USING YOUR
HENSLEY & GIBBS
BULLET MOLD

FOREWORD

We'll try to make this as short and informative as possible, as you are undoubtedly wanting to start casting, and not just read about casting!

You have gone to the expense and taken the time to acquire a premium quality bullet mold, so before you "fire up" your new mold, let's take the time to go over some of the general points of procedure, and also touch on some of the finer points--the questions most often asked. While, frankly, there is no substitute for experience and practice (which is true of most things that are worthwhile, when you think about it), it is hoped that this information will assist you in producing the best possible bullets in the least amount of time.

This information is a compilation of our own experiences, and those of our customers. Your own equipment, alloy composition requirements and casting technique must all fit together to accomplish best results. You may, as you cast, evolve variations on these methods that will work better for you. If so, let us know. Maybe we can share them also.

SAFETY PROCEDURES

To safely cast bullets, there are a few rules to remember, other than dropping the mold on your foot (advice--don't)

They are--Remember, you are working with hot, molten alloy, so take precautions. Make sure the alloy melting pot is not in a position to be jarred or spilled, especially when breaking the sprue. The mold must be held together while alloy is "setting up". Be especially careful to wear appropriate clothing, such as gloves, shoes, long-sleeve shirt, and eye protection.

Use in a well ventilated area. Avoid breathing fumes--even when casting outdoors, it is a good idea to use an electric fan to carry fumes away. When placed advantageously, this air circulation can be also used to great advantage for regulation of the mold temperature. More on this later.

Take care that moisture stays out of the molten alloy. You would be amazed at the distance that molten alloy will fly, if you should, for instance, toss in a bullet that has moisture on it. It turns to super-heated steam--don't mess with it!

Be sure to carefully read the directions and safety precautions of the suppliers of your other casting accessories before using them.

Do not touch metal parts of hot molds or accessories, as serious burns could result. Always use wood grips when handling, and use gloves.

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CLEANING YOUR NEW BULLET MOLD

Don't try to "burn" out oil in the cavities--this works ok when cooking eggs in a frying pan, but bullets ain't eggs, and a bullet mold ain't a frying pan. Oil and other contaminants must not be present in cavities during the heating or casting process, as they will form gas pockets in the bullets as the contaminants vaporize as the molten alloy enters the cavities. The mold should be thoroughly cleaned in a good petroleum cutting solvent. We have also found automotive disk brake cleaners very handy for cleaning molds. It comes as an aerosol spray, is non-volatile, and works very well. Care should be taken to wear eye protection when using, as it tends to splash, due to force of the spray. (also see Cleaning in Maintenance Section)

MOLD PREHEATING--DETERMINING PROPER TEMPERATURE

This saves casting a whole bunch of bullets to bring the mold up to temperature, which may be great casting practice, but otherwise wastes one heck of a lot of time! What you need to make life easier is a "hotplate", usually electric, that you can plug in at the same time you turn on the electric melting furnace. The procedure, especially the first time, should go like this--take a piece of fine emery cloth, or wet-or-dry sandpaper, and polish a spot on the side of the outside surface of the mold block, down to the "white" original color of the cast iron. This should be in a location where you can see the color change as the mold comes up to temperature. This is your "thermometer". Set the mold blocks in an upright position on the hotplate. Support the handles at appropriate height so that the blocks are laying flat on the element for proper heat transfer. Start timing the process when everything is turned on. With a little luck, mold will be ready to use at approximately the same time as the melting furnace comes up to temperature. Carefully watch for color change. When blocks reach a light straw color (just a slight color change) mold should be about ready to cast with linotype alloy. Higher lead content alloys will usually need a slightly darker coloring (more heat). Holding wood grips firmly to hold blocks tightly closed,turn the mold upside down, and with blocks level, pour a small drop of molten alloy onto the bottom surface of blocks. Pour just enough to form a puddle or bead, that stands up above the block surface. Note--a nifty way to hold the blocks closed is with a clothespin type steel woodworking clamp (without the plastic workpiece pads), clamped over the blocks.

If the drop of alloy solidifies in the normal length of time--usually around ten seconds, give or take a few seconds, (check that alloy has actually set up, and not just "skinned" over by tapping lightly on it with a lead or wooden mallet. If the alloy underneath is still molten, wait a few seconds longer.) You have probably already guessed the reason for this rather strange procedure--if the blocks were originally much too hot, there's no harm done, as eventually the alloy will set up, and can easily be removed from the bottom of the blocks. If the alloy had been poured directly into the cavities of a considerably overheated mold, you would probably be spending a considerable amount of time letting the blocks cool, tediously removing lead fouling from between the blocks, and rerunning the whole procedure!

Let us assume the temperature has proven correct; it is now time to start casting bullets. Record the time it took for your mold and alloy to reach proper temperature, and use that time as a guideline each time you begin casting.

POURING THE ALLOY

If you are using a bottom pour furnace, place an end cavity sprue hole under the drop tube (pour spout). Some people prefer to pour from the farthest end to the nearest end, and some the reverse. Either way works. Start the pour, directing the stream into the sprue hole. When alloy has almost filled the cavity and sprue hole, move along to the next cavity, while the alloy continues to flow. This directs the alloy stream into cavities as much as possible, which provides pressure to fill out the bullets, yet allows for rapid production. See "Adjusting the pour height", page 9

NOTE--some people find that, after pouring all cavities in the trough, they gain a higher percentage rate of completely filled out bullets by flowing alloy back over the sprue, which is still molten, with the idea that this supplies further pressure and "feeds" the base of bullet to insure alloy is sufficient to fill out the corner at the point where cavity meets the sprue cutter. If you are using an open ladle, the same general system applies.

NOTE--small, closed spout ladles, such as Lyman produces, work well on one or two cavity molds with individual pour holes, but are NOT suitable for use with open trough, multi-cavity molds like ours.

After pouring alloy, watch sprue alloy. When it appears to have solidified, check by tapping the sprue lightly with a lead or wood mallet. (Sometimes the alloy has just "skinned" over, and is still molten underneath, and will wipe across bottom of sprue cutter when opening.) If alloy appears solid where it has been lightly dented, the mold should be ready to open.

OPERATING THE SPRUE CUTTER

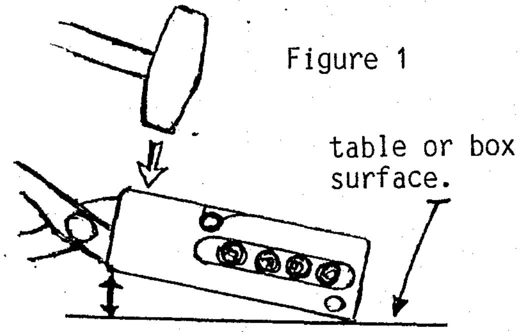


Figure 1

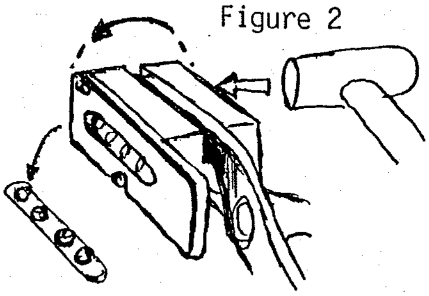


Figure 2

Turn mold a quarter-turn to the right. Strike sprue cutter with mallet, as shown in figure 1. If mold is held at an angle and rested at front on bench or bullet catch-box, sprue cutter will have rotation stopped by this surface. Sprue oftentimes will drop out at this point. If not, rotate one-half turn to the left, as in figure 2., and tap bottom of blocks lightly to release sprue. Turn blocks to the upright position, and swing sprue cutter to the full-open position, as shown at figure 3. This allows the front bullet (closest to hinge screw) to fall free without interference from sprue cutter.

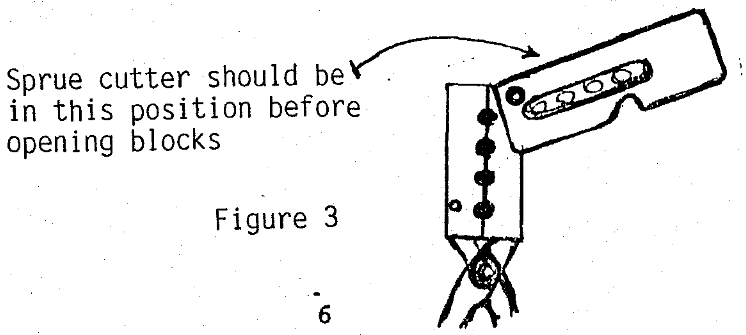
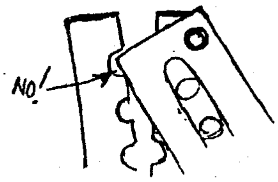


Figure 3

Tap blocks lightly on one side, while applying gentle pressure with your other hand to "pry" open grips. Tap lightly on either handle tang, in the area where the tang is attached to each half-block. Allow bullets to fall in catch-box. Return sprues etc. to pot with pliers or ladle. Splashes of molten lead alloy we don't need!

Figure 4

OUCH!!!



NOTE--THIS IS MOST IMPORTANT--
Sprue cutter MUST be in this fully-open position when block halves are reclosed! If sprue cutter is allowed to swing toward its' closed position before block-halves are reclosed, the leading edge of the sprue cutter can contact and damage the top edge of left-hand block-half. This can result in a ruined mold. See fig. 4.

With blocks lightly tapped closed, swing sprue cutter into closed position, and repeat the whole procedure.

MAINTAINING OPTIMUM CASTING TEMPERATURE

An important factor in casting good quality bullets is maintaining the correct temperature of the mold blocks. Molds cut for lighter weight bullet designs tend to run cooler than heavier, larger caliber designs, due to the quantity of molten alloy that is being used in the mold. With small, light weight bullets, a more rapid casting cycle should be used, to maintain enough heat in the blocks.

If, on the otherhand, the blocks are tending to overheat, we have found that an electric fan, played across the blocks, is an excellent way to hold heat at proper casting temperature. This is far supperier to "dunking" blocks into a container of water, as the moisture tends to rust the screws, which then need to be removed and oiled after each casting session. It also lessens the dangerous possibility of combining moisture and molten alloy!

Automatic casting machines depend upon blowers to maintain their high casting rate, and you can do likewise. A small electric fan works well. For even greater airflow, you may wish to use a blower, such as ones used on fireplaces and central heating furnaces, which can be controlled with a speed control to tailor the airflow to your needs. If set up appropriately, (and not in a contained area) this airflow can be used to assist in the removal of fumes from the casting process, thereby doing "double duty"; however, it should be remembered that when working indoors it is necessary to be certain that fumes are ejected out of the work area, and not just recirculated and inhaled.

Mold blocks should be placed into the airflow when sprue is cooling Blowing across either side seems to work fine. Setting blocks on an aluminum "heat-sink" also adds considerably to cooling.

ALLOY TEMPERATURE

There doesn't seem to be a set rule as to the proper alloy temperature. Reports from our customers on optimum operating temperatures vary considerably. This could be due to variations in melting furnace thermostats, (You will find a separate high-temperature thermometer, such as supplied by Brownell's to be a wise investment for accurate temperature control, especially when adding alloy to the pot--molten alloy may be temperarily cooler than you think.) but it's more likely due to the actual composition of the alloy (linotype, for example, casts well at cooler temperatures than alloys containing more lead.)

It is best to start out at lower temperatures and crank up the temp as necessary to obtain well filled out bullets. Lower temps have the advantage of faster cooling rates, which translates into faster casting rate.

Generally, if the alloy is too cool, the bullets will be shiny, but poorly filled out on the corners, and will have wrinkles. If alloy is too hot, bullets will be frosty in appearancae, and may "flash" slightly at vent lines. They will also tend to be harder to remove from the mold.

PROBLEMS CAUSED BY OVERHEATING

An interesting side note on mold and alloy running temperatures-

Most of us have done some soldering at one time or another. Remember how it works? Say you intend to solder two copper wires together. You heat up the old soldering iron, gun, whatever; then you "tin" it with the solder; somewhere along the line, either within the solder itself, or applied to the part to be soldered, flux is added--the flux cleaning the parts to be joined, and aiding in the flow of molten solder material. You apply heat, to the properly prepared wires, while applying the solder, and when the temperature is appropriate---Bingo! As if by magic, the wires are soldered.

The point of all this, as far as casting goes, is that it is also possible to solder cast iron, when all conditions are appropriate. As soldering the blocks together (or just, more likely, acquiring lead smears) is not in our best interest, it is wise to remember to keep the block temperature within the proper heat range. Fortunately, we are also aided by the oxides which occur naturally from contact with air of the surfaces of the blocks to keep the lead from adhering.

ADJUSTING THE POUR HEIGHT

A factor of considerable importance in casting quality bullets is the pour height--that is, the distance from either the ladle or the bottom of the drop tube on the bottom pour furnace, to the sprue cutter. As a rule of thumb, between ½" to 1½" are the usual extremes in variation. Start up close and lengthen the distance as necessary. You will notice that as the pour height, and hence the pressure, becomes greater, the bullets will fill out better, until the optimum height is reached, after which the alloy will possibly start tending to flow out the vent lines. The correct pour height varies with bullet design (conical designs, for example, seem to need considerably less pressure than wadcutter designs) the alloy being used, and the quality of the alloy.

ALLOYS FOR BULLET CASTING

Probably the best source of quality alloy are dealers in nonferrous metals. They can be located by checking the Yellow Pages of most larger cities. Many have facilities to analyze lead alloy contents, so that each purchase will be consistent.

Other sources of alloy are service stations for wheel weights, radiator repair shops for used solder, and print shops for linotype. While the alloy materials acquired from these sources are usually considerably less expensive, there can be problems with their use. Quite often much of the original alloy components (the expensive ones, unfortunately,), have been "burned" out of them in use. That could be why they are being sold---they don't work anymore! This is especially true with linotype, unless the printer has gone modern, and converted to offset printing, doing away with the linotype machine. If this is the case, and the linotype alloy is being sold at a reasonable price, it would seem worthwhile to sell the family jewels and stock up, as this source seems to be drying up rapidly.

Wheel weights are a good, cheap source of alloy, and is of appropriate hardness for most use. Problems can arise in that alloy contents and percentages are difficult to determine. This is undoubtedly caused by the fact that the manufacturer is in the business of putting weights on car wheels---if one weight isn't enough, add two. No one is really interested in having the most beautiful cast tire weight---who cares how it looks! Luckily for the bullet caster, most all problems can be remedied by the addition of tin for free-flowing qualities and some hardness, and antimony for hardness. Rarely, some wheel weights seem to be contaminated beyond use. Some contaminants in this category are aluminum, zinc, bismuth, or a silicone containing lubricant.

MAINTENANCE

Let's imagine, in this section, that you were bequeathed an H&G bullet mold by your old Uncle Homer. Upon examination, it appears to be covered with swamp scum, been in a fire, and retrieved from a flood. This reminds you of some of the stories good old Homer used to tell. He was sort of the adventuresome type, traveled around a lot, and took his mold with him. (Don't laugh-we hear tell of a sargeant in WW II who carried his H&G mold with him clear through the Pacific area, casting as he went along.) We've been making molds since 1934, and there are a whole bunch of those early molds still in use. Anyway, the mold looks basically sound, so let's see what we can do to fix it up and put it back to use.

SCREW REMOVAL Let's start with the handle retainer screws.

It will be a good idea here to spray some WD-40 type lubricant/penetrant on the screws and let it soak in. We will be cleaning the mold anyway, so no harm done! Swinging the sprue cutter out of the way, clamp the blocks, bottom side up, in a smooth-jawed vise. Take care that you are only clamping the blocks, so that sprue cutter screw are not bent, and handles are free, being held to blocks only by their retaining screws. Apply a little muscle to the handle retaining screws. With a little luck, when Uncle Homer went over Victoria Falls in the rain barrel to save the eastern princess, the moisture didn't corrode the screws to the blocks, and we are home free. (O.K.-so maybe Victoria Falls is a little far-fetched, but seriously, a very informal poll of our customers concludes that fires and floods, while named frequently as the cause of damaged or destroyed molds, run a distant second and third place to--would you guess?--loaning molds to friends.)

If the screws won't unscrew with reasonable encouragement, it may help to heat the blocks to operating temperature, especially if you suspect screws were installed with Lock-tite.

If, at this point, you are greeted by an ugly snapping sound, or you find that the screw has previously been broken off, it's quite possible that the mold can be used anyway, as long as the blocks will still pivot freely to properly align themselves.

To remove the remainder of screws, set the mold blocks upright, with vise holding them closed, and remove the lock screws located on each end of blocks, then the sprue cutter screws.

GETTING OUT THE CRUD

There are several ways to clean the blocks, depending upon the contaminants, so let's start with the easier methods, and work our way along, as necessary.

CLEANING WITH SOLVENTS

Pour a solvent that will disolve petroleum, such as stoddard solvent or paint thinner, which is virtually the same thing, into an empty container (coffee can or whatever), about 1" deep. Denatured alcohol also can work well, but won't dissolve contaminants. Acetone is excellent, but is considerably more volatile, and evaporates very rapidly. Use even greater care with its use. There are other effective solvents that can be used--take a quick browse through your local hardware store's paint section for these. An excellent solvent that can even be used while the mold is still assembled (say, to remove a light coating of oil that you applied when storing your mold) is disc brake cleaner, available in an aerosol spray can at auto supply stores. It is non-volatile, and cleans well. Spray especially the cavity area, then wipe out contaminants with a cotton swab. Care should be taken that spray doesn't splash back into your face, as it is emitted from can as a stream, not a mist.

Dunk the parts into the solvent, making sure that they are separated, so as not to damage each other during cleaning.

CLEANING CAVITIES

Use a stiff-bristled brush to scrub out the cavity area, and the rest of the mold surfaces. A small paint brush or clean soldering flux brush works well here--so does a tooth brush, but solvents tend to rapidly disintegrate the plastic in most tooth brushes.

DON'T--NEVER, NOT EVER--USE A WIRE BRUSH, OR ROTARY WIRE BRUSH IN THE CAVITY AREA!

This also applies to even rouge wheel buffing. Remember those friends that are the Number One Nemesis of bullet molds? Well, wire brushing is their primary method of destruction. The mold is usually returned with the cheery comment--"Say, friend, I accidentally dropped your mold into the lead pot, but no problem, 'cause I polished the lead out of the cavities with my trusty wire brush, and the mold looks like new!" At this point, you can rightly consider that the only thing that's going to look "new" is a new mold, and maybe a new friend! Wire brushing rounds the corners of the cavities, and it cannot be repaired. Bullets cast from this mold will have wings like little toy fighter planes, which may make great gifts for your kid at Christmas, to go with his toy soldier set, but they aren't worth a darn for shooting purposes!

Anyway, back to the cleaning process. After carefully brushing to clean all surfaces, remove the parts and dry them. Dry the cavities with a cotton swab.

MILD ABRASIVE CLEANSERS

Now, examine the cavities. If they still appear to have foreign matter in them, try scrubbing them with a cleanser, such as Bon-Ami or Comet or Ajax, using a tooth brush. Rinse very thoroughly in hot water, then dunk in alcohol or solvent to displace the water, then dry thoroughly by wiping and/or compressed air. Be especially careful to dry cavities, so that they do not rust.

BOILING WITH TSP

The next method of cleaning is useful in extreme cases, where contamination of cavities prevents the pouring of well filled out bullets.

Purchase some TSP (trisodium phosphate) at a local hardware or paint store (It's regularly used for cleaning oil from garage floors and preparing surfaces for painting). Place mold blocks and sprue cutter into an empty coffee can (we seem to be drinking a lot of coffee here), and being careful that parts won't bump into each other and become damaged, we chuck in a cup or so of TSP pour in enough water to cover the parts, and boil for an

hour, replenishing the water as it evaporates. Make sure you have adequate ventilation, as this doesn't smell great! Remove parts from water while they are still hot, rinse while scrubbing parts with tooth brush, and dunk in alcohol and dry very carefully , as this method seems to get the metal so free of oils, etc. that they can very easily form a light coating of rust at this point. It probably won't hurt, but we want to keep it to minimum.
We use the above method especially when the simpler methods fail to produce acceptable bullets.

LAPPING CAVITIES

Now, if over the years, the cavities have become pitted with rust, (see "How to Prevent Rust", page 17.) lapping the cavities may be necessary.
To do this, one should have a lathe available. Chuck a bullet cast in the mold in the lathe, with the base out. spot base with a center drill, then drill 3/8" deep or so with a #20 drill, then with a 10-32 tap in tail stock, and revolving lathe by hand, thread tap into hole until tight. Without removing tap from bullet, remove both from lathe, and turn bullet around, chucking tap in lathe headstock. You now have a lap (bullet) with a shank (tap) to revolve it by. Put some valve grinding compound (that you have purchased at an auto supply store--water based works well) into each cavity, and apply some to the bullet-lap. Place bullet into cavity (do each half-block individually) and turn on lathe.
DO NOT OVERDO IT! a few revolutions should do much to clean out the rust. If the bullet seems to be distorting in shape, after lapping a few cavities, make more laps by the same method using a fresh bullet. Care is the keyword here. When desired results have been obtained in all half-cavities, rinse in hot running water, then alcohol, scrubbing cavities carefully. Dry thoroughly.

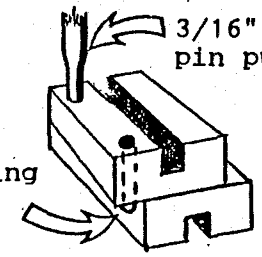
Now, hopefully, the cavities, etc. are cleaned of oils, etc. The outside of blocks, can be polished with emery cloth, if you feel it necessary, but don't work on the top face, or inside faces of blocks with handheld emery cloth. There is always the possibility of rounding the areas off near the cavities--a no-no!
Instead, mount fine emery cloth or "wet-or-dry" sandpaper onto a flat surface-- glass, steel, or a flat piece of wood. Carefully rub blocks along emery cloth in longitudinal strokes. This should remove burrs that the file may have missed, and leave a good, smooth surface. Care must be taken, however, to not overdo sanding/polishing, as it can eventually round outer edges of blocks and leave a gap.

The half-block containing the dowel pins can be polished by allowing the pins to hang over the flat backing surface.

Burrs can also be removed with a mill-smooth file, if used very carefully. Be careful to hold file flat.

Now, let's check the block vent lines to see if they are clean, to allow for proper air release from cavities. This may sound strange, at first, but the best way to remove lead (this also applies when casting) is with another piece of lead! Take a lead hammer (a bullet also works fine) and rub across the adhered lead, applying pressure to "seize" the lead to the hammer or bullet. It is surprising how well this works. If the lead fouling is buried deeply into the ventlines, etc., use a pointed needle or scriber or single edge razor blade to remove. Care must be taken to not scratch or otherwise damage cavities during this operation.

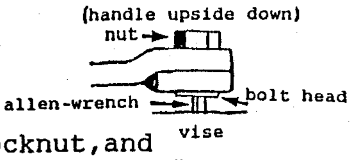
ADJUSTING DOWEL PINS



Check dowel pins for proper fit in the following manner-- After any evident burrs have been removed, as above, and you have determined that the blocks are going closed, give them a twisting motion. There should be no "slop"-that is, you should feel no pin movement. If they are too loose, perform the following adjustment-- Set the half-block that does not contain the pins onto a flat benchblock, and lay the other block on top of it, with one pin in its mating hole, and the other pin over the the bottom edge of the other block. This way, we will be only adjusting one pin at a time.

Using a flat punch slightly smaller than ¼" in diameter, carefully drive dowel pin slightly further into lower block. Use a small hammer--strike lightly, until you feel the dowel pin move. Now, lift up the top block. If half-block lifts easily, with no resistance, repeat this operation. You may have to repeat several times. Continue carefully driving pin into mating block until you feel slight resistance to pulling them apart. This means that the pin is "home"--that is, slightly gripping, so we have removed the "play". Now, pick up both blocks, viewing between the blocks, toward a lightsource, check that blocks are going closed. You can probably get away with a very slight gap showing, but it is best to have no light showing, if possible. If it appears that pin is holding blocks open, the pin will have to be carefully driven back into block slightly, until best possible pin fit is obtained. Now, let the pin that has just been adjusted overhang the outside edge of the mating block, and repeat the procedure

ADJUSTING THE HANDLES



Adjust the handle pivot bolt thusly--Unlock locknut,and tighten pivot bolt lightly. Lock appropriate size "Allen" wrench in vise, with business end vertically protruding. Turn handle upside down, insert bolt head onto wrench.

Turn both handles counterclockwise 1/16 of a turn, and lock up the locknut. If the bottom handle (the one closest to the bolt head) isn't free to turn, unlock the locknut, and give it another 1/16th turn, and repeat until handle closest to bolt head pivots smoothly through normal operating openin and closing positions. It's always wise to remember to have a slight bit of extra play on this fit, (same thing for sprue cutter fit) to allow for head expansion.

HANDLE GRIPS

Check the wood grips. They tend to loosen, over a period of time, due to the heat, which dries out the wood. Usually, this can be corrected by driving them farther on. If this does not do the trick, a product called JB Weld has been used successfully to attach loose wood grips. It is made for higher heat applications in automotive use (hence, usually available in auto supply stores) Follow directions on package.

SPRUE CUTTER

File to remove any obvious burrs, especially on bottom face (where it rests on mold blocks), and polish on the flat emery board. Place on top of the blocks--there should be no light showing between the sprue cutter and block top, or at least a very minor amount. It should be noted here, that interestingly (and fortunately) enough, blocks seldom, if ever, warp, but sprue cutters will occassionally over a long period of use, as they are made of steel, and the constant hammering to break the sprue sometimes will bend the sprue cutter slightly. If this should happen,the sprue cutter can be surface ground, either locally, or by us. If you opt to havae it done locally, the sprue cutter should be straightened as much as possible before surface grinding, as the magnetic chuck on the surface grinder will simply "suck" out the warp, the surface will be ground, then, upon removal from magnetic chuck, will return to it's bent original condition.

Check the sprue holes at the point where they cut off the sprue. If rounded over, they can usually be sharpened by surface grinding.

CORRECT ADJUSTMENT OF SPRUE CUTTER

Take care, when attaching sprue cutter to blocks, that screws are properly adjusted.

TAPER ADJUSTABLE SPRUE CUTTER HINGE & STOP SCREWS INSTRUCTIONS

Sprue cutter hinge screw has been adjusted prior to shipment. After a period of use, screw should be readjusted for proper fit. Loosen set screw in front end of block with a 3/32" hex key, then adjust hinge screw with a 5/32" hex key, so that sprue cutter is just free enough to swing easily of its own weight. Retighten set screw in end of block.

Sprue cutter stop screw forces sprue cutter down against block at stop, and is adjustable to keep sprue hole in line with center of bullets. When necessary, adjust as follows. Place cast bullet in cavity closest to wood grips. Mark bullet at its center line. Loosen set screw in rear of block with 3/32" hex key, then adjust stop screw with a 5/32" hex key. When screwed in, tapered screw will stop sprue cutter further to right. When screwed out, sprue cutter is allowed to swing further to left. After adjustment, retighten set screw in end of block.

If these alloy screws should become difficult to turn, they should be replaced so they won't damage the threads in the mold block.

Block breakage could result if hinge screw is allowed to lock the sprue cutter to the block, and sprue cutter then is hammered open. Check that sprue cutter swings freely, and check lock screw for tightness. Sprue cutter becomes tighter when heated due to expansion, so recheck swing when up-to-temperature. High-temperature lubricant can be used sparingly on head of hinge screw.

STORING YOUR MOLD TO PREVENT RUST

VPI (vapor barrier) paper works very well in preventing molds from rusting. Before storing, after each use, wrap blocks and sprue cutter end of mold in VPI paper, and then a plastic bag.

If you are going to store the mold for an extensive period of time, and/or you live in a very humid climate, you may also want to take the precaution of coating the mold in WD-40, or a good grade of oil. The problem here is that the oil must be removed before the next use.

When storing and/or transporting molds, be sure the blocks are securely held together, so the blocks will not be damaged. A couple rubber bands around the blocks will do the trick.

MOLD RELEASE SPRAYS

Generally speaking, a good quality, well-made bullet mold doesn't need mold release agents. Bullets should release readily enough without their use, if there are no burrs remaining from cutting the cavities, and if cherry is properly designed. If, however, you are having trouble with lead adhering to the blocks, a mold release spray that contains only graphite, with an alcohol carrier seems to work satisfactorily, if used very sparingly. (otherwise, the buildup of graphite will mar the surface of the bullets.) WE DO NOT RECOMMEND THE USE OF TEFLON OR SILICON SPRAYS! Teflon starts to deteriorate at 550° or less, so won't hold up at casting temperatures, and silicon sprays can, and often do, cause air pockets and deformation of bullets, possibly due to the carriers that bond the silicon to the surface which then gasify when subjected to the high temperature of the molten alloy. It can cause real casting headaches, and is the devil itself to remove!

HAMMERS FOR MOLD USE

LEAD HAMMERS--
For years we have used a lead hammer with a one pound head for opening and closing the molds, and consider them unbeatable for the purpose. They are light enough for constant use without undue tiring, yet of enough heft to open sprue cutter in one blow. On top of this, if the striking surface is kept clean, they won't mar the mold surfaces.
WOOD MALLETS--work very well, but the heads need replacing rather rapidly, and they must, of necessity, be of larger diameter than the lead hammer to have enough weight, and this makes it more difficult to strike the sprue cutter accurately.
RAWHIDE MALLETS --also works well, but it is also considerably larger in diameter, and the surface of head must be kept clean to protect the surface of mold.
PLASTIC HAMMERS--be careful to keep striking surface clean, and take care that molten particles of plastic don't drop into cavities and contaminate the casting process. Otherwise, they work well.
HAMMER HANDLES--work ok for 4 cavity molds, but are not really heavy enough to be very satisfactory.

FLUXES

DRY FLUXES, BEESWAX

Dry fluxes seem to work ok, but we seem to keep coming back to our good old reliable beeswax. It may smoke some, but sure works well. If smoke or a flame-up is a problem, it may be best to stick with dry flux. Read instructions carefully.
We flux only when needed--if the alloy starts to pour "stringy", and/or the alloy is looking cruddy, and/or the bullets are starting to show blemishes. In other words, "if it ain't broke, don't fix it.")
SAL-AMMONIAC--can be used as a flux, but we would only use it in extreme cases, as it stinks like mad and smokes like crazy! It also tends to rust everything in sight, so should definitely only be used outdoors, and with care.

SETTING UP YOUR CASTING BENCH

Whether you are using a bottom pour furnace or pouring with an open ladle, it really takes a lot of strain out of casting to have a support for the mold blocks while pouring, and while waiting for the alloy to cool.
When using a bottom pour furnace, the mold rest should be such that the blocks can be drawn along under the pour spout. Mold is then usually withdrawn to another solid rest, (quite often a sturdy wood box, with the blocks resting on the box sidewall closest to the furnace. When the alloy cools sufficiently, the operator can either strike the sprue cutter with the blocks in the upright position, or can give the blocks a quarter rotation to the right, which allows the sprue cutter to be struck straight downwards, with the box bottom stopping its movement. Rotate back to upright position, open mold blocks with a tap on the handle pivot bolt, while giving a slight pry on grips with other hand. Tap lightly on handle tangs and bullets should fall out, being caught in box. Works slick!

TOP PUNCHES

Sizer manufacturers usually have a top punch available that will work satisfactorily. It does not need to exactly fit the nose of bullet, as long as it guides the bullet concentrically into the die, and does not mar the nose of bullet. We have been experimenting with drilling out the punch oversize of bullet nose, then filling this cavity with "5-minute" epoxy. We insert the bullet from the die bottom to avoid any distortion of nose, coat everything lightly with grease (except cavity in punch), fill cavity with epoxy and install in sizer until it sets up. This should make everything come out nicely aligned. Seems to work well, but don't know how long it will hold up in use. Care to give it a try?

TROUBLESHOOTING

A HIGH PERCENTAGE OF REJECT BULLETS

FROSTED APPEARANCE-- Alloy and/or mold blocks too hot. Try fan to cool blocks, possibly lower alloy temperature thermostat.
WRINKLED APPEARANCE-- Alloy and/or mold blocks too cool (probably mold blocks). Preheat blocks, then cast in a faster cycle.
CORNERS DON'T FILL OUT--Especially bases of bullets--Try a higher pouring height. This really makes a difference. Alloy might need fluxing. Alloy and/or blocks may be contaminated. Clean. If Alloy is contaminated it may never work well. However, it may be salvaged by the addition of tin and antimony.

DEBRIS IN BULLETS--Flux alloy. If you are using a bottom pour furnace, pot needs to be periodically cleaned. "crud" in the alloy not only floats to the surface, it collects on the sides and bottom of the pot, and in the drop-tube, especially. Sometimes simply cleaning out the drop-tube with a wire will be adequate (be careful--place a container to catch any spilled alloy). If problem persists, pot needs to be drained. When cool, clean all surfaces of pot.
NOTE- If a certain cavity or cavities <u>sometimes</u> produces a bullet of poor quality, the variable results virtually guaranty the problem is <u>not</u> in the block itself, but points to one of the problems above!
LEADING IN BARREL --CAN IT BE MY BULLET LUBE?
This can be a tough one. Our customers seem to swear by (and at!) different lubes. A strong theory here is barrel roughness, especially where the bullet enters bore. A microscopic, virtually invisible roughness at this point could cause leading, and pressure increases. This is also true in sizing dies. A virtually invisible roughness in die throat can make it all but impossible to force bullet into die. A judicious amount of polishing at entrance will cure the problem. Too much velocity--Very roughly speaking, 1000 fps seems about maximum for swaged (almost pure lead) bullets, "wheel weight" alloy around 1400 to 1500 fps (depends on caliber and weight) and linotype bullets up to 1600fps in .44 cal. and up to 2000 fps in smaller calibers. Gas checks needed for higher velocities.

ACCURACY (OR INACCURACY)--While there are many factors in loading ammunition that effect accuracy, one that particularly pertains to cast bullets is--The sized bullet must be of large enough diameter to well seal the bore (and grip the rifling). They should be large enough to size to bore diameter, or up to .001 larger than bore diameter. You can make minor adjustments in the cast bullet diameter by adding antimony to the mix.