

THE AMERICAN RIFLEMAN

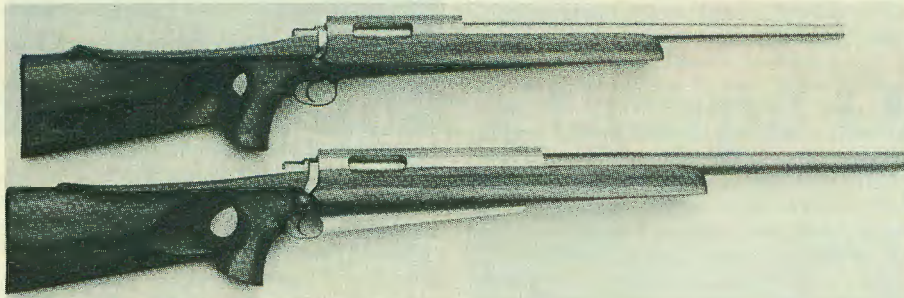
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**ALUMINUM
BENCH-REST
ACTIONS**

THE 'RIGID LOOK' AS BUILT INTO BENCH-REST ACTIONS



Stolle rifles: Top—Light Varmint with short Panda action. Bottom—Heavy Varmint with full-length Panda receiver and strongback trigger guard.

By STUART OTTESON and JOHN EATON

EARLY bench-rest rifles, as they evolved shortly after World War II, were typically built around surplus Mauser, Springfield, or Enfield actions. It was soon apparent that these as-issued actions could not properly support long, heavy target barrels and were thus a serious limiting factor to ultimate rifle accuracy. Various methods were soon developed to build up, stiffen, and lengthen the receivers.

Simultaneously, a small but steady market developed for custom-built bench-rest actions. This demand continues today despite the introduction of a few inherently rigid factory actions, notably the solid-bottom Remington 40X series. Bench-rest actions made by Ralph Stolle of Seabrook, Md., are prime examples of why the demand still exists.

Stolle, a master printer by trade and for many years a top shooter in National Bench Rest Shooters Ass'n competitions, started making actions on a limited production basis in 1967. While there are many variations in the 100 or so Stolle actions made to date, there have been only three basic patterns: The Grizzly model, an all-steel Bench-Rest Rifle action; the Panda, an aluminum Varmint-Class action; and the Polar, a massive aluminum action introduced in 1974 to replace the Grizzly.

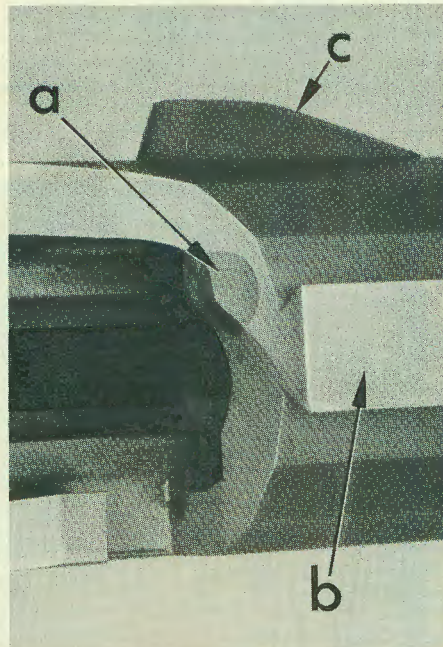
Stolle's basic goal is to build a more precise, rigid, and stable competition action. He has been remarkably successful. The key to this success is found in a number of important design features included in all his actions: large exterior dimensions, lack of a magazine opening, a minimum-sized ejection port, an extra-long barrel tenon, a tang recoil system, and the use of pre-heat-treated materials.

From the standpoint of receiver strength and rigidity, the advantages of extra-large overall dimensions, small ejection ports, and solid-bottom surfaces are obvious. So is the value of the extra length of the

threaded portion of the receiver ring which in the Stolle receivers is about double the length of those in most commercial receivers.

Most Stolle receivers are between 12" and 15" long overall. Since a normal-length bolt is used, the extra receiver length is forward of the breech, encircling the barrel to provide an off-the-barrel mounting point for long target-style scopes. This length also adds valuable area to the receiver's underside and re-distributes the bedding support forward toward the center of balance of the barreled action.

Recoil in Stolle actions is taken by the squared-off rear tang of the receiver. Although custom action makers have tried



Close up of Panda action showing hardened extraction-cam insert (a), integral scope rib (b), and Stolle bolt stop (c).

nearly every conceivable recoil-lug system, logic almost demands use of the rear tang for bench-rest style rifles. It provides the most concentric recoil support possible.

Stolle receivers are not heat-treated after machining, thus insuring absolute dimensional precision and stability. For the first several years, he managed this by machining each receiver from pre-hardened steel blanks. Since 1971, the same effect has been achieved by using a system of pre-hardened steel inserts for the bearing points. In both cases, since the finished part is not heated and quenched, every surface and dimension remains as straight, true and concentric as it is possible to obtain with modern machine tools.

Bolts are of conventional design. Either a standard 722-length Remington bolt or a custom version made to Stolle's specifications by Will Gardner of Burtonsville, Md., is used. The latter differs primarily in the design of the extractor. Both bolts have "extended" handles—a small but vital detail which avoids weakening the rifle with the usual deep notch in the side of the receiver and stock.

The bolt stop is an extremely neat and effective push-button type pivoted in the left side of the receiver. It allows easy one-handed actuation, overrides automatically on insertion of the bolt, and makes full contact with the left locking lug to protect the latter's bearing surface. Finally, and perhaps most important from Stolle's viewpoint, it requires no cuts or linkages in the receiver's underside.

The Grizzly was the original and is still the most frequently seen Stolle action. It was designed for the huge Bench-Rest Class rifles (more informally known as big guns) with barrels sometimes weighing as much as 12 to 14 lbs. For proper support, the Grizzly has a massive cylindrical receiver machined from 1 3/4" steel barstock.

Stolle had originally planned to make the Grizzly receivers from conventional 4140 steel barstock. However, the first two machined were lost to warpage during heat treatment. Though it is not generally understood, bolt-action receivers made by the conventional sequence of machining followed by heat treatment are often significantly warped by the quenching phase.

Being a purist by nature, Stolle wanted no more warped receivers, regardless of how well this might be controlled by careful quenching or repaired by later grinding and lapping. Thus, all Grizzly receivers were made from pre-hardened and stabilized 4140 steel blanks (32-34 Rockwell "C"), a very costly and time-consuming process.

The Panda action, intended for Varmint-Class rifles, was introduced in 1971. The earliest versions had cylindrical receivers, but now Stolle makes only a flat-bottomed version. The flat pattern is far more time-consuming to machine than the cylindrical type but stays properly bedded in the stock much longer.

What makes the Panda action so technically interesting is the application of aluminum (7075 T6) in the receiver. This lightweight material allows much larger receiver dimensions than would otherwise



Ralph Stolle beginning work on a 2¼" x 2¼" aluminum blank.

be possible in a Varmint-Class rifle, thus giving a substantial potential increase in performance over steel receivers.

Since overall rifle weight (including scope) is limited to 10.5 lbs. for light varmint rifles and 13.5 lbs. for heavy varmint rifles, the weight which can be allotted to the action generally is only about 2.5 to 3.5 lbs. The aluminum-receiver Panda easily manages this.

Advantages of the aluminum Panda receiver are best illustrated by the specification table which compares it with the Remington 40XBR and an aluminum-sleeved Remington Model 700—both very popular and technically successful approaches to constructing varmint-class rifles in recent years. Most of the data are self-explanatory, with the possible exception of the quantity we have termed rigidity. This is the vertical, cross-sectional rigidity of the receiver about its centerline and in a plane through its mid-section. It is computed by multiplying the Moment of Inertia of the receiver's cross section (a purely geometrical factor) by the Modulus of Elasticity of the material (an inherent material property, approximately 30 x 10⁶ lb./sq. in. for steel and 10.4 x 10⁶ lb./sq. in. for aluminum). This rigidity, combined with the available bedding surface, is a measure of the receiver's ability to resist bending and thus support a heavy, free-floated barrel in a rigid, uniform manner.

Rigidity of the Panda is superior because this is an overwhelmingly dimensional phenomenon. The action's cross-sectional pattern forms an I-beam effect, basically the same thing which accounts for the success of aluminum in airframe design.

This use of aluminum for high-powered rifles is possible because pre-hardened 4140 steel inserts are used to strengthen critical bearing points. Two inserts are threaded and epoxied into the receiver. At the rear, a small solid insert forms the extracting cam. The other insert is a heavy ring threaded inside the receiver ring to form the locking seats and barrel threads.

When Stolle switched to the square-bottom receiver pattern in 1971, continuing

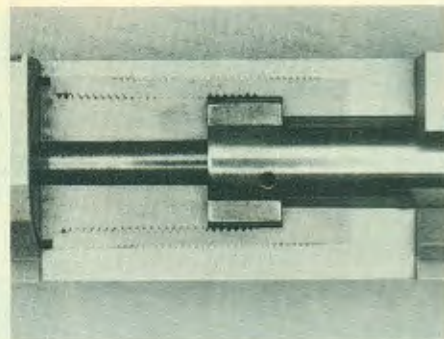
to manufacture big-gun actions using pre-hardened steel receivers became a real problem. Making the lathe-turned round Grizzly receivers was already taking about 25 hours of machining time. With increased need for milling operations, Stolle estimates that to have continued with this material in the new pattern would have almost doubled the time, to say nothing of increasing the already high tool wear costs.

For several years, Stolle made square-bottom receivers for these big-gun actions by using mild-steel blanks and fitting them with the same type of pre-hardened inserts developed for the Panda. While certainly a far more practical approach to non-warped receivers, machining time still proved impractical. Very few of these "interim" steel actions were made, and in 1974, Stolle developed what is basically an enlarged Panda for the big-gun actions.

This latest aluminum action is the Polar. In spite of the lower physical properties of aluminum compared to steel, the Polar's efficient cross-sectional pattern and the enormous size of the new receiver actually give it better rigidity and bedding strength than the highly regarded Grizzly.

Like many other bench-rest shooters, Ralph Stolle is a perfectionist. Any action that is not perfect is simply scrapped, regardless of how minor the flaw or how much time has been invested in it. Stolle's actions are probably made with more precision than really necessary for a top-shooting competition rifle. Their manufacture is thus, to some extent, an exercise in pure precision for precision's sake. That, of course, is the essence of bench-rest shooting, and it is the major reason Stolle devotes so much of his free time to building these actions.

Stolle's shop exhibits the usual assortment of lathes and milling machines, plus a number of specially-made jigs and fixtures. Perhaps the most unique machine used to manufacture these actions is a




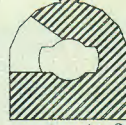



Close up of sectioned Panda action showing hardened steel locking insert.

completely automatic rig Stolle personally designed and built to cut out the receiver raceways. This particular cut is the most difficult in making custom bolt-actions, and accounts for the many custom designs which use some form of full-diameter bolt in which the lugs do not protrude beyond the bolt body.

Stolle's machine scrapes out the raceways with a single-edge form cutter in a process not unlike that used to cut rifling grooves. An automatic counter reveals when the full depth of cut is reached (about 1 hour for each side). The scraping process produces extremely smooth and precise raceways. It is an ingenious piece of machinery, typical of Stolle's natural engineering ability and that of so many other bench-rest shooters of the old school.

Although Stolle once built complete rifles, including excellent laminated thumb-hole stocks, he now concentrates on actions alone. Prices vary depending on the bolt, trigger, and style of trigger guard; but typically, they are around \$300 for a Panda and \$400 for a Polar. These prices may seem high. However, considering time and workmanship, Stolle actions represent value hard to beat in today's market. ■

Table 1 - Technical Specifications

| | Stolle Grizzly | Stolle Polar | Stolle Panda | Remington 40XBR | Aluminum-sleeved Remington 700 |
|----------------------------------|---|---|--|---|---|
| Cross section (in.) |  1.72 |  2.00 x 2.18 |  1.50 x 1.70 |  1.36 |  1.75 |
| Weight (lb.) | 6.5 | 5.8 | 2.6 | 2.4 | 2.8 |
| Rigidity (in. ² -lb.) | 11.0 x 10 ⁶ | 11.7 x 10 ⁶ | 3.9 x 10 ⁶ | 2.3 x 10 ⁶ | 3.3 x 10 ⁶ |
| Length (in.) | 15 | 15 | 12 | 7.85 | 12 |
| Bedding surface (sq. in.) | 24.5 | 28.9 | 16.9 | 8.3 | 17.5 |
| Barrel tenon | 1.0625 - 18 1.5 in. long | 1.0625 - 18 1.5 in. long | 1.0625 - 18 1.3 in. long | 1.0625 - 16 .7 in. long | 1.0625 - 16 .7 in. long |

Dimensions of Stolle actions compared with sleeved and unsleeved Remington actions. Cross-sectional views are to scale.