	3/4-Jacket per 250	4.00
	44	3/4-Jacket per 250	5.00
Speer	45	3/4-Jacket per 250	5.00
	30	1/2-Jacket	15.00
	38	1/2-Jacket	15.00
	38	3/4-Jacket	17.60
	41	3/4-Jacket	18.40
	44	1/2-Jacket	17.60
	45	1/2-Jacket	17.60
	45	3/4-Jacket	18.40

Note: Several reloading tool manufacturers also supply jackets, but these normally are obtained from the bullet making firms so are not listed here.

### HERTER'S Gas Checks

Gilding metal caps protect bullet base from the burning effect of hot powder gases and permit higher velocities. Seated during the sizing operation. Price per 1000.

22 cal. through 35 cal .....\$3.79  
44 and 45 cal .....\$4.79

### HORNADY Crimp-On Gas Checks

Made with open edge thicker than the sidewall so that sizing die crimps them permanently to bullets. Price per 1000 in calibers 22, 25, 270, 30, 32, 35 and 6, 6.5 or 7mm .....\$4.00  
In 44 and 45 .....\$5.50

### LYMAN Gas Checks

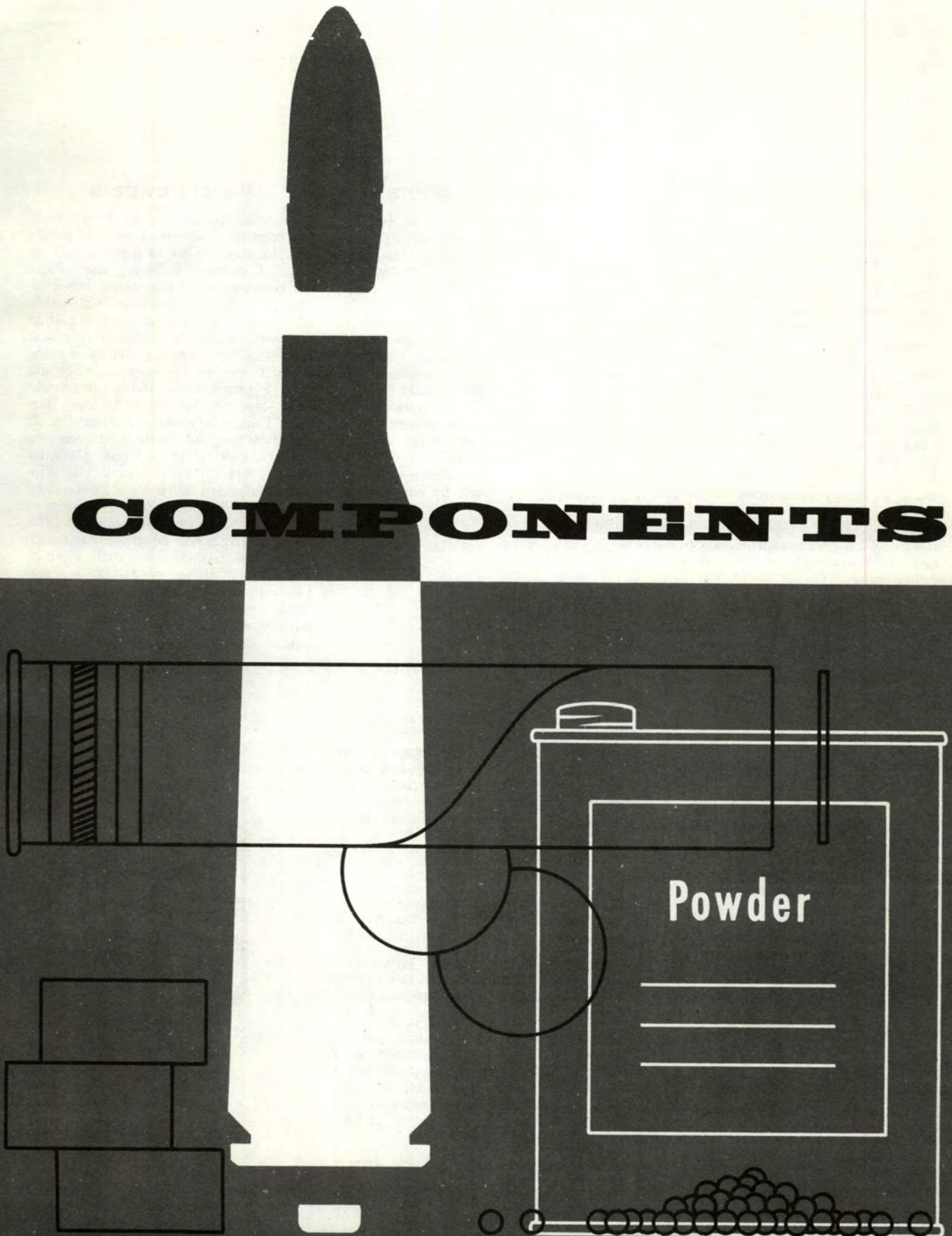
Protect bullet base from hot powder gases, permit higher velocities with cast bullets. Seated during sizing operation.

22 through 38, per M .....\$4.50  
41, 44, 45, per M .....\$5.50



**6th EDITION — PART 5**

# **COMPONENTS**





## Notes on Powder ....

Powders, generally, may be divided into three groups, depending on their use—pistol, rifle and shotgun. Some powders can be loaded for more than one use: Hercules 2400, basically a rifle powder, can be used

for high velocity loads in some revolvers, or for 410 shotshells.

The manufacturers' suggested loads should be adhered to completely for accurate safe loads (let the "max" loads go for

awhile) and only those powders specified should be loaded. "Wildcatting" of shotshells, too, is unnecessary and dangerous!

Leave the experimenting to experienced reloaders.

### Rifle Powders

Hercules offers only Unique and 2400. The Reloder powders were discontinued in 1971. Both are double base types, containing both nitrocellulose and nitroglycerine in percentages calculated to produce the desired performance. DuPont makes an extensive line of rifle powders—IMR (Improved Military Rifle) numbers 4198, 4320, 4227, 3031, 4064 and 4350. Recently 4895, long available only as a surplus military powder, was released in standard canister lots. These powders are all single-base types containing no nitroglycerin. Their formulas are essentially the same; they differ primarily in granulation and coating required to vary their burning rates. DuPont SR (Sporting Rifle) 4759 (discontinued in mid-1965) is especially useful in loading for obsolete cartridges at relatively low pressures. Hodgdon continues to offer many surplus powders, all excellent values.

### Shotgun Powders

Shotgun powders are made only in dense form today, now that DuPont's Bulk Shotgun Smokeless has been obsolete. DuPont's dense powders are PB (porous base) for high velocity and magnum loads, and Hi-Skor for target loads. Hercules Unique is used primarily for medium loads, Red Dot is used for light target loads, Green Dot for medium loads and Herco, a coarse-grained powder, is used in the heavier loads. 2400 should be used only in low velocity 410 shells. Hodgdon's HS10 requires special components when loaded in 12 gauge shotshells, and the loading data given by Hodgdon should be followed exactly. Alcan offers a wide variety of shotshell powders for handloaders.

### Pistol Powders

Smokeless pistol powders are relatively fast burning. The short barrels of pistols demand this quality to achieve best results. Hercules' Bullseye, the oldest smokeless pistol powder made, has a nitroglycerin content and is finely granulated. This permits it to burn freely and ignite easily under all conditions. It is used successfully in large capacity cases made originally for black powder; in 38 Spl. and 45 ACP target loads, and is the powder most used for factory cartridges. Hercules' Unique for medium and heavy loads and 2400 magnum loads have been consistently used, in their proper place, by handloaders for many years. The Winchester-Western Ball powder for standard loads, 230P, has been rapidly gaining in popularity since its introduction in 1960. W-W 295HP, a ball powder for magnum loads, was discontinued shortly after its introduction. Hodgdon's H-4227 is a surplus military powder repacked into convenient size canisters. W-W's Ball pistol powder, 630P, is suggested for magnum loads.

### ALCAN Shotshell Powders

The Alcan Co. has imported an excellent line of shotshell powders for a number of years. They are manufactured specifically for Alcan and are not off-the-shelf European items. The 4 powders currently available cover the entire field of shotshell loading well. Some have been used successfully in handgun loads, but that is not their primary purpose.



**AL-5 Shotgun** A dense progressive burning powder for maximum velocity in heavy loads. 8-ounce tin .....\$2.85

**AL-7 Shotgun** A dense, very progressive burning powder for magnum loads of high velocity using heavy shot charges. 8-ounce tin .....\$2.85

**AL-8 Shotgun** A super-magnum powder for highest velocity with heavy shot charges. This coarse grain powder is for use in heavy loads only. It will not burn well except with recommended shot weights. 8-ounce tin .....\$2.85

**AL-120 Shotgun** A powder especially designed for field and trap loads. Ignites with ease, burns cleanly, gives high, uniform velocity with moderate pressures. 8-ounce tin .....\$2.20





## DU PONT Smokeless Powders

For many reloaders, Du Pont powders have long been considered the standard of excellence in quality and performance. Commercial loaders and the military services, as well, have confidence in Du Pont's consistently high quality.

Du Pont laboratories are constantly at work, not only developing new, improved products, but also performing endless checks to maintain the high standards of their current powders.

Note: Add 15¢ to prices in 11 Western states.

**4227 Rifle** Designed for relatively small capacity cartridges. It is too quick in burning to function to the best advantage in relatively large capacity cartridges, except in reduced loads.

1-lb. canister **\$350**

**4198 Rifle** Developed especially for use in medium capacity cartridges and for reduced loads. An extremely popular powder for handloading.

1-lb. canister **\$350**

**4895 Rifle** Used in billions of rounds of 30-cal. military ammunition and proved an excellent performer in cases from the 222 to the 458, now available in canister lots. Slightly faster than 4320.

1-lb. canister **\$350**

**4064 Rifle** A powder for large capacity cartridges that has exceptional burning qualities. Consistent accuracy is easily achieved with this powder when it is loaded properly.

1-lb. canister **\$350**

**4320 Rifle** Intended specifically for use in military cartridges, but is equally satisfactory in all ordinary high-velocity cartridges.

1-lb. canister **\$350**

**4350 Rifle** An excellent powder designed especially for magnum cartridges. When properly loaded this powder will give very uniform results.

1-lb. canister **\$225**



**SR 7625** For use in 12-gauge high velocity shotshell loads; also suitable for a wide variety of centerfire handgun cartridges.

8-ounce canister **\$350**

**3031 Rifle** Particularly recommended for medium capacity and mid-range loads. For the purpose indicated the reloader will find this one of the most satisfactory powders on the market.

1-lb. canister **\$225**

**PB Shotgun** This powder replaces the old Du Pont MX. It is a dense powder for use in high base shells for high-velocity and magnum loads. Single base type.

8-ounce canister **\$225**

**SR 4756 Shotgun** For magnum shotshells. Produces excellent 410-bore target ammunition when loaded per manufacturer's instructions. Useful in heavy centerfire handgun ammunition.

8-ounce canister **\$225**

**Hi-Skor 700X Shotgun** Double Base. Developed for 12-gauge components, gives optimum ballistics at minimum charge weight. Wad pressures not critical.

8-ounce canister **\$225**

## HERTER'S Model Perfect Powders

Herter's imports three double-base shotshell and four single-base rifle powders from Noble of Scotland, with wide flexibility within their range. The low-number shotshell powder is fastest and the high-number slowest in burning rate, while the order of rifle powders is just the opposite. The rifle powders are coated with methyl centralite, said to lower combustion temperatures and reduce barrel erosion.



**100** Slowest burning rifle powder of the Herter series, it is best suited for heavy bullets in large capacity cases. Comes in 1 lb. can ..... **\$2.30**

**101** A medium-slow rifle powder closely approximating the burning speed of IMR 4320 (loading information may be substituted). 1 lb. can ..... **\$2.30**

**102** A medium-fast burning rifle powder with characteristics similar to those of IMR 3031, for use in cartridges of 30-30 class. 1 lb. can ..... **\$2.30**

**103** Fastest of the Herter rifle powders, this number burns just a bit faster than IMR 4198 and is best in the small rifle cases. 1 lb. can ..... **\$2.30**

**160** The fastest burning shotshell powder in this line, it is easily ignited and suited to target and light field loads. Comes in 9 ounce can ..... **\$1.30**

**162** Somewhat slower than 160, this powder is useful in most shotshell field loads for all gauges except 410. Comes in 9 ounce can ..... **\$1.30**

**164** Slowest shotshell powder from Herter's, it is best used for heavy field loads and those for the magnums. Comes in 10 ounce can ..... **\$1.40**







## HERCULES Double-Base Smokeless Powders



Hercules is still offering six double-base powders for the reloader. They discontinued their RelodeR powders, 7, 11 and 21 in 1971. Until recently Hercules was the only U.S. maker of double-base sporting powders (DuPont's 700-X has a nitroglycerin component). Hercules has announced their new Blue Dot powder but that is all we know of it at this time. Write for their latest prices.

**2400 Powder** A fine-grained powder intended for small-capacity rifle cartridges and for reduced loads, or light projectiles in larger capacity rifle cartridges, 410-gauge shotshells, and high-velocity loads in some revolvers.

1-lb. canister **\$350**

**Bullseye Pistol** A high-energy, quick-burning powder designed for pistol and revolver ammunition; available in 11-ounce canisters, 3-pound kegs, and 15-pound kegs.

11 ounce canister **\$275**

**Unique Powder** An all-round powder, designed for large-caliber and for medium-gauge shotshells. It can also be used for gallery loads in rifle cartridges.

13-ounce canister **\$300**

**Red Dot Shotgun** The powder preferred by many for light and standard shotshell loads.

8-ounce canister **\$225**

**Green Dot Shotgun** Developed for light and medium 12-gauge shotshell loads. Uniform ignition and performance; minimum blast and residue, nonhygroscopic.

8-ounce canister **\$225**

**Herco Shotgun** A coarse grained powder for use in heavy hunting loads.

11 ounce canister **\$275**

Note: Prices listed are for smallest containers.



## HODGDON Smokeless Powders

**Top Mark** A spherical powder designed for trap shooting and light field loads, also excellent for target loads in centerfire pistol. 1 lb. can ..... **\$3.25**

**H4227, H4198** Fastest burning of the IMR series. Well adapted to Hornet, light bullets in 222 and all bullets in 357 and 44 mag. 1 lb. can ..... **\$3.25**

**HS5** A spherical heavy field load shotshell powder. Excellent ballistics. Comes in 1 lb. can ..... **\$3.25**

**HS6** A spherical magnum shotshell powder. Leaves ample space for wad column. 1 lb. can ..... **\$3.25**

**H110** A spherical powder designed for the M1 carbine. Adaptable to heavy pistol and 410 shotshell. 1 lb. can ..... **\$3.25**

**Spherical BL-C 2** A favorite of the benchrest shooters. Best performance is in the 222, and in other cases smaller than 30-06. 1 lb. can ..... **\$3.25**

**4895** May well be the most versatile of all rifle propellants. It gives desirable performance in almost all cases from the 222 to the 458. Reduced loads, as little as 1/2 of maximum, still give target accuracy. 1 lb. can ..... **\$3.25**

**Spherical H380** Excellent in the 22/250, 220 Swift, the 6mm's, 257 and 30-06; can be used in moderate charges in the 25-06 and bigger cases. 1 lb. can ..... **\$3.25**

**4831** The most popular of all powders for the bigger magnums. Outstanding performance with medium and heavy bullets in the 6mm's, 25-06 and 270. Comes in 1 lb. can ..... **\$1.95**

**Spherical H335** Best adapted to 222 and 308 Winchester. 1 lb. can ..... **\$2.25**

**Spherical H450** A good powder for maximum loads in most cartridges; gives excellent performance in 30-06 and larger calibers, including magnums. Comes in 1 lb. can ..... **\$3.25**

**H570, Spherical H870** Both of about the same burning rate—very slow. Adaptable to the largest magnums with heavy bullets. 1 lb. can ..... **\$1.95**

**Spherical H414** In many popular medium to medium-large calibers, pressure velocity relationship is better with this new spherical powder. 1 lb. can ..... **\$3.25**

## WINCHESTER-WESTERN Ball Powders

Ball powder, used for years by Winchester-Western in the loading of commercial and military ammunition, is offered to handloaders in five shotshell grades, two centerfire pistol type and 4 center-fire rifle types. It is highly suited to handloading because of its stability and clean burning. The smooth, round, graphited grains flow easily through powder measures, resulting in accurate charges.

**230-P Pistol** A double-base ball powder for moderate handgun loads. Comes in 12-ounce can ..... **\$3.40**

**630-P Pistol** A double-base powder, slower burning than 230-P, for centerfire pistol, revolver and some rifle loads. Available in 1 lb. cans ..... **\$3.80**

**450-LS Shotgun** A double-base powder for reduced shotshell loads. Comes in a 12-ounce can ..... **\$3.60**

**500-HS Shotgun** A double-base powder for high velocity shotshell loads. Comes in 1 lb. can ..... **\$4.00**

**540-MS Shotgun** A double-base powder for magnum cases and loads in the larger gauges. 1 lb. can ..... **\$4.00**

**AA12S Shotgun** A double-base powder for 12-gauge shotshells for target and standard velocity loadings. Comes in 8 ounce can ..... **\$2.20**

**AA20S Shotgun** A double-base powder for 20-gauge AA shotshells for target and standard velocity loadings. Comes in 8 ounce can ..... **\$2.20**

**680-BR Rifle** A double-base powder for the very small centerfire rifle cartridges. 1 lb. can ..... **\$3.80**

**748-BR Rifle** A double-base powder for rifle cartridges smaller than 30-06. 1 lb. can ..... **\$3.60**

**760-BR Rifle** A double-base powder for the 30-06 and cartridges of similar size. 1 lb. can ..... **\$3.60**

**780-BR Rifle** A double-base powder for the larger rifle cartridges, producing factory ballistics in the magnums. 1 lb. can **\$3.60**



## NORMA Smokeless Powders

Norma offers reloaders 5 nitrocellulose (single-base) rifle powders, designed to cover cartridges from 222 Remington to the large magnums. These make up the Norma "200" series; their relative burning rates are indicated by their numbers, the lowest being the fastest burning, the highest the slowest burning.

There are two handgun powders and two shotgun powders available to reloaders. These are non-hygroscopic and their special composition is claimed to reduce combustion temperature and therefore decrease barrel erosion. Write for their latest prices.

**N-200 Rifle** Medium-fast burning, especially adapted to the 222 but good with light bullets and/or light loads in larger cases. 400-gram canister ..... **\$3.50**

**N-201 Rifle** Recommended for light bullets in medium size cases, or with some big caliber cartridges having a large bore volume which must be quickly filled by expanding gases. 400-gram canister **\$3.50**

**N-203 Rifle** Medium burning rate; the most widely used powder in Norma factory ammunition. Excellent with cartridges of 30-06 class. 400-gram canister .. **\$3.50**

**N-204 Rifle** Slow burning. Adapted to cartridges of large capacity or those using heavy bullets in relation to their caliber (270/150-gr. bullet and similar capacity necked-down wildcats). Comes in 400-gram canister ..... **\$3.50**

**N-205 Rifle** Very slow burning. Developed for high velocity with large volume cases. Do not load below recommended *minimum* with this powder. Comes in 400-gram canister ..... **\$3.50**

**N-1010 Handgun** A fast burning, double-base, easily ignited powder for use in most pistol and revolver cartridges. 255-gram canister ..... **\$2.25**

**N-1020 Handgun** A slower burning, double-base powder designed especially for use in magnum cartridges. 425-gram canister ..... **\$2.85**

**N-2010 Shotgun** Recommended for light and standard loads and in particular for trap and Skeet. 227-gram canister **\$2.00**

**N-2020 Shotgun** A slower version of N-2010, designed for magnum and heavy shot-charge hunting loads. 284-gram canister ..... **\$2.35**



## Notes on Primers and Percussion Caps . . .

Small arms ammunition manufactured in the U.S. and Canada utilizes a single flash hole and Boxer primers. They consist of a brass cup into which is pressed a pellet of priming compound and a 2- or 3-legged anvil. Generally speaking, the rest of the world uses Berdan primers. They are similar except that the anvil is an integral part of the bottom of the primer pocket and 2 or more flash holes are used.

Boxer primers used in sporting and most military ammunition come in two basic sizes—.175" and .210" diameter—and two strengths. Those for handgun use contain less priming compound and have thinner and softer cups than primers for rifle use. Handgun cartridges contain less powder, thus require less flash for ignition, and pistols do not have the heavy firing pin blow necessary to properly indent the heavy rifle cups. Consequently, there are four basic primer types—large rifle, small rifle, large pistol and small pistol. In addition, Federal offers a special rifle primer for use in large capacity magnum-type cases with heavy powder charges. Also, CCI produces a "Magnum" primer in each of the four types for essentially the same reason. The magnum types reportedly produce a larger flash of longer duration, intended to give more uniform ignition of large charges than standard primers impart.

Remington has introduced three new primers, the 9½M, 5½ and 7½. The 9½M is for magnum belted rifle cases, particularly those using very heavy charges. The 5½ and 7½, in general, supplement the older 6½ and replace it in several instances. For years the 6½ was used in such revolver cartridges as the 357 Magnum and in small rifle loads like the 222. However, on occasion it proved too hard and/or thick for the 357, yet at the same time too soft or thin for the 222. The 5½ is specifically designed for the 357 and the 7½ for small rifle cartridges from the 221 Fireball to the 222 Magnum.

Oil and grease kill primers. Do not handle them with greasy fingers or allow oil on any part of the reloading tool with which they come in contact. This applies especially to automatic primer feeds where only dry lubricants can safely be used.

So far as can be determined all commercial primers available today are noncorrosive and nonmercuric. This means, simply, that their residues will neither cause the bore to rust nor the cases to be weakened—problems that existed in the past. Careful cleaning prevented the rusting, even then, but nothing could be done to salvage cases once they were contaminated by mercuric primers. They became brittle and unsafe. Now handloaders don't have

that worry.

U.S.-made shotshells and some imports use battery cup primers. Reloading is normally done by replacing the complete primer; however, the battery cup and anvil can be re-used at a considerable saving if one cares to go to extra trouble. The battery cup is made of copper, open at one end and pierced by a flash hole at the other. First, a pointed anvil is pressed down into the cup, then a cap containing the priming compound is pressed into place. The cap looks much like a standard large pistol primer without its anvil.

Primers for Winchester-Western shotshells will not interchange with some of Remington-Peters make. Independent makers produce primers for both makes and those for W-W cases have the number 209 in their designation. When intended for use in R-P paper cases (or 28 gauge plastic), primers have 57 in the designation. In addition, R-P uses a special size battery cup in 28 and 410 gauge paper cases.

Remington-Peters No. 97 primer, introduced two years ago, has the same dimensions as other standard shotshell primers, and is interchangeable with them. Today most battery cup primers have the flash hole closed with a waterproof seal which also keeps powder granules from entering the cup.

	Alcan	CCI	Federal	Herter	Norma	Rem.-Pet.	Hodgdon	Win.-West.	Per M
<b>Large Rifle</b>	Max-Fire	200 250M	210 215M	120 500	LR	9½ 9½M	LR	8½-120	\$9.30 (c) 9.30 (l)
<b>Small Rifle</b>	Max-Fire	400 450M	200	6½	SR	6½ 7½	SR	6½-116	8.45 (c) 8.25
<b>Large Pistol</b>	Max-Fire	300 350M	150	111 400	LP	2½	LP	7-111 7M-111F	8.45 (c) 9.30 (l)
<b>Small Pistol</b>	Max-Fire	500 550M	100	1½	SP	1½ 5½	SP	1½-108 1½M-108	8.45 (c) 9.30
<b>Shotshell Caps</b>		209B PC57		H209FWW(e)			9		12.50 (d) 7.45
<b>Shotshell(a)</b>	WW209F	109	209	H209W(d)			209		14.95
<b>Shotshell(b)</b>	220	157		H57PR(d)	57 97(g) 69(h)				14.95 14.95 14.95
			410						
<b>Berdan Rifle(f)</b>									
<b>Berdan Shotshell</b>									
<b>Percussion Caps</b>	G11F					10 (.162") 11 (.167") 12 (.172")			11.00 11.00 11.00
<b>Winged Musket Caps</b>	G4F(i)								11.95

NOTE: Large rifle and large pistol primers measure .210"; small rifle and small pistol measure .175".

(a) For Winchester-Western, Monarch, J. C. Higgins, Revelation and Canuck cases.

(b) For Remington-Peters paper cases.

(c) Herter's price, \$5.80.

(d) Herter's price, \$10.48.

(e) Long battery cup type for Winchester-

Western, Federal or Herter plastic shells, yester-year. \$7.95.

(f) Norma makes a .216" Berdan primer, \$10.00.

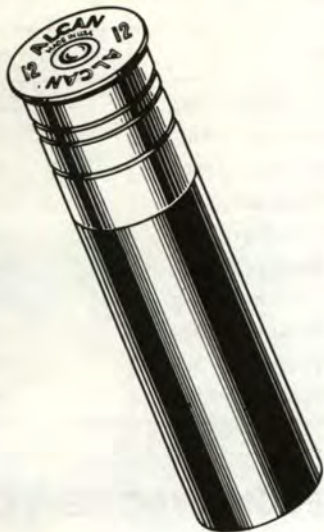
(g) Battery cup; used in 12-ga. plastic trap and Skeet loads.

(h) Copper plated; used in 410 and 28 ga. shells.

(i) Fits old Springfields, muskets, etc., of



## Cases, Metallic and Shotshell:



### ALCAN CM Shotshell

High brass ( $\frac{3}{8}$ " head) with double steel-reinforced base wad for magnum loads. Available in 10, 12 and 20 gauge. Per 100, unprimed.

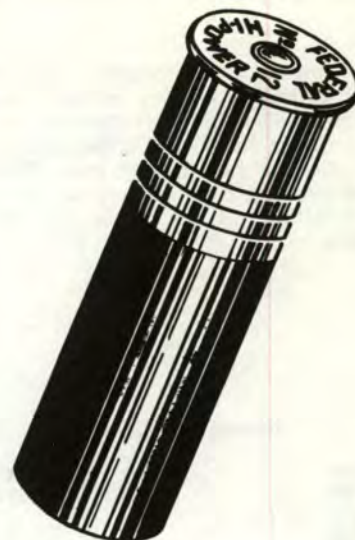
10 gauge, $3\frac{1}{2}$ " plastic	\$17.81
10 gauge, $2\frac{7}{8}$ " paper	16.80
12 gauge, 3" plastic	8.53
20 gauge, 3" plastic	8.38

The average case can be reloaded many times, and it is not unusual to find handloaders who have reloaded a metallic case 20 or more times. Handgun cases, and those rifle cases that must be crimped every time they are reloaded, will have a somewhat shorter life span. Maximum loads shorten case life, too. Shotshell cases won't take as many reloadings, of course—particularly those of paper—for the mouth soon frays.

When a cartridge is fired, the case expands to the size of the chamber, then springs back slightly if the brass is correctly annealed. If such cases are to be fired again in the same rifle, only neck sizing is usually needed; full length sizing is generally required if cases will be used in a rifle other than the one they came out of. Standard  $\frac{7}{8}$ -14 dies can do both jobs—for neck sizing only position the die  $\frac{1}{8}$ " or so away from contact with the shell holder. Full length sizing of paper and plastic shotshell cases is virtually a must, and all tools are made to do so.

Cases should be carefully examined before and during reloading, and any defective cases discarded. Watch for split necks and bodies; incipient head separations; swelling of head and primer pocket, torn or frayed mouths of paper cases.

You'll get better results from your handloads if you keep your cases segregated by make and lot. Mixed cases often will show considerable difference in weight (hence volumetric capacity), flash holes, temper or anneal, etc. Shotshells, because of the need for exact wad-column height, should be of the same make and type.



### FEDERAL Empty Primed Shotshells

"Monark" brand low brass  $2\frac{3}{4}$ " empty paper shotshell with Federal No. 209 primers. Available in 12, 16 and 20 gauge. These tubes are famous for their reloading strength. Price per 1000, \$62.70, \$61.70 and \$60.80 respectively.

### REMINGTON PETERS Empty Shotshells

Either field or target style, in 12, 16, 20 and 28 gauge,  $2\frac{3}{4}$ ", plastic. Primed, not mailable.

Per 100	\$6.05, \$5.95, \$5.85, \$7.50
Target cases per 100 (also available in $2\frac{1}{2}$ " 410)	\$6.75 to \$7.50

### ALCAN LB-7 Plastic Shotshell

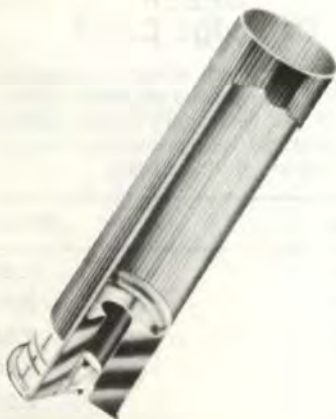
Low brass ( $\frac{1}{2}$ " head) for Skeet, trap and light hunting loads. Available in 10 and 28 gauge. Requires the Alcan 220 Max-Fire primer. Per 100 (unprimed)

10 gauge, $2\frac{7}{8}$ "	\$12.15
28 gauge, $2\frac{3}{4}$ "	\$6.00

### FEDERAL 410 Plastic Shotshells

Available in  $2\frac{1}{2}$ " length only, these 410 hulls are designed for a standard  $2\frac{1}{2}$ -dram,  $\frac{1}{2}$ -oz. Skeet load. Use with Federal's 410 single-wad column/shot cup and special 410 primers (listed elsewhere).

Price per 1000	\$14.95
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### HERTER'S Inter-Nation Shotshells

Injection moulded space-age plastic shotshell cases are reloadable a minimum of 10 times. Resizing is unnecessary since these shells do not bulge. Hulls accept all types of wadding—conventional felt and card or single unit plastic. Special over/shot wads—type 1 for most loads, type 2 for magnum—are used rather than a star crimp. Available for 12 gauge only.

Per 100 with top wads	\$3.97
Over/shot wads per M	\$2.19





## EMPTY CARTRIDGE CASES

### Remington and Winchester Rifle and Handgun Cases

Remington and Winchester offer the most extensive lines of metallic cases available to handloaders in the U.S. Since they are for the most part identical, data are combined here to save space. Those cases available from only one source are marked thus: (R) Remington; (W) Winchester.

All rifle cases are packed 20 per box except those marked with an asterisk (\*) which are 50 per box. All handgun cases are packed 50 per box except the 221 Rem., which is 20. Prices are for unprimed (mailable) cases; primed cases are available at 20¢ per 100 more, but cannot be mailed.

#### Handgun Cases

Caliber	Primer	Per C
221 Rem. (R)	S	\$9.25
22 Rem. Jet (R)	S	6.10
25 Auto	S	5.30
256 Win. Mag. (W)	S	8.70
30 Luger	S	8.25
32 S&W	S	4.60
32 S&W Long	S	4.60
32 Short Colt	S	4.60
32 Long Colt	S	4.60
32 Colt NP	S	4.60
32 Auto	S	5.20
357 Mag.	S	6.25
9mm Luger	S	8.25
380 Auto	S	5.20
38 Auto	S	6.25
38 Super	S	6.10
38 S&W	S	5.20
38 Special	S	5.60
38 Short Colt	S	5.20
38 Long Colt	S	5.60
41 Mag. (R)	L	8.45
44 Rem. Mag.	L	8.70
44 Special	L	6.60
45 Colt	L	8.70
45 ACP	L	8.25
45 Auto Rim (R)	L	8.05
5 in 1 Blank (R)	L	9.20

#### Rifle Cases

Caliber	Primer	Per C
218 Bee*	S	\$8.25
22 Hornet*	S	8.25
220 Swift	L	13.50
222 Rem.	S	9.80
222 Rem. Mag. (R)	S	10.70
22-250	L	14.10
223 Rem. (R)	S	11.05

225 Win. (W)	L	10.95
6mm Rem. (R)	L	13.75
243 Win.	L	14.10
244 Rem. (R)	L	14.10
25-06 (R)	L	14.85
25-20 Win.*	S	8.70
257 Roberts	L	14.10
25-35	L	13.40
250 Savage	L	14.10
6.5 Rem. Mag. (R)	L	17.85
264 Win. Mag.	L	18.25
270 Win.	L	14.85
280 Rem. (R)	L	14.55
284 Win. (W)	L	14.85
7mm Rem. Mag.	L	18.25
7x57mm Mauser	L	14.85
30-30 Win.	L	12.75
30 Carbine*	S	8.55
30 Rem.	L	12.75
30-40 Krag	L	14.85
30-06	L	14.85
300 Savage	L	14.10
300 H&H Mag.	L	18.85
300 Win. Mag.	L	18.50
303 Sav.	L	12.75
303 Br.	L	14.85
308 Win.	L	14.10
8mm Mauser	L	14.85
32 Rem.	L	12.75
32-20 Win.*	L	8.70
32 Win. Spl.	L	12.75
338 Win. Mag. (W)	L	18.90
348 Win.	L	17.75
350 Rem. Mag. (R)	L	17.85
35 Rem.	L	14.10
358 Win. (W)	L	14.10
351 SL* (R)	S	14.05
375 H&H Mag.	L	20.25
38-40 Win.*	S	8.70
44-40 Win.	S	8.70
444 Marlin (R)	L	16.40
45-70	L	12.75
458 Win. Mag.	L	19.80

## WEATHERBY Unprimed Cartridge Cases

Caliber	Per 20
224 Weatherby Mag.	\$3.25
240 Weatherby Mag.	3.40
257 Weatherby Mag.	4.20
270 Weatherby Mag.	4.20
7mm Weatherby Mag.	4.20
300 Weatherby Mag.	4.65
340 Weatherby Mag.	4.65
375 Weatherby Mag.	4.75
378 Weatherby Mag.	9.50
460 Weatherby Mag.	9.50

## OREGON AMMO SERVICE

OAS imports a wide variety of ammunition and components for the big British express cartridges. These often can be reformed to make similar cartridges no longer in production. Bullets, primers and cases available. Write for catalog, \$2.00.

## ROBERT POMEROY Formed Cases

Custom forming of obsolete cases, all made from new 45-70 and 30-40 Krag cases or new Norma brass. 45-90, 40-82, 40-70, 38-70, 35 WCF, 40-72 and 38-72 are just a few of the sizes available. Write about your needs.

## HERTER'S Cartridge Cases

These cases are made from virgin brass and will accept standard (Boxer) American primers. No scrap brass is used in their manufacture. Available in handgun sizes from 32 S&W Long to 44 Magnum, and in rifle sizes from 222 to 338. Write for complete catalog, \$1.00.

## SPEER Cartridge Cases

Speer offers many of the more popular calibers in unprimed cases. Also they have some of the scarcer European calibers with American type primer pockets, unprimed, made of virgin brass.

Caliber	Per 10
7x57R	\$2.00
7x65R	2.00
9.3x62	2.50
9.3x64	3.50
9.3x72R	2.50
9.3x74R	3.30

## RUSSELL L. CAMPBELL Formed Cases

Cases formed for most obsolete, foreign or hard-to-get calibers, made from new brass and trimmed to correct length. Write for latest list or state your needs. Also loaded ammunition available in hundreds of calibers, modern and obsolete.

## NORMA Cartridge Cases

Made of virgin brass, specifically for handloading, these cases take U.S. (Boxer) primers, and are available in rifle sizes from 222 Rem. to 375 H&H Magnum and in handgun sizes from 30 Luger to 44 Magnum. Write for full list and prices.



## Notes on Rifle Bullets ...

A basic rule for best rifle accuracy is to match the barrel twist to the bullet weight and length. As an example, a 30-06 barrel with a 1-in-10 twist will handle 150- to 220-grain bullets better than those of 90- to 150-grains, with some exceptions. If only lightweight, high velocity bullets are to be fired in a 30-06, then a twist of either 1-in-12 or 1-in-14 is generally preferable.

There are many types and classes of rifle bullets, each designed to do more or less specific jobs. Light, high velocity varmint bullets should not be used on big game, nor ought long range target bullets be used for varmint shooting. Try to choose the correct bullet for the job to be done.

It is just as imperative to select a load

that will utilize the full potential of the bullet. A heavy hunting bullet must be driven at the velocity for which it was designed to obtain correct expansion, shocking power and penetration. For example, a 30-30 bullet, designed for the lower velocities, must not be driven too fast or it will tend to explode on contact and fail to give good performance.

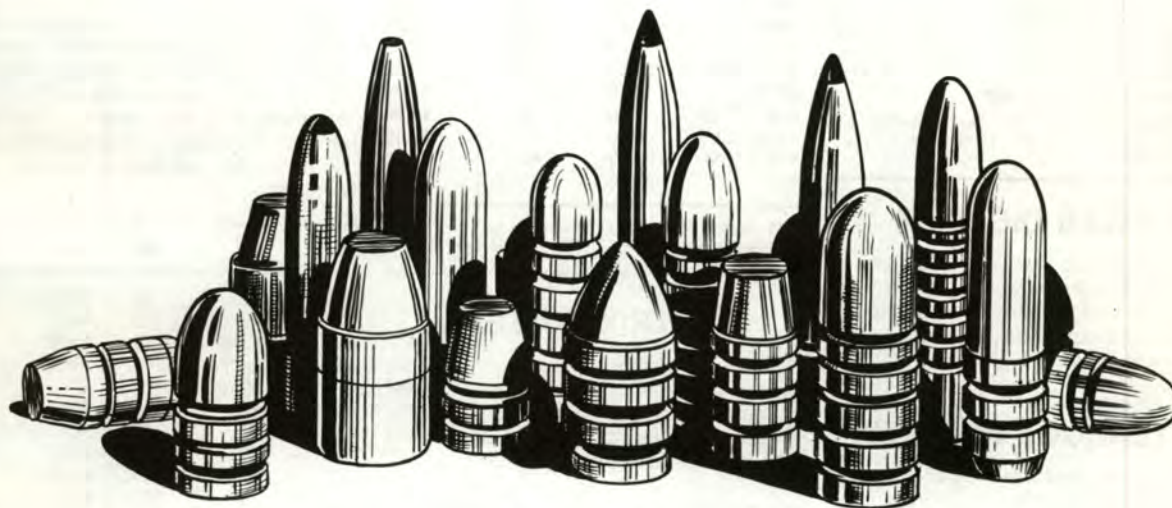
Today virtually all bullet makers make good bullets. Choose one suitable for the job at hand, give it the right velocity and it will do that job—but only if you do your part!

One of the finest hunting bullets is the Nosler Partition bullet. It is designed to provide satisfactory expansion plus maximum penetration, while retaining ap-

proximately two-thirds of its original weight when recovered from game. It is also highly accurate.

Hornady, Speer, Sierra and others, including Remington and Winchester, also make a full line of excellent hunting bullets.

Match bullets are another thing. Many of the best match bullets are handmade and hand-inspected. The fine Sierra 30 cal. 168-grain, soft-swaged bullets are superbly accurate, and so are the 30 cal. 187-grain Norma (No. 567) bullets. In this class it is usually a question of matching the barrel to the bullet, or vice versa. Several smaller makers (you'll find them listed in our Directory) offer excellent match bullets, particularly in the 22 to 6mm range.



## Notes on Handgun Bullets ...

There are today three classes of handgun bullets. The cast lead bullet, relatively hard and lubricated, has been with us many years. It is excellent for target work and hunting at lower velocities.

The swaged lead, lubricated bullet is a relative newcomer. These bullets are just about as perfect as a lead bullet can be. They have no cavities, holes or off-balance hollows. They also make good target and

low velocity game bullets.

The newest bullet today is the jacketed or half-jacketed handgun bullet. Some manufacturers use pure lead, others use lead alloys. The softer the lead the greater the shocking power on game. Jackets are swaged right onto the lead cores, permitting a high velocity bullet. For hunting it has no superior.

Some manufacturers not only swage the

jacket right onto the lead core, they go further and crimp it on so that the jacket cannot come off in the barrel, in flight or on impact. This also reduces the bearing surface, thus increasing velocity with no increase in pressures. Unless the jacket completely covers all of the bearing surface, this type bullet leads the bore badly. Best are those in which the jacket is turned down over the ogive.



## ACCURACY BULLET CO.

Accuracy Perfecast bullets are made of alloys specially prepared in large volume by metal foundries. They are cast in multiple moulds, sized, lubricated and inspected. Machine rest tested. Bullets sized as follows: 32 cal.—.313; 9mm—.356; 38—.358; 44—.429; 45—.452. Other diameters available at no extra cost.

### ACCURACY BULLET CO

No.	Cal.	Grs.	Type	Per C
W97	32	97	WC	\$2.70
R126	9mm	126	RN	2.75
W251	38	146	WC	2.90
W146BB	38	146	WCBB	2.80
W146	38	146	WC	2.80
HP153*	38	153	HP-K	3.40
R158*	38	158	RN	2.85
SW160*	38	160	SWC-K	2.85
SW220*	41	200	SWC-K	3.80
SWC196	44	196	SWC-K	3.40
HP247*	44	247	HP-K	4.45
SW250*	44	250	SWC-K	3.90
SW180-1†	45	180	SWC	3.30
SW180-2†	45	180	SWC	3.30
WC200†	45	200	WC	3.80
SW200†	45	200	SWC	3.40
SW215†	45	215	SWC	3.50
R230†	45	230	RN	3.70
HP231*	45	231	HP-K	4.45
SWC240*	45	240	SWC-K	3.80
SWC250	45	250	SWC-K	3.90

\*For revolver use. †For 45 ACP.

WC—Wadcutter  
RN—Round Nose  
K—Keith design  
SWC—Semi-Wadcutter  
BB—Bevel Base

## BAHLER DIE SHOP

This well-known maker of bullet swage dies produces a line of precision 17-caliber bullets. Swaged by the "expanded-up" method, these bullets are available in 20-, 22-, 25- and 30-gr. weights at \$4.00 per hundred.

## BITTERROOT BULLETS

Heavy gilding metal jackets are bonded to the core by an exclusive process, one which prevents these bullets from disintegrating when fired at magnum velocities, yet they expand reliably at ranges out to 600 yards.

Caliber	Grs.	Per 20
270	130	\$6.00
	150	6.00
7mm	140	6.00
	160	6.00
	175	6.00
30 (.308)	165	6.00
	180	6.00
	200	7.00
338	200	7.00
	225	7.00
	250	8.00
358	250	8.00
	275	8.00
	300	8.00
375	275	8.00
	300	8.00
	325	9.00

## COLORADO CUSTOM BULLETS

Formerly Barnes Bullets, this is a complete line of custom bullets for those who want accuracy and efficiency. Jackets are of pure copper tubing, which doesn't shatter on impact; cores are pure lead. Available in over 25 calibers from the 17/25-gr. to the 585/750-gr., including fairly scarce diameters such as .406", .411", .416" and .423". These are favorites of large-caliber devotees who hunt dangerous game.

To control expansion in the larger calibers, a choice is offered for jacket thicknesses—.032" and .049". Only selected samples are listed here.

Caliber	Grs.	Type	Per C
17 (.172)	25	SPS	\$ 6.00
22 (.224)	60	SPS	8.00
6mm (.243)	110	SPS	8.50
6.5mm (.264)	165	SPS	9.50
270 (.277)	180	RN	9.50
7mm (.284)	195	SPS	10.00
30 (.308)	250	RN	11.50
	250	FJ	16.00
8mm (.323)	250	SPS	11.50
33 WCF	200	RNSP	11.50
333 (.333)	300	RNSP	12.50
338 (.338)	300	RNSP	12.50
348 (.348)	220	RNSP	11.50
35 (.358)	300	RNSP	12.50
375 (.375)	350	RN	13.50
38/55	255	FNPS	11.50
404 (.411)	400	RNSP	16.50
45 (.458)	600	RNSP	30.50
475 (.488)	500	RN	30.00
458	400	RNSP	22.50

SPS—Spitzer S.P.  
RN—Round Nose

FJ—Full Jacket  
RNSP—Round Nose S.P.

## CENTRIX BULLETS

Centrix bullets are designed for high accuracy (weight tolerance - 0.2 grs.) and maximum velocity. Jackets are gilding metal, the separately swaged cores are a 3% antimonial alloy.

Caliber	Grs.	Type	Per C
6mm (.243)	75	HP	\$4.30
	87	SPS	4.55
	100	SPS	4.85
25 (.257)	100	SPS	4.90
	117	SPS	5.20
6.5mm (.264)	120	SPS	5.20
	140	SPS	5.45
270 (.277)	100	SPS	5.00
	130	SPS	5.60
	150	SPS	5.85
7.35mm (.299)	128	SPS	5.20
30 (.3085)	110	RN	4.25
	125	SPS	5.15
	150	SPS	5.50
	180	SPS	5.75
	150	FN	5.50
	180	RN	5.75
303 (.311)	150	SPS	5.50
8mm (.323)	150	SPS	5.60
	170	SPS	5.85

HP—Hollow Point  
SPS—Spitzer S.P.

RN—Round Nose  
FN—Flat Nose

## ELK MOUNTAIN ALASKAN BULLETS

These bullets contain a two part core which includes a non-deformable tungsten alloy section having a density about twice that of lead. The 300 grain bullet has essentially the same dimensions as a standard 220 grain lead bullet. The forward half of the core is constructed the same as a common soft nose hunting bullet. In the event heavy bone shatters the lead portion, the tungsten alloy rear core (170 grains) remains intact and continues to penetrate. The bullets are offered in 308 Win., 30-06, 30-06 Imp., 300 H&H, 308 Norma, 300 Win., 300 Weath., 243 Win., and 6mm Rem. The 243 and 6mm bullets sell for \$4.80 per box of 5, that's right 5. The others sell for \$5.50 per 5. The makers supply complete load data and statistics.



## GREEN BAY BULLETS Cast, Sized and Lubed

An excellent line of rifle and handgun bullets, produced under rigidly controlled conditions for high uniformity and accuracy. All bullets packed 100 per box except 30 caliber, which are packed in 50s. There are also 1/2 jacketed swaged bullets available in 30-, 38-, and 9mm caliber in various weights.

No.	Cal.	Grs.	Type	Per C
312	25	90	FPGC	\$2.75
325	25	115	RNGC	2.75
469	6.5mm	125	RNGC	2.75
455	6.5mm	140	RNGC	2.75
18	30	120	FP	2.25
466	30	155	PGC	2.75
467	30	180	PGC	2.75
41	30	180	FPGC	2.75
297	32	180	FPGC	2.75
315	35	200	RN	2.75
248	38/55	250	FP	2.85
43	38/40	175	FP	2.85
169	40/65	245	FP	2.85
445	32/20	95	SWC	2.00
402	9mm	125	SWC	2.25
156	357	158	SWCGC	2.75
87	38	127	WC	2.25
87-A	38	140	WC	2.25
50	38	148	WC	2.25
73	38	148	SWC	2.25
42	38	200	SWC	2.50
242	38	125	RN	2.25
26	41	200	WC	2.85
256	41	210	SWC	2.85
98	44/40	210	FP	2.85
352	44	250	WC	2.85
421	44	250	SWC	2.85
389	45 ACP	185	RN	2.85
460	45 ACP	200	SWC	2.85
78	45 ACP	220	SWC	2.85
424	45	255	SWC	2.85
124	45/70	395	RN	3.50

P—Pointed  
RN—Round Nose  
WC—Wad Cutter

GC—Gas Check  
FP—Flat Point  
SWC—Semi-Wadcutter



# COLORADO CUSTOM BULLETS

RT. 1 BOX 507-B MONTROSE, COLORADO 81401

FORMERLY

BARNES BULLETS

RICH HOCH & RUSS COOK

## PRICE LIST

CALIBER	Jacket Thickness	Price Per 100
<b>17 CALIBER</b>		
.172- 25 Gr. Semi-Spitzer Soft Point . . . . .	.030"	\$ 6.00
<b>22 CALIBER</b>		
.224- 60 Gr. Semi-Spitzer Soft Point . . . . .	.030"	\$ 8.00
.224- 70 Gr. Semi-Spitzer Soft Point . . . . .	.030"	8.00
.228- 70 Gr. Semi-Spitzer Soft Point . . . . .	.030"	8.00
.230- 70 Gr. Semi-Spitzer Soft Point . . . . .	.030"	8.00
<b>6 mm. CALIBER</b>		
.243- 90 Gr. Semi-Spitzer Soft Point . . . . .	.030"	\$ 8.00
.243-100 Gr. Semi-Spitzer Soft Point . . . . .	.030"	8.50
.243-110 Gr. Semi-Spitzer Soft Point . . . . .	.030"	8.50
.243-120 Gr. Round Nose Soft Point . . . . .	.030"	8.50
<b>25 CALIBER</b>		
.257- 90 Gr. Semi-Spitzer Soft Point . . . . .	.032"	\$ 8.00
.257-125 Gr. Semi-Spitzer Soft Point . . . . .	.032"	\$ 8.50
.257-125 Gr. Round Nose Soft Point . . . . .	.032"	8.50
<b>256 (6.5 mm.) CALIBER</b>		
.264-130 Gr. Semi-Spitzer Soft Point . . . . .	.032"	\$ 8.50
.264-150 Gr. Semi-Spitzer Soft Point . . . . .	.032"	8.50
.264-165 Gr. Semi-Spitzer Soft Point . . . . .	.032"	9.50
<b>270 WIN. CALIBER</b>		
.277-120 Gr. Semi-Spitzer Soft Point . . . . .	.032"	\$ 8.50
.277-130 Gr. Semi-Spitzer Soft Point . . . . .	.032"	8.50
.277-150 Gr. Semi-Spitzer Soft Point . . . . .	.032"	8.50
.277-150 Gr. Round Nose Soft Point . . . . .	.032"	\$ 8.50
.277-160 Gr. Semi-Spitzer Soft Point . . . . .	.032"	8.50
.277-180 Gr. Round Nose Soft Point . . . . .	.032"	9.50
.277-180 Gr. Round Nose Solid . . . . .	.032"	9.50
<b>276 (7mm.) CALIBER</b>		
.284-125 Gr. Semi-Spitzer Soft Point . . . . .	.032"	\$ 8.50
.284-140 Gr. Semi-Spitzer Soft Point . . . . .	.032"	8.50
.284-160 Gr. Semi-Spitzer Soft Point . . . . .	.032"	9.00
.284-180 Gr. Semi-Spitzer Soft Point . . . . .	.032"	9.50
.284-195 Gr. Semi-Spitzer Soft Point . . . . .	.032"	10.00
.284-200 Gr. Round Nose Solid . . . . .	.035"	16.00
Sized to .288 - \$1.00 extra		
<b>30 CALIBER</b>		
.308-150 Gr. Semi-Spitzer Soft Point . . . . .	.032"	\$ 8.50
.308-180 Gr. Semi-Spitzer Soft Point . . . . .	.032"	9.50
.308-200 Gr. Semi-Spitzer Soft Point . . . . .	.032"	10.50
.308-200 Gr. Round Nose Soft Point . . . . .	.032"	10.50
.308-225 Gr. Semi-Spitzer Soft Point . . . . .	.032"	11.50
.308-225 Gr. Round Nose Soft Point . . . . .	.032"	11.50
.308-250 Gr. Round Nose Soft Point . . . . .	.032"	11.50
.308-250 Gr. Round Nose Solid . . . . .	.035"	16.00
<b>8 mm. CALIBER</b>		
.323-150 Gr. Semi-Spitzer Soft Point . . . . .	.032"	\$ 8.50
.323-180 Gr. Semi-Spitzer Soft Point . . . . .	.032"	9.50
.323-200 Gr. Semi-Spitzer Soft Point . . . . .	.032"	10.50
.323-250 Gr. Semi-Spitzer Soft Point . . . . .	.032"	11.50
Sized to .318 - \$1.00 extra		
<b>333 O. K. H. CALIBER</b>		
.333-200 Gr. Semi-Spitzer Soft Point . . . . .	.032"	\$10.50
.333-250 Gr. Semi-Spitzer Soft Point . . . . .	.032"	11.50
.333-300 Gr. Round Nose Soft Point . . . . .	.032"	12.50
.333-300 Gr. Round Nose Soft Point . . . . .	.049"	16.50
Sized to .330 - \$1.00 extra		
<b>33 WCF</b>		
.338-200 Gr. Flat Nose Soft Point . . . . .	.032"	\$11.50
Cannelured		
<b>338 WIN. CALIBER</b>		
.338-200 Gr. Semi-Spitzer Soft Point . . . . .	.032"	\$10.50
.338-200 Gr. Round Nose Soft Point . . . . .	.032"	10.50
.338-250 Gr. Semi-Spitzer Soft Point . . . . .	.032"	11.50
.338-300 Gr. Round Nose Soft Point . . . . .	.032"	12.50
.338-300 Gr. Round Nose Solid . . . . .	.049"	18.50
<b>348 WINCHESTER</b>		
.348-220 Gr. Flat Nose Soft Point . . . . .	.032"	\$11.50
Cannelured		
.348-250 Gr. Flat Nose Soft Point . . . . .	.032"	\$11.50
Cannelured		

All Bullets Cannelured  
on Request - No Charge

CALIBER	Jacket Thickness	Price Per 100
<b>35 CALIBER</b>		
.351-180 Gr. Round Nose Soft Point . . . . .	.032"	\$10.50
.358-200 Gr. Semi-Spitzer Soft Point . . . . .	.032"	10.50
.358-250 Gr. Semi-Spitzer Soft Point . . . . .	.032"	11.50
.358-300 Gr. Round Nose Soft Point . . . . .	.032"	12.50
.358-300 Gr. Round Nose Soft Point . . . . .	.049"	16.50
.358-300 Gr. Round Nose Solid . . . . .	.049"	18.50
<b>38/55 WINCHESTER</b>		
.375-255 Gr. Flat Nose Soft Point . . . . .	.032"	\$11.50
Cannelured		
<b>375 MAG CALIBER</b>		
.366-250 Gr. Semi-Spitzer Soft Point . . . . .	.032"	\$12.50
.375-250 Gr. Semi-Spitzer Soft Point . . . . .	.032"	11.50
.375-300 Gr. Semi-Spitzer Soft Point . . . . .	.032"	13.50
.375-350 Gr. Round Nose Soft Point . . . . .	.032"	13.50
.375-350 Gr. Round Nose Soft Point . . . . .	.049"	18.50
.375-350 Gr. Round Nose Solid . . . . .	.049"	20.50
<b>401 WINCHESTER S.L.</b>		
.406-250 Gr. R. N. S. P. Only . . . . .	.032"	\$12.50
<b>404 (.411) CALIBER (.405 WIN.)</b>		
.411-300 Gr. Semi-Spitzer Soft Point . . . . .	.032"	\$12.50
.411-400 Gr. Round Nose Soft Point . . . . .	.032"	16.50
.411-400 Gr. Round Nose Soft Point . . . . .	.049"	21.50
.411-400 Gr. Round Nose Solid . . . . .	.049"	23.50
<b>416 RIGBY</b>		
.416-300 Gr. Semi-Spitzer Soft Point . . . . .	.032"	\$13.50
.416-400 Gr. Round Nose Soft Point . . . . .	.032"	17.50
.416-400 Gr. Round Nose Soft Point . . . . .	.049"	22.50
.416-400 Gr. Round Nose Solid . . . . .	.049"	24.50
<b>404 JEFFREY</b>		
.423-400 Gr. Round Nose Soft Point . . . . .	.032"	\$17.50
.423-400 Gr. Round Nose Soft Point . . . . .	.049"	22.50
.423-400 Gr. Round Nose Solid . . . . .	.049"	24.50
<b>44 MAGNUM</b>		
.430-250 Gr. Flat Nose Soft Point . . . . .	.032"	\$12.50
.430-300 Gr. Flat Nose Soft Point . . . . .	.032"	12.50
<b>425 WESTLEY RICHARDS</b>		
.435-410 Gr. Round Nose Soft Point . . . . .	.049"	\$23.00
.435-410 Gr. Round Nose Solid . . . . .	.049"	25.00
<b>45-70 CALIBER</b>		
.458-300 Gr. Round Nose Soft Point . . . . .	.032"	\$12.50
.458-400 Gr. Round Nose Soft Point . . . . .	.032"	16.50
.458-500 Gr. Round Nose Soft Point . . . . .	.032"	19.50
<b>450 MAGNUM</b>		
.458-400 Gr. Round Nose Soft Point . . . . .	.049"	\$22.50
.458-500 Gr. Round Nose Soft Point . . . . .	.049"	\$24.50
.458-500 Gr. Round Nose Solid . . . . .	.049"	26.50
.458-600 Gr. Round Nose Soft Point . . . . .	.049"	28.50
.458-600 Gr. Round Nose Solid . . . . .	.049"	30.50
<b>465 NITRO</b>		
.468-500 Gr. Round Nose Soft Point . . . . .	.049"	\$26.00
.468-500 Gr. Round Nose Solid . . . . .	.049"	28.00
<b>475 A&amp;M and 470 NITRO</b>		
.475-500 Gr. Round Nose Soft Point . . . . .	.049"	\$26.00
.475-500 Gr. Round Nose Solid . . . . .	.049"	28.00
.475-600 Gr. Round Nose Soft Point . . . . .	.049"	30.00
.475-600 Gr. Round Nose Solid . . . . .	.049"	32.00
<b>475 No. 2 JEFFREY</b>		
.488-500 Gr. Round Nose Soft Point . . . . .	.049"	\$28.00
.488-500 Gr. Round Nose Solid . . . . .	.049"	30.00
<b>505 GIBBS</b>		
.505-600 Gr. Round Nose Soft Point . . . . .	.049"	\$35.00
.505-600 Gr. Round Nose Solid . . . . .	.049"	40.00
.505-700 Gr. Round Nose Soft Point . . . . .	.049"	45.00
.505-700 Gr. Round Nose Solid . . . . .	.049"	50.00
.510-600 Gr. Round Nose Soft Point . . . . .	.049"	36.00
.510-600 Gr. Round Nose Solid . . . . .	.049"	41.00
<b>577 NITRO</b>		
.585-750 Gr. Round Nose Soft Point . . . . .	.049"	\$75.00
.585-750 Gr. Round Nose Solid . . . . .	.049"	\$95.00



## 45 BRAND BULLETS

These bullets are made on automatic machines, drawn through tungsten carbide dies for close tolerances and tumbled for smooth finish. The heavy metal jackets are drawn thin at the nose for dependable expansion. Cores are soft alloyed lead.

Caliber	Grs.	Type	Per C
22 (.224)	50	SPS	\$3.05
	55	SPS	3.05
6mm (.243)	70	HP	3.95
	85	SPS	4.15
	100	SPS	4.40
25 (.257)	87	HP	4.15
	100	SPS	4.40
	117	SPS	4.65
6.5mm (.263)	130	SPS	4.80
	150	RN	5.15
270 (.277)	110	HP	4.65
	130	SPS	5.00
	150	RN	5.25
7mm (.284)	139	HP	5.00
	175	RN	5.75
30 (.308)	110	RN	4.55
	125	HP	4.70
	150	SPS, FN	5.00
	180	SPS	5.25
	220	RN	5.75
303 (.312)	150	SPS	5.10
	180	SPS	5.35
8mm (.323)	150	SPS	5.00
	180	RN	5.25
35 (.358)	200	SPS	5.75
	250	RN	6.30
375 (.375)	235	SPS	6.30
	300	RN	7.35

SPS—Semi-Pointed Soft Point  
HP—Hollow Point  
RN—Round Nose  
FN—Flat Nose



## HERTER'S Banana Peel Bullets

The inside of the gilding metal jacket is partly cut through or "scored" to aid the mushrooming of this bullet. The jacket is thicker at the base to prevent blowup and keep the bullet intact. Per C .....\$3.64

Caliber	Grs.	Type
6mm (.243)	85	BP
	87	SP
25 (.257)	87	BP
	117	BP
6.5 (.263)	90	HP
	156	BP
270 (.277)	150	BP
303 (.311)	150	SP
	150	BP
	180	BP



## HERTER Jacketed Rifle Bullets

Caliber	Grs.	Type	Per C
17 (.224)	25	HP	\$3.29
22 (.224)	40	SP	2.59
	45	SP	2.59
	50	SP	2.75
	53	HP	3.39
	55	SP	2.75
6mm (.243)	70	HP	3.12
	85	SP	3.32
	100	SP	3.53
25 (.257)	87	HP	3.32
	100	SP	3.49
	117	SP	3.72
6.5mm (.263)	100	SP	3.53
	130	SP	3.83
	150	RN	4.05
270 (.277)	110	HP	3.70
	130	SP	3.99
	150	RN	4.19
7mm (.284)	125	SP	3.72
	139	HP	3.99
	150	SP	3.99
	175	RN	4.35
30 (.308)	110	RN	3.60
	125	HP	3.72
	150	SP	3.99
	150	FNC	3.99
	168	BTM	4.09
	170	RNC	4.19
	180	BTM	4.19
	180	SP	4.19
	220	RN	4.49
303 (.311)	150	SP	3.99
	180	SP	4.21
7.35mm	170	RN	4.26
8mm (.323)	150	SP	3.99
	180	RN	3.99
	236	RN	4.89
33 (.338)	200	RN	4.43
	265	RN	5.29
35 (.358)	200	RN	4.53
	250	RNC	4.99
375 (.375)	235	SP	5.29
	300	RN	5.89
45 (.458)	350	RNC	*4.63
	500	RNC	*5.42

\*Per box of 50  
SP—Soft Point  
HP—Hollow Point  
RN—Round Nose

BTM—Boattail Match  
FN—Flat Nose  
C—Cannelured  
FJ—Full Jacket

## 224 CLARK BULLETS

The 224 Clark cartridge is a varmint type designed for flat trajectory at long ranges. Clark offers an 80 grain hollow point varmint bullet priced at \$6.50 per hundred. These are hand swaged especially for the 224 Clark.

Also offered is the 82 grain spire point game bullet which has an "inner jacket" to control expansion of the rear portion of the bullet. Price is \$5.00 per 50.

## HERTER'S Semi-Jacket Handgun

Made with fine quality gilding metal jackets, these Herter bullets need no lubrication, can be loaded to much higher velocity than cast bullets.

Caliber	Grs.	Type	Per C
30	150	SWC	\$2.99
30	180	SWC	3.25
38	135	SWC	2.85
	158	SWC	3.15
	200	SWC	3.79
44	220	SWC	3.76
	240	SWC	3.79
45	210	SWC	3.59
	230	SWC	3.75

SWC—Semi-Wadcutter

## Swaged Pistol Bullets

Made from extruded lead wire with 3% antimony content. No tin is used. Bullets are lubricated and come in popular styles.

Caliber	Grs.	Type	Per C
32	98	RN	\$1.29
9mm	125	RN	1.34
38	148	WC	1.39
38	158	SWC	1.42
401	160	WC	1.55
401	180	SWC	1.60
401	200	RN	1.65
44	220	SWC	1.83
44	240	SWC	1.83
45	230	RN	1.83
45	250	RN	1.90

RN—Round Nose  
WC—Wadcutter  
SWC—Semi-Wadcutter



## HERTER Wasp Waist Sonic Bullet

Named for the reduced-diameter area of the bearing section, the wasp-waist design is claimed by Herter's to give reduced pressures and increased accuracy.

Caliber	Grs.	Type	Per C
22 (.224)	55	SP	\$3.59
6mm (.243)	85	SP	4.15
270 (.277)	130	SP	4.79
30 (.308)	150	SP	4.79
30 (.308)	180	SP-MT	4.99

Note: The 180 gr. 30 caliber bullet has longer tail section (MT — Missile Tail). The 30 caliber bullets are not suitable for use in short-necked cases such as the 300 savage. Case neck must be long enough to hold the bullet forward of the waist.



# Hornady Bullets – a complete selection for handloading

## 17 CALIBER (.172)

25 grain spire HP.....\$4.40

## 22 CALIBER (.222)

40 grain Jet.....\$3.40

## 22 CALIBER (.223)

45 grain Hornet.....\$3.40

## 22 CALIBER (.224)

45 grain Hornet.....\$3.40

50 grain spire point SX.....\$3.60

Super Explosive

50 grain spire point.....\$3.60

50 grain spire point.....\$3.60

## 22 CAL. MATCH BULLET

53 grain spire HP.....\$4.20

55 grain spire point SX.....\$3.60

Super Explosive

55 grain spire point.....\$3.60

60 grain spire point.....\$3.60

60 grain spire HP.....\$4.50

## 6MM CALIBER (.243)

70 grain spire point.....\$4.50

75 grain spire H.P.....\$4.60

87 grain spire point.....\$4.75

100 grain spire point.....\$5.10

100 grain round nose.....\$5.10

## 25 CALIBER (.257)

60 grain soft point.....\$4.40

75 grain spire HP.....\$4.60

87 grain spire point.....\$4.75

100 grain spire point.....\$5.15

117 grain round nose.....\$5.40

120 grain spire HP.....\$5.50

## 6.5MM CALIBER (.264)

100 grain spire point.....\$5.25

129 grain spire point.....\$5.50

129 grain round nose.....\$5.50

140 grain spire point.....\$5.75

140 grain round nose.....\$5.75

160 grain round nose.....\$6.10

## 270 CALIBER (.277)

100 grain spire point.....\$5.25

110 grain spire HP.....\$5.40

130 grain spire point.....\$5.75

150 grain spire point.....\$6.00

150 grain round nose.....\$6.00

## 7MM CALIBER (.284)

120 grain spire point.....\$5.40

120 grain spire H.P.....\$5.50

139 grain spire point.....\$5.75

154 grain spire point.....\$6.00

154 grain round nose.....\$6.00

175 grain spire point.....\$6.30

175 grain round nose.....\$6.30

## 30 CALIBER (.308)

100 grain short jacket.....\$3.50

110 grain spire point.....\$5.25

110 grain round nose.....\$4.40

130 grain spire point.....\$5.50

150 grain spire point.....\$5.75

150 grain round nose.....\$5.75

165 grain spire point.....\$5.90

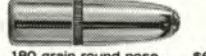
## 30 CAL. MATCH BULLET

168 grain boat tail HP.....\$6.80

170 gr. flat point (30-30).....\$6.00



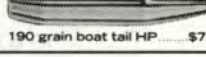
180 grain spire point.....\$6.00



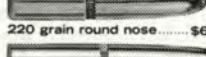
180 grain round nose.....\$6.00

## 30 CAL. MATCH BULLET

190 grain boat tail HP.....\$7.00

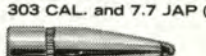


220 grain round nose.....\$6.65

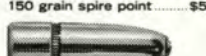


220 grain FMJ.....\$12.50

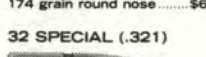
Full Metal Jacket



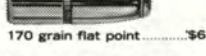
303 CAL. and 7.7 JAP (.312)



150 grain spire point.....\$5.75



174 grain round nose.....\$6.00



32 SPECIAL (.321)



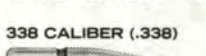
170 grain flat point.....\$6.00



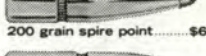
8MM CALIBER (.323)



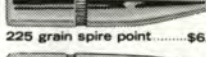
125 grain spire point.....\$5.50



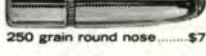
150 grain spire point.....\$5.80



170 grain round nose.....\$6.10



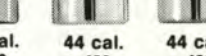
338 CALIBER (.338)



200 grain spire point.....\$6.60



225 grain spire point.....\$6.90

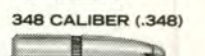


250 grain round nose.....\$7.25

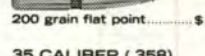


250 grain FMJ.....\$14.25

Full Metal Jacket



348 CALIBER (.348)



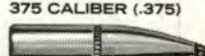
200 grain flat point.....\$7.00



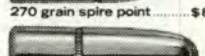
35 CALIBER (.358)



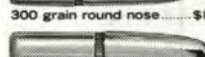
200 grain round nose.....\$6.50



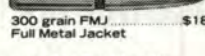
250 grain spire point.....\$7.30



375 CALIBER (.375)



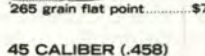
270 grain spire point.....\$8.50



300 grain round nose.....\$8.80



300 grain FMJ.....\$18.00



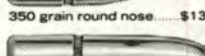
44 CALIBER (.430)



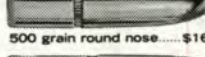
265 grain flat point.....\$7.50



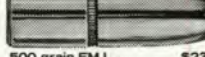
45 CALIBER (.458)



300 grain H.P.....\$7.00



350 grain round nose.....\$13.50



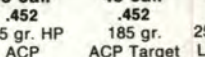
500 grain round nose.....\$16.30



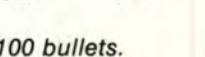
500 grain FMJ.....\$23.50



185 gr. ACP.....\$4.75



185 gr. ACP Target.....\$4.75






250 gr. HP Long Colt.....\$5.25

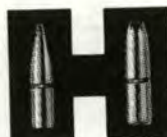
## Hornady PISTOL BULLETS

												
9mm .355	9mm .355	38 cal. .357	38 cal. .357	38 cal. .357	38 cal. .357	38 cal. .357	41 cal. .410	44 cal. .430	44 cal. .430	45 cal. .452	45 cal. .452	45 cal. .452
100 gr. FMJ	115 gr. HP	110 gr. HP	125 gr. HP	158 gr. HP	158 gr. FP	210 gr. HP	200 gr. HP	240 gr. HP	240 gr. HP	185 gr. HP	185 gr. ACP Target	250 gr. HP Long Colt
\$4.10	\$4.10	\$4.10	\$4.15	\$4.25	\$4.25	\$5.20	\$5.00	\$5.20	\$5.20	\$4.75	\$4.75	\$5.25

## Lead Pistol Bullets

		
38 cal. .358	38 cal. .358	38 cal. .358
148 gr. HB Wadcutter	158 gr. Round Nose	158 gr. Semi-Wadcutter
\$3.00*	\$3.20*	\$3.20*

\* Bulk price information supplied on request.



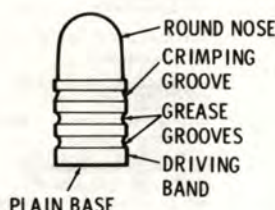
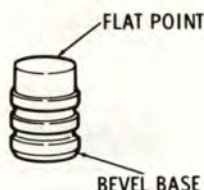
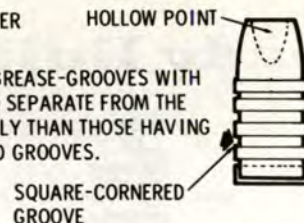
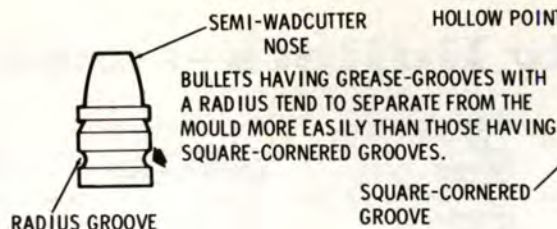
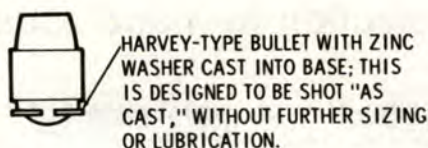
**Hornady Bullets**

HORNADY MANUFACTURING CO.  
Grand Island, Nebraska 68801

All prices per 100 bullets.  
Effective January 1, 1972

FFL 47-404



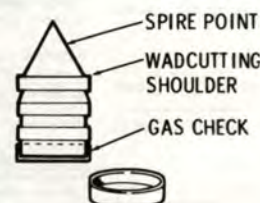
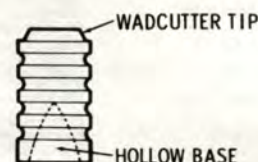


## MARKELL BULLETS

Markell Precision Cast Bullets are cast in multi-cavity moulds of precision-controlled alloys, made to their special order. Each bullet is carefully sized, lubricated and inspected.

Markell Golden Arrow Bullets are heavily copper coated to insure maximum accuracy and prevent leading. Excellent performance in both 44 and 38 magnums. Also available in all other calibers. For Golden Arrow prices add 90¢ per C to list price.

Bullets sized thus: .32 cal.—.313; 9mm—.356; 38—.358; 44—.429; 45—.452. Other diameters available.



## GODWIN BULLETS

These are high quality cast bullets cast of #1 lead-tin-antimony alloy sized and lubed with the NRA-recommended 50/50 Alox and beeswax formula—a softer #2 alloy may be had on orders for 500 of any one type. Other Lyman styles and weights are available—minimum order 2000. Bullets are delivered sized to standard diameter unless specified otherwise.

No.	Cal.	Grs.	Per C
FP-18	30	119	\$2.65
FP-41	30	178	3.85
RN-242	9mm	92	2.60
CON-402	9mm	121	2.65
SWC-446	357	158	2.75
SWC-156	357	158	3.75
WC-495	38	146	2.70
SWC-477	38	150	2.70
FP-248	375	250	3.75
FP-28	41	210	3.35
SWC-421	44	250	3.75
SWC-460	45ACP	200	3.30
SWC-424	45	260	3.75

FP—Flat Point RN—Round Nose CON—Conical  
SWC—Semi-Wadcutter GC—Gas Check WC—Wad-  
cutter K—Keith design.

## HI-PRECISION BULLETS

A complete line of fine jacketed bullets for hunters, target shooters and experimenters. Quality control and quality material are combined to give consistent accuracy. Sold only in quantity to commercial loaders and those who wish to apply their own labels. Special items supplied on order.

Available in calibers and weights from 22/45 gr. to 45/500 gr. Write for details and prices.

No.	Cal.	Grs.	Type	Per C
C115	30	115	SWC	\$3.55
W66	32	98	WC	3.25
P65	32	98	SWC	3.25
P7	9mm	125	SP	3.30
R115	9mm	125	RN	3.30
R107	380	107	RN	3.25
R130	38	130	RN	3.25
P145	38	145	SWC-R	3.35
W148	38	148	WC	3.35
BB146	38	146	WCBB	3.35
FW148	38	148	WC	3.35
SW150	38	150	SWC	3.25
R158	38	158	RN	3.40
R200	38	200	RN	4.00
SW160	38	160	SWC-S	3.40
HP160	38	148	HP-S	4.05
GC160	38	160	SWCGC	4.50
SW173	38	173	SWC-K	3.40
HP173	38	160	HP-K	4.10
GC173	38	173	SWCGC	4.60
SW190	38/40	190	SWC	3.95
SW198	41	198	SWC	4.10
W198	41	198	WC	4.05
W185	44	185	WC	3.95
SWC200	44	200	SWC	4.10
SW210	44	210	SWC	4.15
SW231	44	231	SWC-B	4.45
HP235	44	235	HP	5.20
GC235	44	235	SWCGC	4.95
SW250	44	250	SWC-K	4.55
SW1-180	45	180	SWC	4.00
SW2-180	45	180	SWC	4.00
W200	45	200	WC	4.10
SW200	45	200	SWC-C	4.10
SW215	45	215	SWC	4.15
R230	45	230	RN	4.40
HP240	45	240	HP-K	5.15
SWC250	45	250	SWC-K	4.55

WC—Wadcutter SP—Spire Point  
BB—Bevel Base HP—Hollow Point  
GC—Gas Check K—Keith  
R—Rector S—Sharpe C—Crawford

## CUMBERLAND ARMS

Cumberland bullets are cast lead from Lyman moulds. They offer 30, 38, 44 and 45 as well as 43 Mauser, 44-60, 44-77 and 44-90 Sharps and Remingtons, the latter four at \$1.80 per 36. They also offer loaded ammunition for some of the scarcer calibers. Write for a complete list of offerings and prices.

## MILLER TRADING CO. Cast Bullets

This firm offers numerous cast bullets for rifles and handguns. These may be had as cast or sized and lubed. All bullets shipped postpaid and insured in wooden boxes. Write to them for their latest list.

## REMCO SHOT CAPS

These handgun components are pre-loaded plastic capsules of No. 9 shot—6 or 7½ also available. Shot caps load easily into your resized brass using target-type powder charges. Completed rounds hold more shot, shoot tighter, more even patterns and make good snake, varmint or small game loads. Packed 50 per box.

38 Spec., 357 Magnum .....\$4.95  
44 Spec., 44 Mag., 45 ACP or 45 Colt  
are .....\$5.95  
Loaded Remco "Shot Caps" cartridges,  
38 Spec. only, packed 25 per box .\$.495





# BULLETS

The unique, patented\* designs of these bullets insure better performance in big-game hunting, varmint hunting and target shooting. Nosler Bullets are designed for instant expansion, even at long ranges, maximum penetration and consistent accuracy, and are manufactured with utmost care and attention to quality.

\*U.S. Patents 3,345,949/3,069,748/3,003,420  
Canada, Patented 1963



## NOSLER Solid Copper Base Bullet

Precisely impact-formed from billets of copper gilding metal. The jacket thins toward the nose to rupture at lower velocity over a longer range, releasing the soft lead core for maximum shocking power. The solid copper base eliminates any possibility of imbalance owing to air pockets or jacket irregularity.

Rear third of bullet is bore diameter to pilot on top the rifling and reduce friction. Annular ridges are barrel groove diameter for a better gas seal. The bullet starts its momentum easier and overcomes friction more readily, resulting in increased accuracy with longer barrel life.



## NOSLER Partition<sup>TM</sup>

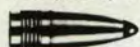
*The premium big-game bullet.*

... Two bullets in one; two lead cores with a partition integral with the jacket between. The forward section mushrooms perfectly on impact even at extreme ranges while the partition always retains 2/3 the bullet weight for maximum penetration. This double action provides optimum shock and penetration for clean, one-shot kills.

### SOLID BASE

#### CALIBER

.22 (.224) Two Dia.

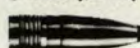


55 Gr. Spitzer

Retail Price Per  
Box of 100

3.95

6 MM (.243) Two Dia.



75 Gr. Spitzer

5.00

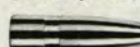


85 Gr. Spitzer

5.30

### PARTITION

6 MM (.243)



85 Gr. Semi Spitzer

Retail Price Per  
Box of 50

5.40



95 Gr. Spitzer

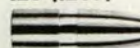
5.50



100 Gr. Semi Spitzer

5.60

.25 (.257)



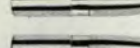
100 Gr. Spitzer

5.60



115 Gr. Spitzer

5.85



117 Gr. Semi Spitzer

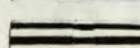
5.90

6.5 MM (.264)



125 Gr. Spitzer

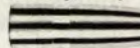
6.10



140 Gr. Spitzer

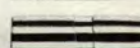
6.40

.270 (.277)



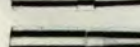
130 Gr. Spitzer

6.15



150 Gr. Spitzer

6.45



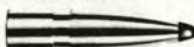
160 Gr. Semi Spitzer

6.75

### PARTITION

#### CALIBER

7 MM (.284)



140 Gr. Spitzer

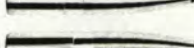
Retail Price Per  
Box of 50

6.55



150 Gr. Spitzer

6.65



160 Gr. Spitzer

6.75



175 Gr. Semi Spitzer

6.95

.30 (.308)



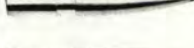
150 Gr. Spitzer

6.55



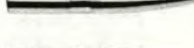
165 Gr. Spitzer

6.65



180 Gr. Spitzer

6.75



200 Gr. Round Nose

6.95

**.300 MAGNUM** Special grooving adaptation of regular 30 cal. Nosler Partition bullet for positive seating in cartridges of extremely heavy recoil.



150 Gr. Spitzer

7.00

165 Gr. Spitzer

7.20

180 Gr. Spitzer

7.30

200 Gr. Round Nose

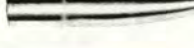
7.50

.338



210 Gr. Spitzer

8.25



250 Gr. Round Nose


8.90













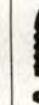




Lyman Ideal Bullet Moulds are available for over 800 different bullet designs and round ball diameters. The chart below shows our catalog items. Other designs available as special orders. The bullet weights shown for rifle and pistol represent bullets cast with No. 2 alloy. The weights shown for muzzle-loading bullets represent pure lead.

### RIFLES



	22 CALIBER						22 SAV. HI-POWER		243—6M/M				
													
BULLET NUMBER	225450	22596	225107	225462	225438	225415	228367	22835	245496	245498	245497	257420	257463
GRAIN WEIGHT (#2 ALLOY)	48 gr.	50 gr.	37 gr.	57 gr.	44 gr.	49 gr.	59 gr.	78 gr.	84 grs.	99 gr.	93 gr.	67 gr.	74 gr.
TOP PUNCH	450	415	415	438	438	415	450	450	203	498	203	420	463
SEATING SCREW	450	415	415	438	438	415	450	450	203	498	203	415	438

#### RECOMMENDED USE:

(FOR LOADING INFO.,  
SEE 45TH HANDBOOK)

.22 HORNET  
.218 BEE

225438, 225415

.222 REM.  
.223 REM.  
.222 REM. MAG.  
.225 WIN.

225438, 225462, 225415

.224 WEA. MAG.  
.22/250  
.220 SWIFT

225415, 225462

.243 WIN.  
.244 REM.  
6 M/M REM.

245496, 245498, 245497

### 30 M1 CARBINE

### 30 CALIBER

BULLET NUMBER	311359	311410	31141	311284	311291	311241	311466	311332	311413	311334	311467	311290	311407
GRAIN WEIGHT (#2 ALLOY)	112 gr.	131 gr.	173 gr.	214 gr.	170 gr.	155 gr.	152 gr.	180 gr.	169 gr.	190 gr.	180 gr.	210 gr.	180 gr.
TOP PUNCH	359	467	8	467	291	465	467	413	413	413	467	467	445
SEATING SCREW	359	467	8	467	465	465	467	413	413	413	467	467	445

#### RECOMMENDED USE:

(FOR LOADING INFO.,  
SEE 45TH HANDBOOK)

.30 REM.

311291, 31141

.303 SAV.

311291, 311334, 31141

30/30

311410, 311291, 311466, 31141

.300 SAV.

311359, 311466, 31141, 311332,  
311316, 311291, 311407

.308

311359, 311466, 31141, 311316,  
311291, 311334

30/40 Krag

311359, 311466, 31141, 311332,  
311316, 311291, 311407, 311290

### 35 CALIBER

### 9.3 M/M

### 375 - 38/55

### 38/40

BULLET NUMBER	35897	358430	358315	358318	3589	366408	375248	375449	375296	375167	40188	40143	401452
GRAIN WEIGHT (#2 ALLOY)	232 gr.	150 & 195	204 gr.	245 gr.	282 gr.	245 gr.	249 gr.	264 gr.	265 gr.	267 gr.	170 gr.	172 gr.	196 gr.
TOP PUNCH	97	430	311	311	430	295	449	449	449	167	88	43	452
SEATING SCREW	97	430	311	311	430	429	449	449	449	167	88	43	452

#### RECOMMENDED USE:

(FOR LOADING INFO.,  
SEE 45TH HANDBOOK)

.358 WIN.  
.350 REM. MAG.  
.358 NORMA MAG.

358315, 358318

.375 H & H

375248, 375167, 375296

.378 WEA. MAG.

375248, 375449



When choosing a bullet mould, check the chart below for the caliber listing of your firearm. Appropriate bullet designs are pictured directly under the caliber listing. In most every case, you will find a choice of several weights and styles. When ordering your mould, indicate the specific bullet number and grain weight required. Gas check bullets may be used with, or without, gas checks as desired. For the correct sizing dies for your bullet, see page 20 of this catalog.



#### HOLLOW POINT DESIGNS

Any bullet design that is not illustrated as a hollow base, may be purchased in a **single cavity mould** as a hollow point. Hollow point designs are not available, however, in double or four cavity moulds. For prices see page 18.



#### HOLLOW BASE DESIGNS

A limited amount of pistol and muzzle loading bullets are available with this design feature. These bullets are available in **single cavity moulds only**. In all cases where available, the hollow base will be indicated in the bullet illustration.

CALIBER			6.5 M/M				270 CAL. WIN. & WEA.			7 M/M				7.35 CARCANO		
257312	257325	257231	266305	266324	266469	266455	280468	280473	280412	287346	287448	287129	287308	287221	287442	287405
89 gr.	113 gr.	106 gr.	101 gr.	119 gr.	141 gr.	127 gr.	114 gr.	125 gr.	137 gr.	135 gr.	118 gr.	124 gr.	164 gr.	175 gr.	139 gr.	150 gr.
420	325	420	305	455	455	455	468	473	468	346	348	346	468	420	377	346
415	438	415	305	438	438	438	438	377	438	438	438	438	438	415	377	438

257420, 257312			6.5 JAP 6.5x54MS			266305, 266455, 266324, 266469			7 M/M MAUSER .284 WIN.			287448, 287346, 287405, 287308		
257420, 257418, 257312			6.5 ITAL. 6.5x55 SWEDE .264 WIN.			266324, 266469, 266455			.280 REM. 7x61 S & H 7 M/M REM. MAG.			287346, 287308, 287405		
257312, 257418			6.5 REM. MAG.			266324, 266455			7 M/M WEA. MAG.			287308, 287221		

/20	32 WIN. SL	32 CALIBER					8 M/M						338 WIN. 340 WEA.		348 WIN.			351 WIN. SL
																		
311419	321298	321427	321297	321317	316475	323470	323359	323365	323481	323378	323471	338320	33889	350482	350447	350457	350319	
88 gr.	151 gr.	134 gr.	181 gr.	161 gr.	155 gr.	165 gr.	115 gr.	182 gr.	185 gr.	243 gr.	215 gr.	201 gr.	247 gr.	251 gr.	183 gr.	250 gr.	167 gr.	
8	295	470	295	470	470	470	295	366	366	470	366	320	320	320	447	447	447	
8	295	470	295	470	470	470	295	366	366	470	278	320	320	320	447	447	447	

311359, 311410, 311291, 311407, 311334, 311316, 311466, 31141, 311332, 311290			7.65 ARG. .303 BRIT. 7.7 JAP			311466, 311284, 311299, 311290			.32 WIN. SPEC.			321427, 321297, 321317		
311291, 311334, 31141, 311290			32/20			311419, 311359, 311316			8 M/M MAUSER			32359, 323378, 323470		
311466, 31141, 311291, 311290			32/40			321317, 321297			.338 WIN. .340 WEA. MAG.			338320, 33889		
			.32 REM.						.35 REM.			358430, 358315		

401 WIN. SL			405 WIN.	44/40		43 SPANISH	43 MAUSER	44 MAG. 444 MARLIN			45/70 — 458 WIN. — 460 WEA.						
																	
403173	410426	41028	412263	42798	429434	439186	446110	429215	429360	429244	457125	457124	457406	457191	457483	457122	462560
290 gr.	240 gr.	212 gr.	288 gr.	205 gr.	215 gr.	370 gr.	340 gr.	210 gr.	232 gr.	245 gr.	500 gr.	385 gr.	475 gr.	292 gr.	378 gr.	330 gr.	545 gr.
43	263	43	263	98	98	187	421	421	360	421	374	374	374	191	191	191	424
43	263	43	263	98	98	187	421	421	360	421	374	374	374	191	191	191	424

375248			.444 MARLIN			429215, 429244, 429360			.458 WIN. MAG.			457124, 457406		
429215, 429360			45/70			457124, 462560, 457406, 457191			.460 WEA. MAG.			462560		



### PISTOLS

	22 JET 221 REM.					256 MAG.					30 & 32 CALIBER							
BULLET NUMBER	225107	225438	225415	257420	257463	311227	311252	313226	313249	313445	313492	3118	356402	358212	35887	35863		
GRAIN WEIGHT (#2 ALLOY)	38 gr.	44 gr.	49 gr.	65 gr.	75 gr.	84 gr.	77 gr.	93 gr.	84 gr.	95 gr.	93 gr.	115 gr.	121 gr.	146 gr.	125 & 140	148 gr.		
TOP PUNCH	415	438	415	420	463	465	465	226	226	445	445	8	402	311	311	344		
SEATING SCREW	415	438	415	415	438	465	465	226	226	445	445	8	402	311	395	344		
RECOMMENDED USE:	.22 JET					225107, 225438					.32 S & W							
(FOR LOADING INFO., SEE 44TH HANDBOOK)	.221 REM.					225438, 225415					.32 A.C.P.							
	.30 LUGER					313249, 313226, 311227					.32 S & W LONG { 311252, 311227, 3118, 313249, 313226							
	.30 MAUSER					313249, 311227					9 M/M LUGER							
											.357 MAG.							
											.380 AUTO							

	38/40					41 S & W					44/40					44 SPEC. &				
BULLET NUMBER	40143	40188	41026	410426	41027	41028	41032	410610	42798	429434	429348	429360	429383	429421	429244					
GRAIN WEIGHT (#2 ALLOY)	172 gr.	170 gr.	199 gr.	240 gr.	220 gr.	212 gr.	212 gr.	210 gr.	205 gr.	215 gr.	180 gr.	232 gr.	245 gr.	245 gr.	245 gr.					
TOP PUNCH	43	88	402	263	402	43	429	610	98	98	348	360	251	421	421					
SEATING SCREW	43	88	402	263	402	43	429	429	98	98	348	360	251	421	421					
RECOMMENDED USE:	38/40					40143, 40188					.44 SPECIAL					.45 A.C.P.				
(FOR LOADING INFO., SEE 44TH HANDBOOK)	.41 MAG.					{ 41026, 41028, 410610, 41032, 41027, 410426					.44 MAG.					.45 AUTO RIM				
											44/40					.45 COLT				
											42798									

### MOULDS FOR FLINT AND PERCUSSION ARMS

Lyman offers a complete line of bullet and round ball moulds to the muzzle loading enthusiast. Seventy five different round ball diameters are available along with many of the famous old bullet designs for rifles and pistols. Whether your muzzle loader is an original or a replica, a Lyman Mould will improve its accuracy.

Each mould is manufactured to the same precision tolerances as our regular bullet line. Each mould is equipped with a clean cutting sprue cutter. Wood sheathed handles supply a cool gripping surface and floating blocks with dowel pins insure accurate alignment. All Lyman moulds are carefully vented to prevent air traps in the projectile.



Photos of  
Muzzle Loading Arms,  
Courtesy  
Navy Arms Co.

### PISTOLS

NOTE: Do not use a patch in Cap & Ball Revolvers.

ORIGINAL COLT 31 CAL. CAP & BALL		ORIGINAL & REPLICA COLT 36 CAL. CAP & BALL	
	31950 105 gr.		37583 145 gr.
	.323 Dia. Ball		.375 Dia. Ball

### RIFLES

NOTE: Minie Bullets are not patched but should be lubricated with Crisco, Lyman bullet lubricant or vaseline.

HOPKINS & ALLEN 36 CAL. RIFLE	DIXIE GUN WORKS 40 CAL. KENTUCKY RIFLE
.350 Dia. Ball with .007 patch	.395 Dia. Ball with .013 patch





# CAST BULLET DESIGNS

# Lyman

## 9 MM & 38 CALIBERS

357443	357446	358156	35893	35891	358101	358311	35875	358430	358495	358477	358429	358432	35864	358480	358425	35872	358242	358345
158 gr.	162 gr.	155 gr.	125 gr.	148 gr.	75 gr.	158 gr.	200 gr.	150 & 195	141 gr.	150 gr.	168 gr.	148 & 160	140 gr.	133 gr.	112	115 gr.	92 & 121	115 gr.
395	429	429	93	495	495	311	429	430	495	429	429	429	311	429	402	430	311	429
395	429	429	93	495	495	311	429	430	495	429	429	429	311	429	402	430	311	429

356402, 358311, 358242	.38 SUPER	358242, 358480, 358311, 356402, 358430	.38 S & W	358242, 358495, 358311, 358480, 358430, 358156
358242, 358495, 358156, 358429, 356402, 358430, 358311	.38 SPECIAL	358101, 358242, 358495, 358311, 358429, 358425, 356402, 358430, 358156		
358242				

## 44 MAG.

## 45 CALIBER

## 45 COLT

429251	429184	429303	429215	429478	452374	452460	452389	452484	452488	452400	452423	452490	454190	454424	454309	454485	45468
255 gr.	235 gr.	200 gr.	210 gr.	210 gr.	225 gr.	200 gr.	185 gr.	225 gr.	195 gr.	240 gr.	238 gr.	230 gr.	250 gr.	255 gr.	235 gr.	250 gr.	175 gr.
251	251	303	421	251	374	460	374	374	374	374	374	424	424	190	424	190	460
251	251	303	421	251	374	460	374	374	374	374	424	424	190	424	374	190	460

452389, 452374, 452460  
452389, 452374, 452460, 452423  
45468, 454190, 454309, 454424

HOPKINS & ALLEN 36 CAL. PISTOL	ORIGINAL & REPLICA 44 CAL. REM. CAP & BALL	NAVY ARMS 44 CAL. KENTUCKY PISTOL	HOPKINS & ALLEN 45 CAL. PISTOL
.350 Dia. Ball with .007 patch	450229 155 gr.	.451 Dia. Ball	.445 Dia. Ball with .007 patch

ROUND BALL MOULDS									
.300	.340	.375	.410	.440	.470	.550	.672		
.308	.345	.378	.420	.445	.490	.560	.678		
.311	.350	.380	.424	.451	.498	.562	.690		
.313	.358	.389	.429	.454	.500	.575	.715		
.319	.360	.395	.433	.457	.526	.648			
.323	.370	.400	.437	.465	.535	.662			

HOPKINS & ALLEN 45 CAL. RIFLE	ORIGINAL 54 CAL. MUSKET	ORIGINAL 56 CAL. MUSKET	ORIGINAL & REPLICA 58 CAL. RIFLED MUSKET	ORIGINAL 69 CAL. MUSKET
445599 MINIE 250 gr.	.445 Dia. Ball with .007 patch	533476 MINIE 410 gr.	557456 MINIE 475 gr.	575602 MINIE 400 gr.
			575213 MINIE 505 gr.*	575213-OS MINIE 460 gr.
			575494 MINIE 315 gr.	57730 MINIE 570 gr.
			.562 Dia. Ball with .013 patch	68569 MINIE 730 gr.

\*ALSO AVAILABLE IN OVERSIZE 585213 - 535 gr.



### HOPKINS & ALLEN BARRELS ONLY:


Hopkins and Allen barrels only are available from Numrich Arms Corp., West Hurley, New York. These barrels will use the same patch and ball combination as listed for the Hopkins and Allen rifles. For the 31 CALIBER BARREL which is not available as a completed rifle, use a .300 diameter ball with a .007 patch. For 58 CALIBER BARRELS use the combinations listed for the rifled musket.




# Sierra Bullets

## JACKETED RIFLE BULLETS









### .22 CALIBER .223 Diameter Hornet

	40 gr. Hornet	\$3.30
	45 gr. Hornet	3.30


### .22 CALIBER .224 Diameter Hornet

	40 gr. Hornet	3.30
	45 gr. Hornet	3.30







### .22 CALIBER .224 Diameter High Velocity

	45 gr. Semi-pointed	3.35
	45 gr. Spitzer	3.35
	50 gr. Semi-pointed	3.60
	50 gr. Spitzer	3.60
	50 gr. Blitz	3.60
	55 gr. Semi-pointed	3.65
	55 gr. Spitzer	3.65
	63 gr. Semi-pointed	3.70








### .22 CALIBER .224 Diameter Bench Rest

	53 gr. Hollow Point	4.50
	52 gr. Hollow Point B.T.	4.50






### 6MM .243 Diameter

	60 gr. Hollow Point	4.35
	75 gr. Hollow Point	4.70
	85 gr. Spitzer	4.95
	85 gr. Hollow Point B.T.	4.95
	100 gr. Spitzer	5.25
	100 gr. Semi-pointed	5.25






### .25 CALIBER .257 Diameter

	75 gr. Hollow Point	4.70
	87 gr. Spitzer	4.90
	90 gr. Hollow Point B.T.	5.10
	100 gr. Spitzer	5.25
	117 gr. Spitzer Boat Tail	5.55
	117 gr. Spitzer Flat Base	5.50
	120 gr. Hollow Point B.T.	5.55





### 6.5MM .264 Diameter

	85 gr. Hollow Point	\$4.90
	100 gr. Hollow Point	5.25
	120 gr. Spitzer	5.55
	140 gr. Spitzer Boat Tail	5.90
	140 gr. Matchking H.P.	6.10



### .270 CALIBER .277 Diameter

	90 gr. Hollow Point	5.25
	110 gr. Spitzer	5.40
	130 gr. Spitzer Boat Tail	6.05
	130 gr. Spitzer Flat Base	6.05
	150 gr. Spitzer Boat Tail	6.25









### 7MM .284 Diameter

	120 gr. Spitzer	5.45
	140 gr. Spitzer	5.85
	160 gr. Spitzer Boat Tail	6.30
	168 gr. Matchking H.P.	6.65





### .30 CALIBER .307 Diameter

	150 gr. Flat Nose 30-30	6.00
	170 gr. Flat Nose 30-30	6.25



### .30 CALIBER .308 Diameter

	110 gr. Rd. Nose Carbine	\$4.55
	110 gr. Hollow Point	5.35
	125 gr. Spitzer	5.70
	150 gr. Spitzer	6.05
	150 gr. Round Nose	6.05
	165 gr. Hollow Point B.T.	6.30
	180 gr. Spitzer Flat Base	6.30
	180 gr. Spitzer Boat Tail	6.40
	180 gr. Round Nose	6.30
	220 gr. Round Nose	6.95



### .30 CALIBER Competition

	168 gr. International H.P.	\$7.50
	190 gr. Matchking H.P.	7.65
	180 gr. Matchking H.P.	7.65
	200 gr. Matchking H.P.	7.75

### .303 CALIBER .311 Diameter

	150 gr. Spitzer	6.05
	180 gr. Spitzer	6.30

### 8MM .323 Diameter



	150 gr. Spitzer	6.10
	175 gr. Spitzer	6.35

## JACKETED PISTOL BULLETS

### .38 CALIBER .357 Diameter

	110 gr. Jacketed Hollow Cavity	\$4.35
	125 gr. Jacketed Soft Point	4.40
	125 gr. Jacketed Hollow Cavity	4.40
	150 gr. Jacketed Hollow Cavity	4.50
	158 gr. Jacketed Soft Point	4.50

### 9MM .355 Diameter

	90 gr. Jacketed Hollow Cavity	\$4.35
	115 gr. Jacketed Hollow Cavity	4.40


### .41 CALIBER .410 Diameter

	170 gr. Jacketed Hollow Cavity	5.40
	210 gr. Jacketed Hollow Cavity	5.60

### 44 MAGNUM .4295 Diameter

	180 gr. Jacketed Hollow Cavity	5.50
	240 gr. Jacketed Hollow Cavity	5.60

### .45 CALIBER .4515 Diameter

	185 gr. ACP Jacketed Hollow Cavity	5.60
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## Proven accuracy, versatility, killing power for Big Game, Varmints, Target Shooting or Plinking

NOTE: Prices shown are for 100 bullets, effective February 1, 1972. Prices subject to change without notice.

# SPEER RIFLE BULLETS

### 22 CALIBER (.223)

40 gr. SP, 45 gr. spitzer...\$3.40

### 22 CALIBER (.224)

40 gr. SP, 45 gr. spitzer 3.40

50 grain spitzer ..... 3.60

52 grain hollow point ... 4.50

52 grain SILVER MATCH 6.50\*

55 grain spitzer ..... 3.65

70 grain semi-spitzer ... 4.40

### 6mm (.243)

75 grain hollow point ...\$4.75

80 grain spitzer ..... 4.85

90 grain spitzer ..... 4.95

105 grain round nose ... 5.25

105 grain spitzer ..... 5.25

### 25 CALIBER (.257)

60 grain spire point .... \$4.40

87 grain spitzer ..... 4.90

\*Limited to available stock

### 7mm (.284)

100 grain hollow point .. 5.35

100 grain spitzer ..... 5.25

120 grain spitzer ..... 5.50

### 6.5mm (.263)

87 grain hollow point ...\$5.00

87 grain spitzer ..... 4.85

100 grain hollow point .. 5.25

120 grain spitzer ..... 5.50

140 grain spitzer ..... 5.90

### 270 CALIBER (.277)

100 grain hollow point ..\$5.50

100 grain spitzer ..... 5.40

130 grain spitzer ..... 6.00

150 grain spitzer ..... 6.25

170 grain round nose ... 6.50

†Also available in .228" diameter

### 7mm (.284)

115 grain hollow point ...\$5.75

130 grain spitzer ..... 5.75

145 grain spitzer ..... 5.85

160 grain spitzer ..... 6.25

175 grain mag, semi-sp. ... 6.50

### 30 CALIBER (.308)

100 grain PLINKER® ....\$3.40

110 grain round nose .... 4.50

110 grain spire point .... 5.35

130 grain hollow point .. 5.85

150 grain flat nose ..... 6.00

150 grain round nose ... 6.00

150 grain spitzer ..... 6.00

### 165 grain round nose ... 6.15

165 grain spitzer ..... 6.15

170 grain flat nose ..... 6.25

180 grain round nose ... 6.30

180 grain spitzer ..... 6.30

180 gr. magnum, soft point 7.50

200 grain round nose ... 6.60

200 grain spitzer ..... 6.60

### 303 CALIBER (.311)

150 grain spitzer ..... \$6.00

180 grain round nose ... 6.30

7.65mm (.313)

175 grain round nose ...\$6.30

### 32 CALIBER (.321)

170 grain flat nose ....\$6.25

### 8mm (.323)

125 grain spire point ...\$5.60

150 grain spitzer ..... 6.10

170 grain semi-spitzer .. 6.35

225 grain round nose .... 8.00

### 338 CALIBER (.338)

200 grain spitzer .....\$6.60

275 grain semi-spitzer .. 8.75

### 35 CALIBER (.358)

180 grain flat nose ....\$6.50

220 grain flat nose .... 7.00

250 grain round nose ... 7.75

250 grain spitzer ..... 7.75

### 375 CALIBER (.375)

235 grain semi-spitzer ..\$7.75

# SPEER PISTOL BULLETS

Largest selling, most popular bullets for handgun loads.

### 9mm (.355)

100 grain hollow point ..... \$4.25

125 grain soft point ..... 4.25

### 38 CALIBER (.358)

148 gr. bevel-base wadcutter ....\$2.90

148 gr. hollow-base wadcutter ... 3.10

158 grain semi-wadcutter ..... 3.35

158 grain round nose ..... 3.35

### 38 CALIBER (.357)

110 grain hollow point .....\$4.25

125 grain soft point ..... 4.25

140 grain hollow point ..... 4.50

146 grain hollow point ..... 4.00

158 grain soft point ..... 4.50

160 grain soft point ..... 4.00

### 41 CALIBER (.410)

200 grain hollow point .....\$4.90

220 grain soft point ..... 5.10

### 44 CALIBER (.429)

200 grain magnum hollow point ...\$5.50

225 grain hollow point ..... 5.00

240 grain soft point ..... 5.20

### 41 CALIBER (.410)

240 grain magnum soft point ..... 5.60

### 45 CALIBER (.452)

200 grain semi-wadcutter .....\$3.75

### 45 CALIBER (.451)

200 grain hollow point .....\$5.00

225 grain magnum hollow point ... 5.50

©SPEER, INC. 1972



## NEW SPEER SHOTSHELL

... for 38 Special & 357 Magnum

The new Speer 38/357 Shotshell produces a consistent, even shot pattern...



...deadly on snakes... outstanding for controlling rodents, pests and small varmints. A special-formula plastic capsule holds the #9 shot and protects the barrel from wear. Add a new dimension to your handgun on your next hunting, fishing, hiking or camping trip! (Great for home protection.) Box of 6—\$1.49

## NEW

a completely new concept in 30 caliber match bullet design

## LAPUA

"lop-wah"

The world's most accurate match bullet. Winner of twelve gold medals at the World Matches, Phoenix, Arizona in 1971. The Lapua bullet offers superior external ballistics at ranges from 100 to 1000 yards. Packaged 50 per box in 2 bullet weights. Price per 100 bullets:

170 grain full metal jacket . . . \$12.50  
185 grain full metal jacket . . . \$12.50



## Sub-velocity Ammunition with reusable plastic case and bullet

Originally developed for the Air Force... extensively used by law enforcement agencies... enjoyed by thousands of handgun shooters for inexpensive training and fun. No powder required (primer does the job—we recommend CCI 350 Mag. primer). No tools needed for reloading. Use over and over!

	50 Bullets	50 Cases
Target 38*	\$1.75	\$1.75
Target 44*	2.00	2.00
Target 45*	2.00*	—



\* (for use in standard ACP metal cases)

# AMMUNITION AND COMPONENTS

## Ammunition Price List

Index No.	Cartridge	Wt.	Bullet Style	No. in Box	Retail Price Per Box
5452	222 Remington	50	PSP	20	\$4.25
6049	243 Winchester*	80	PSP	20	5.85
6051	243 Winchester*†	85	PSP	20	5.85
6060	243 Winchester*	100	PSP	20	5.85
6930	270 Winchester*	130	PSP	20	6.40
6945	270 Winchester*	150	PSP	20	6.40
7045	7mm (7x57) Mauser*	145	PSP	20	6.40
7645	7mm Rem. Magnum*	145	PSP	20	7.95
7675	7mm Rem. Magnum*	175	SP	20	7.95
7695	300 Savage*	150	PSP	20	6.20
7698	300 Savage*	180	PSP	20	6.20
7755	308 Winchester*	150	PSP	20	6.40
7756	308 Winchester*	165	PSP	20	6.40
7758	308 Winchester*	180	PSP	20	6.40
7785	30-30 Winchester*	150	FNSP	20	5.00
7787	30-30 Winchester*	170	FNSP	20	5.00
7855	30-06 Springfield*	150	PSP	20	6.40
7856	30-06 Springfield*	165	PSP	20	6.40
7858	30-06 Springfield*	180	PSP	20	6.40
7904	300 Win. Magnum*	180	MAG. SP	20	8.20
7905	300 Win. Magnum*	200	PSP	20	8.20
7957	32 Winchester Spl.*	170	FNSP	20	5.15
8037	8mm (8x57) Mauser*	170	SP	20	6.40
3610	9mm Luger (Par.)*	100	JHP	50	8.10
3620	9mm Luger (Par.)*	125	JSP	50	8.10
3748	38 Special*	148	HBWC	50	6.45
3758	38 Special*	158	RN	50	6.20
3710	38 Special*	110	JHP	50	7.65
3720	38 Special*	125	JHP	50	7.65
3725	38 Special*	125	JSP	50	7.65
3740	38 Special*	140	JHP	50	7.65
3759	38 Special*	158	JSP	50	7.65
3709	38 Special Shotshell†	—	#9 Shot	6	1.49
3920	357 Magnum*	125	JHP	50	8.55
3925	357 Magnum*	125	JSP	50	8.55
3940	357 Magnum*	140	JHP	50	8.55
3959	357 Magnum*	158	JSP	50	8.55

\*Packed in reusable plastic box.  
†Limited to existing stock.

### ABBREVIATIONS GUIDE:

HBWC — Hollow-base wadcutter  
JSP — Jacketed soft point  
RN — Round nose lead  
MAG — Magnum

JHP — Jacketed hollow point  
PSP — Pointed soft point  
SP — Soft point  
FNSP — Flat nose soft point

## Cartridge Case Price List

American type primer pockets—unprimed

Index No.	Cartridge	No. Per Box	Retail Price Per Box
545	222 Remington	20	\$1.96
600	243 Winchester*	20	2.82
690	270 Winchester*	20	2.97
700	7mm Mauser*	20	2.97
760	7mm Remington Mag.*	20	3.65
710	7x57R	10	2.00
730	7x65R	10	2.00
778	30-30 Winchester*	20	2.55
769	300 Savage*	20	2.82
770	308 Winchester*	20	2.82
780	30-06 Springfield*	20	2.97
792	300 Winchester Mag.*	20	3.70
795	32 Winchester Spl.*	20	2.55
803	8mm Mauser*	20	2.97
920	9.3x62	10	2.50
940	9.3x64	10	3.30
950	9.3x72R	10	2.50
970	9.3x74R	10	3.30
360	9mm Luger (Par.)*	50	4.13
370	38 Special*	50	2.80
390	357 Magnum*	50	3.13

\*Packed in reusable plastic box.

Prices effective February 1, 1972

Words "PLINKER," "TARGET 38," "TARGET 44," "TARGET 45" are registered trade names of SPEER, INC.

**SPECIAL NOTE:** Federal Law prohibits shipping ammunition or ammunition components to individuals. To get Speer ammunition or ammunition components, place order with your local gun dealer. Ask him to place the order with us also sending along a certified copy of his Federal Firearms License. This applies to bullet display boards also. Plastic bullets and cases are exempt from this law.



## The famous SPEER MANUAL



### HARD-COVER EDITION

By far, the most complete, authoritative reloading manual. A 448-page re-loader's dream, filled with "how-to" illustrations, detailed instructions, complete ballistic tables, special techniques, trouble shooting, glossary of terms ... everything a beginner or expert needs for accurate, safe reloading. For example: **RIFLE SECTION**

with 2000 new loads (including the best wildcats), latest powders, bullets and cartridges; **PISTOL SECTION** with more than 1300 new loads, latest powders and bullets for most popular handgun ammunition; **SHOTGUN SECTION** with latest factory loads, data. **\$3.95**

## NEW shot capsules

Plastic shot capsules (2-piece) for 38 special and 357 magnum reloading. #9 shot recommended. Shot capsules packed 50 to a box, **\$1.95**



## BULLET JACKETS:

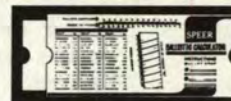
30 & 38 Cal., 1/2-jackets **\$15.00/M**  
44 & 45 Cal., 1/2-jackets **17.60/M**  
38 Cal., 3/4-jackets **17.60/M**  
41 & 44 Cal., 3/4-jackets **18.40/M**

## LEAD WIRE

10 lb. Box\*  
.250 (30 Cal.) **\$7.40**  
.300 (38 Cal.) **7.40**  
.365 (44 & 45 Cal.) **7.40**

\*Packed in 12-inch lengths.

## BALLISTIC CALCULATOR



Now you can compute bullet drop and remaining velocity, from 100 to 1,000 yards. Combine this calculator with the Speer Manual and you'll have all you need for top performing reloads. Easy to use, and only **\$2.95**



## 4-WAY AMMO PACK

This tough-plastic storage box protects 20 cartridges from dirt and moisture. Unique design of grid divider permits 4-way use to adapt to almost every cartridge size. Only **\$1.00**. Also available (not illustrated) for 50 pistol cartridges (38/357 and 44/45) ... only **\$1.00**.



## Full-Color "Collector's" BULLET BOARD

The "Old West" comes to life on the Speer Bullet Display (illustrated in living color by historical artist Jack Woodson). An informative guide to all Speer bullets, it is also a colorful decorative piece for your den, family room or reloading area. Handsome 21"x11" stained hardwood frame. Available **ONLY** from your dealer ... **\$11.50**

# SPECIALTY AMMUNITION

Prices effective January 1, 1972

## DWM METRIC AMMUNITION

Index No.	Cartridge	Wt.	Bullet Style	No. in Box	Retail Price Per Box
*5472	5.6x50 Magnum	50	PSP	20	\$7.30
*5492	5.6x50R (Rimmed) Mag.	50	PSP	20	7.30
6487	6.5x54 Mann.-Sch.	159	RNSP	10	4.45
6621	6.5x57	93	PSP	10	4.80
6628	6.5x57	123	SM	10	5.55
6721	6.5x57R	93	PSP	10	5.20
6728	6.5x57R	123	SM	10	6.35
*7016	7x57	103	PSP	10	4.80
*7056	7x57	154	SM	10	4.80
*7067	7x57	162	TIG	10	5.20
*7116	7x57R	103	PSP	10	5.40
*7136	7x57R	139	RNSP	10	4.65
*7156	7x57R	154	SM	10	5.40
*7167	7x57R	162	TIG	10	5.75
*7216	7x64	103	PSP	10	5.55
*7236	7x64	139	RNSP	10	4.80
*7256	7x64	154	SM	10	5.55
*7267	7x64 Brenneke	162	TIG	10	6.75
*7288	7x64 Brenneke	177	TIG	10	7.50
*7316	7x65R	103	PSP	10	6.15
*7336	7x65R	139	RNSP	10	5.40
*7356	7x65R	154	SM	10	6.15
*7367	7x65R Brenneke	162	TIG	10	7.65
*7388	7x65R Brenneke	177	TIG	10	8.35
†8000	8x56 Mann.-Sch.	200	RNSP	10	5.40
†8013	8x57J (.318")	196	RNSP	10	3.75
8030	8x57JS (.322")	123	RNSP	10	4.25
8035	8x57JS (.322")	198	TIG	10	5.00
8113	8x57JR (.318")	196	RNSP	10	4.10
8130	8x57JRS (.322")	123	RNSP	10	4.40
8133	8x57JRS (.322")	196	RNSP	10	4.40
8135	8x57JRS (.322")	198	TIG	10	5.40
8233	8x60S	196	RNSP	10	5.00
8235	8x60S	198	TIG	10	6.30
†8415	8x64 Brenneke	198	TIG	10	8.40
†8435	8x64S Brenneke	198	TIG	10	8.40

Index No.	Cartridge	Wt.	Bullet Style	No. in Box	Retail Price Per Box
†8515	8x65R Brenneke	198	TIG	10	9.00
†8535	8x65RS Brenneke	198	TIG	10	9.00
*9280	9.3x62	285	RNSP	10	5.20
*9290	9.3x62	293	TUG	10	6.50
*9480	9.3x64	285	RNSP	10	8.40
*9490	9.3x64 Brenneke	293	TUG	10	9.65
*9520	9.3x72R	193	FNPS	10	6.65
*9780	9.3x74R	285	RNSP	10	8.80
*9790	9.3x74R	293	TUG	10	8.80

## CIL AMMUNITION

CENTER FIRE					
5570	22 Savage	70	PSP	20	\$6.25
6553	6.5 Mann.-Sch.	160	SP	20	6.25
6555	6.5x55	160	SP	20	6.25
7935	303 British	150	PSP	20	6.45
7938	303 British	180	SP	20	6.45
7940	32/40 Winchester	170	SP	20	6.50
9020	35 Remington	200	SP	20	5.80
9555	38/55 Winchester	255	SP	20	6.50
11455	455 Colt	265	RN LEAD	50	10.55
RIM FIRE					
6351	25 Stevens Short	65	RN LEAD	50	\$4.70
6352	25 Stevens Long	65	RN LEAD	50	5.00
8080	32 Short	80	RN LEAD	50	4.70
8081	32 Long	80	RN LEAD	50	5.00

\*American primer pocket. †Limited to existing stock.

### ABBREVIATION GUIDE:

RNSP — Round nose soft point TUG — Brenneke Torpedo Universal Bullet (Soft Point)  
RSP — Pointed soft point SM — Starkmantel ("Strong Jacket") (Soft Point)  
TIG — Brenneke Torpedo Ideal Bullet (Soft Point)

NOTE: Metric ammunition orders filled as available. Metric components (cases and bullets) on special order only. Prices subject to change without notice.

100M 2-1-72 DPC Litho in U.S.A.



# Remington Special Order Bullets...

Your dealer may not stock these bullets as they are packed to customer order. In general, purchasing these bullets will require placing a special order.

## Jacketed Bullets

BULLET CAL.	BULLET DIAM.	GRAIN WEIGHT AND TYPE	ORDER NUMBER	PRICE PER 100 SUGGESTED RETAIL
22	.224	45 HP	B 22702	\$3.30
		50 MC	B 22708	3.60
223	.224	55 MC	B 22794	3.70
243	.243	80 Ptd SP	B 22720	4.75
		100 Ptd SPCL	B 22726	5.20
25	.250	50 MC (25 Auto)	B 22728	3.40
		86 SP	B 22734	4.55
25	.257	100 Ptd SP	B 22738	4.90
		100 SPCL	B 22740	5.20
280	.284	125 Ptd SPCL	B 22754	5.80
		165 SPCL	B 22758	6.30
7 mm Mauser	.284	175 SP	B 22760	6.70
30	.307	170 SPCL	B 22798	6.20
		93 MC	B 22764	3.95
30	.308	110 Ptd SP	B 22766	5.20
		150 SPCL (300 Sav.)	B 22772	5.80
		170 HPCL	B 22780	6.10
303	.311	180 SPCL	B 22812	6.20
		215 SP	B 22814	6.70
32	.310	100 SP	B 22810	4.90
32	.311	71 MC	B 22816	3.85
32	.320	170 HPCL	B 22826	6.10
348	.348	200 SPCL	B 22836	6.70
351	.351	180 SP	B 22840	6.85
38	.355	95 MC	B 22844	4.45
		130 MC	B 22848	4.45
		95 SJHP	B 22944	5.10
38	.357	125 SJHP	B 22716	5.10
		158 SJHP	B 22718	5.10
35	.358	150 Ptd SPCL	B 22864	6.70
350 Mag.	.359	200 Ptd SPCL	B 22928	6.70
375	.375	270 SP	B 22902	8.35
		300 MC *	B 22904	16.90
38	.400	180 SP	B 22880	7.05
44	.425	200 SP	B 22882	7.05
		405 SP *	B 22898	13.65
45	.457	500 MC *	B 22908	23.25
		510 SP *	B 22910	15.10

## Center Fire Lead Bullets

BULLET CAL.	BULLET DIAM.	GRAIN WEIGHT AND TYPE	ORDER NUMBER	PRICE PER 100 SUGGESTED RETAIL
25	.257	86 Lead	B 22732	\$3.20
32	.301	82 Lead	B 22800	2.95
		80 Lead	B 22802	2.95
32	.310	100 Lead for 32/20	B 22806	3.30
		88 Lead	B 22818	3.05
		98 Lead	B 22820	3.20
		100 Lead for 32 NP	B 22822	3.30
357	.358	158 Lead MP for 357 Mag.	B 22860	5.05
		158 Lead MP for 38 Spec.	B 22858	5.05
38	.358	158 Lead Semi-Wadcutter	B 22994	3.30
		150 Lead for 38 LC	B 22852	3.10
		200 Lead	B 22862	3.70
38	.360	146 Lead	B 22870	3.15
38	.374	125 Lead	B 22874	2.75
44	.431	246 Lead	B 22886	4.95
45	.451	230 Lead	B 22894	4.50
45	.454	250 Lead	B 22896	4.55

### ABBREVIATIONS:

Br Pt — Bronze Point  
 CL — Core-Lokt  
 HP — Hollow Point  
 MP — Metal Point  
 NP — New Police  
 LC — Long Colt  
 MC — Metal Case  
 Ptd — Pointed  
 SP — Soft Point  
 WC — Wad Cutter  
 THMC — Taper Heel Metal Case  
 PL — Power-Lokt  
 J — Jacketed  
 SJ — Semi-Jacketed  
 \*Packed 50 per box, all others 100 per box.



# Remington Bullets

## 22 cal. (.222)

40gr. SP B22990 \$3.40

## 22 cal. (.224)

45gr. SP B22704 3.30

46gr. HP B22714 3.30

50gr. PSP B22710 3.60

52gr. HPBR B22948 7.00

55gr. PSP B22924 3.60

## 6mm (.243)

80gr. PSP B22966 4.75

90gr. PSP B22722 4.90

100gr. PSPCL B22920 5.20

## 25 cal. (.257)

100gr. PSPCL (25-06) B22730 5.20

117gr. SPCL B22742 5.45

120gr. PSPCL (20-06) B22736 6.45

## 6.5 mm (.264)

100gr. PSPCL B22912 5.20

120gr. PSPCL B22926 5.95

140gr. PSPCL B22900 5.80

## 270 cal. (.277)

100gr. PSP B22744 5.30

130gr. PSPCL B22746 5.80

130gr. BrPt B22748 6.40

150gr. SPCL B22750 6.15

## 7mm (.284)

150gr. PSPCL B22756 6.15

125gr. HP B22932 6.05

175gr. PSPCL 7mm. Rem. B22918 6.25

## 30 cal. (.308)

110gr. SP Carbine B22796 5.10

125gr. PSP (30-06) B22914 5.45



150gr. BRPT (30-06) B22770 6.40



150gr. SPCL (30-30) B22774 5.80



150gr. Ptd SPCL B22776 5.80



165gr. THHP B22838 6.20



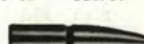
170gr. SPCL B22782 6.10



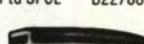
180gr. Br. Pt. B22784 6.70



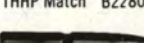
180gr. SPCL B22786 6.10



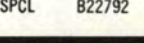
180gr. Ptd SPCL B22788 6.10



168gr. THHP Match B22804 6.90



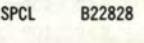
220gr. SPCL B22792 6.70



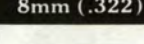
32 cal. (.320)



170gr. SPCL B22828 6.10



8mm (.322)



170gr. SPCL B22832 6.10

## 35 cal. (.358)

200gr. SPCL B22868 6.70

## 350 cal. (.359)

250gr. Ptd SPCL B22930 7.25

## "Power-Lokt" Bullets

## 17 cal. (.172)

25gr. PLHP B22936 4.40

## 22 cal. (.224)

50gr. PLHP B22950 4.20

50gr. PL MATCH B22956 4.40

55gr. PLHP B22952 4.20

55gr. PL MATCH B22958 4.40

## 6mm (.243)

80gr. PLHP B22954 5.60

80gr. PL MATCH B22960 5.90

## 25 cal. (.257)

87gr. PLHP B22752 5.90

## Remington Pistol Bullets

### 9mm (.354)

115gr. JHP B22942 4.55 124gr. MC B22842 4.45

### 357 cal. (.357)

125gr. SJHP B22866 5.10 158gr. SP B22846 5.95 158gr. SJHP B22938 5.10

### 41 mag. (.410)

210gr. SP B22888 7.00

### 44 cal. (.430)

240gr. SP B22906 7.10 240gr. SJHP B22940 5.10

### 45 cal. (.450)

230gr. MC B22892 5.15

### 45 cal. (.451)

185gr. MCWC B22890 4.75

### 357 cal. (.358)

158gr. LEAD B22856 4.10

### 38 cal. (.358)

148gr. LD WC B22850 3.30 158gr. LEAD B22854 3.30

### 41 mag. (.411)

210gr. LEAD B22922 4.85

### 44 cal. (.432)

240gr. LEAD GC B22884 4.95



# WINCHESTER BULLETS

Bullet Cal.	Diam.	Grain Weight And Type	Symbol Number	Sug-gested Price Per 100	Bul-lets Per Box	Wt./ lbs. Per Box
22	.224	40 H.P.	2240H	\$ 3.30	100	¾
22	.224	45 S.P. (Hornet & Bee)	2245	3.30	100	¾
		46 H.P. (Hornet & Bee)	2246H	3.30	100	¾
		50 P.S.P.	2250	3.60	100	¾
		55 P.S.P.	2255	3.60	100	1
		56 H.P.	2256H	3.60	100	1
243 or	.243	80 P.S.P.	6M80	4.75	100	1½
6 mm		100 P.P.	6M10P	5.20	100	1½
25	.251	50 F.M.C. (25 Auto)	B25AP	3.45	50	½
25	.257	60 H.P.	2560H	4.30	100	1
		86 S.P.	B25202	4.55	50	¾
		87 P.S.P.	2587	4.80	100	1¼
		100 S.T.	2510S	5.20	100	1½
		117 P.P.	2511P	5.45	100	1¾
25-06	.257	90 P.E.P.	2590	5.80	100	1¼
		120 P.E.P.	2512	6.50	100	1¾
6.5 mm	.264	100 P.S.P.	65M10	5.20	100	1½
		140 P.P.	65M14P	5.80	100	2
270	.277	100 P.S.P.	2710	5.30	100	1½
		130 H.P.	2713H	5.80	100	2
		130 P.P.	2713P	5.80	100	2
		130 S.T.	2713S	5.80	100	2
		150 P.P.	2715P	6.15	100	2¼
7 mm and 284	.284	125 P.P. (284 Win.)	2812P	5.80	100	2
		150 P.P. (284 Win.)	2815P	6.15	100	2¼
		150 P.P. (7 mm Mag.)	7MM15RP	6.15	100	2¼
		175 P.P. (7 mm Mag.)	7MM17RP	6.25	100	2½
		175 S.P. (7 mm Mauser)	7M17	6.70	100	2½
30	.308	93 F.M.C. (30 Luger)	B30LP	3.95	50	¾
		110 H.S.P. (Carbine)	30C11H	5.10	100	1¾
		110 P.S.P.	3011	5.25	100	1¾
		125 P.S.P.	3012	5.45	100	2
		150 P.P.	3015P	5.80	100	2¼
		150 S.T.	3015S	5.80	100	2¼
		150 S.T. (High Vel.)	3015SHV	5.80	100	2¼
		150 Spitzer S.P.	3015ZR	5.80	100	2¼
		150 H.P. (30-30)	B30301	5.80	100	2¼
		150 P.P.F. (30-30)	3015PF	5.80	100	2¼
		150 S.T.F. (30-30)	3015SF	5.80	100	2¼
		170 P.P.F. (30-30)	3017PF	6.10	100	2½
		170 S.T.F. (30-30)	3017SF	6.10	100	2½
		180 P.P.	3018P	6.10	100	2¾
		180 Spitzer S.P.	3018ZR	6.10	100	2¾
		180 P.P.	30W18P	6.10	100	2¾
		180 S.T.	3018S	6.10	100	2¾
		180 F.M.C.B.T. Match	3018MC	6.85	100	2¾
		190 S.T. (303 Savage)	3019S	6.20	100	2¾
		200 S.T.	3020S	6.25	100	3

Bullet Cal.	Diam.	Grain Weight And Type	Symbol Number	Sug-gested Price Per 100	Bul-lets Per Box	Wt./ lbs. Per Box
30	.308	220 S.T.	3022S	\$ 6.65	100	3¼
		220 P.P.	3022P	6.65	100	3¼
303	.312	180 P.P. (303 British)	3118P	6.20	50	1¼
32	.312	71 F.M.C. (32 Auto)	B32AP	3.85	50	½
		100 S.P. (32-20)	B32202	4.90	50	¾
32	.322	170 P.P.F. (32 Spec.)	8M17PF	6.10	50	1¼
		170 S.T.F. (32 Spec.)	8M17SF	6.10	50	1¼
8 mm		170 P.P. (8 mm Mauser)	8M17P	6.10	50	1¼
338	.338	200 P.P.	3320P	6.65	50	1½
		250 S.T.	3325S	7.30	50	2
		300 P.P.	3330P	8.35	50	2¼
348	.349	200 S.T.	3420S	6.65	50	1½
9 mm Luger	.355	115 F.M.C.	BW9LP	4.45	50	¾
38	.356	95 F.M.C. (380 Auto)	B380AP	4.45	50	¾
		130 F.M.C. (38 Auto)	B38A1P	4.45	50	1
35	.358	200 P.P. (35 Rem.)	3520P	6.65	50	1½
		200 S.T. (35 Rem.)	3520RS	6.65	50	1½
		200 S.T. (358 Win.)	3520S	6.65	50	1½
		250 S.T. (358 Win.)	3525S	7.25	50	2
375	.375	270 P.P.	3727P	8.35	50	2
		300 S.T.	3730S	8.50	50	2¼
		300 F.M.C.	3730MC	16.90	50	2¼
38-40	.400	180 S.P.	B3840	7.00	50	1¼
44-40	.427	200 S.P.	B4440	7.00	50	1½
44 Mag.	.430	240 H.S.P.	B44MHSP	7.05	50	1¾
45 Auto	.451	185 F.M.C. Match	B45AWCP	4.75	50	1½
		230 F.M.C.	B45A1P	5.15	50	1¾
45	.457	405 S.P. (45-70)	4540	13.65	50	3
		500 F.M.C. (458 Mag.)	4550MC	23.20	50	3½
		510 S.P. (458 Mag.)	4551	15.10	50	3¾
25	.257	86 Lead	B25201	3.25	50	¾
32 Long Colt	.300	82 Lubaloy	B32LCP	3.00	50	¾
32-20	.312	100 Lead	B32201	3.35	50	¾
32 S&W	.314	85 Lead	B32SWP	3.00	50	¾
32 S&W Long	.314	98 Lead	B32SWLP	3.25	50	¾
357	.357	158 Lubaloy	B3571P	4.10	50	1¼
		158 J.H.P.	B3574HP	5.50	100	1¼
		158 J.S.P.	B3575SP	5.50	100	1¼
38	.359	145 Lead (S&W)	B38SWP	3.10	50	1
		150 Lubaloy (Long Colt)	B38LCP	3.10	50	1
38 Special	.359	148 Lead M.R. Match	B38SMRP	3.30	50	1
		150 Lubaloy	B38S4P	4.10	50	1
		158 Lead	B38S1P	3.30	50	1¼
		158 Lead Semi-Wad Cutter	B38WCP	3.65	100	1¼
		200 Lead	B38S3P	3.70	50	1½
44 S&W	.430	246 Lead	BW44SP	4.95	50	1¾
44 Mag.	.433	240 Lubaloy G.C.	B44MP	4.95	50	1¾
45 Auto	.456	210 Lead M.R. Match	B45AMRP	4.10	50	1½
45 Colt	.456	255 Lead	B45CP	4.55	50	1¾

**ABBREVIATIONS:**  
B.T. — Boat Tail  
F. — Flat  
F.M.C. — Full Metal Case

G.C. — Gas Check  
H.P. — Hollow Point  
H.S.P. — Hollow Soft-Point  
H.V. — High Velocity

L. — Lead  
Lub. — Lubaloy  
M-R — Mid-Range  
Mat. — Match



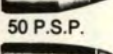
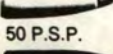
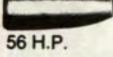
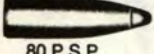
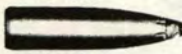
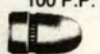

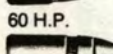
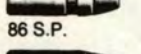
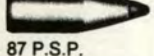

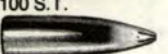

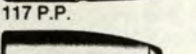
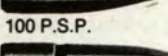
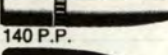
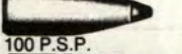
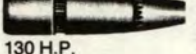

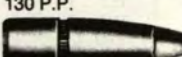
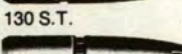
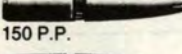
P.P. — Power-Point (Soft Point)  
P.S.P. — Pointed Soft Point  
S.P. — Soft Point  
S.T. — Silvertip Expanding



## WINCHESTER BULLETS

## Jacketed

## Lead

Jacketed					Lead
Diam.		Diam.		Diam.	
.224	45 S.P.				
					
.224	46 S.P.				
					
.224	50 P.S.P.				
					
.224	50 P.S.P.				
					
.224	56 H.P.				
					
.243 or 6 MM	80 P.S.P.				
					
.243 or 6 MM	100 P.P.				
					
.251	50 F.M.C. (25 Auto)				
					
.257	60 H.P.				
					
.257	86 S.P.				
					
.257	87 P.S.P.				
					
.257	100 S.T.				
					
.257	90 P.E.P.				
					
.257	117 P.P.				
					
.264	100 P.S.P.				
					
.264	140 P.P.				
					
.277	100 P.S.P.				
					
.277	130 H.P.				
					
.277	130 P.P.				
					
.277	130 S.T.				
					
.277	150 P.P.				
					
.284	125 P.P. (284 Win.)				
					
.284	150 P.P. (284 Win.)				
					
.284	150 P.P. (7 MM Mag.)				
					





## NORMA PRECISION

Norma manufactures a fine line of bullets for both handguns and rifles in a wide variety of types and weights. Prices listed are approximate; write for their latest price sheets.

### Rifle Bullets

Caliber	Grs.	Type	Per C
22 (.224")	50	SPS, FJS	\$3.40
	55	SPP	3.40
6mm (.243")	80	SPS	4.60
	100	FJS, SPP	4.90
25 (.257")	87	SPS	4.60
	100	SPS	4.80
6.5mm (.264")	120	SPS	5.15
	77	SPS	4.50
	139	SPS, FJPBT	5.50
270 (.277")	156	SPR	5.75
	110	SPS	5.15
	130	SPSBT, HPBT	5.50
7mm (.283")		FJPBT	5.50
	150	SPSBT, FJPBT	5.75
	110	SPS	5.15
	150	SPSBT, FJPBT	5.75
	160	SPSBT	5.75
30 (.308")	175	SPR	6.00
	110	SPR, FJR	4.75
	130	SPSBT, FJSBT	5.00
	150	SPF, SPSBT	5.50
	170	SPF	5.75
	180	SPSBT, HPBT, SPR	5.75
303 (.311")	180	DCR, DCS	8.25
	220	SPR., FJRBT	6.35
	130	SPS	5.25
	150	SPS	5.60
	180	SPSBT	5.90
8mm (.318")	215	SPR	6.40
	196	SPR, FJR	5.95
8mm (.323")	123	SPS	5.25
	165	SPR	5.75
	196	FJR, SPR	5.95
35 (.358")	227	SPR	6.40
	200	SPS	6.20
	250	SPS	7.35
9.3mm (.365")	286	SPR, FJR	9.45

## NORTHRIDGE BULLETS

Northridge manufactures three styles of 38-cal. 147-gr. handgun bullets. All are machine formed under 10,000 lbs. pressure to eliminate internal defects. Grease grooves are swaged in to prevent off balance bullets resulting from rolled grooves. Production tolerances are held to less than five-tenths grain weight. Amply lubricated to prevent barrel leading. 6% antimony content.

Northridge specializes in furnishing bullets in large quantities to police departments and custom loaders at prices as low as \$9.00 per M. Prices shown are for lots of 10M to 25M; smaller quantities are slightly higher. All FOB.

The 3X bullet is for revolver use, the 2X and 1X for revolver or automatic. All are full wadcutters.

Number	Cal.	Description	Per M
3X	38	Flat base button	\$10.00
2X	38	Flat base flush head	10.00
1X	38	Hollow base	10.50

## ROBERT POMEROY

Pomeroy offers 33 Win. (200 gr. RN, \$6.50 per 100), 38-55 (jacketed, \$6.50 per 100) and 40 cal. (jacketed, \$7.50 per 100) plus an extensive line of scarce, hard to get cartridges. These are available in three styles: loaded, refills or empty cases. Write for his complete price list.

## Handgun Bullets

Caliber	Grs.	Type	Per C
32 ACP (.308")	77	FJR	\$3.65
30 Luger (.308")	93	FJR, SPR	3.65
	104	AP	5.25
	115	HP	4.75
9mm (.355")	116	FJR, SPR	4.60
357 (.357")	148	LWC	3.00
	158	LR, FJSWC, SPR, SWCHP	3.00-4.90
44 (.430")	240	SPF	7.20
45 (.452")	230	SWCHP	7.00

SP—Soft Point  
HP—Hollow Point  
FJ—Full Jacket  
P—Pointed  
R—Round Nose  
S—Semi-Point

F—Flat Nose  
BT—Boattail  
DC—Dual Core  
L—Lead  
WC—Wadcutter  
HJ—Half Jacket

## C.H. STOCKING 17 Caliber Bullets

All bullets are hand swaged, of hollow-point form and may be had in 22-, 25-, or 28-grain weights. Price per hundred \$4.35, plus postage.



## SUPER VEL Jurras Bullets

These soft-core, jacketed bullets are the result of years of field testing by guides, outfitters, explorers, lawmen and big game hunters. Designed for high velocity, they offer terrific hydrostatic shock and are recommended for the advanced hand-loader only. Packed 50 per box.

Caliber	Grs.	Type	Per C
380	80	HP	\$5.10
9mm	90	HP	5.10
	108	SP	4.90
38	105	SP	5.10
38	110	SP	4.90
38	110	HP	4.90
38	125	HP	5.10
38	137	SP	5.20
41	170	HP	6.20
41	170	SP	6.20
44	180	HP	6.20
44	180	SP	6.20
44	210	HP	6.20

## ZERO BULLETS

Zero is offering a fine line of swaged and cast bullets in 30, 38, 9mm, and 45 in different styles and weights for all applications. These bullets are high quality due to the quality control measures taken by the makers. They are available in both 100 and 500 round lots and are priced accordingly. Write for the latest price sheet giving styles and weights.



## Notes on Wads . . . .

There are three basic wad types: over-powder, filler and overshot. The over-powder wads are available in card form (made of compressed paper), or as the newer plastic wads. The over-powder wad separates the powder from the softer filler

wads and effects a gas seal ahead of the powder. Filler wads are resilient to cushion the initial shock, and are available in a variety of thicknesses to give the proper wad column height for perfect crimps and correct pressure. Since the majority of

shotshells loaded today are star crimped, they need no over-shot wad. Only the older roll crimp shells require a wad which is held by the crimp to contain the shot.

Over-shot wads are made of compressed paper, similar to the over-powder type.



### ALCAN

Type	Gauge	Description	Per M
PGS	10, 12, 16, 20	Plastic Gas Seal	\$ 8.50
Air-Wedge	12 (paper)	Plastic gas wads	11.00
Nitro Over Powder	All sizes	.070", .135", .200"	3.92-5.72
Feltan-Bluestreak	All sizes	1/4", 5/16", 3/8", 1/2"	6.24-7.28
Flite-Max	12	Comb. of Bluestreak, Air-Wedge and shot protector. 6 wad col. hgts. Reduce powder charge 7 to 10%. 12 ga. only.	14.00
Kwik-Sert	10, 12, 16, 20	Polyethylene shot protector, seated with wads.	4.00-5.20
Unisleve	12	Plastic single unit wad for plastic target or Alcan and Federal paper shells.	11.00

### HERTER's

Over-Powder card wads—Contain no impurities or abrasives; flexible.

Per M: .135", \$1.65; .200" . . . . . \$1.79

Fiberfelt Filler Wads—Lightweight, wax-edge-lubricated, contain no impurities or abrasives.

Per M: 3/8", \$2.49; 1/2", \$2.99; 1/4" 2.49

Shaped Charge Over-Powder Wads—These 5/16" polyethylene plastic wads force the powder gases outward, effectively sealing the rim. 12 gauge only.

Per M . . . . . \$1.99

Plastic Shot Cups—One-piece construction for use with conventional wads, these flat-based cups reduce shot distortion and stringing. Available in 12 ga. only, slit or unslit in 1 1/8 (unslit only), 1 1/4 and 1 1/2 oz. capacity (specify). Per M . . . . . \$3.98



Plastic Shot Sleeve—Polyethylene strips which are inserted above the wad column of 12 or 20 ga. shells to reduce shot deformation and improve shot patterns.

Per M . . . . . \$2.59

Grand Prix—About the same as the Vandalee wad, but sides split to top for more open shot patterns. Recommended for 16 yard trap shooting. Available in 12 and 20 ga., and various wad column lengths from 5/16" to 1".

Per M . . . . . \$4.95

Vandalee—1-piece wad column and shot protector cup. Prevents shot deformation and produces better patterns. Available lengths from 7/16" to 1" in 12, 16 and 20 ga.

Per M . . . . . \$4.95

Spin off wads—These plastic over-the-powder wads spin away after the shot leaves the barrel, leaving the charge in a dense, even shape. Can be used with all star or rolled crimp shells. 12 gauge only.

Per M . . . . . \$2.19

Chalice Four Star—Plastic one piece single column wads with four slits in a shot-cup. Chalice shape keeps shot in a more forward shape. 12 gauge only. 3/8" wad column for Herter's Inter-Nation, both spin off and star crimps. Winchester cases other than AA, Remington and Peters cases. 1" wad column for Federal, Sears, Winchester AA Alcan and J.C. Higgins cases.

Per M . . . . . \$4.95



## FEDERAL CARTRIDGE CORP.

Type	Gauge	Description	Per M
Champion Pellet Protector (plastic)	12	12 ga. 7/8" for 1 1/8 oz. loads	\$12.35
Plastic Shot Cups	12, 16, 20	12 ga. 1 1/2, 1 1/4, 1 oz.; 16 ga. 1 oz.; 20 ga. 7/8 oz.	9.00
410 Wad Column (plastic)	410	Single-unit, 1/2 oz.	11.80
Card Wads	12, 16, 20	.045 Inches	1.40
		.080	2.30
		.135	2.50
		.200	2.70
Fiber Cushion (waxed edges)	12, 16, 20	1/4 Inch	2.80
		3/8	2.80
		1/2	3.40



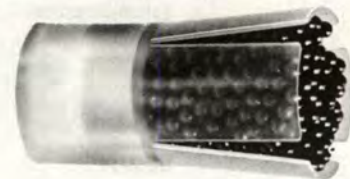
## REMINGTON

Type	Gauge	Description	Per M
Power Piston (plastic)	12, 16, 20, 28	Plastic or 12-ga. paper shells	\$ 12.65
Power Piston (plastic)	12, 16, 20	Trap and Skeet field loads	12.65



## WINCHESTER

Type	Gauge	Description	Per M
Cup Wads	12	Polyethylene gas seal	\$ 4.40
Cardboard	10, 12, 16, 20, 28	Over powder wads; .180", .050", .135", .200" thick	1.34-2.43
Molded Fiber (edge lub.)	12, 16, 20, 28	1/4 Inch (all gauges)	3.00
		3/8 (not in 28)	3.00
		1/2 (not in 28)	3.60
Double A. (AA)	12	Comb. polyethylene shot protector and wad col.	12.65



### LJUTIC Mono Wad

A 1-piece wad for general use that eliminates the 2-piece, 2- or 3-stage wad column. Ljutic Mono-Wads give less recoil and make possible the use of less powder for the same muzzle velocity and pattern. Available in all standard gauges, including 410.

Per M .....\$5.99

### LJUTIC Plastic Mono Wad

Made in 12 gauge only, this wad features serrated runners the length of the wad to give less drag on the barrel. One piece design eliminates other wads and gives more consistent loads, greater speed with a reduction in powder charge. For use in Winchester AA plastic hulls and Federal plastic and paper shells.

Per M .....\$8.00



### HODGDON Arro-Wads

Designed for 12 gauge AA shells and similar inside-base-wad depth empties, these wads give superior cushioning and gas sealing for improved patterns and less apparent recoil.

Per M .....\$7.95

### KUSH Pattern Perfect Wad

This one-piece plastic wad gives a longer gas seal area with improved center-point thrust for excellent gas sealing properties. Intended for use with target loads, the wads are available in 12 gauge only.

Per M .....\$7.45



### PACIFIC Verelite Wads

The Verelite wad is made in three colors—red for 1 1/8 oz. shot charge in the WW AA or Federal paper cases, green for 1 1/4 oz. target loads in RP plastic target or WW paper target cases, and blue for 1 1/2 oz. loads in the WW, AA or Federal paper hulls.

Per M .....\$11.50

### FARMER BROS. Lage Uniwad

This two-piece universal wad allows a change of powder charge for different cases and still stacks the proper height for a good crimp. Designed for 1 1/4 oz. trap and Skeet loads, but it can be used for hunting loads too. Available in 12 gauge only.

Per M .....\$9.95



## Wax Bullet Loads and Blanks ....

The growth of fast-draw shooting has fostered an interest in reloading cartridges with wax bullets. These wax bullets, propelled only by the force of the exploded primer, are relatively safe—and certainly less expensive to shoot than fac-

tory rounds, or even handloaded squib loads. Law enforcement agencies, too, have taken to wax bullet shooting for practice because of economy as well as duplication of actual shooting.

Some wax loading kits come with a sup-

ply of modified cases—the modification being an enlargement of the flash hole. This is necessary to prevent setback of the primer to the point where it would bind when the revolver cylinder is turned. This enlarged flash hole also helps accuracy.



HERTER PLASTICS

### HERTER'S Plastic Ammunition

Plastic cases are 38 Special cal. and may be used in 357 Mag. handguns as well as for indoor target practice. Reusable plastic projectiles or wax bullets are propelled by a primer only—no powder is used.

Complete kit includes 100 cases and bullets .....\$2.89



SPEER PLASTICS

### SPEER Plastic Ammunition

Sturdy plastic indoor ammunition for use in 38 S&W, 38 Spl., 357 Mag., and 44 revolvers. To prepare, large pistol primers are seated and the plastic projectiles inserted. Reusable many times.

Target-38's 50 cases .....\$1.75  
50 bullets .....\$1.75  
Target-44's 50 cases .....\$2.00  
50 bullets .....\$2.00

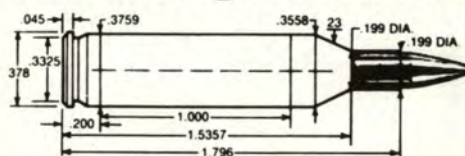
### FORSTER-APPELT Wax Loading Kit \$4.95

A complete kit for reloading wax bullets: shell holder, primer punch, primer seater, special wax bullet compound, and a supply of modified (enlarged flash hole), unfired cases. Made in 38 Spl., 45 ACP and 45 Colt. Cases listed below are modified.

50 38 Spl. cases, new .....\$3.60  
50 38 Spl. cases, once fired .....\$2.40  
50 45 Colt cases, new .....\$5.25  
Wax bullet compound (14 oz.) ..\$ .59



## 17 CAL. REMINGTON Reloading Data from **Hornady**



Rifle: Remington Model 700  
Barrel: 24", 1 in 9 twist  
Case: Remington  
Primer: 7½ Remington  
Bullet: Hornady 25 gr. HP  
Sectional Density: .121  
Ballistic Coefficient: .190

### 17 CAL. REMINGTON LOADING DATA AND BALLISTICS

VELOCITY ↓	3500 fps	3600 fps	3700 fps	3800 fps	3900 fps	4000 fps	4100 fps
POWDER							
4198	16.9 gr.	17.6 gr.	18.4 gr.	19.1 gr.	<b>19.8 gr.</b>	<i>Bold face indicates maximum loads</i>	
3031	19.6 gr.	20.3 gr.	20.9 gr.	21.6 gr.	<b>22.2 gr.</b>		
Norma 203	20.3 gr.	21.1 gr.	21.8 gr.	22.5 gr.	<b>23.3 gr.</b>	<b>24.0 gr.</b>	
4064	20.8 gr.	21.4 gr.	22.0 gr.	22.5 gr.	<b>23.1 gr.</b>		
4895	21.2 gr.	21.9 gr.	22.6 gr.	23.2 gr.	<b>23.8 gr.</b>	<b>24.5 gr.</b>	
4320	22.1 gr.	22.6 gr.	23.1 gr.	23.7 gr.	<b>24.2 gr.</b>	<b>24.7 gr.</b>	<b>25.2 gr.</b>

### BALLISTICS AND DROP TABLE

RANGE ↓	MUZZLE	100 YDS.	200 YDS.	300 YDS.	400 YDS.	500 YDS.
Remaining Vel.	4000	3412	2875	2390	1965	1600
Energy (Ft-lbs.)	888	646	459	317	214	142
100 yd. 0	-1.5"	0 "	-1.5"	-7.3"	-19.5"	-40.9"
200 yd. 0	-1.5"	.8"	0 "	-5.0"	-16.4"	-37.0"
300 yd. 0	-1.5"	2.5"	3.4"	0 "	-9.6"	-28.6"
400 yd. 0	-1.5"	4.9"	8.2"	7.3"	0 "	-16.5"
500 yd. 0	-1.5"	8.2"	14.8"	17.2"	13.2"	0 "
Remaining Vel.	3900	3321	2792	2317	1901	1546
Energy (Ft-lbs.)	845	612	433	298	201	133
100 yd. 0	-1.5"	0 "	-1.7"	-8.0"	-21.0"	-43.6"
200 yd. 0	-1.5"	.9"	0 "	-5.4"	-17.6"	-39.3"
300 yd. 0	-1.5"	2.7"	3.6"	0 "	-10.3"	-30.2"
400 yd. 0	-1.5"	5.3"	8.8"	7.7"	0 "	-17.3"
500 yd. 0	-1.5"	8.7"	15.7"	18.1"	13.9"	0 "

Note: Approach maximum loads with caution — do not exceed. Pressures in this caliber increase dramatically with only slight increases in powder charges. No liability is implied or assumed.

86 Bullets for Handloading. Send for list

**Hornady** BULLETS  
HORNADY MANUFACTURING CO.  
Dept. R, Grand Island, Nebr. 68801



# CENTER RIFLE CARTRIDGES — BALLISTICS AND PRICES

Winchester-Western, Remington-Peters, Federal, Speer-DWM, Browning and Frontier

Most of these centerfire loads are available from Winchester-Western and Remington-Peters. Loads available from only one source are marked by a letter, thus: Winchester (a); Western (b); Remington (c); Peters (d); Speer-DWM (f). Those fewer cartridges also available from Federal are marked (e). Contrary to previous practice, W-W and R-P prices are not necessarily uniform. All prices are approximate.

Cartridge	Bullet Wt. Grs.	Type	Muzzle	Velocity (fps)			Muzzle	Energy (ft. lbs.)			Mid-Range Trajectory			Price for 20*
				100 yds.	200 yds.	300 yds.		100 yds.	200 yds.	300 yds.	100 yds.	200 yds.	300 yds.	
17 Remington	25	HP, PL	4020	3290	2630	2060	900	600	380	230	Not Available			\$4.85
218 Bee*	46	HP	2860	2160	1610	1200	835	475	265	145	0.7	3.8	11.5	10.80
22 Hornet*	45	SP	2690	2030	1510	1150	720	410	230	130	0.8	4.3	13.0	10.35
22 Hornet* (c, d)	45	HP	2690	2030	1510	1150	720	410	230	130	0.8	4.3	13.0	10.35
22 Hornet*	46	HP	2690	2030	1510	1150	740	420	235	135	0.8	4.3	13.0	10.35
222 Remington (e)	50	PSP, MC, PL†	3200	2660	2170	1750	1140	785	520	340	0.5	2.5	7.0	4.25
222 Remington Magnum (c, d)	55	SP, PL†	3300	2800	2340	1930	1330	955	670	455	0.5	2.3	6.1	4.50
222 Remington Magnum (c, d)	55	HP, PL	3300	2830	2400	2010	1330	975	700	490	Not Available			4.85
223 Remington (c, d, e)	55	SP, PL†	3300	2800	2340	1930	1330	955	670	455	0.5	2.1	5.4	4.50
22-250 Remington	55	PSP	3810	3270	2770	2320	1770	1300	935	655	0.3	1.6	4.4	4.65
22-250 Remington (c, d)	55	HP, PL	3810	3330	2890	2490	1770	1360	1020	760	Not Available			4.90
225 Winchester (a, b)	55	PSP	3650	3140	2680	2270	1630	1200	875	630	0.4	1.8	4.8	4.65
243 Winchester (e)	80	PSP, PL†	3500	3080	2720	2410	2180	1690	1320	1030	0.4	1.8	4.7	5.85
243 Winchester (c, d)	80	HP, PL	3450	3050	2675	2330	2115	1650	1270	965	Not Available			6.25
243 Winchester (e)	100	PP, CL, PSP	3070	2790	2540	2320	2090	1730	1430	1190	0.5	2.2	5.5	5.85
6mm Remington (c, d)	80	PSP, HP, PL†	3450	3130	2750	2400	2220	1740	1340	1018	0.4	1.8	4.7	5.70
6mm Remington (c, d)	100	PCL	3190	2920	2660	2420	2260	1890	1570	1300	0.5	2.1	5.1	5.70
244 Remington (c, d)	90	PSP	3200	2850	2530	2230	2050	1630	1280	995	0.5	2.1	5.5	5.70
25-06 Remington (c, d)	87	HP	3500	3070	2680	2310	2370	1820	1390	1030	Not Available			6.20
25-06 Remington (c, d)	120	PSP, CL	3120	2850	2600	2360	2590	2160	1800	1480	Not Available			6.40
25-20 Winchester*	86	L, Lu	1460	1180	1030	940	405	265	200	170	2.6	12.5	32.0	8.25
25-20 Winchester*	86	SP	1460	1180	1030	940	405	265	200	170	2.6	12.5	32.0	9.00
25-35 Winchester	117	SP, CL	2300	1910	1600	1340	1370	945	665	465	1.0	4.6	12.5	5.75
250 Savage (a, b)	87	PSP, SP	3030	2660	2330	2060	1770	1370	1050	820	0.6	2.5	6.4	5.50
250 Savage	100	ST, CL, PSP	2820	2460	2140	1870	1760	1340	1020	775	0.6	2.9	7.4	5.50
256 Winchester Magnum* (b)	60	OPE	2800	2070	1570	1220	1040	570	330	200	0.8	4.0	12.0	10.10
257 Roberts (a, b)	87	PSP	3200	2840	2500	2190	1980	1560	1210	925	0.5	2.2	5.7	6.05
257 Roberts (a, b)	100	ST, CL	2900	2540	2210	1920	1870	1430	1080	820	0.6	2.7	7.0	6.05
257 Roberts	117	PP, CL	2650	2280	1950	1690	1820	1350	985	740	0.7	3.4	8.8	6.05
6.5 Remington Magnum (c)	100	PSPCL	3450	3070	2690	2320	2640	2090	1610	1190	Not Available			7.70
6.5mm Remington Magnum (c)	120	PSPCL	3030	2750	2480	2230	2450	2010	1640	1330	0.5	2.3	5.7	7.70
264 Winchester Magnum	100	PSP, CL	3700	3260	2880	2550	3040	2360	1840	1440	0.4	1.6	4.2	7.95
264 Winchester Magnum	140	PP, CL	3200	2490	2700	2480	3180	2690	2270	1910	0.5	2.0	4.9	7.95
270 Winchester	100	PSP	3480	3070	2690	2340	2690	2090	1600	1215	0.4	1.8	4.8	6.40
270 Winchester (e)	130	PP, PSP	3140	2880	2630	2400	2850	2390	2000	1660	0.5	2.1	5.3	6.40
270 Winchester	130	ST, CL, BP, PP	3140	2850	2580	2320	2840	2340	1920	1550	0.5	2.1	5.3	6.40
270 Winchester (c, d)	150	CL	2800	2440	2140	1870	2610	1980	1520	1160	0.6	2.9	7.6	6.40
270 Winchester (a, b, e)	150	PP	2900	2620	2380	2160	2800	2290	1890	1550	0.6	2.5	6.3	6.40
280 Remington (c, d)	150	PCL	2900	2670	2450	2220	2800	2370	2000	1640	0.6	2.5	6.1	6.20
280 Remington (c, d)	165	CL	2820	2510	2220	1970	2910	2310	1810	1420	0.6	2.8	7.2	6.20
284 Winchester (a, b)	125	PP	3200	2880	2590	2310	2840	2300	1860	1480	0.5	2.1	5.3	6.40
284 Winchester (a, b)	150	PP	2900	2630	2380	2160	2800	2300	1890	1550	0.6	2.5	6.3	6.40
7mm Mauser (e)	139	SP	2710	2440	2190	1960	2280	1850	1490	1190	0.7	3.0	7.8	6.40
7mm Mauser (e)	175	SP	2490	2170	1900	1680	2410	1830	1400	1100	0.8	3.7	9.5	6.40
7mm Remington Magnum	125	CL	3430	3080	2750	2450	3260	2630	2100	1660	0.6	1.8	4.7	7.95
7mm Remington Magnum (e)	150	PP, CL	3260	2970	2700	2450	3540	2940	2430	1990	0.4	2.0	4.9	7.95
7mm Remington Magnum (e)	175	PP	3070	2720	2400	2120	3660	2870	2240	1750	0.5	2.4	6.1	7.95
7mm Remington Magnum (c, d)	175	PCL	3070	2860	2660	2460	3660	3170	2740	2350	0.5	2.1	5.2	7.95
30 Carbine* (e)	110	HSP, SP	1980	1540	1230	1040	950	575	370	260	1.4	7.5	21.7	10.05
30-30 Winchester (c, d)	150	CL	2410	1960	1620	1360	1930	1280	875	616	0.9	4.5	12.5	5.00
30-30 Winchester (e)	150	HP	2410	2020	1700	1430	1930	1360	960	680	0.9	4.2	11.0	5.00
30-30 Winchester (a, b)	150	PP, ST, OPE	2410	2020	1700	1430	1930	1360	960	680	0.9	4.2	11.0	5.00
30-30 Winchester (e)	170	PP, HP, CL, ST, MC	2220	1890	1630	1410	1860	1350	1000	750	1.2	4.6	12.5	5.00
30 Remington	170	ST, CL	2120	1820	1560	1350	1700	1250	920	690	1.1	5.3	14.0	5.85
30-06 Springfield (a, b)	110	PSP	3370	2830	2350	1920	2770	1960	1350	900	0.5	2.2	6.0	6.40
30-06 Springfield	125	PSP	3200	2810	2480	2200	2840	2190	1710	1340	0.5	2.2	5.6	6.40
30-06 Springfield (c, d)	150	BP	2970	2710	2470	2240	2930	2440	2030	1670	0.5	2.4	6.0	6.40
30-06 Springfield (e)	150	PP	2970	2620	2300	2010	2930	2280	1760	1340	0.6	2.5	6.5	6.40
30-06 Springfield	150	ST, PCL, PSP	2970	2670	2400	2130	2930	2370	1920	1510	0.6	2.4	6.1	6.40
30-06 Springfield	180	PP, CL, PSP	2700	2330	2010	1740	2910	2170	1610	1210	0.7	3.1	8.3	6.40
30-06 Springfield (e)	180	ST, BP, PCL	2700	2470	2250	2040	2910	2440	2020	1660	0.7	2.9	7.0	6.40
30-06 Springfield	180	MCBT, MAT	2700	2520	2350	2190	2910	2540	2200	1900	0.6	2.8	6.7	9.45
30-06 Springfield	220	PP, CL	2410	2120	1870	1670	2830	2190	1710	1360	0.8	3.9	9.8	6.40
30-06 Springfield (a, b)	220	ST	2410	2180	1980	1790	2830	2320	1910	1560	0.8	3.7	9.2	6.40
30-40 Krag	180	PP, CL	2470	2120	1830	1590	2440	1790	1340	1010	0.8	3.8	9.9	6.50
30-40 Krag	180	ST, PCL	2470	2250	2040	1850	2440	2020	1660	1370	0.8	3.5	8.5	6.50
30-40 Krag (a, b)	220	ST	2200	1990	1800	1630	2360	1930	1580	1300	1.0	4.4	11.0	6.50
300 Winchester Magnum (e)	150	PP, PCL	3400	3050	2730	2430	3850	3100	2480	1970	0.4	1.9	4.8	9.35
300 Winchester Magnum (e)	180	PP, PCL	3070	2850	2640	2440	3770	3250	2790	2380	0.5	2.1	5.3	9.35
300 Winchester Mag (a, b)	220	ST	2720	2490	2270	2060	3620	3030	2520	2070	0.6	2.9	6.9	9.35
300 H&H Magnum (a, b)	150	ST	3190	2870	2580	2300	3390	2740	2220	1760	0.5	2.1	5.2	9.35
300 H&H Magnum	180	ST, PCL	2920	2670	2440	2220	3400	2850	2380	1970	0.6	2.4	5.8	9.35
300 H&H Magnum (a, b)	220	ST, CL	2620	2370	2150	1940	3350	2740	2260	1840	0.7	3.1	7.7	9.35
300 Savage (e)	150	PP	2670	2350	2060	1800	2370	1840	1410	1080	0.7	3.2	8.0	6.20
300 Savage	150	ST, PCL	2670	2390	2130	1890	2370	1900	1510	1190	0.7	3.0	7.6	6.20
300 Savage (c, d)	150	CL	2670	2270	1930	1660	2370	1710	1240	916	0.7	3.3	9.3	6.20
300 Savage (e)	180	PP, CL												



## CENTERFIRE RIFLE CARTRIDGES — BALLISTICS AND PRICES (continued)

Cartridge	Bullet		Muzzle	Velocity (fps)			Energy (ft. lbs.)			Mid-Range Trajectory			Price for 20*	
	Wt. Grs.	Type		100 yds.	200 yds.	300 yds.	Muzzle	100 yds.	200 yds.	300 yds.	100 yds.	200 yds.		300 yds.
8mm Mauser (e)	170	PP, CL	2570	2140	1790	1520	2490	1730	1210	870	0.8	3.9	10.5	\$6.40
338 Winchester Magnum (a, b)	200	PP	3000	2690	2410	2170	4000	3210	2580	2090	0.5	2.4	6.0	8.60
338 Winchester Magnum (a, b)	250	ST	2700	2430	2180	1940	4050	3280	2640	2090	0.7	3.0	7.4	8.60
338 Winchester Magnum (a, b)	300	PP	2450	2160	1910	1690	4000	3110	2430	1900	0.8	3.7	9.5	8.60
348 Winchester (a)	200	ST	2530	2220	1940	1680	2840	2190	1765	1509	0.4	1.7	4.7	8.95
348 Winchester (c, d)	200	CL	2530	2140	1820	1570	2840	2030	1470	1090	0.8	3.8	10.0	8.95
35 Remington (c, d)	150	CL	2400	1960	1580	1280	1920	1280	835	545	0.9	4.6	13.0	5.80
35 Remington (e)	200	PP, ST, CL	2100	1710	1390	1160	1950	1300	860	605	1.2	6.0	16.5	5.80
350 Remington Magnum (c, d)	200	PCL	2710	2410	2130	1870	3260	2570	2000	1550	Not Available			7.70
350 Remington Magnum (c, d)	250	PCL	2410	2190	1980	1790	3220	2660	2180	1780	Not Available			7.70
351 Winchester Self-Loading*	180	SP	1850	1560	1310	1140	1370	975	685	520	1.5	7.8	21.5	12.65
358 Winchester (a, b)	200	ST	2530	2210	1910	1640	2840	2160	1610	1190	0.8	3.6	9.4	7.75
358 Winchester (a, b)	250	ST	2250	2010	1780	1570	2810	2230	1760	1370	1.0	4.4	11.0	7.75
375 H&H Magnum	270	PP, SP	2740	2460	2210	1990	4500	3620	2920	2370	0.7	2.9	7.1	10.20
375 H&H Magnum	300	ST	2550	2280	2040	1830	4330	3460	2770	2230	0.7	3.3	8.3	10.20
375 H&H Magnum	300	MC	2550	2180	1860	1590	4330	3160	2300	1680	0.7	3.6	9.3	10.20
38-40 Winchester*	180	SP	1330	1070	960	850	705	455	370	290	3.2	15.0	36.5	10.70
44 Magnum* (c, d)	240	SP	1750	1360	1110	980	1630	985	655	510	1.6	8.4	—	10.95
44 Magnum (b)	240	HSP	1750	1350	1090	950	1630	970	635	480	1.8	9.4	26.0	4.50
444 Marlin (c)	240	SP	2400	1845	1410	1125	3070	1815	1060	675	Not Available			6.15
44-40 Winchester*	200	SP	1310	1050	940	830	760	490	390	305	3.3	15.0	36.5	12.85
45-70 Government	405	SP	1320	1160	1050	990	1570	1210	990	880	2.9	13.0	32.5	7.90
458 Winchester Magnum	500	MC	2130	1910	1700	1520	5040	4050	3210	2570	1.1	4.8	12.0	18.95
458 Winchester Magnum	510	SP	2130	1840	1600	1400	5140	3830	2900	2220	1.1	5.1	13.5	12.45

\* Price for 50 HP—Hollow Point SP—Soft Point PSP—Pointed Soft Point PP—Power Point L—Lead Lu—Lubaloy ST—Silvertip HSP—Hollow Soft Point MC—Metal Case BT—Boat Tail MAT—Match BP—Bronze Point CL—Core Lokt PCL—Pointed Core Lokt OPE—Open Point Expanding †PL—Power-Lokt (slightly higher price) (1) Not safe in handguns or Win. M73.

## WEATHERBY MAGNUM CARTRIDGES — BALLISTICS AND PRICES

				Bullet		Velocity (fps)			Energy (ft. lbs.)			Mid-Range Trajectory			Price for 20	
				Wt. Grs.	Type	Muzzle	100 yds.	200 yds.	300 yds.	Muzzle	100 yds.	200 yds.	300 yds.	100 yds.		200 yds.
224	Weatherby	Varmintmaster	50	PE	3750	3160	2625	2140	1562	1109	1670	1250	0.7	3.6	9.0	\$5.95
224	Weatherby	Varmintmaster	55	PE	3650	3150	2685	2270	1627	1212	881	629	0.4	1.7	4.5	5.95
240	Weatherby		70	PE	3850	3395	2975	2585	2304	1788	1376	1038	0.3	1.5	3.9	6.95
240	Weatherby		90	PE	3500	3135	2795	2475	2444	1960	1559	1222	0.4	1.8	4.5	6.95
240	Weatherby		100	PE	3395	3115	2850	2595	2554	2150	1804	1495	0.4	1.8	4.4	6.95
257	Weatherby		87	PE	3825	3290	2835	2450	2828	2087	1553	1160	0.3	1.6	4.4	7.75
257	Weatherby		100	PE	3555	3150	2815	2500	2802	2199	1760	1338	0.4	1.7	4.4	7.75
257	Weatherby		117	SPE	3300	2900	2550	2250	2824	2184	1689	1315	0.4	2.4	6.8	7.75
270	Weatherby		100	PE	3760	3625	2825	2435	3140	2363	1773	1317	0.4	1.6	4.3	7.75
270	Weatherby		130	PE	3375	3050	2750	2480	3283	2685	2183	1776	0.4	1.8	4.5	7.75
270	Weatherby		150	PE	3245	2955	2675	2430	3501	2909	2385	1967	0.5	2.0	5.0	7.75
7mm	Weatherby		139	PE	3300	2995	2715	2465	3355	2770	2275	1877	0.4	1.9	4.9	7.75
7mm	Weatherby		154	PE	3160	2885	2640	2415	3406	2874	2384	1994	0.5	2.0	5.0	7.75
300	Weatherby		150	PE	3545	3195	2890	2615	4179	3393	2783	2279	0.4	1.5	3.9	8.95
300	Weatherby		180	PE	3245	2960	2705	2475	4201	3501	2925	2448	0.4	1.9	5.2	8.95
300	Weatherby		220	SPE	2905	2610	2385	2150	4123	3329	2757	2257	0.6	2.5	6.7	8.95
340	Weatherby		200	PE	3210	2905	2615	2345	4566	3748	3038	2442	0.5	2.1	5.3	8.95
340	Weatherby		210	Nosler	3165	2910	2665	2435	4660	3948	3312	2766	0.5	2.1	5.0	10.95
340	Weatherby		250	SPE	2850	2580	2325	2090	4510	3695	3000	2425	0.6	2.7	6.7	8.95
378	Weatherby		270	SPE	3180	2850	2600	2315	6051	4871	4053	3210	0.5	2.0	5.2	17.50
378	Weatherby		300	SPE, FMJ	2925	2610	2380	2125	5700	4539	3774	3009	0.6	2.5	6.2	17.50
460	Weatherby		500	RN, FMJ	2700	2330	2005	1730	8095	6025	4465	3320	0.7	3.3	10.0	17.50

Trajectory is given from scope height. Velocities chronographed using 26" bbls. Available with Nosler bullets; add \$2.00 per box. SPE—Semi-Pointed Expanding RN—Round Nose PE—Pointed Expanding FMJ—Full Metal Jacket

## RIMFIRE CARTRIDGES — BALLISTICS AND PRICES

### Remington-Peters, Winchester-Western, Federal & CCI

All loads available from all manufacturers except as indicated: R-P (a); W-W (b); Fed. (c); CCI (d). All prices are approximate.

CARTRIDGE	WT. GRs.	BULLET TYPE	VELOCITY FT. PER SEC.		ENERGY FT. LBS.		MID-RANGE TRAJECTORY 100 YDS.	HANDGUN BARREL LENGTH	BALLISTICS		PRICE FOR 50
			MUZZLE	100 YDS.	MUZZLE	100 YDS.			M.V. F.P.S.	M.E. F.P.	
22 Short T22 (a, b)	29	C, L*	1045	810	70	42	5.6	6"	865	48	\$ .92
22 Short Hi-Vel.	29	C, L	1125	920	81	54	4.3	6"	1035	69	.92
22 Short HP Hi-Vel. (a, b, c)	27	C, L	1155	920	80	51	4.2	—	—	—	1.01
22 Short (a, b)	29	D	1045	—	70	—	—	—	—	(per 500)	7.93
22 Short (a, b)	15	D	1710	—	97	—	—	—	—	(per 500)	7.93
22 Long Hi-Vel.	29	C, L	1240	965	99	60	3.8	6"	1095	77	1.01
22 Long Rifle T22 (a, b)†-1	40	L*	1145	975	116	84	4.0	6"	950	80	1.07
22 Long Rifle (b)†-2	40	L*	1120	950	111	80	4.2	—	—	—	1.71
22 Long Rifle (b)†-3	40	L*	—	—	—	—	—	6¾"	1060	100	1.71
22 Long Rifle (d)†-4	40	C	1165	980	121	84	4.0	—	—	—	.99
22 Long Rifle Hi-Vel.	40	C, L	1285	1025	147	93	3.4	6"	1125	112	1.07
22 Long Rifle HP Hi-Vel. (b, d)	37	C, L	1315	1020	142	85	3.4	—	—	—	1.19
22 Long Rifle HP Hi-Vel. (a, c)	36	C	1365	1040	149	86	3.4	—	—	—	1.19
22 Long Rifle (b, c)	No.	12 Shot	—	—	—	—	—	—	—	—	2.17
22 WRF [Rem. Spl.] (a, b)	45	C, L	1450	1110	210	123	—	—	—	—	2.95
22 WRF Mag. (b)	40	JHP	2000	1390	355	170	1.6	6½"	1550	213	2.95
22 WRF Mag. (b)	40	MC	2000	1390	355	170	1.6	6½"	1550	213	2.95
22 Win. Auto Inside lub. (a, b)	45	C, L	1055	930	111	86	—	—	—	—	2.95
5mm Rem. RFM (a)	38	PLHP	2100	1605	372	217	Not Available				4.00

†—Target loads of these ballistics available in: (1) Rem. Match; (2) W-W LV EZXS, Super Match Mark III; (3) Super Match Mark IV and EZXS Pistol Match; (4) CCI Mini-Group. C—Copper plated L—Lead (Wax Coated) L\*—Lead, lubricated D—Disintegrating  
 \*C—Metal Case HP—Hollow Point JHP—Jacket Hollow Point PLHP—Power-Lokt Hollow Point



## NORMA C.F. RIFLE CARTRIDGES — BALLISTICS AND PRICES

Norma ammunition loaded to standard velocity and pressure is now available with Nosler bullets in the following loads: 270 Win., 130-, 150-gr.; Super 7x61 (S&H), 160-gr.; 308 Win., 180-gr.; 30-06, 150-, 180-gr., all at slightly higher prices. All ballistic figures are computed from a line of sight one inch above center of bore at muzzle. Write for their latest prices.

Cartridge	Bullet Wt. Grs.	Type	Velocity, feet per sec.				Energy, foot pounds				Max. height of trajectory, inches			Price for 20
			V Muzzle	V 100 yds.	V 200 yds.	V 300 yds.	E Muzzle	E 100 yds.	E 200 yds.	E 300 yds.	Tr. 100 yds.	Tr. 200 yds.	Tr. 300 yds.	
220 Swift	50	PSP	4111	3611	3133	2681	1877	1448	1090	799	.2	.9	3.0	\$5.35
888 Remington	50	PSP	3200	2660	2170	1750	1137	786	523	340	.0	2.0	6.2	4.10
223	55	SPP	3300	2900	2520	2160	1330	1027	776	570	.4	2.4	6.8	4.50
22-250	50	SPS	3800	3300	2810	2350	1600	1209	885	613	Not Available			4.50
	55	SPS	3650	3200	2780	2400	1637	1251	944	704	Not Available			4.50
243 Winchester	80	SP	3500	3070	2660	2290	2041	1570	1179	873	.0	1.4	4.1	5.70
	100	PSP	3070	2790	2540	2320	2093	1729	1433	1195	.1	1.8	5.0	5.70
6mm Remington	100	SPS	3190	2920	2660	2420	2260	1890	1570	1300	.4	2.1	5.3	5.70
250 Savage	87	PSP	3032	2685	2357	2054	1776	1393	1074	815	.0	1.9	5.8	5.35
	100	PSP	2822	2514	2223	1956	1769	1404	1098	850	.1	2.2	6.6	5.35
6.5 Carcano	156	SPRN	2000	1810	1640	1485	1386	1135	932	764	Not Available			7.00
6.5 Japanese	139	PSPBT	2428	2280	2130	1990	1820	1605	1401	1223	.3	2.8	7.7	7.00
	156	SPRN	2067	1871	1692	1529	1481	1213	992	810	.6	4.4	11.9	7.00
6.5 x 54 MS	139	PSPBT	2580	2420	2270	2120	2056	1808	1591	1388	.2	2.4	6.5	7.00
	156	SPRN	2461	2240	2033	1840	2098	1738	1432	1173	.3	3.0	8.2	7.00
6.5 x 55	139	PSPBT	2789	2630	2470	2320	2402	2136	1883	1662	.1	2.0	5.6	7.00
	156	SPRN	2493	2271	2062	1867	2153	1787	1473	1208	.3	2.9	7.9	7.00
270 Winchester	110	PSP	3248	2966	2694	2435	2578	2150	1773	1448	.1	1.4	4.3	6.20
	130	PSPBT	3140	2884	2639	2404	2847	2401	2011	1669	.0	1.6	4.7	6.20
	150	PSPBT	2802	2616	2436	2262	2616	2280	1977	1705	.1	2.0	5.7	6.20
7 x 57	110	PSP	3068	2792	2528	2277	2300	1904	1561	1267	.0	1.6	5.0	6.20
	150	PSPBT	2756	2539	2331	2133	2530	2148	1810	1516	.1	2.2	6.2	6.20
	175	SPRN	2490	2170	1900	1680	2410	1830	1403	1097	.4	3.3	9.0	6.20
7mm Remington Magnum	150	SPSBT	3260	2970	2700	2450	3540	2945	2435	1990	.4	2.0	4.9	7.70
	175	SPRN	3070	2720	2400	2120	3660	2870	2240	1590	.5	2.4	6.1	7.70
7 x 61 S & H (26 in.)	160	PSPBT	3100	2927	2757	2595	3415	3045	2701	2393	.0	1.5	4.3	8.20
30 U.S. Carbine	110	SPRN	1970	1595	1300	1090	948	622	413	290	.8	6.4	19.0	3.95
30-30 Winchester	150	SPFP	2410	2075	1790	1550	1934	1433	1066	799	.9	4.2	11	4.85
	170	SPFP	2220	1890	1630	1410	1861	1349	1003	750	.7	4.1	11.9	4.85
308 Winchester	130	PSPBT	2900	2590	2300	2030	2428	1937	1527	1190	.1	2.1	6.2	6.20
	150	PSPBT	2860	2570	2300	2050	2725	2200	1762	1400	.1	2.0	5.9	6.20
	180	PSPBT	2610	2400	2210	2020	2725	2303	1952	1631	.2	2.5	6.6	6.20
	180	SPDC	2610	2400	2210	2020	2725	2303	1952	1631	.7	3.4	8.9	6.70
7.62 Russian	180	PSPBT	2624	2415	2222	2030	2749	2326	1970	1644	.2	2.5	6.6	7.00
308 Norma Magnum	180	DC	3100	2881	2668	2464	3842	3318	2846	2427	.0	1.6	4.6	9.30
30-06	130	PSPBT	3281	2951	2636	2338	3108	2514	2006	1578	.1	1.5	4.6	6.20
	150	PS	2972	2680	2402	2141	2943	2393	1922	1527	.0	1.9	5.7	6.20
	180	PSPBT, SPDC	2700	2494	2296	2109	2914	2487	2107	1778	.1	2.3	6.4	6.20
	220	SPRN	2411	2197	1996	1809	2840	2358	1947	1599	.3	3.1	8.5	6.20
7.65 Argentine	150	PSP	2920	2630	2355	2105	2841	2304	1848	1476	.1	2.0	5.8	7.00
303 British	130	PSP	2789	2483	2195	1929	2246	1780	1391	1075	.1	2.3	6.7	6.25
	150	PSP	2720	2440	2170	1930	2465	1983	1569	1241	.1	2.2	6.5	6.25
	180	PSPBT	2540	2340	2147	1965	2579	2189	1843	1544	.2	2.7	7.3	6.25
7.7 Japanese	130	PSP	2950	2635	2340	2065	2513	2004	1581	1231	.1	2.0	5.9	7.00
	180	PSPBT	2493	2292	2101	1922	2484	2100	1765	1477	.3	2.8	7.7	7.00
8 x 57 JS	123	PSP	2887	2515	2170	1857	2277	1728	1286	942	.1	2.3	6.8	6.20
	159	SPRN	2723	2362	2030	1734	2618	1970	1455	1062	.2	2.6	7.9	6.20
	196	SPRN	2526	2195	1894	1627	2778	2097	1562	1152	.3	3.1	9.1	6.20
358 Norma Magnum	250	SPS	2790	2493	2231	2001	4322	3451	2764	2223	.2	2.4	6.6	8.90
44 Magnum*	240	SPFP	1750				1640				Not Available			4.45

P—Pointed SP—Soft Point HP—Hollow Point FP—Flat Point RN—Round Nose BT—Boat Tail MC—Metal Case  
 DC—Dual Core SPS—Soft Point Semi-Pointed NA—Not announced \*Price for 50



## CENTERFIRE HANDGUN CARTRIDGES — BALLISTICS AND PRICES

Winchester-Western, Remington-Peters, Norma, Federal, Browning & S&W/Fiocchi

Most loads are available from W-W and R-P. All available Norma loads are listed. Federal cartridges are marked with an asterisk. Other loads supplied by only one source are indicated by a letter, thus: Norma (a); R-P (b); W-W (c). Prices are approximate.

Cartridge	Bullet Gr.	Style	Muzzle Velocity	Muzzle Energy	Barrel Inches	Price Per 50
22 Jet (b)	40	SP	2100	390	8 3/8	\$9.85
221 Fireball (b)	50	SP	2650	780	10 1/2	4.55
25 (6.35mm) Auto*	50	MC	810	73	2	5.70
256 Winchester Magnum (c)	60	HP	2350	735	8 1/2	10.10
30 (7.65mm) Luger Auto	93	MC	1220	307	4 1/2	9.80
32 S&W Blank (b, c)	No bullet	—	—	—	—	4.35
32 S&W Blank, BP (c)	No bullet	—	—	—	—	4.35
32 Short Colt	80	Lead	745	100	4	5.00
32 Long Colt, IL (c)	82	Lub.	755	104	4	5.20
32 Colt New Police	100	Lead	680	100	4	6.05
32 (7.65mm) Auto*	71	MC	960	145	4	7.00
32 (7.65mm) Auto Pistol (a)	77	MC	900	162	4	6.50
32 S&W	88	Lead	680	90	3	5.00
32 S&W Long	98	Lead	705	115	4	5.20
32-20 Winchester	100	Lead	1030	271	6	7.20
32-20 Winchester	100	SP	1030	271	6	9.00
357 Magnum (b)*	158	SP	1550	845	8 3/8	8.55
357 Magnum	158	MP	1410	695	8 3/8	8.30
357 Magnum	158	Lead	1410	696	8 3/8	7.30
357 Magnum (a)	158	JHP	1450	735	8 3/8	8.55
9mm Luger (a)	116	MC	1165	349	4	8.10
9mm Luger Auto*	124	MC	1120	345	4	8.25
38 S&W Blank	No bullet	—	—	—	—	4.50
38 Smith & Wesson	146	Lead	685	150	4	6.55
38 S&W (a)	146	Lead	730	172	4	6.15
38 Special Blank	No bullet	—	—	—	—	7.00
38 Special, IL (c)	150	Lub.	1060	375	6	6.50
38 Special, IL (c)	150	MP	1060	375	6	7.75
38 Special	158	Lead	855	256	6	6.20
38 Special	200	Lead	730	236	6	6.45
38 Special	158	MP	855	256	6	7.65
38 Special (b)	125	SJHP	Not available	—	—	7.65
38 Special (b)	158	SJHP	Not available	—	—	7.65
38 Special WC (b)	148	Lead	770	195	6	6.45
38 Special Match, IL (c)	148	Lead	770	195	6	6.45
38 Special Match, IL (b, c)	158	Lead	855	256	6	6.30
38 Special Hi-Speed*	158	Lead	1090	425	6	7.65
38 Special (a)	158	RN	900	320	6	6.20
38 Short Colt	125	Lead	730	150	6	5.60
38 Short Colt, Greased (c)	130	Lub.	730	155	6	5.60
38 Long Colt	150	Lead	730	175	6	6.20
38 Super Auto (b)	130	MC	1280	475	5	6.90
38 Auto, for Colt 38 Super (c)	130	MC	1280	475	5	6.90
38 Auto	130	MC	1040	312	4 1/2	6.90
380 Auto*	95	MC	955	192	3 3/4	6.70
38-40 Winchester	180	SP	975	380	5	10.70
41 Remington Magnum (b)	210	Lead	1050	515	8 3/4	9.25
41 Remington Magnum (b)	210	SP	1500	1050	8 3/4	10.60
44 S&W Special	246	Lead	755	311	6 1/2	8.40
44 Remington Magnum	240	SP	1470	1150	6 1/2	11.00
44 Remington Magnum	240	Lead	1470	1150	6 1/2	10.65
44-40 Winchester	200	SP	975	420	7 1/2	12.85
45 Colt	250	Lead	860	410	5 1/2	8.40
45 Colt, IL (c)	255	Lub., L	860	410	5 1/2	8.40
45 Auto	230	MC	850	369	5	8.50
45 ACP (a)	230	JHP	850	370	5	8.75
45 Auto WC*	185	MC	775	245	5	8.95
45 Auto MC (a, b)	230	MC	850	369	5	8.75
45 Auto Match (c)	185	MC	775	247	5	9.25
45 Auto Match, IL (c)	210	Lead	710	235	5	8.75
45 Auto Match*	230	MC	850	370	5	9.25
45 Auto Rim (b)	230	Lead	810	335	5 1/2	8.70

IL—Inside Lub. JSP—Jacketed Soft Point WC—Wad Cutter  
RN—Round Nose HP—Hollow Point Lub—Lubricated  
MC—Metal Case SP—Soft Point MP—Metal Point  
LGC—Lead, Gas Check JHP—Jacketed Hollow Point

## SUPER VEL HANDGUN CARTRIDGES — BALLISTICS AND PRICES

The cartridges listed below are perhaps the most powerful and destructive of these calibers commercially manufactured. Bullets listed can be had as components — other weights (not loaded by Super Vel) are also available.

Cartridge	Bullet Gr.	Style	Muzzle Velocity	Muzzle Energy	Barrel Inches	Price Per 50
380 ACP	80	JHP	1026	188	5	\$7.45
9mm Luger	90	JHP	1422	402	5	7.90
9mm Luger	110	SP	1325	428	5	7.90
38 Special	110	JHP/SP	1370	458	6	7.45
38 Special Match	147	HBWC	775	196	6	6.25
38 Special Int.	158	Lead	1110	439	6	6.15
357 Magnum	110	JHP/SP	1690	697	6	8.35
357 Magnum	137	JHP/SP	1620	796	6	8.35
44 Magnum	180	JHP/SP	2005	1607	6	4.85
45 Auto	190	JHP	1060	473	5	9.45

JHP—Jacketed Hollow Point SP—Jacketed Soft Point  
HBWC—Hollow Base Wad Cutter †Price per 20

## SHOT SHELL LOADS AND PRICES

Winchester-Western, Remington-Peters, Federal, Eley & S&W/Fiocchi

In certain loadings one manufacturer may offer fewer or more shot sizes than another, but in general all makers offer equivalent loadings. Sources are indicated by letters, thus: W-W (a); R-P (b); Fed. (c); Eley (d). Prices are approximate.

GAUGE	Length Shell Ins.	Powder Equiv. Drams	Shot Ozs.	Shot Size	PRICE FOR 25
<b>MAGNUM LOADS</b>					
10 (a <sup>1</sup> , b)	3 1/2	5	2	2	\$10.05
12 (a, b, c)	3	4 1/2	1 3/8	BB, 2, 4	6.30
12 (a <sup>1</sup> , b)	3	4 1/4	1 3/8	2, 4, 6	6.10
12 (a)	3	Max	1 3/8	2, 4, 6	6.10
12 (a <sup>1</sup> , b, c, d)	2 3/4	4	1 1/2	2, 4, 5, 6	5.65
16 (a, b, c, d)	2 3/4	3 1/2	1 1/4	2, 4, 6	5.00
20 (a, b, c)	3	3 1/4	1 1/4	4, 6, 7 1/2	4.95
20 (a <sup>1</sup> )	3	Max	1 3/8	4	5.15
20 (a <sup>1</sup> , b, c, d)	2 3/4	3	1 1/8	2, 4, 6, 7 1/2	4.55
<b>LONG RANGE LOADS</b>					
10 (a, b)	2 3/8	4 3/4	1 3/8	4	6.10
12 (a <sup>1</sup> , b, c, d)	2 3/4	3 3/4	1 1/4	BB, 2, 4, 5, 6, 7 1/2, 9	4.55
16 (a, b, c, d)	2 3/4	3 1/4	1 1/8	4, 5, 6, 7 1/2, 9	4.20
20 (a <sup>1</sup> , b, c, d)	2 3/4	2 3/4	1	4, 5, 6, 7 1/2, 9	3.95
28 (a, b)	2 3/4	2 1/4	3/4	6, 7 1/2, 9	3.95
28 (c)	2 3/4	2 1/4	7/8	4, 6, 7 1/2, 9	3.95
<b>FIELD LOADS</b>					
12 (a, b)	2 3/4	3 1/4	1 1/4	7 1/2, 8	3.60
12 (a, b, c, d)	2 3/4	3 1/4	1 1/8	4, 5, 6, 7 1/2, 8, 9	3.80
12 (a, b, c, d)	2 3/4	3	1	4, 5, 6, 8	3.75
16 (a, b, c, d)	2 3/4	2 3/4	1 1/8	4, 5, 6, 7 1/2, 8, 9	3.60
16 (a, b, c)	2 3/4	2 1/2	1	6, 8	3.45
20 (a, b, c, d)	2 3/4	2 1/2	1	4, 5, 6, 7 1/2, 8, 9	3.50
20 (a, b, c)	2 3/4	2 1/4	7/8	6, 8	3.20
<b>SCATTER LOADS</b>					
12 (a, b)	2 3/4	3	1 1/8	8	3.95
<b>TARGET LOADS</b>					
12 (a, b, c)	2 3/4	3	1 1/8	7 1/2, 8	3.85
12 (a, b, c)	2 3/4	2 3/4	1 1/8	7 1/2, 8	3.85
16 (a, b, c)	2 3/4	2 1/2	1	9	3.55
20 (a, b, c)	2 3/4	2 1/4	3/4	9	3.20
28 (a, c)	2 3/4	2 1/4	3/4	9	3.90
410 (a, b, c, d)	3	Max	3/4	9	3.00
410 (a, b, c)	2 1/2	Max	1/2	9	3.00
<b>SKEET &amp; TRAP</b>					
12 (a, b, c, d)	2 3/4	3	1 1/8	7 1/2, 8, 9	3.80
12 (a, b, c, d)	2 3/4	2 3/4	1 1/8	7 1/2, 8, 9	3.80
16 (a, b, c, d)	2 3/4	2 1/2	1	9	3.55
16 (c)	2 3/4	1 1/8	1 1/8	8, 9	3.55
20 (a, b, c)	2 3/4	2 1/4	7/8	9	3.20
<b>BUCKSHOT</b>					
12 (a, b, c)	3 Mag.	4 1/2	—	00 Buck—15 pellets	7.85
12 (a, b, c)	3 Mag.	4 1/2	—	4 Buck—41 pellets	7.85
12 (b)	3 Mag.	4	—	1 Buck—20 pellets	6.80
12 (a, b, c)	2 3/4 Mag.	4	—	00 Buck—12 pellets	6.80
12 (a, b, c)	2 3/4	3 3/4	—	00 Buck—9 pellets	6.05
12 (a, b, c)	2 3/4	3 3/4	—	0 Buck—12 pellets	6.05
12 (a, b, c)	2 3/4	3 3/4	—	1 Buck—16 pellets	6.05
12 (a, b, c)	2 3/4	3 3/4	—	4 Buck—27 pellets	6.05
16 (a, b, c)	2 3/4	3	—	1 Buck—12 pellets	6.00
20 (a, b, c)	2 3/4	2 3/4	—	3 Buck—20 pellets	6.00
<b>RIFLED SLUGS</b>					
12 (a, b, c, d)	2 3/4	3 3/4	1	Slug	7.10
16 (a, b, c)	2 3/4	3	7/8	Slug	6.75
20 (a, b, c)	2 3/4	2 3/4	3/4	Slug	6.50
410 (a, b, c)	2 1/2	Max	1/2	Slug	6.10

W-W 410, 28- and 10-ga. Magnum shells available in paper cases only, as are their scatter and target loads; their skeet and trap loads come in both plastic and paper.

RP shells are all of plastic with Power Piston wads except: 12 ga. scatter loads have Post Wad: all 10 ga., 410-3" and rifled slug loads have standard wad columns.

Federal magnum, range, buckshot, slug and all 410 loads are made in plastic only. Field loads are available in both paper and plastic.

Eley shotshells are of plastic-coated paper.

†—These loads available from W-W with Lubaloy shot at higher price.





# CIL Ballistics

## BALLISTICS

KKSP—'Kling-Kor' Soft Point  
PSP—Pointed Soft Point  
SP—Soft Point  
CPE—Copper Point Expanding

MC—Metal Cased (Hard Point)  
PNEU—Pneumatic  
HP—Hollow Point  
ST—'Sabretip'

DESCRIPTION	Bullet		Velocity in Feet per Second					Energy in Foot Pounds						
	Wt. Grains	Type	Muzzle	100 Yds.	200 Yds.	300 Yds.	400 Yds.	500 Yds.	Muzzle	100 Yds.	200 Yds.	300 Yds.	400 Yds.	500 Yds.
22 HORNET	45	PSP	2690	2030	1510	1150	—	—	720	410	230	130	—	—
22 SAVAGE	70	PSP	2800	2440	2110	1840	—	—	1220	925	690	525	—	—
222 REMINGTON	50	PSP	3200	2600	2170	1750	—	—	1140	785	520	340	—	—
243 WINCHESTER	75	PSP	3500	3070	2660	2290	1960	1670	2040	1570	1180	875	640	465
243 WINCHESTER	100	PSP	3070	2790	2540	2320	2120	1940	2090	1730	1430	1190	995	835
244 REMINGTON	75	PSP	3000	3070	2660	2290	1960	1670	2040	1570	1180	875	640	465
0.5 x 57 MM MAUSER-SCH.	100	SP	2160	1950	1790	1570	—	—	1660	1390	1090	875	—	—
0.5 x 55 MM	160	SP	2420	2190	1960	1760	1590	1420	2000	1700	1360	1110	885	715
25-20 WINCHESTER	86	SP	1460	1180	1030	940	—	—	405	265	200	170	—	—
25-35 WINCHESTER	117	SP	2300	1910	1600	1340	—	—	1370	945	665	465	—	—
250 SAVAGE	100	PSP	2820	2460	2140	1870	—	—	1760	1340	1020	775	—	—
257 ROBERTS	117	PSP	2650	2280	1950	1690	—	—	1820	1350	985	740	—	—
270 WINCHESTER	100	PSP	3400	3070	2690	2340	2010	1700	2690	2090	1600	1215	890	640
270 WINCHESTER	130	PSP	3140	2850	2500	2320	2090	1860	2340	2340	1920	1550	1260	1000
270 WINCHESTER	160	KKSP	2900	2530	2230	2050	1840	—	2790	2270	1850	1490	1200	—
7 x 57 MM MAUSER	130	PSP	2800	2500	2240	1990	1770	1500	2420	1930	1550	1220	965	770
7 x 57 MM MAUSER	160	KKSP	2650	2330	2040	1780	1550	1350	2500	1930	1480	1130	855	645
7 MM REMINGTON MAGNUM	175	SP	3070	2720	2400	2120	1870	1640	3660	2870	2240	1750	1360	1040
30-30 WINCHESTER	150	PNEU	2410	2020	1700	1430	—	—	1930	1360	960	680	—	—
30-30 WINCHESTER	170	KKSP	2220	1890	1630	1410	—	—	1860	1350	1000	750	—	—
30-30 WINCHESTER	170	ST	2220	1890	1630	1410	—	—	1860	1350	1000	750	—	—
30-30 WINCHESTER	170	MC	2220	1890	1630	1410	—	—	1860	1350	1000	750	—	—
30-30 WINCHESTER	150	ST	2410	2020	1700	1430	—	—	1930	1360	960	680	—	—
30 REMINGTON	170	KKSP	2120	1820	1560	1350	—	—	1700	1250	920	690	—	—
30-40 Krag	180	KKSP	2470	2120	1830	1590	1400	—	2440	1790	1340	1010	785	—
30-06 SPRINGFIELD	130	HP	3150	2730	2470	2170	1920	1690	2870	2160	1770	1360	1060	820
30-06 SPRINGFIELD	150	PSP	2970	2670	2400	2130	1890	1670	2930	2370	1920	1510	1190	930
30-06 SPRINGFIELD	150	ST	2970	2670	2400	2130	1890	1670	2930	2370	1920	1510	1190	930
30-06 SPRINGFIELD	180	KKSP	2700	2330	2010	1740	1520	—	2910	2170	1610	1210	920	—
30-06 SPRINGFIELD	180	CPE	2700	2400	2280	2080	1900	1730	2910	2460	2080	1730	1440	1190
30-06 SPRINGFIELD	180	ST	2700	2470	2250	2040	1850	1670	2910	2440	2020	1660	1370	1110
30-06 SPRINGFIELD	220	KKSP	2410	2120	1870	1670	1480	—	2830	2190	1710	1360	1070	—
300 WINCHESTER-MAGNUM	180	ST	3070	2850	2640	2440	2250	2060	3770	3250	2790	2380	2020	1700
300 HOLLAND & HOLLAND MAGNUM	180	PSP	2920	2670	2440	2220	2020	1830	3400	2850	2380	1970	1630	1340
300 SAVAGE	150	PSP	2670	2390	2130	1890	1660	—	2370	1900	1510	1190	915	—
300 SAVAGE	150	ST	2670	2390	2130	1890	1660	—	2370	1900	1510	1190	915	—
300 SAVAGE	180	KKSP	2370	2040	1760	1520	1340	—	2240	1660	1240	920	715	—
300 SAVAGE	180	ST	2370	2160	1960	1770	1600	—	2240	1860	1530	1250	1020	—
303 SAVAGE	190	KKSP	1980	1680	1440	1250	—	—	1650	1190	875	660	—	—
303 BRITISH	150	PSP	2720	2420	2150	1900	1670	1470	2460	1950	1540	1200	930	720
303 BRITISH	150	ST	2720	2420	2150	1900	1670	1470	2460	1950	1540	1200	930	720
303 BRITISH	180	KKSP	2540	2180	1860	1590	1360	—	2580	1900	1380	1010	740	—
303 BRITISH	180	CPE	2540	2330	2130	1940	1760	1600	2580	2170	1810	1500	1240	1020
303 BRITISH	180	ST	2540	2300	2090	1900	1730	1580	2580	2120	1750	1440	1200	1000
303 BRITISH	215	KKSP	2180	1900	1660	1460	1250	—	2270	1720	1310	1020	750	—
300 WINCHESTER	130	HP	2930	2590	2290	2010	1770	1560	2480	1940	1520	1170	905	700
300 WINCHESTER	150	PSP	2860	2570	2300	2050	1810	1590	2730	2200	1760	1400	1090	840
300 WINCHESTER	150	ST	2860	2570	2300	2050	1810	1590	2730	2200	1760	1400	1090	840
300 WINCHESTER	180	KKSP	2610	2240	1920	1640	1400	—	2720	2010	1470	1070	785	—
300 WINCHESTER	180	ST	2610	2390	2170	1970	1780	1600	2720	2280	1870	1540	1260	1010
300 WINCHESTER	200	KKSP	2450	2210	1980	1770	1580	1410	2670	2170	1750	1400	1110	875
8 MM MAUSER	170	PSP	2570	2300	2040	1810	1600	—	2490	2000	1570	1240	965	—
32-20 WINCHESTER	115	SP	1480	1220	1050	940	—	—	560	380	280	225	—	—
32 WINCHESTER SPECIAL	170	KKSP	2280	1920	1630	1410	—	—	1960	1390	1000	750	—	—
32 WINCHESTER SPECIAL	170	ST	2280	1920	1630	1410	—	—	1960	1390	1000	750	—	—
32 REMINGTON	170	KKSP	2120	1800	1540	1340	—	—	1700	1220	895	680	—	—
32-40 WINCHESTER	170	KKSP	1540	1340	1170	1050	—	—	895	680	515	415	—	—
35 REMINGTON	200	SP	2100	1710	1390	1160	—	—	1950	1300	865	605	—	—
351 WINCHESTER SELF-LOADING	180	SP	1850	1560	1310	1140	—	—	1370	975	685	520	—	—
350 (0.5 MM) WINCHESTER	200	KKSP	2530	2210	1910	1640	1400	—	2840	2160	1610	1190	870	—
30-40 WINCHESTER	180	SP	1330	1070	960	850	—	—	705	455	370	290	—	—
30-55 WINCHESTER	255	SP	1600	1410	1240	1110	—	—	1450	1130	880	700	—	—
43 (7 MM) MAUSER	385	LEAD	1360	1150	1030	940	—	—	1580	1130	910	750	—	—
44-40 WINCHESTER	200	SP	1310	1050	940	830	—	—	760	490	390	305	—	—
44 REMINGTON MAGNUM	240	SP	1850	1450	1150	980	—	—	1820	1120	710	510	—	—

**Short Range Sighting-in**—It is preferable to sight-in a rifle at the "recommended sighting" range. However, it is sometimes necessary to sight-in a rifle at a distance shorter than the "recommended sighting"

range because you don't have the necessary yardage available. To do this, find from the range table at what distance the bullet will first cross the line of sight. Put up a target at this distance and from a firm rest fire



# and Range Table

**RANGE TABLE**—Values shown in this table are based on a sight height 1½" above line of bore. **RECOMMENDED SIGHTING:** ⊕ Indicates the most favourable sighting range in order to minimize the sighting problem at shorter and longer ranges. + Indicates inches high; - Indicates inches low.

## RANGE

First Crosses Line of Sight App. Yds.	50 Yds.	75 Yds.	100 Yds.	125 Yds.	150 Yds.	200 Yds.	250 Yds.	300 Yds.	400 Yds.	500 Yds.	Bullet		DESCRIPTION
											Wt. Grains	Type	
29.0	—	+1.5	—	—	⊕	-4.0	—	—	—	—	45	PSP	22 HORNET
25.0	—	—	+2.0	—	—	⊕	-4.5	—	—	—	70	PSP	22 SAVAGE
30.0	—	—	+2.0	—	—	⊕	-3.5	—	—	—	50	PSP	222 REMINGTON
30.0	—	—	—	+2.5	—	—	⊕	-3.0	-15.5	-36.5	75	PSP	243 WINCHESTER
27.5	—	—	—	+3.0	—	—	⊕	-3.5	-16.5	-35.5	100	PSP	243 WINCHESTER
30.0	—	—	—	+2.5	—	—	⊕	-3.0	-15.5	-36.5	75	PSP	244 REMINGTON
25.5	—	+1.5	—	—	⊕	-4.0	—	—	—	—	160	SP	6.5 x 53 MM MAUSER, SCN.
21.0	—	—	+3.5	—	—	⊕	-5.0	-13.0	-39.0	—	160	SP	6.5 x 50 MM
16.0	+2.0	—	⊕	-4.0	—	—	—	—	—	—	86	SP	25-20 WINCHESTER
23.0	—	+1.5	—	—	⊕	-4.5	—	—	—	—	117	SP	25-35 WINCHESTER
27.5	—	—	+2.0	—	—	⊕	-3.5	—	—	—	100	PSP	250 SAVAGE
24.0	—	—	+2.5	—	—	⊕	-4.5	—	—	—	117	PSP	257 ROBERTS
31.5	—	—	—	+2.5	—	—	⊕	-3.5	-14.5	-33.5	100	PSP	270 WINCHESTER
27.5	—	—	—	+3.0	—	—	⊕	-4.0	-16.0	-35.5	130	PSP	270 WINCHESTER
28.5	—	—	+2.0	—	—	⊕	-4.0	—	-25.0	—	160	KKSP	270 WINCHESTER
27.0	—	—	+4.0	—	—	—	⊕	-4.5	-18.5	-41.0	139	PSP	7 x 57 MM MAUSER
29.0	—	—	+2.5	—	—	⊕	-4.0	—	-28.5	—	160	KKSP	7 x 57 MM MAUSER
25.0	—	—	+3.5	—	—	—	⊕	-4.0	-18.0	-43.0	175	SP	7 MM REMINGTON MAGNUM
27.0	—	+1.5	—	—	⊕	-4.0	—	—	—	—	150	PNEU	30-30 WINCHESTER
23.0	—	+1.5	—	—	⊕	-4.5	—	—	—	—	170	KKSP	30-30 WINCHESTER
23.0	—	+1.5	—	—	⊕	-4.5	—	—	—	—	170	ST	30-30 WINCHESTER
23.0	—	+1.5	—	—	⊕	-4.5	—	—	—	—	170	MC	30-30 WINCHESTER
27.0	—	+1.5	—	—	⊕	-4.0	—	—	—	—	150	ST	30-30 WINCHESTER
20.0	—	+2.0	—	—	⊕	-5.0	—	—	—	—	170	KKSP	30 REMINGTON
21.0	—	—	+3.0	—	—	⊕	-5.5	—	-41.0	—	180	KKSP	30-30 Krag
27.0	—	—	—	+3.0	—	—	⊕	-4.0	-19.5	-47.0	130	HP	30-06 SPRINGFIELD
25.0	—	—	—	+3.5	—	—	⊕	-4.0	-17.5	-41.0	150	PSP	30-06 SPRINGFIELD
25.0	—	—	—	+3.5	—	—	⊕	-4.0	-17.5	-41.0	150	ST	30-06 SPRINGFIELD
24.0	—	—	+2.5	—	—	⊕	-4.0	—	-32.5	—	180	KKSP	30-06 SPRINGFIELD
21.0	—	—	—	+4.0	—	—	⊕	-4.5	-20.5	-46.0	180	CPE	30-06 SPRINGFIELD
20.0	—	—	—	+4.0	—	—	⊕	-4.5	-21.0	-48.5	180	ST	30-06 SPRINGFIELD
21.0	—	—	+3.0	—	—	⊕	-5.5	—	-41.0	—	220	KKSP	30-06 SPRINGFIELD
27.5	—	—	—	+3.0	—	—	⊕	-3.5	-14.5	-32.5	180	ST	300 WINCHESTER-MAGNUM
25.0	—	—	+3.5	—	—	—	⊕	-4.0	-17.5	-39.0	180	PSP	300 HOLLAND & HOLLAND MAGNUM
26.0	—	—	+2.5	—	—	⊕	-3.5	—	-29.0	—	150	PSP	300 SAVAGE
26.0	—	—	+2.5	—	—	⊕	-3.5	—	-29.0	—	150	ST	300 SAVAGE
20.0	—	—	+3.5	—	—	⊕	-5.5	—	-43.0	—	180	KKSP	300 SAVAGE
21.5	—	—	+3.0	—	—	⊕	-5.5	—	-35.0	—	180	ST	300 SAVAGE
17.5	—	—	+3.0	—	—	⊕	-5.5	—	—	—	190	KKSP	303 SAVAGE
22.0	—	—	—	+4.5	—	—	⊕	-5.0	-23.0	-53.5	150	PSP	303 BRITISH
22.0	—	—	—	+4.5	—	—	⊕	-5.0	-23.0	-53.5	150	ST	303 BRITISH
23.0	—	—	+3.0	—	—	⊕	-5.0	—	-41.0	—	180	KKSP	303 BRITISH
19.0	—	—	—	+4.5	—	—	⊕	-5.0	-23.0	-52.5	180	CPE	303 BRITISH
17.5	—	—	—	+5.0	—	—	⊕	-5.5	-26.5	-71.0	180	ST	303 BRITISH
16.0	—	—	+4.5	—	—	⊕	-7.0	—	-54.0	—	215	KKSP	303 BRITISH
23.5	—	—	—	+3.5	—	—	⊕	-4.5	-23.5	-59.0	130	HP	300 WINCHESTER
25.0	—	—	—	+3.5	—	—	⊕	-4.5	-20.0	-47.5	150	PSP	300 WINCHESTER
25.0	—	—	—	+3.5	—	—	⊕	-4.5	-20.0	-47.5	150	ST	300 WINCHESTER
23.0	—	—	+3.0	—	—	⊕	-5.5	—	-38.0	—	180	KKSP	300 WINCHESTER
22.0	—	—	—	+4.5	—	—	⊕	-5.0	-21.5	-51.5	180	ST	300 WINCHESTER
22.0	—	—	+3.0	—	—	⊕	-5.0	-12.0	-35.0	-48.5	200	KKSP	300 WINCHESTER
22.5	—	—	+3.5	—	—	⊕	-5.5	—	-33.5	—	170	PSP	8 MM MAUSER
16.5	+2.0	—	⊕	-3.5	—	—	—	—	—	—	115	SP	32-20 WINCHESTER
23.0	—	+2.0	—	—	⊕	-4.5	—	—	—	—	170	KKSP	32 WINCHESTER SPECIAL
23.0	—	+2.0	—	—	⊕	-4.5	—	—	—	—	170	ST	32 WINCHESTER SPECIAL
20.0	—	+2.0	—	—	⊕	-5.0	—	—	—	—	170	KKSP	32 REMINGTON
21.0	+1.0	—	⊕	-2.5	—	—	—	—	—	—	170	KKSP	32-40 WINCHESTER
19.5	—	+2.5	—	—	⊕	-6.0	—	—	—	—	200	SP	35 REMINGTON
16.0	—	+3.0	—	—	⊕	-7.5	—	—	—	—	180	SP	351 WINCHESTER SELF-LOADING
20.5	—	—	+3.0	—	—	⊕	-5.0	—	-38.5	—	200	KKSP	350 (0.8 MM) WINCHESTER
14.5	+2.5	—	⊕	-4.0	—	—	—	—	—	—	180	SP	30-40 WINCHESTER
13.5	—	+4.0	—	—	⊕	-8.5	—	—	—	—	255	SP	30-55 WINCHESTER
16.0	+2.0	—	⊕	-3.5	—	—	—	—	—	—	385	LEAD	43 (11 MM) MAUSER
12.5	+3.0	—	⊕	-4.5	—	—	—	—	—	—	200	SP	44-00 WINCHESTER
13.0	—	+4.5	—	—	⊕	-8.0	—	—	—	—	240	SP	44 REMINGTON MAGNUM

a three-shot group. The centre point of the group is the "centre of impact"—the average spot where the bullets strike. Adjust sights to bring the centre of impact to the centre of the target then fire another

group. If the centre of impact is on target the rifle will be sighted in at the range recommended in the range table. It is, however, desirable to fire a target at that range as soon as possible as a double check.



# FEDERAL<sup>®</sup> AMMUNITION

FEDERAL CARTRIDGE CORPORATION 2700 FOSHAY TOWER MINNEAPOLIS, MINN. 55402



## SHOT SHELL LOADS

Gauge	Shell Length Inches	Drams Equiv.	Shot Ozs.	Shot Sizes	Price Per Box
<b>MAGNUM LOADS</b>					
12	3	4	1 7/8	BB, 2, 4	6.60
12	3	4	1 7/8	2, 4, 6	6.15
12	2 3/4	3 3/4	1 1/2	2, 4, 5, 6	5.60
16	2 3/4	3 3/4	1 1/4	2, 4, 6	4.85
20	3	3	1 1/4	4, 6, 7 1/2	5.05
20	2 3/4	2 3/4	1 1/8	4, 6, 7 1/2	4.40

## HI-POWER<sup>®</sup> LOADS

12	2 3/4	3 3/4	1 1/4	BB, 2, 4, 5, 6, 7 1/2, 9	4.55
16	2 3/4	3 3/4	1 1/8	4, 5, 6, 7 1/2, 9	4.20
20	2 3/4	2 3/4	1	4, 5, 6, 7 1/2, 9	3.95
28	2 3/4	2 1/4	7/8	6, 7 1/2, 9	3.95
410	3	Max.	1 1/16	4, 5, 6, 7 1/2	3.60
410	2 1/2	Max.	1/2	6, 7 1/2	3.00

## FIELD LOADS

12	2 3/4	3 3/4	1 1/4	7 1/2, 8, 9	3.95
12	2 3/4	3 3/4	1 1/8	4, 5, 6, 7 1/2, 8, 9	3.75
12	2 3/4	3 3/4	1	6, 8	3.50
16	2 3/4	2 3/4	1 1/8	4, 5, 6, 7 1/2, 8, 9	3.50
16	2 3/4	2 1/2	1	6, 8	3.35
20	2 3/4	2 1/2	1	4, 5, 6, 7 1/2, 8, 9	3.40
20	2 3/4	2 1/2	7/8	6, 8	3.10

## TARGET LOADS

12 <sup>1</sup>	2 3/4	2 3/4	1 1/8	7 1/2, 8, 8 1/2, 9	3.50
12 <sup>1</sup>	2 3/4	3	1 1/8	7 1/2, 8, 8 1/2, 9	3.50
12	2 3/4	2 3/4	1 1/8	7 1/2, 8, 8 1/2, 9	3.65
12	2 3/4	3	1 1/8	7 1/2, 8, 8 1/2, 9	3.65
12 <sup>3</sup>	2 3/4	3 3/4	1 1/8	7 1/2, 8, 9	3.90
16	2 3/4	2 3/4	1 1/8	7 1/2, 8, 9	3.50
20 <sup>2</sup>	2 3/4	2 1/2	7/8	8, 9	3.20
28	2 3/4	2	3/4	9	3.95
410	2 1/2	Max.	1/2	9	3.00

## BUCKSHOT & RIFLED SLUG LOADS

12	3	Sup.	—	00 Buck, 15 Pellets	1.57
12	3	Sup.	—	No. 4 Buck, 41 Pellets	1.57
12	2 3/4	Mag.	—	00 Buck, 12 Pellets	1.36
12	2 3/4	Mag.	—	No. 1 Buck, 20 Pellets	1.36
12	2 3/4	Mag.	—	No. 4 Buck, 34 Pellets	1.36
12	2 3/4	Max.	—	00 Buck, 9 Pellets	1.20
12	2 3/4	Max.	—	0 Buck, 12 Pellets	1.20
12	2 3/4	Max.	—	No. 1 Buck, 16 Pellets	1.20
12	2 3/4	Max.	—	No. 4 Buck, 27 Pellets	1.20
16	2 3/4	Max.	—	No. 1 Buck, 12 Pellets	1.20
20	2 3/4	Max.	—	No. 3 Buck, 20 Pellets	1.20
12	2 3/4	Max.	—	7/8 oz. Rifled Slug	1.42
16	2 3/4	Max.	—	4/5 oz. Rifled Slug	1.35
20	2 3/4	Max.	—	5/8 oz. Rifled Slug	1.30
410	2 1/2	Max.	—	1/5 oz. Rifled Slug	1.22

All Plastic tubes except  
1 Paper 2 Offered in Plastic and Paper  
3 International Load.

Packaged 25 per box except Buckshot and slugs 5 per box.

Wad Columns: Triple-Plus in 12, 16, 20 Ga. Hi-Power and Fields.  
Magnums, 28 Gauge, 410 use shot cup with conventional wads.  
12 Gauge Target loads use plastic "Champion" air-chamber wad.  
Buck and Rifled Slugs do not use shot cups.



## CENTERFIRE PISTOL & RIFLE

Cartridge	Gr.	Bullet Style	Muzzle Velocity	Muzzle Energy	Barrel Length Inches	Price Per Box
<b>PISTOL</b>						
25 (6.35mm) Auto	50	MC	810	73	2	5.70
32 Auto	71	MC	905	128	4	6.50
357 Mag., Ni.Pl.Cs.	158	JSP	1550	845	6	8.55
9 mm Luger Auto	123	MC	1120	345	4	8.10
380 Auto	95	MC	955	192	3 3/4	6.70
38 Special Match	148	WC	770	195	6	6.45
38 Special	158	Lead	855	256	6	6.20
38 Special, Hi-Vel.	158	Lead	1090	415	6	6.90
45 Auto Match	230	MC	850	370	5	8.75
45 Auto Match	185	WC	775	247	5	9.25

## RIFLE

222 Remington	50	SP	3200	1140	26	4.10
22250 Remington	55	SP	3810	1770	26	4.50
223 Remington	55	SP	3300	1330	26	4.50
*243 Winchester	80	SP	3500	2180	26	5.70
*243 Winchester	100	SP	3070	2090	26	5.70
*270 Winchester	130	HS	3140	2840	24	6.20
*270 Winchester	150	HS	2800	2610	24	6.20
*7 mm Mauser	175	HS	2490	2410	24	6.20
*7 mm Mauser	139	HS	2710	2280	24	6.20
7 mm Rem. Mag.	150	HS	3260	3540	26	7.70
7 mm Rem. Mag.	175	HS	3070	3660	26	7.70
30 Carbine	110	SP	1980	955	18	3.90
*3030 Winchester	150	HS	2410	1930	26	4.85
*3030 Winchester	170	HS	2220	1860	26	4.85
*3006 Springfield	150	HS	2970	2930	24	6.20
*3006 Springfield	180	HS	2700	2910	24	6.20
*3006 Springfield	125	SP	3200	2840	24	6.20
*300 Savage	150	HS	2670	2370	24	6.05
*300 Savage	180	HS	2370	2240	24	6.05
300 Win. Mag.	150	HS	3400	3850	26	9.10
300 Win. Mag.	180	HS	3070	3770	26	9.10
*303 British	180	HS	2540	2580	26	6.25
*308 Winchester	150	HS	2860	2730	24	6.20
*308 Winchester	180	HS	2610	2720	24	6.20
*8mm Mauser	170	HS	2570	2490	23 1/2	6.20
*32 Win. Special	170	HS	2280	1960	26	5.00
*35 Remington	200	HS	2100	1950	22	5.65
44 Magnum	240	HP-SP	1750	1630	18 1/2	4.40

Pistol Cartridges Packaged 50 per box

Rifle Cartridges Packaged 20 per box

MC-Metal Case JSP-Jacketed Soft Point WC-Wadcutter

SP-Soft Point HS-"Hi-Shok" Soft Point HP-Hollow Point

\*Caliber with "Cartridge Carrier" pack.



## RIMFIRE 22'S

Cartridge	Gr.	Bullet Style	Muzzle Velocity	Barrel Length	Price Per Box
<b>HI-POWER<sup>®</sup></b>					
22 Short	29	Solid	1125	24	.88
22 Short	29	Hollow Point	1155	24	.99
22 Long	29	Solid	1240	24	.93
† 22 Long Rifle	40	Solid	1285	24	1.04
† 22 Long Rifle	38	Hollow Point	1315	24	1.15
22 Long Rifle	25	No. 12 Shot	—	24	2.11

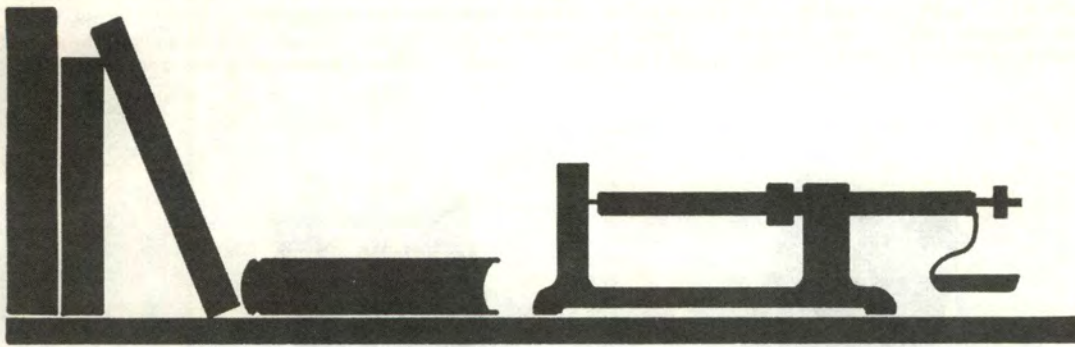
## STANDARD VELOCITY

22 Short	29	Solid	1045	24	.88
22 Long Rifle	40	Solid	1145	24	1.04

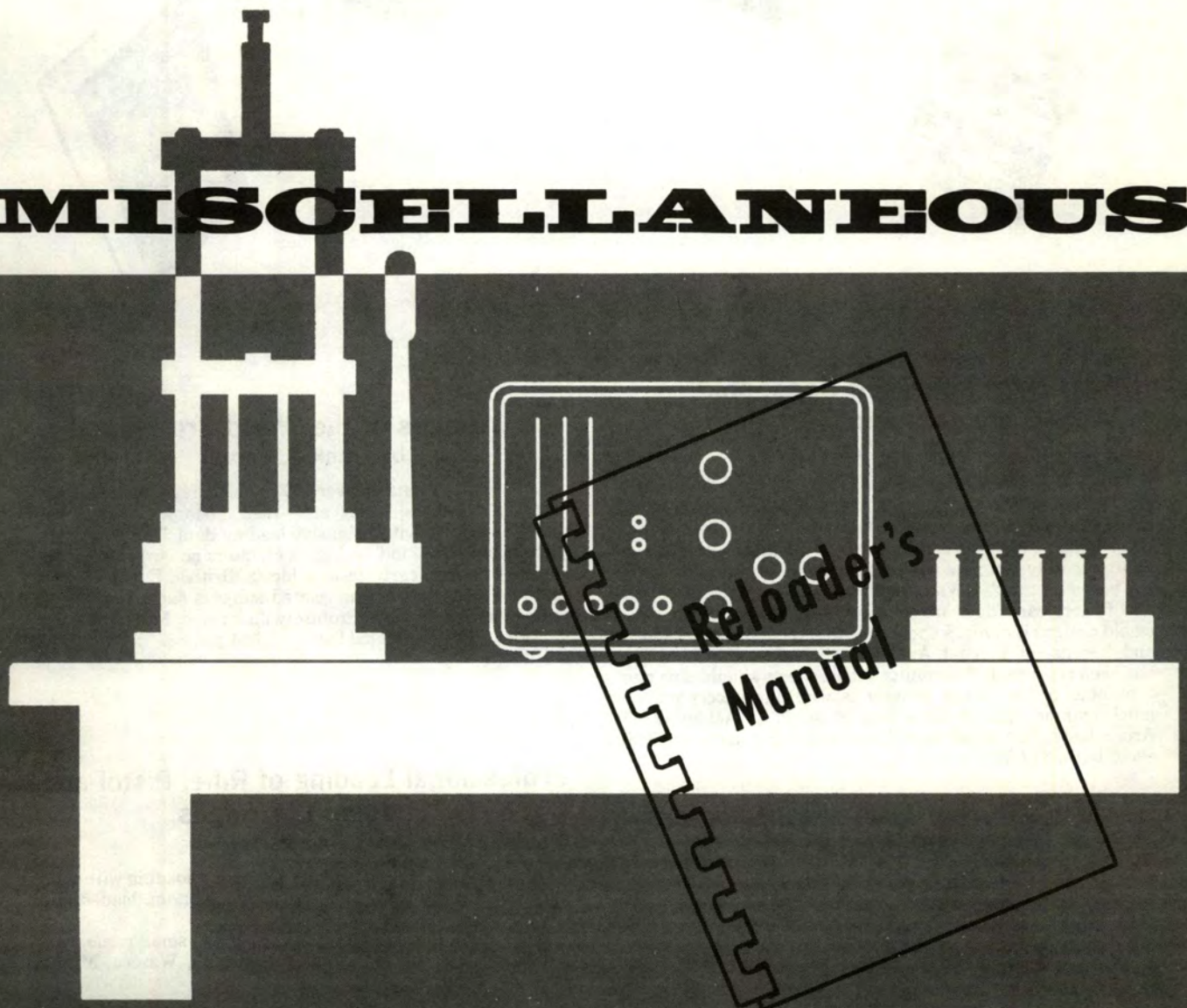
Packaged 50 per box. Items with † also available packaged 100 per plastic box.



**6th EDITION — PART 6**



# **MISCELLANEOUS**





## Notes on Books & Manuals . . .

The reloading bench without a choice selection of books and/or manuals is by no means complete. No case should be charged or bullet seated until the reloader is sure that the load and bullet he is using is the correct one to do the job he wants done. Whether you are new to reloading or a veteran of many years, a good selection of written material is a must if you are to produce safe, accurate ammunition

each time you reload.

The man who wants to enjoy handloading will read as much material on the subject as he can, he'll go beyond the point of looking at the pictures, captions and bold face type and read and heed the cautions and warnings he'll find in all reloading literature. He'll use only the powder type recommended, approach maximum loads with extreme caution and double check

the manuals along every step of his operation. He'll be safe, not sorry—slower, of course, but surer.

Best of all, he'll be able to take advantage of years of testing and experimentation by men who have devoted their lives to handloading. It is a sorry sight indeed to see a man buy a loading press, dies, components, etc., and walk out of the store without a manual of some sort.



### **Ackley's Revised Handbook for Shooters and Reloaders** by P. O. Ackley

The excellent reference work of this title described in the 4th Edition of HANDLOADER'S DIGEST has been expanded to two volumes totalling almost 1200 pages. Vol. 1 is a reprint of the original; Vol. 2 is a continuation of the first, with data on approximately 100 new wildcat cartridges, including a number based on the 284 Win. and 350 Rem. Magnum cases. All new factory cartridges are covered, new loading information on old designs is given, a shotgun load section has been added and, because of demand, Ackley's article on action blow-ups has been reprinted. The results of these tests should surprise a number of the newer guncranks who have accepted too much opinion and too little fact. From P. O. Ackley, 2235 Arbor Lane, Salt Lake City, Utah 84117. Separately, \$9.00 each. Both, \$17.50.

### **Ackley's Pocket Manual for Shooters and Reloaders** by P. O. Ackley

A durable handbook-size volume containing selected data from Ackley's bigger book. Many factory and wildcat cartridges are covered in detail. An excellent working reference for shooters and reloaders. \$3.50.

### **Cartridges of the World 3rd Edition** by Frank C. Barnes

Authoritative data on over 1000 rifle, handgun and shotgun cartridges, bullets, loads, etc.—their history, development and dimensions, with extensive loading data. The most complete book of its kind, including chapters on current and obsolete American cartridges, wildcats, British, European and military loads, as well as related subjects such as primers, gunpowder and bullets. Profusely illustrated. Edited by John T. Amber. Digest Books, Inc. 384 pp., 8½" x 11". \$6.95

### **Professional Loading of Rifle, Pistol and Shotgun Cartridges** by G.L. Herter

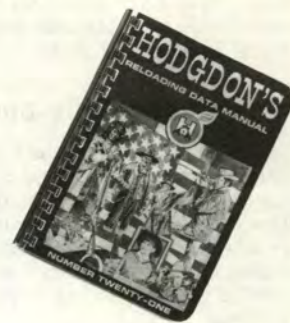
Over 750 pages covering every phase of reloading with complete data on loads for rifle, pistol and shotgun, loaded and chronographed at the Herter plant.

In addition, hunting methods for big and small game, varmints, etc. are covered in detail. Herter's, Waseca, Minn., 1961. \$4.98.



## Hornady Handbook of Cartridge Reloading

Reloaders who are familiar with the loading data sheets supplied by Hornady will feel at home with this book. A total of 360 pages of data, including 72 pages of ballistic tables, with figures out to 500 yards in most cases, covering rifle cartridges only. A short history and case dimensions are given for each cartridge. Profusely illustrated and comprehensive in its scope. \$3.50.



## Hodgdon's Reloading Data Manual #21

Contains a great deal of loading data featuring Hodgdon's many powders. In most instances it lists specific pressure data collected during Hodgdon's tests. Few other references list actual pressures, so this manual is particularly valuable. Weatherby calibers are also included. \$2.00.

## Lee Reloading Manual

This book is Lee's first attempt at compiling all of their data in one book. The information is useful with the simple Lee tool or with conventional press and scale. The introductory section explains many facets of component manufacture. A complete key to the Lee powder measure kit is contained within the 100 pages of the book. Most popular cartridges, rifle, pistol and shotshell, are covered. 98¢.



## Lyman Reloading Handbook 45th Edition

A standard reloading reference for shooters the world over. Its easy-to-follow instructions will make the novice an expert in no time. The Handbook covers the entire field, including step-by-step instructions on the use of Lyman reloading equipment, complete information on reloading for rifles, pistols, shotguns, and muzzle-loaders. It is a mine of valuable data, including up-to-date information on new loads, pet loads, bullets and techniques. \$4.95.

## Lyman Shotshell Handbook 1st Edition

This reloading handbook covers every aspect of shotshell reloading. It includes over 1000 tested loads covering all gauges; 10, 12, 16, 20, 28, and 410. Complete "How to Reload" section on choosing a load, factory velocities, assembling shotshells, etc. Finger tabbed and color coded for speed and ease of reference. The large reference section covers up-to-date pressure information, full color case identification chapter, plus chapters on wads, patterns, powder and primers. An indispensable guide for the shotshell reloader. \$3.00



## Principles and Practice of Loading Ammunition by Earl Naramore

Actually two volumes in one. The first part (565 pp.) deals with ballistics and the principles of cartridge making—plus the chemistry, metallurgy, and physics involved. The second part (350 pp.) is a thorough discussion of the mechanics of loading cartridges. Nothing else quite approaches this superb work. Stackpole, Harrisburg, Pa. \$14.95



## Pacific Shotgun Handloading Manual

Devoted to the reloading of shotshells exclusively, most aspects of component selection and manufacture are covered in the 106 pages of this book. 20 pages of loading data for 12, 16, 20, 28 and 410 shotshells are included. While slanted toward Pacific tools the information applies to other manufacturers' tools as well. \$3.00.

## Pacific Rifle and Pistol Manual

Metallic cartridge loaders will find this 318-page manual comprehensive in scope and carrying good, detailed information on most aspects of load development and performance. More than 5000 loads for the most popular 100 cartridges are given—useful with components by many manufacturers—including data for the 17 caliber wildcats. A catalog of Pacific metallic tools is carried at the back of the book for ready reference. \$3.50.

## Powley Computer for Handloaders

This handy 4" x 9" slide chart computes quickly and accurately the following data for handloaders: Most efficient powder for guns using Military Rifle powders. Best powder for combination of bullet weight and case. Powder charge. Estimated velocity. From Homer Powley. \$4.50

## Powley PSI Calculator

Used in conjunction with the Powley Computer and a counter chronograph, this 3" x 8½" slide chart supplies pounds-per-square inch chamber pressures. A very useful tool for handloaders. Available from Hutton Rifle Ranch. \$3.00

## RCBS Reloading Guide

Although of small format and containing only 36 pages, this book is just what the novice reloader needs. Concise, fact-filled articles by some of the best known, knowledgeable writers in the field tell step-by-step loading procedures and component selection. A few "beginning" loads for 17 popular calibers are also included. Price \$1.00.

## Why Not Load Your Own? by Col. Townsend Whelen

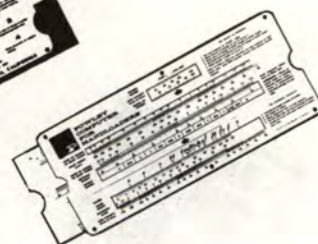
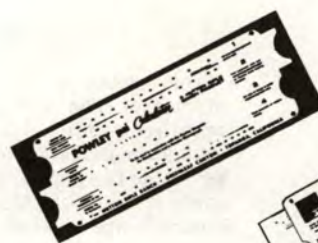
Here's a handloading book for everybody. The late Col. Whelen, long-time dean of firearms writers, covers the handloading operations in clear concise language. 520 basic loads, ranging from the 22 Hornet to the 45-70, are thoroughly covered, as are basic tools and accessories. A. S. Barnes & Co., New York, 1957, 4th ed. rev. 237 pp., many illustrations. \$5.95.

## Cartridge Conversions George C. Nonte, Jr.

The single reference book for handloaders who want to convert commercially available cartridge cases for use in shootable but obsolete arms. Tools and materials needed for case reforming are covered as well as step-by-step instructions on the procedures. Over 300 cartridge data sheets are included, giving complete information on adaptable cases, forming operations required and loading data. 404 pp. illustrated. Stackpole Co., Harrisburg, Pa., \$8.95.

## NRA Handloaders Guide

An enlarged and revised edition of the earlier *NRA Illustrated Reloading Handbook*. The new work is 88 pages larger, contains 75 major articles and 33 short articles on handloading in general. In addition there are 56 articles of specific loading information for rifles, shotguns and handguns. An invaluable volume, one that should be on every handloader's bench. National Rifle Assn., publishers, Washington, D.C. 20036. \$5.00 (NRA members' price, \$4.00).





## Complete Guide to Handloading by Philip B. Sharpe

A comprehensive, authoritative coverage, but somewhat dated today. This revised 3d edition (1953) of the "hand-loader's bible" gives much information on tools and techniques, old and semi-new, and on every phase of handloading. Containing over 8000 individual loads for rifle, revolver and pistol cartridges, it discusses practically every variety of shell and primer, bullet and bullet mould, for rifle and revolver. Funk & Wagnalls, New York. Fully illustrated, 734 pages. Price \$10.00.

## Speer Ballistics Calculator

A handy item for all handloaders, it will accurately calculate bullet drop, mid-range trajectory and remaining velocity up to 1000 yards range. From Speer, Inc. \$2.95 postpaid

## Reloader's Guide by R.A. Steindler

A useful volume on handloading by long-time practitioner Bob Steindler. This book will introduce the beginner to reloading and suggest refinements to the advanced operator. Tools, components and loads are covered at length. Shooter's Bible Publications, South Hackensack, N.J. \$3.95

## Sierra First Edition

Sierra has completed their first reloading manual that features complete loading data for all the Sierra rifle and pistol bullets, extensive external ballistic data and a complete reference section with an index and glossary. It comes in a heavy duty 3-ring binder cover with lots of printed pages the reloader can insert next to his favorite cartridges to record his own results. Price \$4.85.

## SAS Bullet Swage Manual by Ted Smith

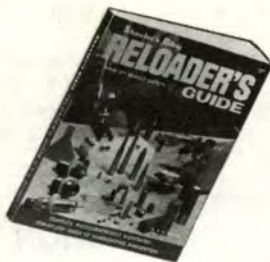
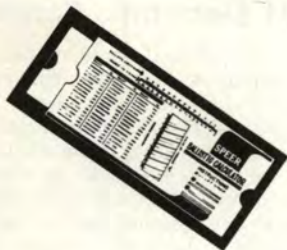
Whether you're a beginner or an expert at bullet swaging, this 68 page book by Ted Smith is a good addition to your library. Step by step instructions are given, even the facts necessary to order your own custom dies, like an expert. The information is general, but many fine points are made which pertain to SAS products and those of others manufacturers. Price \$2.00.

## Speer Manual for Reloading Ammunition No. 8

A very authoritative reloading manual containing 448 pages of "how-to" illustrations, detailed instruction, complete ballistic tables, special techniques, trouble shooting, glossary of terms ... everything for the beginner or expert. The rifle section alone contains 2000 new loads (including the best wildcats), latest powders, bullets and cartridges. The book is profusely illustrated and attractively hard bound to withstand constant use. \$3.95.

## Personal Firearms Record Book Handloaders Record Book

This book was developed to help the handloader build an accurate and effective system for evaluating the results of his efforts. The special record form for recording data on components, firing conditions and performance was designed with the aid of many experts in the field. The looseleaf construction of the book makes it easy to shift, add or drop records as required. Covers are pliable, heavy-duty vinyl. Comes complete with a supply of record sheets and a set of die-cut dividers permitting records to be kept by caliber or firearms. Size: 4½" x 7". \$3.95.





## Notes on Chronographs .....

The chronograph, at one time only for the advanced experimenter, is fast becoming a tool within the reach of more handloaders. Modern production methods and new, improved designs have aroused the interest in this instrument of more and more handloaders. Now many can pur-

chase well-made, dependable instruments capable of accurate readings previously available only to the owners of expensive cumbersome machines. This, of course, is only the beginning. It is not difficult to foresee smaller, less expensive chronographs. Compact transistor types are al-

ready here that allow the shooter excellent mobility.

While not yet inexpensive enough for all, the present prices present an opportunity for clubs or groups to have the facilities available for accurate evaluation of members' loads.

AVTRON T973



### AVTRON K100-K101 Electronic Screens

Fully solid state for utmost reliability, these latest photoeye chronograph screens entirely eliminate false triggering caused by vibration, muzzle blast, flash or ambient light changes. Development tests showed that muzzle flash from a 25mm cannon fired in a dark room did not cause false triggering. Most of the electronic components are separately contained, may be remotely located, away from any danger of a wild shot! 110-Volt operated, these Avtron electronic screens were designed for use with Avtron chronographs, but may also be adapted to other instruments. Both models are housed in sturdy metal frameworks, black-crackle finished, as in the metal container for the electronics.

Model K100 screens (2) have 213 square inches of sensitive area, are intended for professional use. .... **\$590.00**

Model K101 screens (2) with 170 square inches, designed for the advanced amateur ballisticians. .... **\$495.00**



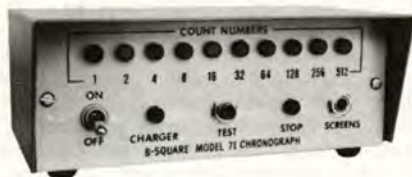
AVTRON K233

### AVTRON T973 Chronograph

Avtron's latest digital chronograph uses solid-state integrated (transistorized) circuits. A 100,000 cycle crystal-controlled time base gives a direct time-interval readout—no adding up of numbers is required. The readout figure is easily converted to velocity (feet per second) via the tables furnished. Powered by a 6-volt lantern battery, the new unit offers the serious experimenter-handloader the high accuracy (plus or minus 0.00001-second) found in other Avtron chronographs at a relatively low price. Complete with leads, 100 screens and two screen holders (less battery). .... **\$159.00**

Extra screens, per 100. .... **\$7.95**

B-SQUARE



### AVTRON K233 Counter Chronograph

This model features in-line 4 digit readout and is completely portable. High frequency crystal controlled time base, one million cycles per second, is incorporated to give high resolution. Circuitry allows use of standard screen spacings, 5, 10 and 20 feet. Unit may be used with expendable screens or Avtron photoelectric screens. K233 can be had with either battery or AC power supply (specify) and comes in a rugged steel case with 100 printed screens, two screen holders, interconnection cables and instructions. .... **\$415.00**

Extra screens, per 100. .... **\$7.95**

### Chronograph Specialists Model 200

Introduced early in 1970, this 6-V battery-operated and fully integrated silicon-transistorized chronograph offers 0.01% accuracy. The crystal-controlled oscillator operates at 500,000 cycles, and a compact 2-ft. screen separation is suggested. Readout is direct in microseconds—a knob is rotated through 3 ranges. A test switch to verify screen connections is included with this light (2 lbs.) and compact instrument. With 6-V power cord, cables, velocity tables, full instructions and 100 screens. .... **\$34.95**

### B-SQUARE Model 71 Chronograph

An economical unit that is battery operated and can be recharged. It is crystal controlled, and like others, counts time elapsing between the breaking of the start and stop screens. Count numbers are added and velocity is taken from provided chart. There is no "reset" necessary before shooting again. Uses any type screens, checks all velocities from 250 fps to 6000 fps. Comes complete with test screens, screen cables, holders, brackets, and instructions. .... **\$149.95**

Extra screens, per hundred. .... **\$9.95**



## OEHLER Model 21 Chronograph

Designed to replace the Model 20 chronograph. Unit has 1,000,000 pulse-per-second crystal oscillator providing microsecond time resolution, five digit display of time allows measurement of low velocities without reducing screen spacing. Time is directly displayed on indicator tubes. Comes in aluminum case 3"x7½"x9" and operates from conventional commercial power. Carries three year warranty. Complete ..... **\$350.00**



OEHLER MODEL 21

## OEHLER Model 55 Ballistic Screens

These screens provide a large shooting aperture of 28"x16" with a rectangular sensitive area of approximately 24"x14". Each screen is 36" high, 18¼" wide and approximately 3½" deep. The units are built of steel and can be joined to provide even larger apertures. The output (via BNC connector) is a 12 volt pulse with duration adjustable from 2 to 8 milliseconds. A sensitivity adjustment is provided. Price each ..... **\$200.00**



OEHLER

## OEHLER Model 10 Chronograph

The 400 kilocycle oscillator of this unit makes a theoretical accuracy of 2.5 microseconds possible. The case measures 8"x5"x4" and weighs 3 lbs, including the 3 flashlight cells used for power. Electronic circuitry has the equivalent of 188 transistors packaged in miniature integrated circuits. The system comes with batteries, screen holders, connecting cables and 50 screens. Add \$2.00 for shipping. .... **\$89.95**

Extra printed screens per hundred ..... **\$6.95**

## OEHLER 50B Photoelectric Screens

Optical detector unit is completely transistorized and uses ultra-fast solid state light sensors to detect passage of a bullet. No adjustments required to use the screens in any ambient light conditions. Fluctuations in the ambient light will not trigger the screens. No printed screens, wires or tapes. Available as Optical Detector Semi-Kits only. Only one output is provided (via BNC connector) and is a 12 volt pulse of approximately 2 millisecond duration. Per pair ..... **\$219.00**



OEHLER

## SUNDTEK Model 150 Chronograph

This unit has 5 digits of information displayed, one ft./sec. accuracy at 5000 fps, resolution of 0.1 microseconds - one count and is compatible with mechanical and most breakwires. Operating frequency is 10,000,000 pulses per second. Requires 115-V or can be operated by a battery giving 6-volts (15 Watts), like a car battery. Unit is 3½"x9"x8" and weighs 5½ lbs. Price includes two mechanical breakwire holders, 100 printed paper breakwires, 20' and 30' coaxial cables, time to velocity tables and instructions ..... **\$450.00**



SUNDTEK 1500

## SUNDTEK Model 1500 Chronograph

Distance register calculations and readout are based upon a fixed screen separation of ten feet. Measures velocities of 775 to 9999 ft./sec. Operating frequency is 10 MHz (10,000,000 pulses per second). Computes a 5 digit time to a 4 digit velocity. Optional 77.5 to 9999.0 fps measurements, AC and DC operation, time and velocity capability. Unit measures 3½"x9"x12½" and weighs 7 lbs ..... **\$875.00**



TECHSONICS

## TELEPACIFIC Model TPB-01 Chronograph

This economical, 6 lb. chronograph has a time base of 400 Kilocycles, time resolution of 2.5 microseconds, and a counter capacity of 3839 counts. Power source is two 6 volt dry cells. The Telepacific "Permascreens" permit the repetitive use of one pair of screens for up to 20 shots without replacement. Price includes the chronograph, front and rear screen frames, five sets of "Permascreens" and technical manual with velocity tables to convert readout ..... **\$165.00**

## TECHSONICS Model 65 Chronograph

The smallest of the currently available all transistor chronographs, this unit is powered by a 9-Volt transistor radio battery. The meter reads directly in feet per second and ordinary kitchen foil is used for bullet screens with the tape holders provided. Extremely simple to operate. Unit is available from Micro Sight Company. .... **\$69.95**



## Cartridge Boxes and Labels

Cartridge boxes, be they plastic or cardboard, are a great convenience to the handloader, as they provide dust-free storage and a means to keep loads separated. The bottoms of the large-caliber plastic pistol boxes make excellent loading blocks for rifle cartridges.

Labels and record sheets, especially made for handloaders, provide a concise, uniform means of permanently recording all pertinent load data.



MTM

FITZ Amm-O-Safe. Soft, quiet polyethylene cartridge boxes. Thumb cut-out. Two rifle, two handgun sizes. High-visibility Hunter Red color. Each ..... **99¢**

FLAMBEAU Shell and cartridge boxes for popular gauges, calibers. Polyethylene, with snug-fitting tops. Shotgun sizes, **\$1.25**; rifle and handgun. .... **\$1.00**

HERTER'S Opaque, non-reflecting red or white soft plastic; friction tight covers, rounded corners. For shotgun, **49¢**; rifle or handgun ..... **47¢**



FLAMBEAU

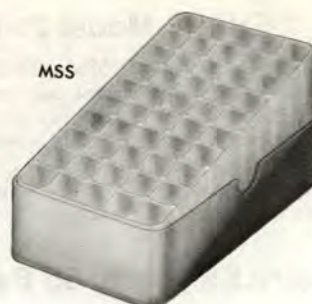


WILLIAMS

HODGDON Compartmented plastic ammo boxes are waterproof and dirt tight. Close fitting tops. Highly visible orange color. Available in two rifle and two pistol sizes. Rifle boxes hold 20, pistol hold 50 rounds. Each ..... **79¢**

MSS Flexible, opaque, white plastic boxes for most sizes of rifle, handgun and 12-ga. shotshell. Rounded corners, friction tight covers ..... **50¢**

MTM Case-Gard Unique ammo boxes made of Polypropylene hold 50 rounds. Hinge is guaranteed for 1 million openings. Positive latch locks top. Load and sight data label inside top. Five sizes available, two for pistol cases and three for rifles. Pistol sizes **\$1.25**, rifle-size boxes are ..... **\$1.95**



MSS



FITZ

PADDOCK A complete line of cartridge boxes for all rifle calibers and 12-ga. shells. Write for prices.

SPEER Hunter's Ammo Pack. Divider type, yellow plastic box assembles 4 ways to hold 20 rifle cartridges of most calibers from 22-250 through 8x57 ..... **\$1.00**

WILLIAMS Partitioned fiberboard boxes for most medium-size rifle cartridges (capacity 20) and for 38 Spl. handgun wadcutters (capacity 50). Each ..... **20¢**

### Cartridge Box Size Chart

20 Rounds Rifle 222-30-06	20 Rounds 300 H&H-375 Weatherby	50 Rounds 38 Spl., 22 H., etc.	50 Rounds 44 & 45 pistol
Fitz R, Herter 1, Flambeau 5210, Williams SR-20 or SR-30	Fitz M, Herter IV, Flambeau 5211	Fitz 3, Herter II, Flambeau 5212, Williams SP38WC	Fitz 4, Herter III, Flambeau 5213,

## BRYNIN Ammo-Info Labels

Self-adhering 2"x3" labels with peel-off backing. Stick permanently to any cartridge container. Space for all pertinent loading data, plus notes. Price per roll of 500. .... **\$5.00**

## PFRB Handload Ammo Labels

The Personal Firearms Record Book Co. offers 1"x2 3/4" pressure-sensitive cartridge box labels. Sold in flat sheets, having 30 labels each, these attach firmly to even the new plastic boxes and provide space for complete load data. Price per sheet. .... **85¢**

Five or more sheets, each. .... **50¢**

RELOADED SHOTGUN SHELLS			
GAUGE		LOADED FOR	
<input type="checkbox"/> HIGH BRASS		<input type="checkbox"/> SKEET	
<input type="checkbox"/> LOW BRASS		<input type="checkbox"/> TRAP	
		<input type="checkbox"/> HUNTING	
BRAND		GAME	
SHELLS		NO.	
GRAINS		PRIMER	
POWDER		TYPE	
OZS. of NO.		O.P. WAD	
SHOT		SPACER WAD	
		SIZE	
		LBS. PRESSURE	
		WITH CRIMP	
		TYPE	

## HERTER'S Labels and Data Sheets

Gummed cartridge box labels with ample room to record just about all load information. Per 1000 ..... **\$4.05**

Punched for standard ring binders, these 8 1/2"x5 1/2" sheets have space for recording all pertinent load data. Price per 1000 ..... **\$7.85**

## JASCO Reloader's Labels

Gummed shotgun box labels are printed in red. Space for 14 items of information. Per 40. .... **\$1.10**

Pressure sensitive metallic ammo-box labels adhere firmly—even on plastic. Space for 14 items of information. Printed in red, per 27. .... **\$1.10**

## PETERSON Handload Labels

Pressure-sensitive labels, 2 sizes, in a convenient roll dispenser that automatically strips off the protective backing as labels are pulled out. Spaces for date and loading data.

2"x2 1/2" (for typewriter feeding), per 1000. .... **\$11.00**

1"x2" (fit end of cartridge box). Price per 1000 ..... **\$7.00**



# HANDLOADER'S TRADE DIRECTORY

## NOTICE

The Gun Control Act of 1968 prohibits mail sale of most components. We continue to list the suppliers below, however, because A) a repealer may be passed to allow sales by mail, and B) the firms shown may be able to direct you to a local licensed dealer handling their products.

## A

A & M Rifle Co., Box 1713, Prescott, Ariz. 86301  
 A & W Engineering (see Diverter Arms Inc.)  
 Ackley, P.O., 5448 Riley Lane, Salt Lake City, Utah 84107  
 Acme Industries, Box 101, Kaukauna, Wis. 54130  
 Alcan (see Smith & Wesson-Fiocchi)  
 Allied Prod. Co., 734 N. Leavitt, Chgo., Ill. 60612 (Cor-O-Dex)  
 Alpha-Molykote, Dow Corning, 45 Commerce Dr., Trumbull, Conn. 06601  
 American Spec. Lubricants, Box 4275, Long Beach, CA 90804 (Mirror Lube)  
 Amron Corp., 525 Progress Ave., Waukesha, Wis. 53180  
 Anchor Alloys Co., 966 Meeker Ave., Brooklyn, N.Y. 11222  
 Anchor Plastics, P.O. Box 300, Logansport, Ind. 46947 (Sullivan)  
 Anderson Mfg. Co., Royal, Ia. 51357  
 Armory C-H Inc., see C-H  
 Aurand's, 229 E. 3rd St., Lewistown, Pa. 17044  
 Austin Powder Co. (see: Red Diamond Distr. Co.)  
 Auto Mag, 660 Arroyo Pkwy., Pasadena, CA 91105  
 Automatic Reloading Equipm., Inc., 1602 Babcock, Costa Mesa, CA 92627  
 Avtron Mfg. Inc., 10409 Meech Ave., Cleveland, Ohio 44105

## B

B-Square Co., Box 11281, Ft. Worth, Tex. 76110  
 Badger Shooters Supply, Owen, Wis. 54460  
 Bahler Die Shop, Box 386, Florence, Ore. 97439  
 Bair Co., P.O. Box 4407, Lincoln, Neb. 68504  
 Bill Ballard, P.O. Box 656, Billings, Mont. 59103  
 Belding & Mull, 100 N. 4th St., Philipsburg, Pa. 16866  
 Belmont Products, Rte. #1, Friendsville, Tenn. 37737  
 Birchwood-Casey, 7900 Fuller Rd., Eden Prairie, Minn. 55343  
 Blackhawk Small Arms Ammunition East, Box C2274, Loves Park, Ill. 61111  
 Blackhawk Small Arms Ammunition West, Box 285, Hiawatha, Kans. 66434  
 Bonanzo Sports Inc., 412 Western Ave., Faribault, Minn. 55021  
 Bowlin, Gene, 3602 Hill Ave., Snyder, Tex. 79549  
 Brown Precision Co., 5869 Indian Ave., San Jose, Cal. 95123  
 A. V. Bryant, 72 Whiting Rd., E. Hartford, Conn. 06118  
 Brynin, Milton, Box 162, Fleetwood Sta., Mt. Vernon, N.Y. 10552  
 Bullet Pouch, Box 4285, Long Beach, Calif. 90804 (Mirror-Lube)

## C

C'Arco, P.O. Box 2943, San Bernardino, CA 92406  
 C-H Tool & Die Corp., Box L, Owen, Wis. 54460

Camdex, Inc., 18619 W. Seven Mile Rd., Detroit, Mich. 48219  
 Campbell, Russell, 219 Leisure Dr., San Antonio, Tex. 78201  
 Carbide Die & Mfg. Co., P.O. Box 226, Covina, Ca. 91706  
 Cascade Cartridge, Inc. (see Omark CCI, Inc.)  
 Chellife Corp., 607 Spring Valley Rd., Richardson, Tex. 75080  
 Chopie Mfg. Co., 531 Copeland, La Crosse, Wis. 54601  
 Chronograph Specialists, Box 5005, Santa Ana, Ca 92704  
 CIL, Box 10, Montreal, Que., Canada  
 Clenzoil, Box 1226, Sta. C, Canton, O. 44708  
 Clerke Prod., 2219 Main St., Santa Monica, CA 90405  
 Coats, Lester, 416 Simpson Ave., No. Bend, Ore. 97459  
 Colorado Shotgun Ammunition, 365 So. Moore St., Lakewood, Colo. 80226  
 Container Dev't Corp., 424 Montgomery St., Watertown, Wis. 53094  
 Cooper Eng., 612 E. 20th St., Houston, Tex. 77008 (Tru-Neck case gauge)  
 Cooper-Woodward, Box 972, Riverside, Calif. 92502  
 Cor-O-Dex, Allied Prod. Co., 734 N. Leavitt, Chicago, Ill. 60612  
 Cumberland Arms, 1222 Oak Drive, Manchester, Tenn. 37355

## D-E

DWM, Speer, Inc., Box 896, Lewiston, Ida. 83501  
 Design & Development Co., 1002 N. 64th St, Omaha, Neb. 68132  
 J. Dewey Gun Co., Clinton Corners, N.Y. 12514  
 Diverter Arms Inc., P.O. Box 22084, Houston, Tex. 77036  
 Division Lead Co., 7742 W. 61st Place, Summit, Ill. 60502  
 Dixie Gun Works, Inc., Hwy. 51, South, Union City, Tenn. 38261  
 Douglas G. R., Co. Inc., 5504 Big Tyler Rd., Charleston, W. Va. 25312  
 DuPont Sales Div., Wilmington, Dela. 19898  
 Eagle Products Co., 1520 Adelia Ave., So. El Monte, Calif. 91733  
 Echo (see Herkner)  
 Elk Mountain Shooters Supply, 2020 Road 44, Pasco, WA 99301  
 English, W. H., 4411 So. W. 100th, Seattle, Wash. 98146 (PAK-Tool)

## F

Farmer Bros. Mfg. Co., 1102 Washington St., Eldora, Ia. 50627  
 Federal Cartridge Corp., 2700 Foshay Tower, Minneapolis, Minn. 55402  
 The Fergusons, 27 W. Chestnut, Farmingdale, N.Y. 11735  
 Fitz, Box 49797, Los Angeles, Calif. 90049  
 Flambeau Plastics Corp., 801 Lynn, Baraboo, Wisc. 53913  
 Forster-Appelt Mfg. Co., 82 Lanark Ave., Lanark, Ill. 61046  
 Frontier Cartridge Co., Inc., Box 906, Grand Island, Neb. 68801



## G

Gaida, David J., 1109 So. Millwood, Wichita, Kans. 67213 (primers, brass)  
Gene's Gun Shop, 3602 Hill Ave., Snyder, Tex. 79549  
Godfrey Reloading Supply, R.R. #1, Box 688, Brighton, Ill. 62012  
Goerg Ent., 3009 So. Laurel St., Port Angeles, Wash. 98362  
Gopher Shooter's Supply, Box 246, Faribault, Minn. 55021  
Green Bay Bullets, 233 N. Ashland, Green Bay, Wis. 54303  
Gun Clinic, 81 Kale St., Mahtomedi, Minn. 55115

## H

Hart, Clyde, R.D. 2, Lafayette, N.Y. 13084  
Hart, Ed, U.S. Rte. 15, Cohocton, N.Y. 14826 (Meyer shotgun slugs)  
Hart, Robert & Son, 401 Montgomery St., Nescopeck, Pa. 18635  
Hemsted, Frank A., (Hemp's), Box 281, Sunland, Calif. 91040  
Hensley & Gibbs, Box 10, Murphy, Ore. 97533  
Hercules Inc., 910 Market St., Wilmington, Dela. 19899  
Herkner, E. C. Co., Box 5007, Boise, Idaho 83702 (Echo)  
Herter's Inc, Waseca, Minn. 56093  
Hodgdon Powder Co., 7710 W. 50 Hiway, Shawnee-Mission, Kans. 66202  
Hollywood Reloading (see Whitney Sales Co.)  
Horton Ballistics, North Waterford, Me. 04267  
House, N. E., Middletown Rd., E. Hampton, CT 06424 (Zinc bases)  
Hulme Firearm Service, Box 83, Millbrae, Calif. 94030  
Hutton Rifle Ranch, P.O. Box 898, Topanga, Calif. 90290

## I-J-K

I & I Co., 709 12th St., Altoona, Pa. 16602  
Independent Mach. & Gun Shop, 1416 N. Hayes, Pocatello, Ida. 83201  
J & G Rifle Ranch, Turner, Mont. 59542  
JASCO, Box 49751, Los Angeles, Calif. 90049  
Javelina Prod., Box 337, San Bernardino, Calif. 92402  
Jet-Aer Corp., 100 Sixth Ave., Paterson, N.J. 07524  
Kexplore, Inc., Box 22084, Houston, Texas 77027  
Kuharsky Bros., Inc., 2425 W. 12th St., Erie, Pa. 16500  
Kush Plastics, P.O. Box 366, Palatine, Ill. 60067

## L

L.L.F. Die Shop, 1281 Highway 99 N., Eugene, Oregon 97402  
Lachmiller Eng. Co., Box 97, Parkesburg, Pa. 19365  
Lage (see Farmer Bros.)  
Laszlo, S. E., 200 Tillary St., Brooklyn, N.Y. 11201  
Lee Custom Eng., 21 E. Wisconsin, Hartford, Wisc. 53027  
Lehigh Chem. Co., Box 120, Chestertown, Md. 21620 (Anderol)  
Lenz Products Co., Box 1226, Sta. C, Canton, Ohio 44708  
Lifetyme Dies, Box 226, Covina, Cal. 91722  
Liquid Wrench (see Radiator Specialties)  
Ljutic Industries, 918 N. 5 Ave., Yakima, Wash. 98902 (Mono-wads)  
Lock's Philadelphia Gun Exch., 6700 Rowland Ave., Philadelphia, Pa. 19149  
Loos, J. T., Box 41, Pomfret, Conn. 06258  
Lyman Gun Sight Corp., Middlefield, Conn. 06455

## M

MTM Molded Prod., 5680 Webster St., Dayton, OH 45414  
Magma Eng. Co., Box 881, Chandler, Ariz. 85224  
Mayville Eng. Co., Box 267, Mayville, Wisc. 53050 (MEC)  
McKillen & Heyer, Inc., 3871 No. Kirtland R., Willoughby, O. 44094  
McLean, Paul, 2670 Lakeshore Blvd., Toronto 14, Ont., Canada  
McMillan, Pat, 1828 E. Campo Bello Dr., Phoenix, Ariz. 85022  
Merit Gun Sight Co., Box 995, Sequim, Wash. 98382  
Michael's Antiques, Box 233, Copiague, N.Y. 11726  
Micro Shooter's Supply, Box 213, Las Cruces, N. Mex. 88001 (Micro-Lube)  
Micro-Sight Co., 242 Harbor Blvd., Belmont, Calif. 94002  
Minnesota Shooters Supply (MSS), 1915 E. 22nd St., Minneapolis, Minn. 55404  
Mint Luster Cleaner, Inc., 1102 N. Division, Appleton, Wis. 54911  
Mirror-Lube, Amer. Spec. Lubricants, Box 4275, Long Beach, CA 90804  
Moderntools Corp., Box 407, Woodside, N.Y. 11377  
Molykote (Alpha-Molykote Corp.), 65 Harvard, Stamford, Conn. 06904  
Motor Mica (Scientific Lub. Co.), 3753 Lawrence Ave., Chicago, Ill. 60625  
Murdock Lead Co., Box 5298, Dallas, Tex. 75222

## N

National Lead Co., Box 831, Perth Amboy, N.J. 08861  
Neise, Karl A., Inc., 56-02 Roosevelt Ave., Woodside, N.Y. 11377 (Moderntools)  
Norma-Precision, South Lansing, N.Y. 14882  
Normington Co., Box 156, Rathdrum, Ida. 83858  
Nuler, John, 12869 Dixie, Detroit, Mich. 48239  
Nutec, Box 1187, Wilmington, Del. 19899 (Dry-Lube)

## O-P

Oehler Research, Box 9135, Austin, Tex. 78756  
Ohaus Scale Corp., 29 Hanover Rd., Florham Park, N.J. 07932  
Omark-CCI, Inc., Box 856, Lewiston, Ida. 83501  
Oregon Ammo. Service, Box 19341, Portland, Ore. 97219  
Outers Laboratories, Inc., P.O. Box 37, Onalaska, Wis. 54650  
Pacific Tool Co., Box 4495, Lincoln, Neb. 68504  
Paddock, C. W., 1589 Payne, St. Paul, Minn. 55101  
Pendleton Gunshop, 1200 S.W. Hailey Ave., Pendleton, Ore. 97801  
Perfection Die Co., 1614 S. Choctaw, El Reno, Okla. 73036  
Personal Firearms Record Book, Box 201, Park Ridge, Ill. 60068  
Peterson Labels, P.O. Box 186, Redding Ridge, CT 06876  
Phelps Reloader Inc., Box 4004, E. Orange, N.J. 07019  
Pindell, Ferris, R.R. 3, Box 205, Connersville, Ind. 47331 (bullet spinner)  
Plum City Ball. Range, Box 128, Plum City, Wisc. 54761  
Pomeroy, Robert, Morison Ave., East Corinth, Maine 04427  
Ponsness-Warren Inc., P.O. Box 861, Eugene, Ore. 97401  
Potter Engineering Co., 1410 Santa Anna Dr., Dunedin, Fla. 33528  
Powley, Marian, 19 Sugarplum Rd., Levittown, PA 19056

## Q

Quinetics Corp., 3740 Colony Dr., San Antonio, Tex. 78230

## R

RCBS, Inc., Box 1919, Oroville, Calif. 95965  
Radiator Specialties, Box 10628, Charlotte, N. C. 28201  
Recreation Products Res., 158 Franklin Ave., Ridgewood, N. J. 07450  
REDCO, Box 15523, Salt Lake City, Utah 84115  
Red Diamond Distributing Co., 1304 Snowdon Dr., Knoxville, Tenn. 37912 (black powder)  
Redding-Hunter Co., 114 Starr Rd., Cortland, N.Y. 13045  
REMCO Co., 1404 Whitesboro St., Utica, N. Y. 13502  
Remington Arms Co., Bridgeport, Conn. 06602  
Reynolds, B. T., 835-B Arcadia Ave., Arcadia, CA 91006 (bullet gauge)  
Rifle Ranch, Rte. 1, Prescott, Ariz. 86301  
Rochester Lead Works, 76 Anderson Ave., Rochester, N.Y. 14607  
Rorschach Prec. Prod., Box 1254, Waco, Tex. 76703  
Rotex Mfg. Co. (see Texan)  
Ruhr-American Corp., So. East Hwy. No. 55, Glenwood, Minn. 56334

## S

SAECO, 726 Hopmeadow St., Simsbury, CT 06070  
SAS (Shooters Accessory Supply), Box 250, N. Bend, Ore. 97459  
Sanderson's, 724 W. Edgewater, Portage, Wis. 53901  
Santa Anita Eng. Co. (SAECO), Box 202, Simsbury, CT 06092  
Schwartz Custom Guns, 9621 Coleman Rd., Haslett, MI 48840  
Scientific Lubricants, 3753 Lawrence Ave., Chicago, Ill. 60625  
Shilo Ind., Inc., 173 Washington Pl., Hasbrouck Hts., N.J. 07604 (4-cavity mould, round ball)  
Shoffstall's Model Shop, 744 Ellis Pl., E. Aurora, N. Y. 14052  
Shooters Serv. & Dewey, Clinton Corners, N. Y. 12514  
Sil's Gun Products, 490 Sylvan Dr., Washington, Pa. 15301  
Simmons, Jerry, 713 Middlebury St., Goshen, Ind. 46526  
Simonson, Rob., Rte. 7, 2129 Vanderbilt Rd., Kalamazoo, Mich. 49002  
Smith & Wesson-Fiocchi, 3640 Seminary Road, Alton, Ill. 62002  
Speer, Inc., Box 896, Lewistown, Ida. 83501  
Sportsmen's Lab., Box 732, Anoka, Minn. 55303  
Star Machine Works, 418 10th Ave., San Diego, Calif. 92101  
Stoeger Arms Corp., 55 Ruta Ct., S. Hackensack, N. J. 07606  
Sullivan (see Anchor Plastics)  
Sundtek Co., P.O. Box 744, Springfield, Ore. 97477



## T-U-V

Techsonic (see Micro-Sight Co.)  
Telepacific Electronics Co., Inc., 3335 W. Orange Ave., Anaheim, CA 92804  
Testing Systems, Inc., 2826 Mt. Carmel Ave., Glenside, Pa. 19038  
Texan Reloaders, Inc., Box 5355, Dallas, Tex. 75222  
Three-D Co., Inc., 6020 Colfax, Lincoln, Nebr. 68507  
Val-Scott, 626 Casserly Rd., Watsonville, Calif. 95076  
Vamco (Valley Automatic Machine Co.), Box 67, Vestal, New York 13850  
Vickerman Mfg. Co., 505 W. 3rd Ave., Ellensburg, Wash. 98926  
Vitt, George N., 11 Sugar Loaf Drive, Wilton, Conn. 06897

## W-X-Y-Z

Walker Mfg. Inc., 8296 S. Channel, Harsen's Island, Mich. 48028  
(Berdan decapper)  
Weatherby Inc., 2781 Firestone Blvd., South Gate, Calif. 90280  
Webster Scale Co., Box 188, Sebring, Fla. 33870  
Whitney Cartridge Co., Box 608, Cortez, Colo. 81321  
Whitney Sales Co., Box 875, Reseda, CA 91335 (Hollywood)  
Whit's Shooting Stuff, Box 1340, Cody, Wyo. 82414  
Williams Gun Sight Co., Davison, Mich. 48423  
Wilson, L. E., Box 324, Cashmere, Wash. 98815  
Winchester-Western Div., Olin, New Haven, Conn. 06504  
Xelex Ltd., Box 66, Hawkesbury, Ont., Canada  
York-Cantrell, Inc., 30241 Rosebriar, St. Clair Shores, Mich. 48082  
(pressure tool)  
Zenith Ent., Rt. 1, Box 522, Del Mar, Calif. 92014  
Zimmerman, A., 127 Highland Trail, Denville, N. J. 07834

## CUSTOM AMMUNITION MAKERS

Some of the firms below offer custom loads for pistol, rifle and shotgun, while others may load only one type or the other. Write to them for their list or state your needs.

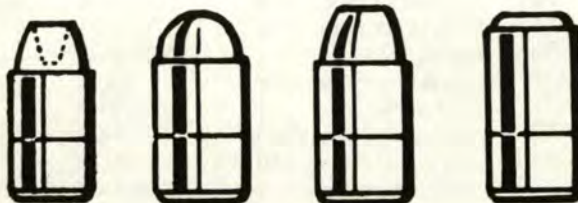
B & K Custom Rel. Serv., Lake 13, Rt. 1, Farwell, Mich. 48622  
Ballard, Bill, P.O. Box 656, Billings, Mont. 59103  
Caldwell Loading Serv., 1314 Monroe Dr., N.E., Atlanta, Ga. 30306  
Campbell, Russell, 219 Leisure Dr., San Antonio, Tex. 78201  
Colorado Shotgun Ammunition, 365 So. Moore, Lakewood, Colo. 80226  
Cumberland Arms, 1222 Oak Dr., Manchester, Tenn. 37355  
Custom Ammo & Gunsmithing, 390 S. Main, Moab, Utah 84532  
Dewey, J., Gun Co., Clinton Corners, N.Y. 12514  
Ellis, E. W., RFD 1, Box 139, Corinth, N.Y. 12822  
Epps, Ellwood, Clinton, Ont., Canada  
Gaida, David J., 1109 So. Millwood, Wichita, KS 67203  
Garrett's Sptg. Goods, 195 S. Oakdale, Kankakee, Ill. 60901  
Hutton Rifle Ranch, Greenleaf Canyon, Topanga, Cal. 90290  
KTW Inc., 710 Cooper-Foster Pk. Rd., Lorain, Ohio 44053  
Keeler, R. H., 1304 S. Oak St., Port Angeles, Wash. 98362  
Kennon, T. C., 5408 Biffle Rd., Stone Mtn., Ga. 30082  
Leon's Reloading Serv., 3945 N. 11th St., Lincoln, Neb. 68521  
Lincoln, Dean, 390 So. Main, Moab, Utah 84532  
Mansfield, Paul G., Box 83, New Boston, N.H. 03070  
Man-Tol Shells, Box 134, Bunnell, Fla. 32010  
Pomeroy, Robert, Morison Ave., East Corinth, ME 04427  
Sailer, Anthony, P.O. Box L, Owen, Wis. 54460  
Sanders, Bob, 2358 Tyler Lane, Louisville, Ky. 40205  
Super Vel Ctdge. Corp., 129 E. Franklin St., Shelbyville, Ind. 46176

3-D Co., 6020 Colfax, Lincoln, Neb. 68507  
Tillinghast, James, Box 568, Marlow, N. H. 03456  
Whitney Cartridge Co., P.O. Box 608, Cortez, Colo. 81321 (shotshells)

## BULLETMAKERS

Some of the manufacturers below make bullets for both rifle and handgun, while others supply only one type or the other. Write them for complete lists.

Accuracy Bullet Co., 2443 41st Ave., San Francisco, Calif. 94116  
Amm-O-Mart, Box 66, Hawkesbury, Ont., Canada (Curry Bullets)  
Bahler Die Shop, Box 386, Florence, Ore. 97439  
Baker, Lee, P.O. Box 1486, Valdosta, Ga. 31601 (17-cal.)  
Balickie, Joe, 6108 Deerwood Pl., Raleigh, N.C. 27607  
Barnes Bullets (see Colorado Customs Bullets)  
Bitterroot Bullet Co., Box 412, Lewiston, Ida. 83501  
Bullet Pouch, Box 4285, Long Beach, Calif. 90804  
Centrix Bullets, 2116 N. 10th, Tucson, Ariz. 85705  
Clark, Kenneth, 18738 Hiway 99, Madera, CA 93637  
Colorado Customs Bull., Rt. 1, Box 507-B, Montrose, Colo. 81401  
Cumberland Arms, 1222 Oak Dr., Manchester, Tenn. 37355  
Curry Bullets (see Amm-O-Mart, Canada)  
Dewey, J. Gun Co., Clinton Corners, N.Y. 12514  
Elk Mountain Shooters Supply, 2020 Road 44, Pasco, WN 99301  
Forty-Five Ranch Ent., 119 So. Main St., Miami, Okla. 74354  
Godfrey, Lynn, 2020 Road 44, Pasco, WN 99301  
Godfrey Rel., R.R. #1, Box 688, Brighton, Ill. 62012 (cast bullets)  
G. J. Godwin, 455 Fox Lane, Orange Park, Fla. 32073 (cast bullets)  
Hemsted, Frank A., (Hemp's), Box 281, Sunland, Calif. 91040  
Herter's Inc., Waseca, Minn. 56093  
Hi-Precision, 109 Third Ave., N.E., Orange City, Iowa 51041  
Hornady Mfg. Co., Box 1848, Grand Island, Neb. 68801  
House, N. E. Co., Middleton Rd., E. Hampton, Conn. 06424  
Jurras Munitions Corp. (see Super Vel)  
Kenru Reloading Service, 166 Normandy Ave., Rochester, N. Y. 14619  
KTW Inc., 710 Cooper-Foster Park Rd., Lorain, Ohio 44053  
L.L.F. Die Shop, 1281 Hwy. 99 North, Eugene, Ore. 97402  
Lee's Precision Bullets, P.O. Box 1486, Valdosta, Ga. 31601 (17-cal.)  
Lyman Gun Sight Corp., Middlefield, Conn. 06455  
Markell, Inc., 4115 Judah St., San Francisco, Calif. 94122  
McMillan, Pat, 1828 E. Campo Bello Dr., Phoenix, Ariz. 85022  
Miller Trading Co., 20 S. Front St., Wilmington, N. C. 28401  
Murphy, G.E., 2443 41st Ave., San Francisco, CA 94116  
(Accuracy Perfecast)  
Norma-Precision, So. Lansing, N.Y. 14882  
Northridge Bullet Co., Box 1208, Vista, Cal. 92083  
Nosler Bullets, P.O. Box 688, Beavertown, Ore. 97005  
Pomeroy, Robert, Morison Ave., East Corinth, ME 04427  
Remco, 1404 Whitesboro St., Utica, N.Y. 13502  
Remington Arms Co., 939 Barnum Ave., Bridgeport, Conn. 06602  
Sierra Bullets, Inc., 421 N. Altadena Dr., Pasadena, Calif. 91107  
Sisk Bullet Co., Box 398, Iowa Park, Tex. 76367  
Speedy Bullets, Box 1262, Lincoln, Nebr. 68501  
Speer, Inc., Box 896, Lewiston, Ida. 83501  
Stocking, C. H., Rte. 3, Hutchinson, Minn. 55350  
Super Vel, 129 E. Franklin, Shelbyville, Ind. 46176  
Taylor Bullets, 327 E. Hutchins Pl., San Antonio, Tex. 78221 (cast bullets)  
Winchester-Western, East Alton, Ill. 62024  
Wood, Fred, Box 386, Florence, Ore. 97439  
Zero Bullet Co., P.O. Box 1012, Cullman, Ala. 35055





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# Useful Information for the Handloader

## Bullet Sectional Density Formula

SD — Sectional Density  
W — Weight (grains)  
D — Diameter (inches)  
7000 — Number of grains per lb.

$$SD = \frac{W}{7000 D^2}$$

## Weight Equivalents

7000 grains=1 avoirdupois pound  
437.5 grains=1 avoirdupois ounce  
15.43 grains=1 gram  
.015 grains=1 milligram  
1 pound=453.6 grams

## Case Capacity (Volume) Formula

a — Weight of empty case  
b — Weight of case filled with water  
c — 252.8 grains (weight of 1 cubic inch of water)  
X (case volume)= $\frac{b-a}{c}$

## Composition of Common Alloys

	Tin	Antimony	Lead
Monotype	9	19	72
Linotype	4	12	84
Ideal #2	5	5	90
1-10 tin-lead	9	—	91
1-20 tin-lead	5	—	95
1-30 tin-lead	3	—	97
III. Bullet Alloy #4	—	—	—
III. Bullet Alloy #7	—	—	—
Lead only	—	—	100

## Metric Conversion Table

Millimeters.....	×	.03937	= Inches	
Millimeters.....	=	25.400	×	Inches
Meters.....	×	3.2809	= Feet	
Meters.....	=	.3048	×	Feet
Kilometers.....	×	.621377	= Miles	
Kilometers.....	=	1.6093	×	Miles
Square centimeters.....	×	.15500	= Square inches	
Square centimeters.....	=	6.4515	×	Square inches
Square meters.....	×	10.76410	= Square feet	
Square meters.....	=	.09290	×	Square feet
Square kilometers.....	×	247.1098	= Acres	
Square kilometers.....	=	.00405	×	Acres
Hectares.....	×	2.471	= Acres	
Hectares.....	=	.4047	×	Acres
Cubic centimeters.....	×	.061025	= Cubic inches	
Cubic centimeters.....	=	16.3866	×	Cubic inches
Cubic meters.....	×	35.3156	= Cubic feet	
Cubic meters.....	=	.02832	×	Cubic feet
Cubic meters.....	×	1.308	= Cubic yards	
Cubic meters.....	=	.765	×	Cubic yards
Liters.....	×	61.023	= Cubic inches	
Liters.....	=	.01639	×	Cubic inches
Liters.....	×	.26418	= U. S. gallons	
Liters.....	=	3.7854	×	U. S. gallons
Grams.....	×	15.4324	= Grains	
Grams.....	=	.0648	×	Grains
Grams.....	×	.03527	= Ounces, avoirdupois	
Grams.....	=	28.3495	×	Ounces, avoirdupois
Kilograms.....	×	2.2046	= Pounds	
Kilograms.....	=	.4536	×	Pounds
Kilograms per square centimeter.....	×	14.2231	= Pounds per square inch	

## Conversion Table — Millimeters to Inches

	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0		.003937	.007874	.01181	.015748	.019685	.023622	.027559	.031496	.035433
1	.03937	.043307	.047244	.051181	.055118	.059055	.062992	.066929	.070866	.074803
2	.07874	.082677	.086614	.090551	.094488	.098425	.102362	.106299	.110236	.114173
3	.11811	.122047	.125984	.129921	.133858	.137795	.141732	.145669	.149606	.153543
4	.157480	.161417	.165354	.169291	.173228	.177165	.181102	.185039	.188976	.192913
5	.196850	.200787	.204724	.208661	.212598	.216535	.220472	.224409	.228346	.232283
6	.236220	.240157	.244094	.248031	.251968	.255905	.259842	.263779	.267716	.271653
7	.275590	.279527	.283464	.287401	.291338	.295275	.299212	.303149	.307086	.311023
8	.314960	.318897	.322834	.326771	.330708	.334645	.338582	.342519	.346456	.350393
9	.354330	.358267	.362204	.366141	.370078	.374015	.377952	.381889	.385826	.389763
10	.393700	.397637	.401574	.405511	.409448	.413385	.417322	.421259	.425196	.429133
11	.433070	.437007	.440944	.444881	.448818	.452755	.456692	.460629	.464566	.468503
12	.472440	.476377	.480314	.484251	.488188	.492125	.496062	.499999	.503936	.507873
13	.511810	.515747	.519684	.523621	.527558	.531495	.535432	.539369	.543306	.547243
14	.551180	.555117	.559054	.562991	.566928	.570865	.574802	.578739	.582676	.586613
15	.590550	.594487	.598424	.602361	.606298	.610235	.614172	.618109	.622046	.625983



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