

# Accuracy Got You

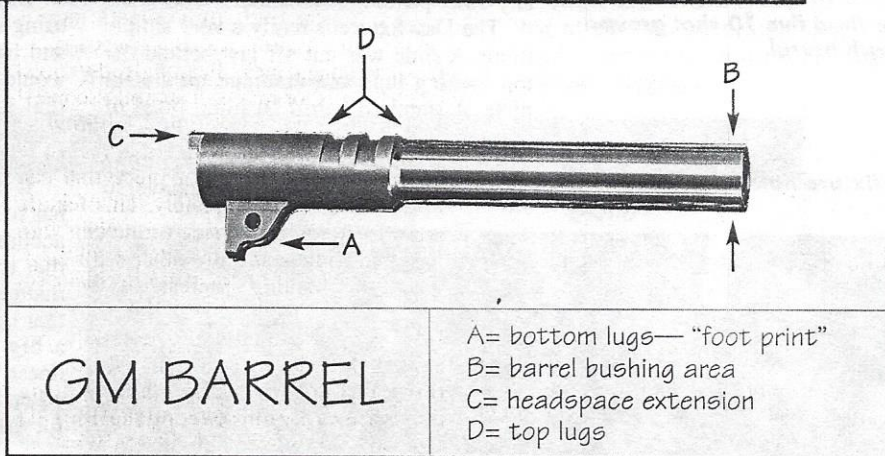
## Over A Barrel?



Then take it up with your pistolsmith, not your barrel maker. We tested the best "match grade" 1911 barrels against an old GI clunker from the '50s and a current production Colt barrel. The high dollar aftermarket tubes weren't much better.

By Charles E. Petty

**W**hether you're talking about rifles or handguns, a certain mystique has grown around match barrels and the processes by which they are made. People spend lots of money buying barrels from famous makers with good reputations when, in fact, the barrel is only a part of the accuracy picture. In the case of the 1911 Government Model, that



seems to be especially true.

For all my early years as a bullseye shooter and gunsmith, I lived and breathed accuracy. My training at the hands of Bob Day and the other gunsmiths at the USAF Marksmanship School never once focused on the quality of the barrel.

That's because we didn't have any choices. In those days, the only barrels we had were taken from GI pistols, carefully built up by welding the bottom lugs and headspace extension and only then fitted to the gun with meticulous hand work.

When we were done, we usually had guns that were capable of between 2" and 3" for 10 shots at 50 yards with the ammo of the time. Life was good, life was simple.

Then we began to get the famous "Shively" barrels which were made oversize to allow fitting without first having to weld. Groups really didn't shrink, as I recall, but it sure saved a lot of time in the building process.

Then somebody in the shop built a lug cutter, which replaced the chainsaw files we had been using to cut bottom lugs. Groups were still about the same.

The practice was for Remington and Winchester to submit samples of specific lots of target ammo— Federal wasn't making centerfire in those days— and the Marksmanship School would test the ammo in guns known to be good shooters. If the sample of ammo was accept-



# 1911 Barrel Accuracy Test Results

| Make                | Type      | Velocity | Group 1 | Group 2 | Group 3 | Group 4 | Group 5 | Average |
|---------------------|-----------|----------|---------|---------|---------|---------|---------|---------|
| Kart                | broach    | 796 fps  | 1.49"   | 1.19"   | 1.24"   | 1.23"   | 1.65"   | 1.36"   |
| Wilson Combat       | broach    | 660 fps  | 1.52"   | 1.34"   | 1.38"   | 1.61"   | 1.26"   | 1.42"   |
| Federal test barrel | n/a       | n/a      | 1.66"   | 1.55"   | 1.19"   | 1.74"   | 1.28"   | 1.48"   |
| Bar-Sto             | broach    | 769 fps  | 1.63"   | 1.03"   | 2.08"   | 1.51"   | 1.56"   | 1.56"   |
| High Standard       | G.I. spec | 753 fps  | 1.22"   | 1.61"   | 1.82"   | 1.57"   | 1.65"   | 1.57"   |
| Colt Nat'l Match    | G.I. spec | 784 fps  | 2.01"   | 1.67"   | 1.35"   | 1.78"   | 1.30"   | 1.62"   |
| Ed Brown #1         | broach    | 750 fps  | 1.46"   | 1.73"   | 1.41"   | 1.65"   | 1.97"   | 1.64"   |
| Briley #2           | ECM       | 790 fps  | 1.27"   | 2.07"   | 1.49"   | 1.56"   | 1.81"   | 1.64"   |
| Ed Brown #2         | ECM       | 717 fps  | 2.08"   | 1.59"   | 1.89"   | 1.83"   | 1.58"   | 1.80"   |
| Kimber              | factory   | 790 fps  | 2.46"   | 1.88"   | 1.69"   | 1.54"   | 1.54"   | 1.82"   |
| Chip McCormick      | ECM       | 753 fps  | 1.89"   | 1.95"   | 1.98"   | 1.29"   | 1.98"   | 1.82"   |
| Colt 1991A1         | factory   | 711 fps  | 2.15"   | 2.17"   | 1.24"   | 1.58"   | 2.14"   | 1.86"   |
| Briley #1           | ECM       | 784 fps  | 2.16"   | 2.59"   | 1.96"   | 1.32"   | 1.93"   | 1.99"   |

Notes: All measurements are 10 shot groups at 50 yards from the Day barrel test fixture. Velocity is the average of all 50 rounds as measured with a PACT Professional Chronograph. All ammunition was Federal 185 gr. Match SWC (GM45B) Lot #38F196V023.

Button rifling is probably the most common method of making rifle barrels, but is not often seen with large caliber handgun barrels. Hammer forging forms the rifling around a mandrel that looks very much like a rifling button. This method does not lend itself to short barrels and is not used in any American-made handgun barrel.

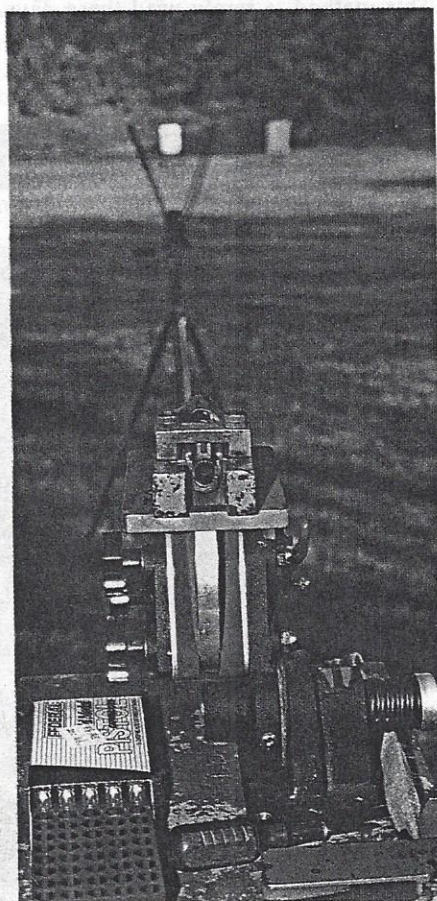
The final, and newest, rifling method is "electro chemical machining," customarily known by the acronym ECM. In this process, the bore is drilled, reamed and honed like in the other processes, but the rifling is formed differently.

A carbon electrode with the rifling pattern is passed through the bore and forms one side of the electrical current. The barrel is grounded and an electrolytic fluid, under pressure, completes the circuit.

The electrode is passed slowly through the bore and the combination of electrical current and high pressure fluid "washes" away metal. This method is becoming popular for rifling handgun barrels because it leaves a very smooth finish and is also economical.

But if making the barrel is relatively straightforward, fitting it to the gun is not. Nor is it easy. Everybody who does it has an individual approach, but there are four different places on the barrel that require attention: bottom locking lugs, top locking lugs, headspace extension and bushing area.

Of those, the bottom lugs, or "footprint," of the barrel are the most important. As long as there is some contact



Chronographing was done in conjunction with group shooting.

between the barrel and the slide stop pin in this area, accuracy will be greatly improved. But a sloppy fit can only go so far. Unless the lugs are really right some potential accuracy will be lost.

You've heard that putting a *tight* bushing on a pistol will improve accuracy. Well, it might, but it can also ruin accuracy if it's too tight. John Browning's wonderful design requires that the barrel tip up and down in order to function, so if somebody puts a bushing on there that's too tight, it could prevent the free movement of the barrel.

Next is the headspace extension. I was trained that the three sides should fit into the slide so that the barrel could move freely up and down, but no light would be visible between the barrel and slide. Now that isn't as hard to do as you might think, but it does require paying attention to where—and how much—you file. Some 'smiths fit this even tighter, but I think that's just as bad as leaving it too loose.

The top locking lugs are a very important component, but normally don't require much work. Unfortunately, the location and depth of the cuts in the slide have been known to vary so it has to be checked to be sure there is enough engagement to keep the barrel and slide locked together in the critical fraction of a second where the barrel and slide recoil together.

Some match barrels have a little extra material so the 'smith can adjust the

*Continued on page 98*



good as the other methods.

Bear in mind that, statistically, there is little, if any, difference between any of the barrels tested. Obviously, it would be a life's work to test a large enough sample of barrels from each maker to reach statistically valid conclusions. However, we cannot ignore the fact that three of the four ECM barrels had the largest groups in the test.

This was contrary to what I expected. The Briley barrel, which is ECM rifled, was one of the earliest tested. Even though you certainly can't call the results bad, the groups were the largest at 2.0". Fortunately I had another, visually identical Briley barrel and repeated the test with it and got the group down to 1.6", a decrease of 20 percent in group size.

After I had done most of the test shooting, I was discussing the results with *American Handgunner* Pistol-smithing Editor Ed Brown and he mentioned that he was no longer going to use the ECM rifling method on his barrels, having changed to broach cut rifling. Since that would be representative of what a customer would get today, I asked Ed to send a broached barrel. The broach rifled barrel was 12 percent more accurate than the ECM barrel (1.6" versus 1.8").

### Strictly GI

Just to make things interesting, I also included a couple of barrels of different

heritage. One was a strictly GI barrel that was made by High Standard during World War II. During the war, High Standard had a contract to make barrels which were used in Remington-Rand and Ithaca 1911A1 pistols. I found one of them that was brand-new and thought it would be enlightening to test.

My experience with GI barrels which are built up by welding is that GI barrels usually shoot just as well as the fancy ones. This, once more, was proved true. That old GI tube shot a 1.6" average for five 10-shot groups out of the Day fixture. One of the groups was 1.2", which is outstanding by any standard.

I also included a new Colt-made National Match barrel from the '60s. Over the years I have used many of these to build guns and they have been uniformly accurate. The average of the five 10-shot groups was also 1.6", but with two of the groups measuring 1.3" each. Interestingly, a Bar-Sto stainless steel Match barrel also averaged that same 1.6".

Since the 1911 really is still a Colt pistol, I also included a barrel from a relatively new Colt 1991A1. It averaged 1.9", the second worst showing of the dozen barrels. (The only one worse was the first Briley barrel at 2.0".)

### Watch The Screens

Since testing was done at 50 yards, the most difficult part was making sure that I

didn't shoot the target mechanism or sky-screens. It took awhile to get everything lined up, but once that was accomplished the actual testing was straightforward, albeit tedious.

Each barrel was clean when testing began. Two fouling shots were fired and then the target was advanced and firing groups-for-record was begun. Five consecutive 10-shot groups were fired with each barrel.

All rounds were chronographed. Since we're talking about a single-shot pistol here, the process was achingly tedious. But in a way that's good, for I quickly got into a mind-numbing rhythm that got it done without any risk of overheating the barrel.

Including time for record keeping and advancing the motorized target, it took 30 to 45 minutes per barrel.

In a way, the shooting was the easiest part. The real work began after all the groups were measured and the data tabulated, trying to decide what it all meant.

All groups were measured center-to-center of the widest shots using electronic calipers. Since so many of the groups were only one ragged hole, those were measured at the widest point and the bullet diameter (.452") was subtracted.

Numerical values were rounded off to two decimal places. We also need to consider what, if any, value to place on the second decimal. Is a barrel that shoots an

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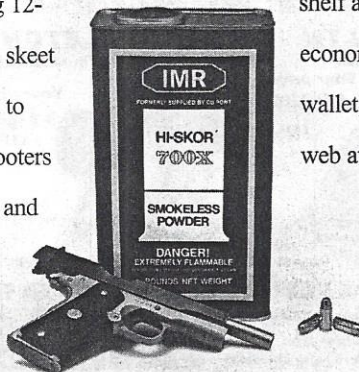
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## BARREL ACCURACY

Continued from page 73

engagement. The lugs also help control the position of the barrel in relation to the firing pin. When the bottom lugs are locked up on the slide stop, it will force the barrel up and cause an off-center firing pin strike.

Lots of people think that's bad, but it really doesn't matter as long as the firing pin hits the primer with enough force to ignite it.

But the most carefully fitted barrel in the world is just so much scrap metal unless you have good ammo. The famous shooter who fussed at Ed Brown for that 1" gun simply didn't know that even the very best .45 ammo simply won't shoot groups that small—not every time.

Yes, I have seen a 1" group at 50 yards. But the accuracy of ammo follows a certain statistical randomness which means that you *may* get a 1" group, but you can also get one that measures 2" from the same lot!

### Dozen Test Barrels

So in order to test a variety of different barrels, I first had to have a sufficient quantity of ammunition from the same lot and know what the ammo would shoot in a standard accuracy test barrel. Federal Cartridge Company came to the rescue with a case of their fine Gold Medal .45 wadcutter. Over the years, I have come to view that ammo as the most consistently accurate stuff around.

A total of 12 different barrels were included in the test. It was a daunting chore so if any of you are inclined to ask, "Why didn't you test a Whumper Super Match?" The answer is, "I didn't have one." Somebody else will no doubt complain that I didn't test their favorite brand. My response: write your own article.

It is an exercise in futility to try to test every make, model, brand and configuration because there really aren't that many companies that make their own.

Those I tested represent a good cross section of *how* barrels are made. Of the 12, four are ECM rifled, seven are either broached or button rifled and one, Kimber, is rifled with a combination of broaching and button rifling that is unusual.

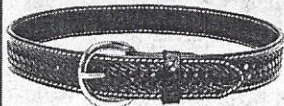
The Kimber barrel is first broached slightly undersize and then finished by button rifling. It produces a very smooth interior finish. It is rumored that another of the barrels I tested is also rifled in this manner, but that has not been confirmed.

### Which Is Best?

It is logical to ask which method produces the most accurate barrels. This data indicates that there is very little difference among the better barrels, which are either broached or button rifled. What it does seem to indicate is that ECM rifling produces accuracy that is not quite as

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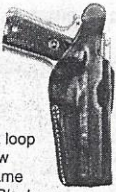
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**BARREL ACCURACY**

Continued from page 99

average of 1.57" really better than one that shoots 1.58"? Not at all. Well it certainly isn't worse! Editor

In fact, I am a little less sure now than I was when the test began that it would be possible to proclaim that one barrel of the 12 is the best. But it is very encouraging to see that several of the barrels delivered groups when fired from Day's little fixture that were equal to or better than the ammunition factory's elaborate system.

About the only thing I can say with complete confidence is that the test method was good. Also, the results might be different on another day. Such is the curse of trying to nit-pick accuracy.

**Sample Size**

One of the most important things in any kind of a test is to have a sample that is large enough to inspire confidence in the results. If you look at the spread of group sizes in Federal's data, you see a difference of .55" from largest to smallest group. The averages from all the different barrels show a difference of .63" from largest to smallest. Some people would conclude that there is little, if any, difference among the barrels.

There is something terribly frustrating about trying to pick a barrel. Over the years I have spoken with any number of barrelmakers and am surprised by their agreement. Most state that they absolutely cannot predict which barrel from a production run of seemingly identical barrels will shoot the best.

About the only thing that is certain is that there will be a difference in accuracy among them. Bore and groove measurements may well be identical, or vary only by a few tenths, but some will shoot better than others.

Even though the *Handgunner* test used the best available factory .45 ACP ammunition, if we repeated the test with another load, the results might be different. How can you scientifically explain the fact that a barrel happens to like one particular load? You really can't.

**Independent Verification**

In order to see if any explanations could be found, I dispatched the dozen barrels to Wilson Arms Co.—no relation to pistolsmith Bill Wilson—for an independent measurement of bore and groove diameters using an air gauge.

It turned out that the ECM rifled barrels could not be measured with an air gauge because of the rounding of the grooves typical of that method.

Accordingly, the ECM barrels were slugged and the *minimum* bore and groove dimensions determined from the lead slug. I am not sure that there is anything to be learned from all that work; all the barrels

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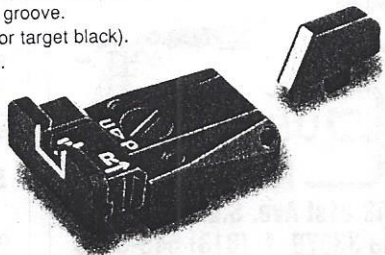
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were pretty consistent from one end to the other although there were some significant differences in basic dimensions. I can find no correlation between the measurements and my accuracy results.

### Human Factor

Obviously, there is a considerable effect attributable to the skill of your gunsmith. You can have the most accurate barrel in the whole wide world, but if it isn't fitted correctly you might as well have a piece of sewer pipe.

When I hear of a gunsmith who *guarantees* that his guns will shoot a certain group size without specifying the ammo, I view it as a sales tool rather than something meaningful. The plain truth is that few shooters have the skill to test a gun to its fullest potential and fewer still bother to clamp a gun in a Ransom Rest.

And, of course, you've got to have good ammo. I am not sure that any .45 ammo, whether hand or factory loaded, is capable of consistently shooting 1" groups at 50 yards. If you look at my data, you will see only a few individual groups that approach that goal.

But I remain hopeful and am fairly confident now that I can handload ammo that will be the equal of most factory ammo, and better than some. I also know that I am not through trying to find a load that will make that 1" gun a reality.

### The Winner Is...

It really would have pleased me to find one make of barrel that was clearly superior. That was not the case. The only firm conclusion I've reached is that the ECM rifled barrels did not shoot as well as broach or cut rifled barrels. Other than that, the tests don't show a strong preference for any brand of barrel.

All of them—when you look at it from a statistical viewpoint—shot very much alike. Buy any of them and then search far and wide for a gunsmith who really knows how to fit it right. Then worry about your ammo.

Please don't look at my data and conclude that the barrel that shot 1.36" is *better* than the one that shot 1.42"! *Again, it's certainly not any worse!* Editor

As I was finishing this test, I happened to pick up Jim Clark's current catalog. Right there, in black and white, were words that could have saved me no end of work:

"A match barrel is simply a barrel with oversize hood and lugs to allow a custom fit with very close tolerances. As long as the bore is good, most factory barrels can be made to shoot as well as match barrels by welding the hood and lugs to oversize dimensions and then refitting just as you would a match barrel."

Of course the grand old master is right. Guns are living proof of the French aphorism, "Le plus ça change, le plus ça change." (The more things change, the more things stay the same.)



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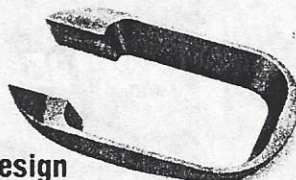
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## RUGER MK. II

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silhouette competitors.

Early in my work with this rig, I recorded 14 separate runs through this course with an aggregate score of 48 percent. The iron sight scores were consistent at nine to 10 animals with an average score of 9.7 out of 20.

The variable scope produced scores ranging from seven to 11 animals with average score of nine out of 20. The Qwik Dot produced strings of eight to 12 animals with an average score of 10.5 out of 20.

The Qwik Point was absolute murder on chickens and pigs and about even with the other sight options on the longer range targets. By the time I had become adept with the optical sights, the silhouettes had been destroyed by range vandals and I don't consider these results an accurate reflection of the capabilities of the optical sights.

### Get Rested

The optical sights really come into their own in combination with a more or less solid rest. This was clearly demonstrated by the 50 yard groups fired from a padded-V and sandbag setup.

As a realistic representation of a variety of available field rests, I used one of the range's folding chairs. Sitting on the ground, I used both hands on my Volquartsen grips resting the base flair across the seat. Pretty close to what you get over the cab of a pickup or from a convenient fence post or rock.

My comfort range for taking game of rabbit size from this sort of set-up using iron sights is 35 yards, which presupposes good shooting light and a fully visible target.

The two minute dot extends this distance to 50 yards and side by side comparison with groups fired with the scope at 4x are essentially the same.

At 75 yards, the 1.5-4x Weaver showed an emerging advantage both in terms of target visibility and hit probability. I obtained vital hits with all rounds fired under magnification, but missed a couple with the dot, which, at this range, subtends an area of 3".

The kicker came at a known distance of 100 yards. Using the scope and a solid rest, I hit nine out of 10 claybirds suspended from the backstop. Switching to the Qwik Dot, the score dropped to six out of 10. The lighted dot was the same size as the bright orange targets and it was more difficult to judge the 4.4" hold-over required at that range.

### Snap Shooting

Electronic dot sights are frequently recommended for close range "snap shooting." I found the Qwik Point to be about as