

Nygord's Notes - Shooting Tips From Don

Don Nygord was a competition shooter for over 30 years and for 22 straight years was a member of the US Shooting Team competing in Olympic style pistol shooting all over the world. He was the National Champion 16 times, was a member of the 1984 and 1988 US Olympic Teams, and was World Champion in air pistol with a score only two points off the World Record at that time. He is the current holder of the US Free Pistol record at 574—a record that has stood for over a decade!—and has held over 40 other National Records. The following "Tips" are the result of this experience and are offered to help both the new and the experienced shooter improve their performance (originally, the tips were released one each month).

Fatigue This month's topic was suggested by someone who probably didn't get his nap on match day! (Actually, it had to do with his eyes getting tired, but I really miss naps on days I don't get them.) Fatigue obviously is going to affect any physical or mental activity, shooting more than others - say, taking out the garbage after the third time your wife 'reminds' you. So, how should we deal with it? Fatigue is mostly the result of the available resources - muscle fibers, oxygen, fuel, etc. being either limited or reduced in usefulness by the buildup of waste products. Lactic acid in muscle fibers, carbon dioxide in the blood and so on. Fuel and oxygen are transported in and waste products out by the circulatory system. Obviously, the better shape this system is, the better the process works. That is why all the emphasis on aerobic fitness, weight and endurance training, etc. for those involved in athletics. Looking down the line at pistol matches one can see the feet behind the "line" but a lot of bellies protruding past it - probably not the best endorsement of shooting as an athletic event! (Most shooters defend this type of physique as "ballast" - "gives me stability, mate!")

In addition to becoming more "fit" - having high oxygen uptake due to aerobic conditioning, having well toned muscles from weight training and having the ability to hold well due to "specific" training (covered in other "Notes") - one needs to consider the rate of transfer element in fatigue. Roughly, the transfer of lactic acid OUT of the muscle fiber takes twice as long as the duration of the effort that created it. I teach a pace of about 1 shot per minute - aborts are a shot - in the air pistol and free pistol discipline. This is broken into about 20 secs of lifting, aiming, and firing and about 40 secs of rest between shots. (2:1, eh?) A reasonably fit competitor can keep this up for hours. Eye fatigue is dealt with during this time: The cilia muscles need to be relaxed from the state of aiming as well as the directional muscles. During your rest period between shots one should look off into the distance - hopefully at a neutral colored background without too much reflected glare - and back to the bench or one's feet. This "flexes" these muscles and compensates for the fixed focus on the sight's position you spend so much time with.

The same sort of strategy can be employed for the leg muscles. During the rest period between shots, flex the thigh and calf muscles, rock on your toes (staying in position, of course), etc. to stretch out these muscles from their static shooting tensions. Periodically, one should break the shooting position and sit down. During such a break, breathing

exercises for relaxation of the entire body and mind, mental exercises using the "left brain" to let the "right brain" rest (verbal, math, etc.) can be used. Of course, on resumption of shooting, one has to get back into the shooting mental and physical postures, so allow time for that. And, don't forget hydration! The body is one big chemical factory and it needs dihydrogen oxide to perform its needed work.

In short, fatigue can be managed to the benefit of the shooter by advance work to achieve physical and mental fitness and then using the time on the line profitably - resting and stretching while on the line - and learning how to time your "breaks" . Of course, sometimes you may not want to take a break at all! If you are in the zone and the 10s are coming, why stop? I watched a lady air rifle shooter in a World Cup shoot the entire match without a break. She could hardly move at the end and her coach said this was not typical, but she was shooting extremely well - won the Gold - and didn't want to interrupt the process. Her superb conditioning made it possible. You should be in good enough condition to permit this if the situation calls for it. As for the eyes, even here advance conditioning is possible: An exercise called "accomodative rock" - focusing at infinity and then at the back of your hand - to infinity - back of hand, etc. will tone the eye muscles and give more endurance for shooting. So, make a plan for off and on the range, use the shot release technique described in another note, drink your water, and you can come off the range with a great score and still with enough energy left to high five your buddies!

Don

Cleaning People, people, people! What am I going to do with you? You buy these great guns, often for more than what two month's beer money comes to and then when they stop working after only 4-5,000 rounds of \$100/case ammo, you get all whiny! Sometimes you send them in and I have to get the crud out of them - which most of the time is all they really wanted - just a little TLC. I decided, while trying to get the black stuff out of the creases of my hands this weekend, having just removed 15 paper towels and 20 patches worth of stuff from one of these poor pistols, that it was time for another note. So, first let us dispel one of the more persistant misconceptions floating around: A dirty gun is NOT a more accurate or a more reliable gun! It is NOT the best idea to "shoot 'em until they jam!" Just as you brush your teeth (hopefully for all around you) and bathe and change the oil in your Miata, you need to clean your gun!

When I was shooting with the All Army Reserve Gold Team, occasionally Col. Jack would ask us to shoot a 2700 along with the 5 international events. We were all shooting in the 880s with the .45 and most used the .45 in both CF and the .45 matches. I always broke my .45 down and cleaned it between the CF and .45 matches! No malfunctions, thank you, and superb accuracy from this match fitted gun. Too much? I didn't and still don't think so. Just depends on how serious you are about the sport. I always started a match with a clean gun or one with no more than 10 rounds of "sight ins" through it. Well, hoping this convinces you to follow the righteous path, lets go through what is recommended.

Air Guns: If there is any gun that can be semi-neglected it is the air pistol. (Top air rifle

shooters are as anal as anything described above, but pistol shooters can take it a bit easier.) I have seen air pistols with several thousand rounds through them without cleaning pull out an almost white patch the first pass. On the other hand, one of the top lady US Champions of a few years ago had a Walther CP2 that had to be cleaned every 200 rounds if it was to group at all. But her air gun was the exception. Their low velocity, excellent finish on the barrels and the lack of powder residues make air pistols almost carefree. For these, I recommend a nylon pull-through loop (doubled and crimped .040" trimmer cord) and a .22 cloth patch (1 1/4" diameter) and a spritz of TSI-301 about every couple of cans of pellets. Feed the loop down the bore from the muzzle, fold the patch in half, put into the loop, spritz and pull through. A couple will probably be enough. Then, take a Q-tip and wipe all around the pellet loading area (small bits of lead are common). Use a toothbrush to brush away lint, dust, etc. from all crevices, sights, and crannies. Lightly oil any moving parts like the pellet plunger and cocking lever pivots, wipe down the barrel and other steel external surfaces with "Breakfree" or equivalent (rust spots on an airgun barrel from acids in perspiration make me want to get out the horse-whip!) and you are done. Some think you need to put silicone grease on the seals and it isn't a bad idea to put it on the cylinder/gun fitting seal (and filling adaptor seal) during your regular maintenance sessions, but the other seals need it very infrequently (and sparingly!)

.22 Pistols Most .22 pistols are very forgiving, but they are still much happier clean than not. .22 firing residue is quite abrasive and there is absolutely no good reason to leave it in the gun rubbing on the reciprocating parts. The bore, on the other hand, needs very little cleaning in modern .22 pistols. I believe the often iterated saying from the small bore rifle shooters that "more .22 bores are ruined by brushing them than by shooting them." You should never have to use a brass brush on a .22 rimfire bore - patches should be all you ever use. Now, you CAN brush the chamber, particularly if you get a firing residue "ring". In the shop and with my own guns, I use the same pull through loop I use for the airguns and the same TSI-301 cleaner. Works just fine. Strangely, it seems many .22 shooters worry about the bore but let the rest of the gun accumulate crud until it stops. I had a gun in a couple of months ago that "just suddenly quit working". I could barely retract the bolt on this Pardini .22. The reason: A semi-solid mass of firing residue and gummed oil was filling the frame to the extent the bolt could literally not plow its way through it any more! I would recommend that at least every 1000 rounds that the gun be stripped down and the frame be cleaned thoroughly inside and out. No need to remove the trigger components, but get in among them and Q-tip and pipe-cleaner and toothbrush them clean of firing residue. I DON'T think much of the "dip, slosh, and blow" type of cleaning. The solvent dissolves the oil and the suspended dirt drops into hard-to-get-at places where it stays until jarred or carried by fresh oil onto surfaces that don't need to be abraded. I prefer to wipe the dirt away and toss it into the wastebasket. Once clean, relubricate with almost any light, non-gumming gun oil. I've been using "Marvel Mystery Oil" for 40 years and it works great. Again, wipe down the outer surfaces with something like "Breakfree".

CF/.45s OK, here we need to really get out the ol' elbow grease! It has been several years now since I have built up 1911 platform match guns and when I was shooting 2700s I was fortunate to be able to use mostly Federal Factory Match ammo. So, I got a little out of touch with the .45 reloading scene until we got in the excellent Pardini GT45s and got

a hundred or so of them out on the market. I became astonished all over again at how much crud could and was allowed to collect in these guns - frames, slides, bores, chambers - all bound up with lead or firing residues and the owner's wondering why they had problems with extraction, feeding, etc. We even had a GT45 come back from a very well known publication where it had been sent for review with the complaint it wouldn't feed wadcutter ammo. As the gun was tested for function before we sent it in (we're not totally dumb!), this was a puzzlement. Looking at the gun, we saw the chamber and the barrel were heavily leaded. Once the gun was cleaned of the lead - surprise! - it functioned perfectly. The tester later acknowledged the gun had been fired with some unknown source reloads prior to the "formal" testing, but no one apparently noticed it was clogged up from lead. The internet bulletin boards catering to bullseye shooting seem to be almost obsessed with stories about how "until I began to use 'magic lube X', I couldn't shoot 30-40 shots without my barrel being hopelessly leaded up." And we have seen some truly atrocious reloads sent in with guns so we could "see what the trouble might be ." Lead composition and type of lubricant is very, very critical in reloading for the .45. And a leaded barrel will NOT shoot well at all! I know full metal jacketed bullets are at least twice as expensive, but using them will eliminate about 95% of all problems. If you are going to reload with lead, for heaven's sake buy good hard alloy bullets with quality lubrication and then test them before using them in matches. Good bullets with good lube should NOT lead your barrel. But, you HAVE a leaded barrel, so lets get it clean. Here you MUST use a tight fitting (50 caliber for the .45 ACP barrel) brass brush and a good cleaning solution. I still use good old Hoppe's #9 (being old fashioned, I guess). You are going to have to "scrub", but do it correctly: soak the brass brush in solution, and push it all the way through the barrel in one direction (start from the chamber and use a clean aluminum rod or a coated steel one.) DO NOT stop mid-bore and try to reverse the brush! Now let the wet bore sit for about an hour (if possible) and then wet the brush again and make several all the way through one way and draw back all the way through the other way type passes. Put through a dry patch and hold the barrel up to the light and use a glass if you have one and look for lead in the grooves and chamber. If there is any, repeat the soaking and brushing until it is gone, gone, gone! You must not leave ANY lead - it will just result in even more, quicker build up of leading and certainly you will not regain the accuracy from the barrel. Also, keep your brushes clean! And, please don't use these lazy man's products out now such as the "Bore Snake". How can you justify pulling a tapered rope with brass bristles through a bore more than the first time unless thoroughly cleaned before the next pass? And, never pull one through a .22 - those brass bristles aren't recommended - see above! Anyway, once the barrel is squeaky clean, go to work on the slide and frame with the Q-tips, pipe cleaners, toothbrushes, etc. Pay particular attention to the extractor. This is the next biggest source of problems. In the 1911, you need to remove it from the slide and thoroughly clean the channel it rides in. In guns like the Pardini, dig out all the residue behind it and the slide. Once again, when clean, lubricate with good gun oil, wipe down the outside, etc. Some shooters using iron sights put on various "sight blackening" materials. These usually are hydroscopic (pick up moisture) and if left on the sights will result in rusting of the metal beneath the black residue. So, brush off completely after use.

In summary, a clean gun will always perform better than a dirty gun and will last a lot longer, have better resale value due to pristine condition, and will often mean the

difference from a pitiful story and a proud smile at the end of the match. Just do it!

Don

Using Red Dot Sights Red-dot sights are so overwhelmingly popular with the NRA "Bullseye" shooter (and also IPSC shooters) that a word or two about how to use them seems to be in order. Using these sights seems almost like cheating to the International event shooter who is restricted by archaic rules to using "iron sights" with their Patridge configuration of square front sight and square notch. The problem of being able to focus on only one element - front, rear or target - makes the use of the iron sights an exercise in discipline and frustration. All this is avoided with the various electronic "red-dot" sights - the target and the dot appear in the same plane. When zeroed, wherever the dot is on the target when the shot is released is where the bullet will impact. And, because the eye/brain is naturally wired to seek the center of a circle, there is a noticeable reduction in effort when using this sight. Putting the dot in the center just sort of happens by itself! But, many questions are common when starting to use this system - How big should the dot be? How bright? Where do you focus your eye?

Dot size is pretty subjective, but my experience has led me to choose a size that is approximately 1/2 the area of the black aiming area of the target for bullseye pistol. Smaller dots seem to lead to the tendency to obsess about "getting the dot perfectly in the middle" - sort of like trying to get the "perfect" hold with iron sights - and forgetting to release the shot smoothly while letting the dot (or the iron sights) "float" in the natural hold area of the day. Some red-dot sights allow you to choose between dot sizes, but in general there seems to be two popular sizes: about 3 - 3 1/2 MOA or about 7 - 7 1/2 MOA. I like the 7.0 MOA dot such as provided by the excellent small "Docter" sight we use on the Pardini GT45s and FWB AW93s. When I tried a red-dot on my AR15, an interesting situation became apparent. For "house-clearing" tactical work, a large dot was quickly acquired and was sufficient for close up "hosing" or even precise head-shots at 50 yards. But, in trying to determine the zero and grouping of the ammo used at 100 yards a MUCH smaller dot was needed. So, obviously, application is a major factor in choosing dot size. For the NRA outdoor pistol shooter, the 7 MOA is probably best.

Brightness is also subjective, but I recommend using the lowest intensity setting that gives good dot visibility without straining to find it as this will also give the roundest cleanest dot without "rays" emanating from the edges. When in bright sunlight, many sights can be fitted with a dual polarizing filter that allows you to diminish the incoming light to a less dazzling level. These are usually just cheap pieces of diffraction grating film and image quality might suffer, however.

Finally, focus on the dot. This is the part of the equation that is moving and the part you can control. The target is not going anywhere or moving at all and you have no control over it. The subconscious mind will analyze the dot's movement and coordinate it with the continuing smooth motion of the trigger release to give you that wonderful "shot breaks just as dot gets to center" experience. This is such a great way to shoot that one can only hope the fossils at the ISSF will soon come into the modern world and allow these sights on free pistols, air pistols, etc.

Don

So THAT'S why there are screws on my rear sight! □ □ I really thought I had written this article before, but looking over the past postings, I don't see it, so we'll put it down now and be done with it. As with many of these notes, they are inspired by clients or shooters seeking advice. We will cover two subjects actually but, as they are related, it shouldn't cause us to go too far afield.

Two separate incidents in the last month prompted me to wonder if what seemed obvious might not be: First a young junior pentathlete's mom related how, during an event out of the country, a medal was lost by disappointing results in the "shoot". It seems the groups shot were fine but were "inexplicably" low and right. "What could have happened?", they wanted to know. Then, about a week later we get a call from a middle-aged, 20 years of experience, shooter who had a "disastrous" indoor sectional match - his groups were not centered even though he had "sighted in carefully at my home range before the trip". Both of these individuals seemed a bit amazed at the discussion that followed which, in short, reminded them of what those funny knobs and/or screws on the rear sight were intended to do. When I told them that I often changed the sight settings during the match as well as within the sighting period, they gasped! What incredible daring, they seemed to think.

This type of thinking is pretty much confined to pistol shooters, I've found - rifle shooters are taught about sight changes from the first shots they take and expect to make them as appropriate. Whole industries are formed around rear sights for rifles with have from 20 to 40 clicks per revolution, built in filters and diaphragms, rotatable bodies, levels, anti-backlash features, etc. Pistol shooters for years had to use "Micro Sight" sights which you HATED to adjust because what if you got a "big" click when you wanted a "small" click?! Maybe this is where the fear of adjusting sights came from. Of course, pistol sights are better now - still a bit primitive compared to rifle sights - but actually adequate for the task.

OK, why do we need to adjust our sights and become confident in our ability to do so? Let us count the whys.

1. Light.

This is probably the biggest reason that adjustments will need to be made by the pistol shooter. Not only do the lighting conditions vary from range to range (especially indoor ranges), but they will vary during the match (outdoors especially.) Even indoor ranges with windows to the outside will see varying light during the hour or two of a match. And, there is an old adage: "The group will follow the light." One common occurrence on outdoor ranges is for the sun to cross from right to left(left to right) on north(south) facing ranges. And, yes, your group will move across the target with it. The reason this occurs is that light refracts off the sharp edges of the front sight, tending to create a "halo" effect there and blurring or making indistinct that edge toward the light source. Then, you center the apparent black bar (which is now thinner than it would be without refraction) and voila! - the group has moved in the direction of the light.

Another effect of changing light is the apparent change in size of the black aiming area. When the target is brightly lit, the bull will appear smaller. This is due to a "bleed over" effect on the retina of the eye. The rods and cones at the demarcation line of the black image and the white background are over-stimulated by the amount of light entering the eye and some cells will "fire off" when they shouldn't, blurring the boundary and registering "white" instead of "black". Obviously, this will result in high groups.

Light is the major external cause of shifting groups, but another one is wind. While rifle shooters are very skilled at 'reading' wind, pistols shooters often ignore it. One can get away with this when it is possible to wait for lulls and only shoot during them, but sometimes wind is more or less constant and from primarily one direction and then it should be obvious that a sight change to compensate for the effect on the projectile and the shooter is needed.

2. The shooter.

More subtle, but often just as important, effects on grouping are internal or shooter based:

A. Body position or stance. If you change your body position in relation to the target, the group will shift. Back in the "Micro Sight" days, if you wanted a 'small' click adjustment from right to left, instead of adjusting the sight you simply moved your left foot in the direction you wanted the group to go and it obligingly WOULD move!

B. Head position. A sub-set of body position often changed unwittingly is the position of the head. I have seen shooters who, during the delivery of the shot, let their heads gradually droop toward the chest. As long as this droop is absolutely consistent, it will matter little. But, if the head position changes from shot to shot or string to string you will either see a shift in group or a much wider group than normal.

C. Grip Pressure/Position. One of the advantages of "orthopedic" grips is that theoretically they will reduce variation in how the gun is held in the hand. This is, of course, good. A very important factor not always getting the attention it should is consistency in grip pressure. It should be obvious that if, under stress, you grip the gun more tightly than 'normal', the group will shift. And, gripping more loosely will cause a shift as well, of course.

D. Fatigue. In the course of a long match such as Free Pistol or Air Pistol, there WILL be fatigue. This can cause changes in A,B, and/or C above. When I was at my peak, I regularly saw my shots in Air Pistol "walk" across the 10 ring from right to left as the match progressed. It took about 8 shots to go from the right hand edge to the left! I just accepted this and took one click to the right every 8 shots or so. Another element of fatigue is the loss of eye focal accommodation and acuity. Fuzzier sights may easily cause the group to change.

Well, now lets discuss coping strategy. First, one needs to become aware of the characteristics of your gun's sights. What happens when you take one click? What happens when you take 10 clicks in one direction? What happens when you take 10 back? Did the group go back to the original area? Is there "backlash" in the mechanism ?

With some sights, you might have to take "two forward and 1 back" to get 1 forward as just taking 1 forward might not do anything! And, you need to know how far the shot group center will move per click. Once you feel you "know" your sight, you will be much less hesitant about changing the setting, knowing what the effect of any number of clicks will be. Also, sight "blackening" with fine soot from candles, camphor, carbide lamps or the newer, convenient lighters such as the "Black Match" can help reduce refraction effects.

When to change? One does not want to "chase" each shot, but rather consider the center of the "group". (This presumes you GET a group when you shoot! A "group" should be defined as a cluster of shots into an area equal to your present hold area - hopefully no bigger than the 9 ring or 8 ring.) A group should be at least three shots and probably 5 shots is better. In ISSF events you get a sighting target(s) and can pretty precisely determine your group's center and adjust it before going to record. In NRA shooting you don't have this luxury, so you must assess your skill level and decide how many shots you need to be SURE you need a change. Very skilled shooters can use one shot, but perhaps a few more would be wise for most of us. Look at the group and draw an imaginary circle that encompasses it and then quarter the circle with vertical and horizontal lines. Where they cross is the center of the group. (It is quite correct to look a cluster of, say, 5 shots and see 4 of them very close together and a fifth "flier" that you KNOW is the result of a poor execution and exclude it from the 'group'!) Next, estimate the distance that the center of the group must be moved to put it in the center of the target (where the printers almost always put the '10 ring'!) From your study of how far 1 or 10 clicks on your sight moves the group at any particular distance, calculate the number of clicks needed **AND THEN TAKE THEM ALL!** (No tentative, chicken-hearted 'sneaking' into the center with two or three changes - that just wastes points.)

Related to the above are a couple of other questions: "What should my sight picture look like?" and, "Where should I hold?" While these are pretty much subjective things, some principles can be used as guides. First, you MUST have some light around the front sight when it is centered in the notch of the rear sight! Even young shooters with eyes "like an eagle" need to have easily discernable bands of light to allow the brain to make judgments as to the quality of the alignment. A good starting point for adjusting the width of the rear notch is to have light bands on either side of the front sight equal at least to \approx BD the front sight's apparent width. I feel the advocates of very narrow light bands are mistaken for physiological reasons: This type of sight picture fires only a few rods and cones in the retina and gives the brain only minimal information. And, as you age, some of these cells don't work anymore making it even worse. This why wide sights are sometimes called "old f---'" sights. ("folk's" - "folk's" - what did you think?) (See the 3/99 "Note" titled "What about sights?" where this WAS discussed before and has some illustrations.)

As to "where to hold", the best natural hold is the "center hold" as it is well established that the eye will seek the center of a circle subconsciously. However, this hold has one fatal drawback: It is hard to see black sights against a black background. This can be mitigated with added "plus" spherical correction in the shooting glasses to make the aiming mark blurred and gray, but still it is deficient in good definition. The absolute

worst hold is the infamous "6-O'clock" hold! It has two main drawbacks: There is only ONE correct hold (top of front sight tangent to the lower edge of the aiming mark) which sets up terrible psychic stress: You are almost always "wrong"! So, you try harder and harder to get the "right" picture and then punch the trigger when it is fleetingly achieved. There is also an optical drawback: The refraction referred to above at the top of the front sight creates a halo there, making the intersection of the aiming mark and the sight indistinct and making it even more difficult to get it "just right".

So, we are left with the best compromise: The "sub-6" hold. Here we use an "area aim" technique like the Center Hold, but now our sights are clearly outlined in the white area of the target. We can let them float there without concern about exact position to the aiming mark and instead concentrate on their alignment. How much below the aiming mark to hold? Start with about the same amount of white as around the front sight when centered in the rear notch. Then let your subconscious pick what it finds is comfortable and quit worrying about it.

OK, enough "school"- lets go shooting!

Don

RELEASING THE SHOT Now being retired from competition for almost two years, it is interesting to observe the changes in my skills and the effect on my precision shooting due to the lack of concentrated training. The first lesson to be relearned was that trying to use a "breaking glass" crisp trigger will result in some awful slow fire shots!

The problem with this kind of trigger is that you MUST be moving your trigger finger throughout the holding and aiming period! But, you cannot do this easily with a super-crisp 2nd stage setup on your trigger. Yet, I would guess that 90% of the "bullseye" shooters try to use this setup and also only begin applying the second stage or final release pressure AFTER they have recognized they are in the "best" part of their hold! This, ladies and gentlemen, is TOO LATE.

Today, we pretty much understand how the mind controls the body and agree that the sub-conscious aspect of the mind is the controller of all the elements in delivering an aimed shot. The only conscious act by the shooter should be the on-going effort to maintain the best alignment of the sights he can while all else is being coordinated by the sub-conscious.

It is also my belief that once the sub-conscious has been correctly programmed (by careful training on each element in the shot delivery process) that it will integrate the observed movement of the gun AND the movement of the trigger finger as it adds pressure to the trigger and moves to the rear to give you the result you want. However, that finger HAS to be moving! Otherwise there is no pressure/movement curve to integrate with the gun movement. Instead, there is a convulsive movement sometime during the hold - probably due to a conscious effort by the shooter. Not good.

The better method that will greatly benefit your performance is to first optimize the mechanical part of the equation by giving the 2nd stage of the trigger setup a bit of "roll"

or movement before release - instead of a 'super crisp break'. This bit of movement is what is needed by the subconscious so it can "time" the rate of release to coincide with the sight-aligned gun's movement into the 'sweet-spot' that results in a 10.

Next, you need to analyze the movement pattern that you have TODAY. Maybe, for many reasons, you aren't as steady as a week ago or even yesterday. This is NOT important - really! What is important is to recognize the current pattern: How far into the hold cycle is the ONSET of your steadiest hold? How long does this period last? (This is also not very important, because you should never get to the end of this short "steadiest" period or even to the middle of it!)

Then, by dry-firing, you find the RATE at which you must apply pressure to the trigger so that the sear (2nd stage) releases JUST AS YOU BEGIN THAT STEADIEST PROTION OF YOUR HOLD. Now at first this is a bit scary: "What if it goes off early?" Well, what if it does? Actually, you will probably get no worse than a 9 and you have about a 50/50 chance of a 10! The release will be clean and your hold is probably better than you think, anyway. For the next shot just use a slightly slower rate. The really bad thing is to not have the rate fast enough and you end up near (or past) the end of the steadiest period before the shot releases. Now you WILL have some bad shots!

When you have the rhythm for this shooting session down, the benefits are enormous: First, you expend far less energy and use up far less oxygen. This means you do not fatigue prematurely and have reserves all the way to the end of the match. Secondly, your confidence goes up greatly as the shots break effortlessly and you begin to see the phenomenon of : "It broke just as it was heading for the sweet spot". You will NOT see those awful "aws---" shots and you'll start wondering why this used to seem so hard!

So, the lesson is: Start the pressure on the second stage as you settle into the aiming area and keep increasing it at a rate that allows the shot to break JUST AS YOU ENTER THE STEADIEST PART OF YOUR HOLD. Note we have insisted on using "steadiest" not "steady". No one is completely steady, nor is it necessary to be! The shot just has to release as the gun enters the area that will result in a 10. Soon, you will realize that your subconscious is sort of 'steering' the gun with the trigger pressure into that area. And never forget - YOU (consciously) cannot do this! Just let your subconscious do it and enjoy!

Don

VISUALIZATION The last couple of "tips" by Dr. Mike Keyes dealt with stress and relaxation as a tool to overcome stress. Now that we are relaxed, lets look at some powerful mental techniques to improve our performance. I refer to these as "Strategic Visualization" and "Tactical Visualization". These techniques work on the principles that the subconscious mind controls such activities as shooting (or should and would if you let it!) and that our neural pathways can be "primed" to transmit preferred messages to the body. Also, it is known that the subconscious mind holds our "self-image" and cannot tell a *vividly* imagined event from a real one (!) With these ideas firmly in place, we can devise a strategy to improve our self image. And, once we have a new self image, we are

compelled to adhere to it! Building a new self-image is done with:

Strategic visualization. The technique is so easy many can't believe there isn't more to it. What you do, is make up an "affirmation" card: a 3X5 card with a positive, present tense, first person statement on it. (Don't skip over this part - all of the last sentence is critical to success.) An example would be: "I am a 570 air pistol shooter". (Of course, this should be a challenging but not ridiculous statement and one that represents a significant improvement.) Now, using the relaxation techniques we have learned, we get comfortable and relaxed, take out your card(s) and then read this statement to ourselves - once out loud and once silently. Then, we close our eyes and visualize - IN AS MUCH DETAIL (color, sound, smells, etc.) as we can - being a 570 shooter. See the scoreboard in your mind with your name and score. Visualize shooting the match with 95 average strings. Feel your friends pat your back, etc. Do this several times a day. That's it. And, believe it or not, in a far shorter time than you might think possible, you will find yourself doing the things necessary to be a 570 shooter and then the day will come that the 570 score is achieved and you'll hardly even be surprised - after all that is YOU, so what's the big deal? You will find that instead of turning on the TV, you think you'll practice a while, because that is what 570 shooters DO. You'll be sure your equipment is suitable for a 570 shooter. All this will happen without conscious effort, just because you WANT to! You can make up several of these statements and even *subordinate* statements. For example, with the "I am a 570 shooter" statement, you might feel that you just can't find enough training time to make this happen, so you make a card that says, "I find it easy to schedule training time" and put in behind the "570" statement and use it the same way. Very soon you will be finding reasons to GO practice rather than reasons NOT to go. The subconscious mind has received all those vivid pictures of the "new you", believes they are actual experiences and is making sure you conform to this new, improved self image. The more frequently you visualize, the quicker the change occurs.

Tactical visualization is a bit different. In Tip #7 we talked about creating a perfect model of the action you wish to take - in this case, a perfectly executed shot. You must have this in order to practice your skill either mentally or physically. Researchers have shown that if an athlete, a down-hill skier in one example, visualizes making a slalom run while hooked up to a mylograph, minute electrical fields are measured that indicate the exact same muscles are being activated that would be used to actually ski the slope. We believe that these neural "paths" can be programmed with the visualization of your perfect "model" just as with actual action. Visualization is probably better because the act can be done perfectly EVERY time! So, this is a way of training mentally anywhere, anytime. One excellent use of tactical imaging is to visualize a perfect shot on the range just before you actually perform the shot. Then, letting your mind hold that image, you raise the gun and execute what you have just visualized. The results of this technique are very gratifying!

And, notice that if you are working hard at visualizing perfect executions, you are not worrying about negative things and are going to be free of the stress-causing concerns that plagued you before!

Don

The Mental Side of Shooting Guest Tip by Dr. Mike Keyes, MD. (Dr. Keyes is a psychiatrist who has worked with the US Team and is a competitive shooter himself. This 'tip' is the first of a series on mental training.) □ □ 'Today the mental side of shooting has become a familiar and vital part of the game in the United States. However, some of us can remember when even the best US shooters felt mental training was a waste of time until it became obvious we couldn't win at the International level without it.. Since then there has been an effort to understand how match stress affects shooters and how to deal with the mental environment of a match. To shoot well in a match, a shooter will need to develop all three parts of the game: Technical competence, physical fitness, and mental toughness. As the shooter progresses in ability and performance, the ratios of each change, but the triad has to be there or the shooter will not perform well and his improvement will stop. The worst obstacle to improvement and high performance is Match Stress. No matter who you are or at what level you shoot (novice, intermediate, master or elite), match pressure will affect you. If a shooter tells you that match pressure does not affect HIM, check his pulse (or in international matches his blood or urine!) At all levels, a shooter must understand and learn to deal with this stress. So - first of all, what is match stress? We will start with the basics. Humans are not designed to be competitive in the way we are in shooting matches. This is ironic, because such competitions came out of warfare, which is actually fairly compatible with human psychology! Matches are different because man is a social animal and we are born, live and die in groups of people and spend much of our time dealing with others. We make friends, we live in groups, we do business, etc. And, we shoot in competition with OTHERS. Therein lies the source of match stress. Man has the quirk of needing to establish hierarchies. This is a primate trait and in human society translates as the urge to be number one or dominate the group. However, society frowns on this ambition in many ways and children are taught to share, to 'be nice' to others, etc. And, when we behave in these 'acceptable' ways - we DON'T KEEP SCORE. Yet, when we are in a shooting match, we DO keep score and one shooter is the winner and the others are not. Worse, EVERYBODY knows exactly where you placed - both in this match and in the general sense of the shooting community. So - when you shoot, you are at a social event (so 'be nice'), yet you are expected to dominate all the others and everyone else has the same mandate. Psychologists call this 'cognitive dissonance' and one result is Match Stress. Match stress doesn't occur when you go hunting (also usually a social event) because there is no absolute standard to meet or pressure to be perfect. Your ego is safe while hunting and is not on the line the way it is in a match. There are dozens of well used reasons why 'the big one got away' that can and do save one's ego! But even small shooting matches cause Match Pressure and high level matches cause an effect that even an elite level shooter may not be ready to deal with. All because you are laying your ego on the line in front of a crowd of peers while trying to meet a standard of perfection most people can't reach and you probably never will! And you thought shooting was supposed to be fun! While the above explanation is somewhat theoretical, the EFFECTS of stress are well known and obvious. For over 100 years scientists have described a 'fight or flight' response to threat which is mediated by adrenaline (and a bunch of other hormones) and is predictable in its effects on humans. If allowed to escalate, the normal response to threat can lead to paralysis, but the usual response is an alerting effect that still can have troubling consequences for the match shooter. While the adrenaline

response to stress makes vision better, makes you stronger and quicker, and puts a burst of energy in the form of glucose into your body, there is more - none of it good for a shooter. We have all felt the physical negative effects - sweaty palms, urinary frequency, rapid pulse, trembling limbs, etc. But the worst effects are mental. The fight or flight reflex sets into motion a whole set of predictable mental conditions including anxiety, poor concentration, and automatic thoughts of possible failure. These intrusive and negative thoughts interfere with good performance. The final result can be a negative feedback loop in which the shooter has a few bad shots, develops anxiety and then has more bad shots as a result. This can continue until performance totally degrades. But - learning the basics of mental training such as relaxation, visualization and imagery can overcome these negative aspects. That will be the subject of next tip!" □ □ *Don*

The Mental Side of Shooting - Relaxation Guest Tip #2 by Dr. Mike Keyes, MD: Relaxation

Last time we pointed out how the problems of Match Stress, Cognitive Dissonance and Negative Feedback Loops could keep you from achieving your shooting goals. This article will give you a major tool to combat these effects.

This basic tool is relaxation. Without the ability to relax your body and mind, good scores will never be achieved no matter how much you practice the other aspects of shooting. Relaxation is an essential ingredient for good shooting performance.

Lets start by defining "relaxation". In the simplest sense it refers to achieving a state of decreased tension in your muscles. The "normal" state of our body is to have equal tension in opposing muscles (flexors and extensors.) The problem we have comes from the fact that target shooting isn't a "normal" activity. Pistol shooting in particular is an "extension" sport – which means that the flexor muscles must be quiet (with the exception of the gripping and trigger fingers) during shot execution. So, just decreasing tension in all our muscles isn't quite what we need.

Ideally, the only muscles that would be working are those needed to hold our position for a brief time and those needed to release the shot. The fewer muscles in use, the steadier our position will be. In real life, however, most shooters are unable to control the flexor-extensor conflict in the muscles used for these acts. Extensor/flexor conflict results in less strength for the extensor and thus more effort is needed to hold our position. With this excessive effort, the position becomes less stable due to early fatigue. To increase stability then, instead of "trying harder", we should actually "try less" and learn to relax! With training, we can determine which muscles must be involved in executing a shot and which have to be "uninvolved" in order to deliver the shot correctly. By learning selective relaxation, we can monitor the shooting effort and relax at will those muscles that should be "quiet".

There is an additional physical benefit to relaxing our body: lowering the center of gravity and decreasing the "lever" effect of a stiff body. To illustrate this effect, try a simple experiment: Stand as stiff as possible and extend your arm. Have someone try to rock you back by pushing on your outstretched arm. It is very easy to rock you because

you have provided the "pusher" a rigid lever and you have raised your center of gravity. Now try the same thing after relaxing as much as possible – letting yourself sag into your shoes and having your arm extended but not rigid. Obviously, a relaxed body is much more stable! Staying loose - relaxing as needed - is good strategy.

This type of "stiffness" is also the main cause of "chicken finger" or the inability to press the trigger smoothly when you are delivering the shot. By relaxing, you will allow the small muscles that flex the finger to pull the trigger without interference from the larger muscles doing the gripping of the gun. Relaxing the body will also let your mental program to do its' job. You can't have a tense mind in a relaxed body!

So, the third benefit of relaxing is that it will help you deal with match pressure. One of the first effects of mental stress is muscle tension – especially with the flexors which are the "fight or flight" motors. Even subtle tensing changes the way you shoot, usually for the worse. Stress releases hormones, glucose is sent out, heart and respiration rates change, and all these cause you to become even more tense due to the increased "fight or flight" messages to your body. Once these chain reactions are started, it is often very difficult to reverse the course of their effects, so if we learn to relax BEFORE this occurs, (maybe starting even the NIGHT before!) we will be much better off. (Actually, we can get TOO relaxed – if you are essentially asleep, you won't perform well either, but that is maybe another article.)

The fourth major effect of relaxation is that it allows you to enter what is called the "alpha state". When you relax, you change the way the brain works. In deep relaxation your brain gives off alpha waves that indicate that you are in an altered state of consciousness. Some of the benefits of such a totally relaxed brain are a sense of total control of the situation, automatic actions that are precise and accurate, and a perception that very little energy is being used. (Many record setting performances have been described by the shooter later as having been "effortless"!) This is sometimes called "being in the Zone" and is well known in many sports. Relaxation allows you to better concentrate on the sights, for example, and they often appear larger and clearer than normal. A relaxed shooter often has an expanded sense of time: a 4 second rapid fire string might seem much longer. Studies have shown that elite shooters are able to achieve the alpha state in their "right brain" while the "left brain" (critical and thinking "side") is suppressed. This leads to the "automatic" shot (really a controlled, rehearsed action performed by the subconscious.)

With all these benefits, one would think that relaxation would be a major goal of all shooting programs. Some shooters don't work at relaxing because they think they are pretty good relaxers naturally so they never learn to develop the technique to full potential. However, if you don't practice this skill like any other, when it is needed the most, the ability to relax just won't be there! So, lets learn the mechanics of relaxing that we might practice them just as we do holding, sighting and trigger release:

I teach a technique used in Europe in which you progressively tense and relax muscle groups. You begin by holding the tension – as hard as you can - for about 10 seconds and then suddenly releasing the tension and letting the muscles relax to whatever point they

will. It is important to release suddenly as the muscle group will relax past your present state of tension only if a sudden release occurs. This will not happen with a slow, gradual release. This exercise can be learned by having the shooter get in a comfortable, well-supported position (lying down or in a chair.) Start with the head/neck group and then with groups (shoulders, hands/arms, stomach, buttocks, etc.) progressively on down to the lower legs and feet. After each muscle group has been tensed and suddenly released, let it rest for at least 20 seconds before starting the next group. Once each group has been relaxed, I usually have the shooter tense the WHOLE body and then relax it suddenly with the image of sinking into the bed (or floor or chair) and further induce relaxation by saying, "relax", each time they breathe out. Even the tensest person will relax some by doing this (some shooters even fall asleep!) Once learned, this can be used even when on the firing line.

By practicing this regularly, you will learn to relax on each expired breath and eventually will be able to relax with just the breathing cue. Thus, as you shoot, you will find you automatically relax on the half breath out while you are lining up your shot. By combining these elements into your shot program and practicing them during your regular training, you will become more aware of your body, control its' reaction to stress and thus become more consistent in your shot delivery. And consistent, relaxed shooting will lead to much improved performance. □□*Don*

Building Your Technique Not that we discourage the attitude that "If I had a better gun, I'd shoot better" (after all we ARE in the business!), but the truth is that hard work on a sound technique is the real way to boost your performance. The problem is the "hard work" part - nobody enjoys that nearly as much as seeing holes appear in paper 10 minutes after you arrive at the range. Still, once you decide that you are serious you will not mind the effort as the results begin to appear. In building your technique, you might as well start at the ground and work up. I like to use the analogy of building a house: You need a good, strong, well designed foundation to support the rest of the structure. □□The first idea to dispel is that of finding your "natural stance". While your physical makeup will have to be factored in (I had one student who had engaged in "Kendo" for years - he was so muscle-bound he could NOT hold his arms out straight!) your stance should be based on basic principles and then MADE "natural" by repetition. Almost all elements of a good shooting technique are compromises and we see that in choosing a good body position: The placement of the feet is a compromise between stress on the ankles and legs and the desire to have the widest possible platform for stability. The commonly stated rule of thumb that the feet should be about as far apart as the shoulder width is a good starting point. Next, we must choose how to orient our feet. Again, the oft heard "45 degrees to the firing line" is a reasonable starting place. The feet are set as if along the sides of a triangle - toes out, heels in with the firing line being the base of the triangle and a line through the feet converging behind the shooter as the apex. We choose something near this angle as the best compromise in reducing strain on the body as we divide the 90 degrees to be subtended between the mechanically inefficient 'facing the target directly on' and the quite efficient 'feet parallel to the firing line' positions. If we were to stand with the feet parallel to the firing line (and some early shooters did!) we put enormous strain on the neck trying to twist the head around enough to sight down the barrel line and we also constrict the carotid artery which is supplying oxygen to the eyes and brain. This

is not a good, so we start with the feet as above and subtend the remaining 45 degrees or so by twisting at the hips and ankles about 20-25 degrees and by turning the head for the remainder of the way. Now we have stabilized the back and have distributed the strain throughout the body leaving the neck arteries free and the neck muscles only mildly extended. The head is erect, of course, and so the balancing organs feel correctly oriented. □□ I recommend you choose a place at home to do your dry firing where you can place and leave tape markers on the floor in the above relationship to the aiming mark on the wall. This way you can step into place exactly the same way each time you begin your dry training. Very quickly your body will "learn" this position/stance and it will become "natural". Don't be afraid to mark your foot position with chalk or tape at the range and even during the match, either! In a long match, it is recommended you take breaks (or, you may have no choice during scoring breaks.) It is very nice to be able to just step back into the exact place and thus eliminate another possible variable. I have seen shooters at world level matches do this, so ignore any odd looks and be confident you are in "your" stance.

Don

Building Your Technique By now, your position should be pretty well established, so as promised, we will take the next step in building our technique and discuss *breathing*. Hey, what's to discuss? Everybody knows how to breathe, right? as usual, however, there are good ways and better ways—particularly if you are shooting. □□ The first things to understand are your physiological needs and how the body treats breathing (it has its own agenda going here and shooting wasn't hardwired in to be part of it!). The brain and the eyes are two of the biggest users of oxygen and darned if those aren't two of the most important organs used in shooting. So, we have to be sure they are getting lots of it. Another thing to consider is that the "out-of-breath, gotta breathe" feeling is NOT due to lack of oxygen, but due to the body detecting an excess of CO₂. When we take these facts into account and add them to the need to not be moving while we deliver a shot, the framework of our breathing technique emerges. Other things to consider are the fact that really full lungs tend to compress the heart and change its beating rate and yet an expanded chest can help support the gun. □□ The first step in breathing for shot delivery is to PURGE the lungs of CO₂. Most of us only use about 1/2 the lung's capacity while breathing "at rest." CO₂ is heavier than air and sinks to the bottom of the lungs. To purge it, we need to make a deep exhale and push all of the CO₂ out. The second step is to take a deep inhale—fill the lungs all the way up. *As we do this, we lift the gun—letting the expanded chest help.* The third step is to make a "normal exhale". This will take the pressure off the heart and as we do so, we lower the gun into the aiming area. Then, I like to "top off the tank" by taking a normal inhale. Now we are "full" of fresh oxygenated air, empty of CO₂ (which promptly starts building up again) and in the aiming area ready to deliver the shot. Here we can fine tune by making a controlled small exhale to let the gun settle into the exact area we have chosen as our aiming area. The chest actually is helping support the gun. You must experiment to find the point that is just right for you. Now we become still, "holding" our breathe while the shot is delivered. Finally, we make a normal exhale and lower the gun to the bench and begin "normal" at-rest breathing while we relax our eyes, body, and mind during the "rest" phase of the shot cycle. □□ Once more: □□ Step 1: Deep exhale □ Step 2: Deep inhale, lift gun as we do so □ Step 3: Normal

exhale to relieve pressure on heart □ Step 4: Normal inhale to "top off" (maybe even a bit MORE than "normal") □ Step 5: Tiny, controlled exhale to fine tune "support" position for the gun in aiming area □ Step 6: Still (hold breath) while shot is delivered (and until after bullet hits target—"follow through") □ Step 7: Exhale normally while lowering gun to bench □ Step 8: Normal respiration while resting between shots. □ □ Who would have thought "breathing" requires all those steps? this routine now must be folded into your technique by slow, careful, exact repetition until it too becomes "natural". As with everything else, consistency is your goal. □ □ *Don*

Time, Ammunition and Oxidation There was some traffic on various bulletin boards around the 'net a bit ago that indicated some misconceptions about ammunition, airgun pellets, and age—specifically deterioration due to oxidation of the lead. □ □ All metals oxidize. Some metals do this very slowly and others rather quickly, but just as animals age, so do metals. Lead is a very interesting metal in that it not only oxidizes, but it changes its *morphology* as well with time. Reloaders, particularly those who cast their own bullets, have been aware of this fact for many years: Bullets made on Friday are noticeably softer than they will be on the following Friday! Pellet makers discovered that this tendency of cast lead to vary in hardness and ductility over time as internal crystalline changes took place meant variations in the quality of the pellets they produced. One maker in particular has taken this into account very successfully and now produces pellets of incredible uniformity (compared to 10-15 years ago). The process starts with an alloy formula that resists oxidation to a great degree. Then ingots are poured from this molten mixture. These ingots are then "aged" – they sit on a shelf in a controlled environment for several weeks. After this stage, the ingots are put into a machine and drawn into coils of wire. As this mechanical "working" again causes the molecular structure of the lead to start changing, another "aging" period is prescribed and the coils sit on the shelf for more weeks. Finally, the wire is fed into the pellet forming machines and the actual pellet is created. As the mechanical change from wire to pellet is much less extreme than that from ingot to wire, the internal structure of the pellet undergoes far less change and thus remains more stable. The production of each machine is kept separate and about 25,000 to 35,000 pellets are numbered as a single lot. These lots are in turn tested, packed and shipped. The best of these lots (10 shot groups from which must fit *inside* a 6mm circle) become "*World Champion*" pellets. While in the past, a shooter had to be concerned that if he or she bought more than 5,000 pellets (one carton), they might not get used up before they "expired" (became oxidized). This has not been a concern for many years. We have pellets in our archives of control samples that are 8 years old and have the same surface appearance as freshly opened tins of pellets – a slightly dull silver finish. In the bad old days before the anti-oxidizing alloys, the pellets would first turn a very dark gray-black and then would become covered with a white powder. Lead has several oxidation states, but these are probably all you will see in ammunition and pellets. The dark color is usually of no concern (look at your eley "tenex" or any other .22 bullets – they will often be a dark gray). However, the white powder can possibly harm the bore and so ammunition or pellets at this stage of oxidation should be disposed of properly. □ □ Fortunately, science and technology have triumphed again to the benefit of the shooter and this is not a worry with modern factory ammunition and pellets. The reloader, however, might still want to keep a close eye on his efforts!

Don

Modifying Your Pistol's Grip One thing that we can probably say for sure is that there are two kinds of pistol shooters: Those that are working on their grips and those that are going to be working on their grips. This is because while there are a zillion different hands out there to hold pistols, the manufacturers decided that maybe four or six or eight different sizes/types of grip were enough to make and stock for each pistol. So, as everyone wants to have THE perfect fit, we are left with no choice but to start modifying. But what and how? We'll try to set out some of the basics in text as fancy diagrams will have to wait for the book.

The objectives: The pistol grip should be made so that your grip is reproducible. Pistol target shooting is just an exercise in repeating the same thing without deviation up to sixty or ninety times, so if the shooter grips the gun in always the same way, as Forrest Gump would say, "That's one more thing not to worry about." Next, the grip should allow the sights to be aligned without having to angle the hand at the wrist. In events like Rapid Fire and Free Pistol, it is critical that when the arm is brought up and the gun allowed to settle with the eyes closed, when the eyes are opened the sights are seen to be aligned. Then the grip should help support the gun and give a "secure" feeling without you having to exert a lot of force on it. Finally, we can throw in at least a degree of comfort as a requirement (certainly no pain!) The major mistake most novice grip changers make is to ADD too much "stuff". Very seldom does material need to be added to a modern generation target pistol grip! Quite to the contrary, most are too big in one or more places for the average hand. Hold your relaxed hand out in front of you and look at how the fingers curl and how a wedge shape is defined as you go from the second finger down to the little finger. A grip should taper in the same manner. Almost always the first removals should be where the web of the hand (between the thumb and forefinger) goes around the grip so the hand is not stretched out unnaturally. The next thing is to taper the grip so the fingers can get around and have the second segment of the fingers perpendicular to the bore. Finger grooves are optional and if not placed perfectly can be a problem. Simpler and better is to make three tapered flats running from the top of the grip to the bottom for the finger segments to lie against. Once these adjustments are made, the grip will usually be far more comfortable, the trigger finger will reach the trigger shoe correctly, and because the flats were proportioned for YOUR hand, the grip will be reproducible.

Next time we'll get to changes that might be needed to bring the front sight into alignment with the rear notch, and when you need to add "stuff".

Don

Modifying Your Pistol's Grip—Part II We discussed the general fit of the pistol grip to the *hand* in the last "tip", and now we need to look at the adjustments that should be made to the grip to bring the line of the sights on the gun into congruence with the line of the eye/target when in shooting position. □ □ You often see the silly statement that the gun should be in a straight line with the bones of your arm, and also with your shooting eye. A second's thought and a quick look shows you that unless you are a contortionist, the gun will NOT be in a straight line with the bones of your arm if it comes anywhere near

lining up with your shooting eye! the gun obviously sits in the hand at a small angle to the bones of the arm—and if "cross dominant" (right-handed and left eye dominant for example), a somewhat greater angle! This angle can be adjusted by making additions or cuts to the grip. To have it clear where to add or remove material from the grip to adjust alignment, cup your shooting hand slightly and think of the center of the hollow formed in that palm as the pivot point for right and left adjustments. This means that if the front sight points to the left when you are in shooting position, then for the gun to move to the right, there must be LESS wood at the front of that "pivot point". Most grips have a shallow depression at the side/front where the fleshy pads at the base of the fingers can nestle. If this groove is deepened (and at the same time dimensioned for YOUR hand), then the gun can pivot to the right. Now the same effect can be realized by ADDING material to the LEFT (if you are right handed) side of the grip, at the back, where the big fleshy pad at the bottom of the palm rests against the (hopefully) curved surface. This is the *hypothenar* muscle and where it fits against the grip is a primary index feature. When you fit the gun into the hand, you press that pad against the wood first, and then wrap the hand around the rest of the grip. So, adding material there - in BACK of the pivot point - will move the front sight to the right. Now, obviously just the reverse of the above - taking material away from the hypothenar contact "pocket" - or - adding material to the groove in the front side of the grip - will move the front of the gun to the LEFT. □□ The next thing to consider as you are working on the front groove is to more sharply define and perhaps add to the RIDGE that is formed in front of the groove. This ridge should go into the crease at the bottom of the fingers where they join the palm. It is your second index feature. As you wrap your hand around the grip after getting into the hypothenar pocket, you should feel the ridge slip into the crease. Building UP this ridge CAN move the front of the gun to the LEFT, of course. The total effect will be a very secure feel, and a grip that results in the sights being in near perfect alignment!

Don

What about sights? As a follow up on the shooting glasses tip, we are going to talk about the sights themselves that you are trying so hard to see. The most common type of "iron" sights, those required by international shooting rules, are the "partridge" type - a square rear notch and a square post front. There are other types - notably the "U" notch rear sight - used by some of the top European shooters. The "U" notch is interesting in that if you make a windage error in aligning the front sight with the rear, it shows up as a change in the height of the bar of light on the error side, as well as a change in the width of the light bar. See figure 1. I used this type of rear notch for several years when shooting Free Pistol, including when I set the National Record of 574.

Many years ago some ingenious experiments were done to determine the optimum width of the front sight and the rear notch. Without describing the process, suffice it to say that the results led the experimenters to believe that a 3/16" (.187") width front post was best for 25 yard shooting, and a 1/10" (.100") width post was best for 50 yard shooting. This resulted in a compromise width of 1/8" (.125") that we find on many U.S. made pistols (High Standard, S&W 41, Ruger, Bomar, etc.). However, as shooters and equipment

became better, and higher levels of performance were required to win important matches, sights were re-examined and new trials - by actually using them in competition - resulted in the finding that for airgun shooting at 10 meters, a 4.5mm (.177") front post seemed best for most shooters, and 5mm was preferred for free pistol shooting at 50 meters. These sights are what is being shipped as standard on most guns being made at this time. But all makers offer other widths as options. Many shooters of mature years prefer front sights even wider: 5mm for airpistols for example. These sometimes are referred to as "old shooters" sights. There is a good reason for this: As the eyes age, the efficiency of the rods and cones in the retina declines - making it more difficult to discern the boundaries of the front sight and the rear notch. The wider sights "fire" more of these receptor cells and give the brain more information.

The next question becomes the ratio of the front sight to the rear notch. This is often defined by comparing the width of the light bars on either side of the front sight when centered in the rear notch, to the width of the sight post itself. The most common ratios are "1:2:1" (see fig.2), and "1:1:1" (see fig. 3). I find the "1:2:1" to be best for me, but you should try to find what is best for you.

Fortunately, the gun manufacturers are making this more easy by producing rear sights that can be adjusted for width of opening in near infinite increments over a pretty wide range. Just remember, it probably is unwise to go with light bars that are too narrow. The brain will be hard pressed to accurately distinguish just how wide each bar is as the number of receptor cells fired by a very narrow light bar are just too few to give reliable information.

Don

The Eyes Have It It seems that I've written more about vision and shooting than anything else, but there also seems to be a constant need to get the word out over and over. So - if you've read my articles on this subject in other media, skip on. But, if you are not sure how to see your sights as clearly as possible under any light conditions, the following explanation may help.

In order to get the correct sight picture at any given time you must be able to **CONTROL** the *power* of your shooting lens and the *depth of field*. In other words, you must be able to *change* these elements. Why? Because your eyes change from day to day, the sight radius of the pistols are different - one from another, and the light you experience from range to range (or minute to minute outdoors) changes. All of these things require you to make an adaptation if you want to get the best possible sight picture.

The only shooting system that I know of that makes this relatively easy is the "Champion" system. This system uses clip-on lenses that can be quickly and easily put over the basic lens (usually a prescription lens to get your vision to "normal" or zero) to add power when needed. Then there is an adjustable iris or diaphragm that goes between the eye and the lens to allow changes in depth of field. With this system you *are* in

control. Remember, there is *no one* lens that is right for all shooting conditions! And that is where the trouble and misunderstanding comes in.

I finally had to purchase a lensometer - a microscope like device to read the "sphere" (power), "cylinder" (shape of lens to correct for astigmatism), and "axis" (angle of rotation of the cylinder) of prescription lenses. I had to do this to unravel the problems I was having with my own shooting glasses and to understand the problems clients were having with theirs. It turns out that a lot of eye care people, even if they are shooters, tend to make the wrong lenses! And, your lenses are practically **NEVER** what the prescription calls for (even if the prescription happens to be correct - which it may not be). We just had a client come by who had some expensive lenses made for his shooting glasses. The instructions were to add +.25 and +.50 diopters sphere to his prescription - resulting in two lenses to be used for pistol shooting. Unfortunately, the optician or the optometrist goofed and the lenses were made with -.25 and -.50 differences. The poor shooter couldn't figure out why things weren't better. This type of thing happens quite often. For this reason, we advise you to not bother the poor eye care person with your needs for shooting, but understand what is to be done, get the right equipment (Champion glasses), and take over the job yourself.

The eye, when relaxed, focuses out about 1.5 meters from your face. The front sight is inside of that distance. Therefore, you want to use a lens that brings that relaxed focus **IN** - ideally *at* the front sight. Some shooters take their gun to the obliging eye doctor's office and he "fits" a lens that does that. That is fine, if you are going to shoot in a relatively dark doctor's office! But, you still can't change! The proper way to do this is with low powered **PLUS** lenses. Plus lenses bring the focus in, minus lenses move the focus out. Generally, we recommend you start with two clip-on lenses: +.25 and +.50 diopter (diopter is one meter change in focal length). These take care of most situations. Here the rule is: "The stronger the light, the stronger the lens". So, in bright light you will need to add the +.50 instead of the +.25. Why? Depth of field.

Depth of field means over how long a distance things are things in focus. In bright light, your natural pupil closes down and you get the "pinhole camera" effect: everything for quite a ways out is in focus. This means the pistol shooter's no-no: the *target* will be in focus! We all know that you don't want that, so it takes an added power lens to "fuzz" it up again. Now what about low light? Well, when your natural pupil opens up everything gets "fuzzy" - most importantly, the front sight! And that is where the adjustable iris comes in: you close it until you get the sights sharp and leave the target "fuzzy".

By now, you see that this is not a straight forward situation of "get a lens for my shooting glasses" and forget about it. And, above I've alluded to problems normally beyond our ken: quality control of the whole process. There is the possible error in the refractive process (the determining of your prescription), the prescribing process (getting the additional power backwards), and the lens making process itself. God help you to get the lens you *really* need to get to "zero" or 20/20! But you can have each step checked so that you get as close as possible - just don't trust anybody. Be a pain in the butt and have each person in the chain show you the lens is exactly what it should be. Then you take over and set up your glasses for the conditions of "right now".

Good seeing/shooting.

Don

The Psychology of Shooting This month we'll examine the psychology of shooting. There are some serious contradictions in the messages we get whenever the subjects of "How to acquire shooting skills", "How to perform at matches", and "What were the results of your last match performance" are discussed. These contradictions occur at all levels of the game, from the guys at the club to the National Team. Almost everybody that has been shooting for any length of time and not living on a desert island has heard "don't think about your score ..." when shooting in a match. Right, sure. Unless you are brain dead, *of course* you think about your score! We used to joke that the Russians (who were whuppin' us) all had received pre frontal lobotomies because they seemed so stoic in victory or defeat - no expressions of anxiety or joy. This was not true, of course, but we speculated that this procedure would probably improve your match performance, but you wouldn't care! The principal expressed in "don't think about your score while shooting ..." is sound enough. Actually, the whole idea is "To acquire great skills, one MUST think about every aspect of execution, and do so all of the time. But to achieve great PERFORMANCE, one must *not* "think" at all!!" What this means is that you must be extremely analytical and cognitive in the effort of learning and perfecting the skill of shooting in order to come up with a good technique. But, when actually performing, you must let the mind/body combination operate on the subconscious level, and so do what it was trained to do **without** the interference of the conscious mind. And, all effort and focus is to be on execution of the act of firing a shot or a series in perfect conformance with the model you derived from all that cognition and rehearsal - not what the results of this execution might yield.

O.K. So you do this, or try to at least. What is the first thing the guys (or the National Coach) asks when you come off of the line? DO they ask, "How many times did you correctly execute your model technique?" Most likely not. Surely they say, "What score did you get?" And, they haven't yet put on a match where the medals are awarded on a percentage of perfect executions, nor do they publish the names of the shooters and the number of excellent executions in the match bulletin. No-sir-ee, they publish the *scores*. So live with it. Forget the silliness of "Don't think about your scores" but DO realize how one accomplishes skill versus how one achieves high performance (which of course equals high scores). Also recognize that *everyone* at every level experiences increased "arousal" (a word much preferred over fear, anxiety, dread, etc.) when in a serious competition. What most of the top performers have is the confidence that the work they did in learning the skill of shooting will carry them through in spite of (or even *because* of) this extra arousal. And, because the same adrenalin rush that makes your mouth dry and your palms sweaty also increases your visual acuity, tactile sense, and cognition speed - darned if you might not just end up with a personal best!

Having a **plan**, i.e. "I am going to execute correctly as much as possible" and *knowing* what that *is* will put you ahead of 90% of the pack before the first shot is fired!

Don

Changing for the better Many times I am asked, "What should I change so I can do better?" We know that change is necessary to go from one state or level to another, but how and when and what do you change if you want to "improve"? One man asked me how to hold his gun "still". He was disappointed when I told him this was not where he should be putting his effort! What he really wanted, of course, was better performance (scores). His analysis of what change would bring him the most improvement was faulty in thinking that his "stillness" or hold was the biggest problem he had. (Of course, we all know what *really* is the biggest problem, don't we?)

I am an inveterate changer myself. I believe this has helped me considerably in my career (although some of the coaches the US team has had were made crazy by this!) All my changes, though, were **SYSTEMATIC**. This means I analyzed the current situation, decided on which element would yield the most performance gain if changed, made the change I thought would be for the best, set up a test of efficacy, set a timetable for implementation and then **RECORDED** everything I could think of: All of the above (the change, the why, the how, the goal for the change, the schedule, etc.) and finally I documented **ALL** the results (scores). Warning!! All changes have side effects: In our eagerness to change something that seems to be an obstacle, sometimes we get negative, unintended results. One of my students decided that he would stop drinking his 8 cups of coffee a day for the duration of the National Championships. This surely would make him less "nervous" and he would do better. The only problem was the intense withdrawal headaches from the sudden cessation of caffeine! Moral: If the change will affect your physical state, make it early enough to allow for acclimation. Another example of this was the student who started weight training in the middle of the shooting season. His body was getting stronger, but his fine muscle control, needed for good performance, was shot! (Pun intended.) This also applies to changes to your equipment: A different gun, adding weights to the gun, a different grip, etc. Make these kinds of changes early enough to allow for adaptation by the time the "big match" must be shot. More subtle changes like trigger weight, trigger position, shooting glass lenses, rhythm of firing, etc. can be made without so much concern about adaptive time, but should be planned, adhered to for a predetermined period and **DOCUMENTED** - then correlated with the results obtained. Only this way can you make an objective evaluation of the value of the change and decide whether to keep the new conditions or go back to "zero" and start again. Of course, sometimes the change is either so good or so bad it is obvious immediately that should either keep it or drop it! Either way, you've learned something you didn't know before and that is progress. And, the smarter we become, the better we perform. So change away - wisely!

Don

Air Tank Refills Explained The most common question lately is "How many fills can I get from my air tank?" (referring to the newer SCUBA or precompressed air guns). Of course, I cannot answer this question.

Why? A quick review of high school physics is needed! First, let's talk about the familiar CO₂ pistols that have been used very successfully for the last 15 years. And, by the way, these pistols are **STILL** just as good as ever! As I have been fond of saying, they didn't

turn into "dog-doo" overnight! These guns were successful due to the fact that the vapor pressure over a liquid is a constant at any specific temperature. Therefore, as long as you had *any* liquid CO₂ left in the gun's cylinder, you had the same pressure for the next shot as for the first.

The precompressed air guns work on an entirely different system and must obey the gas laws. In this case they are $V_1P_1 = V_2P_2$ and $P = nRT/V$. (V = volume, P = pressure, n = amount of air, R = the "gas constant" that makes everything come out right, and T = temperature). From this we see that, because the volume of the gun's cylinder stays constant, the pressure in the cylinder must change with each shot. The gun, however, is fitted with a regulator that is designed to "step down" the pressure in the cylinder to a more-or-less (depending on the efficiency of the regulator) constant pressure ("working pressure") that is presented to the pellet. Thus, until the pressure in the cylinder drops to the working pressure, you have the same velocity for each shot.

Now let's talk about the supply tank. Each time you fill a cylinder the amount of air ("n") in the supply tank is reduced, so therefore the pressure remaining in the tank is less. The pressure in the cylinder is *almost* the same as the pressure in the tank (a little less because V_2 in this case is the volume of the supply tank + the cylinder + the connecting lines). Because you have less air after each fill, you will get fewer shots/less fill the next time and so on until you decide you need to get your tank pressure back up to 3000 PSI. How soon this is or "how many fills (shots) can I get" depends on the size of your tank. In my opinion, the 80 cubic foot standard US SCUBA tank is about as small as you would want. And how many shots per cylinder is entirely dependent on the pressure in the tank at the time. Some of you are wondering about the "T" in the equation above. Yes, temperature does have an effect. But, compared to the steepness of the CO₂ vapor pressure vs. temperature curve, the curve for compressed air is pretty flat and can safely be ignored for the practical business of shooting. So, now you know!

Don

Grip Pressure We get a lot of questions regarding gripping pressure. How hard do you grip a Free Pistol? An Air Pistol?

While every individual is different as to grip strength, amount of body mass (to absorb recoil), etc., there are some guide lines. The "grip" that you take on a pistol must be:

- . Constant
- . Adequate to hold the pistol securely during firing
- . Allow free and independent movement of the trigger finger

It is this last factor that often causes the most problems. If you are "squeezing the sap" out of the wood on the grip of the gun, you will have a very difficult time moving the trigger finger with any finesse. For this reason Free Pistol grips are constructed to require a bent wrist. The more you must depress the hand and thereby take the wrist away from a straight position, the less force can be applied to the grip. This in turn forces you to grip more lightly and thus free the trigger finger for more subtle application of pressure to the 20-50 gram trigger weight of the Free Pistol. As you move up to higher trigger weights,

the grip angle becomes less obtuse and finally you get to something like the Colt .45 Government model with a trigger pull of 4 lbs. (1800 grams!) and the gun is constructed to be held with an almost straight wrist.

So, start out gripping the Free Pistol with about the same pressure you would exert during a handshake with a young girl - not a "limp fish", but not so hard as to cause any discomfort!

Don

Training Plans How do you set up a training plan? What is *training*, anyway?

Training is a learning process both for your mind and your body (anyone out there think you can separate them?). Learning theory is pretty well established and basically says that short sessions and lots of them is the most efficient way to learn anything. The U.S. Shooting Team shotgun coach, Lloyd Woodhouse, has the most rational plans that I have heard. He defines "training" as that time spent perfecting each element of the technique (sometimes called "the fundamentals"), this should consume about 80% of your learning time. "Practice" should take about 15% of your learning time and is defined as simulating match conditions as closely as possible, but being able to stop in the middle of or at the end of a series of shots, making an adjustment to come closer to the perfect technique, and then repeating the series or continuing as needed. You'll notice that there is 5% left - and that is the time spent at actual matches.

Three sessions a week for about 3-4 hours per session is a pretty heavy learning load, but it is about what is required on the range for those seeking to become elite shooters. Alternate days should be spent in physical or mental "training" to maintain good physical condition or increase strength, and/or to work on visualization techniques.

One important aspect not commonly recognized is to schedule uninterrupted time and concentrate on a single element. New studies show that if you try to learn *more than one thing in a day*, your learning efficiency goes down! It seems that it takes the mind/body combo some significant time to integrate what it is trying to learn. So, when you "train", pick one element of the technique, focus on it, work to perform it perfectly and don't try to do anything else in that session. Then take a break, for heaven's sake!

Don

Modifying Your Pistol's Grip by Don Nygord

One thing that we can probably say for sure is that there are two kinds of pistol shooters: Those that are working on their grips and those that are going to be working on their grips. This is because while there are a zillion different hands out there to hold pistols, the manufacturers decided that maybe four or six or eight different sizes/types of grip were enough to make and stock for each pistol. So, as everyone wants to have THE perfect fit, we are left with no choice but to start modifying. But what and how? We'll try to set out some of the basics in text as fancy diagrams will have to wait for the book.

The objectives: The pistol grip should be made so that your grip is reproducible. Pistol target shooting is just an exercise in repeating the same thing without deviation up to sixty or ninety times, so if the shooter grips the gun in always the same way, as Forrest Gump would say, "That's one more thing not to worry about." Next, the grip should allow the sights to be aligned without having to angle the hand at the wrist. In events like Rapid Fire and Free Pistol, it is critical that when the arm is brought up and the gun allowed to settle with the eyes closed, when the eyes are opened the sights are seen to be aligned. Then the grip should help support the gun and give a "secure" feeling without you having to exert a lot of force on it. Finally, we can throw in at least a degree of comfort as a requirement (certainly no pain!) The major mistake most novice grip changers make is to ADD too much "stuff". Very seldom does material need to be added to a modern generation target pistol grip! Quite to the contrary, most are too big in one or more places for the average hand. Hold your relaxed hand out in front of you and look at how the fingers curl and how a wedge shape is defined as you go from the second finger down to the little finger. A grip should taper in the same manner. Almost always the first removals should be where the web of the hand (between the thumb and forefinger) goes around the grip so the hand is not stretched out unnaturally. The next thing is to taper the grip so the fingers can get around and have the second segment of the fingers perpendicular to the bore. Finger grooves are optional and if not placed perfectly can be a problem. Simpler and better is to make three tapered flats running from the top of the grip to the bottom for the finger segments to lie against. Once these adjustments are made, the grip will usually be far more comfortable, the trigger finger will reach the trigger shoe correctly, and because the flats were proportioned for YOUR hand, the grip will be reproducible.

Next time we'll get to changes that might be needed to bring the front sight into alignment with the rear notch, and when you need to add "stuff".

Don Modifying Your Pistol's Grip—Part II

We discussed the general fit of the pistol grip to the hand in the last "tip", and now we need to look at the adjustments that should be made to the grip to bring the line of the sights on the gun into congruence with the line of the eye/target when in shooting position.

You often see the silly statement that the gun should be in a straight line with the bones of your arm, and also with your shooting eye. A second's thought and a quick look shows you that unless you are a contortionist, the gun will NOT be in a straight line with the bones of your arm if it comes anywhere near lining up with your shooting eye! the gun obviously sits in the hand at a small angle to the bones of the arm—and if "cross dominant" (right-handed and left eye dominant for example), a somewhat greater angle! This angle can be adjusted by making additions or cuts to the grip. To have it clear where to add or remove material from the grip to adjust alignment, cup your shooting hand slightly and think of the center of the hollow formed in that palm as the pivot point for right and left

adjustments. This means that if the front sight points to the left when you are in shooting position, then for the gun to move to the right, there must be LESS wood at the front of that "pivot point". Most grips have a shallow depression at the side/front where the fleshy pads at the base of the fingers can nestle. If this groove is deepened (and at the same time dimensioned for YOUR hand), then the gun can pivot to the right. Now the same effect can be realized by ADDING material to the LEFT (if you are right handed) side of the grip, at the back, where the big fleshy pad at the bottom of the palm rests against the (hopefully) curved surface. This is the hypothenar muscle and where it fits against the grip is a primary index feature. When you fit the gun into the hand, you press that pad against the wood first, and then wrap the hand around the rest of the grip. So, adding material there - in BACK of the pivot point - will move the front sight to the right. Now, obviously just the reverse of the above - taking material away from the hypothenar contact "pocket" - or - adding material to the groove in the front side of the grip - will move the front of the gun to the LEFT.

The next thing to consider as you are working on the front groove is to more sharply define and perhaps add to the RIDGE that is formed in front of the groove. This ridge should go into the crease at the bottom of the fingers where they join the palm. It is your second index feature. As you wrap your hand around the grip after getting into the hypothenar pocket, you should feel the ridge slip into the crease. Building UP this ridge CAN move the front of the gun to the LEFT, of course. The total effect will be a very secure feel, and a grip that results in the sights being in near perfect alignment!

Don