



Australia's new 5.56 service rifle is the Steyr AUG.

The 5.56 mm Target Rifle

by Greg Matthews

ALTHOUGH there appears to be very little interest in the 5.56 × 45 NATO as an alternative target round in the UK, the idea is very much alive in Australia and Canada. Obviously those who think the .303 should never have been replaced by the 7.62 are unlikely to welcome the diminutive 5.56 round. Even here in Australia, most sporting shooters regard the civilian .223 only as an accurate and adequate 250 yard small game cartridge. The thought of it furnishing match accuracy at four times this distance seems incredible.

In the mid-1980s, Australian Defence Forces adopted the 5.56 cartridge along with the Steyr AUG rifle and FN Minimi machine gun. As a writer for various Australia and US magazines I was supplied samples of new locally made 5.56 propellants for independent evaluation. My work meant frequent contact with various military research establishments. One of the forward thinking researchers proposed a 5.56 sniper rifle so every member of a squad in the field would use the same ammunition.

Like most military ideas the actual mechanics of producing a suitable prototype were left to outside suppliers. A target/sniper rifle seemed an ideal way to test the new powders so a Remington 40X action was fitted with a 26" long 10" twist Delta barrel, fibreglass stock and Leupold 6.5X-20X scope. Before going on perhaps I should explain the need for fast twist barrels in this type of rifle. Normal .22 high power rifles such as .222s are fitted with 14" twist barrels as this twist rate stabilizes the full range of sporting projectiles. Secondly benchresters have found the slowest possible twist rate usually produces best accuracy. The same theory applied to 7.62 target rifles has led to the widespread adoption of 14" twist barrels. Such barrels adequately stabilize lighter .30 calibre bullets up to 168 grains.

When FN began development of heavy bullet 5.56 ammunition it changed the standard 12" twist rate specified for older 5.56 rifles to 7". Actually this is faster than necessary for the new 62 grain SS-109 bullet. The main reason for a very tight twist is the extremely long L110 tracer projectile. The slowest twist that will permit use of both 62gr full metal jacket SS-109 projectiles and commercial 68-69gr hollow point match bullets is one turn in ten inches hence the choice of this rate for the test rifle.

The Army's Engineering Development Establishment in Melbourne sent me some of the FN cartridges imported to evaluate the AUG and Minimi samples. To say the least this ammo was unimpressive with big 10" groups at 300 metres. The Australian Government paid \$1.50 per round for these cartridges, hardly good value. Much more impressive were the 69gr Sierra handloads. These produced very neat groups just an inch or so high and a few inches wide. The Footscray Ammunition Factory was not about to load a special Sierra bullet sniper ammunition so the

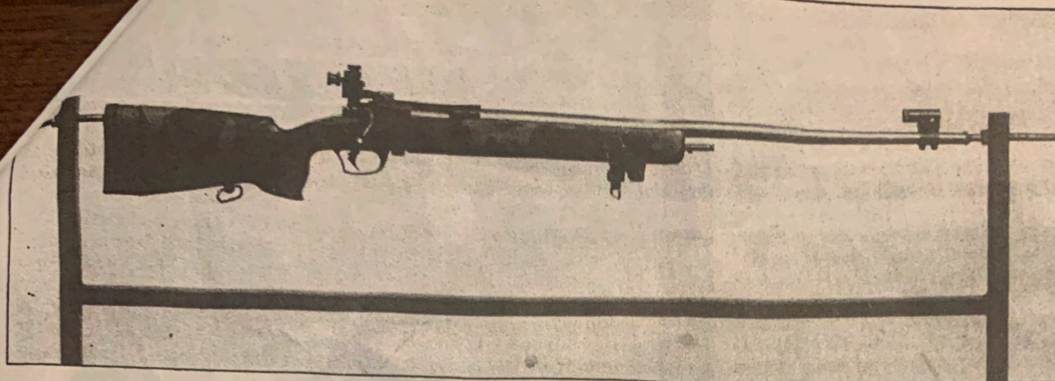
EDE dropped the idea at least until locally made SS-109 components became available.

As the whole project appeared to be headed for the scrapheap, the test rifle was rebuilt for benchrest work leaving no suitable test vehicle when Australian made 62gr SS-109 projectiles appeared a few years later. About this time I was evaluating Parker-Hale's M85 7.62 sniper rifle. The new bullets and F1 5.56 cartridge cases prompted a fateful discussion with P-H managing director Roger Hale. P-H had done some preliminary development work on a Cadet General Purpose (CGP) rifle for school cadet work. The British MoD dropped the proposal leaving P-H with a few prototype actions but no barrels. My work as a former button rifling subcontractor to target rifle manufacturers, MAB Engineering, meant I still had a few 10" twist Delta blanks on hand. These were dispatched to England and resulted in a decidedly military looking 5.56 CGP target/sniper prototype.

P-H tested its new toy in an underground test range and found it capable of 0.5" groups at 100 metres. The CGP was then sent to Australia for military and police evaluation. Accuracy testing with the new 62gr military bullet suggested these projectiles were capable of accuracy similar to the Sierras. Although it seemed a little foolish at the time I tried a few 10 shot 500 metre groups. These later measured 6-8" with absolutely no allowance for wind. Similar groups shot using the bipod and a Leupold scope recorded 10" groups at 700 yards.



New bullets and powders have resulted in a viable 5.56 long range target cartridge combination. Big bore shooters may soon have a small bore alternative for match shooting.



The Parker-Hale
GP prototype.

Obviously the CGP needed the services of an accomplished 7.62 shooter to help realize its long range potential. To this end I enlisted the aid of one of Queensland's most consistent prize winners, Lee Jamieson. No complete Australian SS-109 F1 ammunition had been loaded at this time so the individual components were handloaded to velocities just under 3000fps. The mild handloads really stunned some of the onlookers. Six out of nine holes in the 700 yard target could be covered by the marker's hand! Although the CGP did spend considerable time in the hands of Queensland, New South Wales and Victoria police members their strapped budget and the CGPs obvious potential as a target rifle seemed to draw it back to the big ranges.

Naturally the range shooters wanted a rifle with iron sights and an increased sight radius. Secondly 68gr Hornady bullets would not stabilize adequately in the 10" pitch. In an effort to remedy this situation a 28" match grade Shilen 9" twist barrel was fitted before the CGP was sent to the West Australian Rifle Assn in Perth. Here any bias I may have had meant nothing because it was handloaded and tested by some obviously capable sceptics including state coach Greg Warrian.

Swanbourne Range is well known for its strong yet constant winds yet the CGP shot 49.6/50 at 500 yards during its first appearance in West Australia. Greg Warrian shot many other excellent scores but at 900 yards neither Sierra or Hornady bullets maintained sufficient stability to prevent occasional keyholing.

About this time MAB Engineering, the successor to Omark, also shipped a Model 44 5.56 conversion to West Australia. MAB has been making conversion kits for some time yet almost all have been sent to Canada where 5.56 rifles are already quite well entrenched. The two prototypes helped to convince local shooters the 5.56 calibre is a viable alternative especially when Footscray made F4 7.62 ammo sells to club members for 57 cents each. A very favourable report to the state association has prompted a request to the Federal body for prices and availability of 5.56 ammunition for competition.

The long awaited Footscray F1 round was by now ready for evaluation. Scores using this ammo were not acceptable. Like the

FN factory loads, the velocity chronographed at around 3225fps. Why didn't these rounds perform as well at 3225fps as my handloads at about 2970fps? I believe it is due to a combination of bullet construction and high pressures.

Normal commercial bullets seldom shoot tight groups at top velocities. Secondly these SS-109 bullets have an unusual construction consisting of a conical steel penetrator and rear lead core inside a sharply pointed full metal jacket. FN designed the 62 grainer to be able to drill its way through a steel helmet at considerable distances hence its complicated and rather expensive design. If the SS-109 round is to be adopted for Australian conditions the problem of accuracy must be addressed. To this end Footscray is in the process of developing a 64 grain lead core training/target bullet. The EDE suggested such a bullet some years ago, however the army rejected the idea because it would not meet NATO standards. The mere fact there is no foreseeable threat to this country and to my knowledge no Australian made SS-109 bullet has ever been used in combat makes no difference to our military planners.

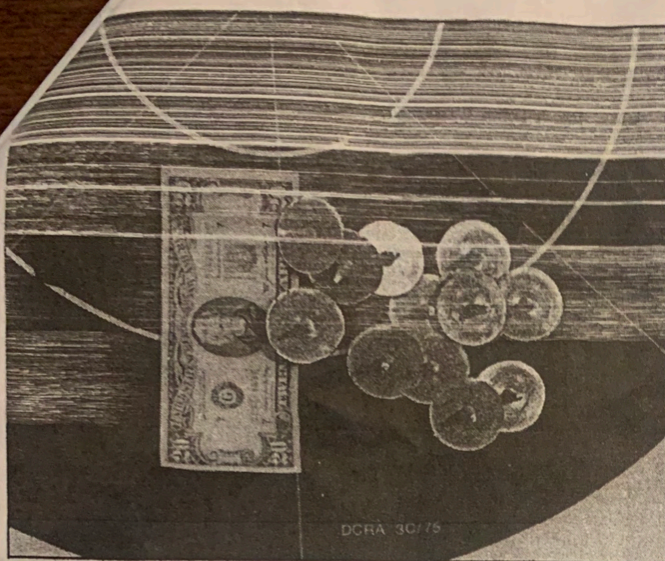
With the recent advent of Australian Defence Industries, the Footscray plant is now run on a commercial basis. This has prompted a more serious approach to the needs of target shooters and in turn development of a suitable .22 calibre target bullet.

Like the best organized projects there are always a few unforeseen bouncers just to keep a batters alert. While the West Australians are pushing for acceptance of 5.56 the next state, South Australia, has been testing another MAB prototype this time in 7.62 x 39 Russian. Right now Australia is swamped with SKS semi autos and millions of cheap Chinese rounds in this calibre. According to South Australian sources the 7.62 x 39 prototype is performing reasonably well at the shorter (300-500 yard) ranges. The SA boys contend that at about 15 cents a round it is cheaper to run than the 5.56 however, until more testing is completed I shall avoid this argument.

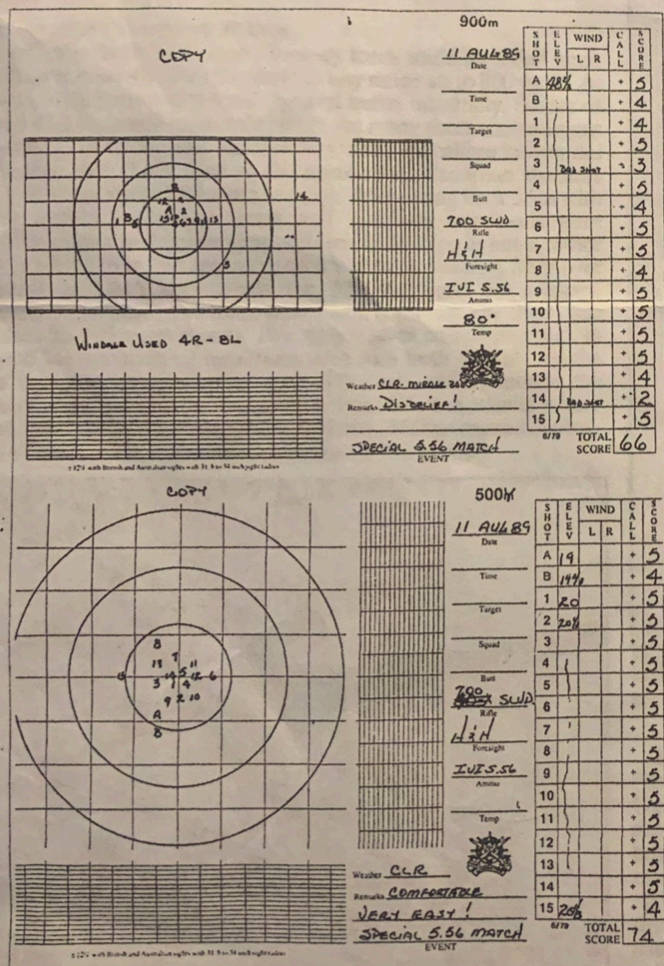
Canadian big bore, or in this case, centrefire small bore shooters are well advanced in their adoption of 5.56 rifles and ammunition. In 1989 a competition for 5.56 rifles was conducted at the DCRA



Many shooters prefer to use the CGP's bipod for steady holding.



This sub minute of angle 500 yard group of just 3.65" demonstrates the excellent accuracy of 5.56 rifles and IVI military ammunition.



Bill Wylde's winning groups at the DCRA Nationals surprised many 7.62 users. Rifles in 5.56 mm are now common on Canadian ranges.

Nationals. The winner, Illinois gunsmith Bill Wylde has built many semi auto and bolt action match rifles for shooters in the US and Canada. His rifles hold several state records in 600 yard high power competition. Converted AR-15s often outshoot .308 and .30-06 semi autos especially in rapid fire events where the 5.56s mild recoil permits more time to aim.

His bolt action range rifles are becoming quite common in Canada where such rifles are shot in competition with existing

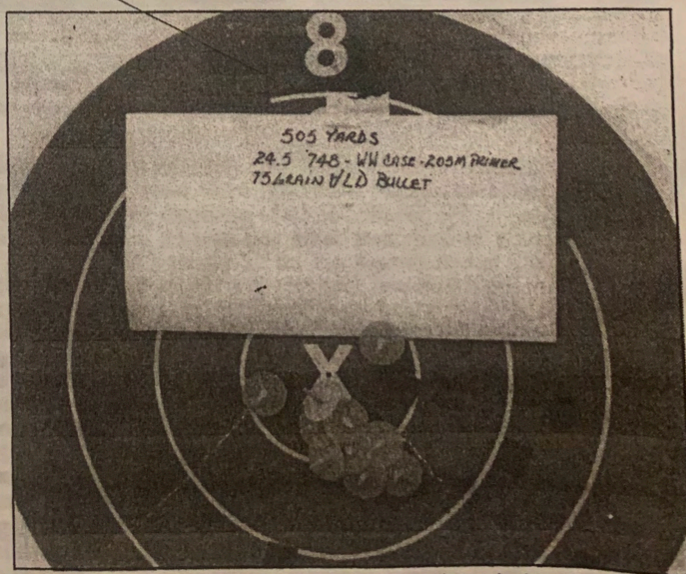
7.62s. Generally speaking the 5.56s are very competitive but this situation is partly the result of the mediocre performance of IVI 7.62 rounds. These cartridges are regarded as being capable of 2-2.5 MoA accuracy. In comparison extensive testing has proved IVI 5.56 ammunition is capable of 0.75 to 1.5 MoA 10 shot groups. With an advantage in ammunition quality, it is not surprising to learn that in a recent match one 5.56 competitor shot 199/200 to blitz a field of 7.62 users. Some 5.56 rifles have fired 10,000 rounds yet still retain good accuracy. Throat erosion has been measured at about .030" per 1000 rounds.

Bill Wylde's match winning score of 274/300 was shot over 300, 500 yards and 800, 900 metres with 15 scoring shots at each range. His best result after a years lay off from competitive shooting was 74/75 at 500 yards. The same rifle built on a sleeved Remington 700 action with a Krieger stainless steel barrel and fibreglass stock has also produced a 12 shot 3.65" group at 500 yards using IVI military ammo. Even better groups including one with 8 out of 10 shot in just 2" at 500 yards, have been shot with hand made hollow point very low drag (VLD) bullets now being made in the US.

These 1.125" long 70 grain and 75 grain VLD bullets have very high ballistic coefficient of .410 and .435 respectively. In comparison the 144 grain 7.62 NATO bullet has a BC of .402. Fired from 28" barrels I have chronographed the 144 grain factory load at 2900fps while the 70 grain VLD is capable of 3000fps with acceptable pressures. In short this means the .22 cal bullet shoots flatter, faster and is marginally less wind affected at any range. Even the most complacent 7.62 shooter would find this a challenging prospect.

Returning to the more mundane world of standard military rounds and their comparative trajectories we find the current 7.62 and 5.56 SS-109 rounds are very similar despite the obvious difference in physical size. Having studied the two cartridges this would appear to be no accident. Both have very similar bore diameter/case capacity ratios and more importantly FN designed the new 62 grain load to produce an almost identical trajectory. According to military figures the 62 grain bullet driven at 3110fps from short self loader barrels will require 28.6 minutes of elevation at 800 yards and 46.3 minutes at 1000 yards. Using a 7.62 barrel of similar length, the larger 144 grain bullet has a muzzle velocity of 2750fps. At 800 yards it requires 29.3 minutes and 43.6 at 1000 yards. In other words the 5.56 has a flatter trajectory to 800 yards but falls a little more at greater distances.

As a gun writer rather than competitive shooter I have no wish to thrust a calibre that may or may not be viable upon my fellow shooters, so when Victorian Rifle Association members requested the CGP for first hand evaluation it was transported to Benalla, Victoria. Bullseye Magazine editor Jim Wood and highly qualified local competitor Peter Hallett shot the CGP at all ranges from 300-900 yards with 68gr Hornady and 69gr Sierra loads powered by 26 grains of Winchester 748 ball powder and 62gr SS-109 factory rounds with about one grain of powder removed from each to



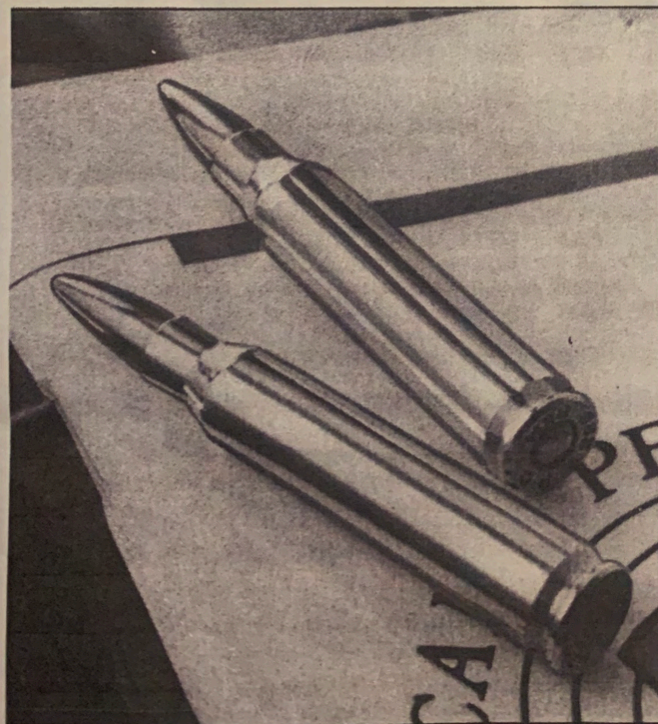
In this 505 yard group eight of the ten shots were in two inches. the new VLD projectiles shoot very tight groups, some as small as two inches at 500 yards.



Three generations of military cartridges. From left to right: .303; 7.62; 223 with 68 grain Hornady handloads; and .223 with 69 grain Sierra handload.

reduce velocities to around 3000fps.

On still days, both Sierra and Hornady loads could be relied upon to produce regular 40-50 ex 50 scores at any range up to 800 yards. At 900 yards both bullets displayed signs of bullet instability. Scores of 49.6 and 49.2 were still quite acceptable yet many shots showed signs of keyholing. In strong and variable winds the .22 calibre bullets did drift further than 7.62s fired at the same time. Canadian shooters usually allow for about 15% extra windage when using their 5.56s with 3200fps factory loads. My Sierra and Hornady handloads were somewhat milder and chronographed barely 3000fps in hot weather and only a little over 2900fps in the cool Victorian autumn. Shot over 500 yards in 12-15 knot winds the 5.56 required 7.5 minutes. Obviously the slower hand loads were more wind affected than their Canadian SS-109 counterparts. This simply gives added emphasis to the need for maintaining maximum velocities both to stabilize the Sierra and Hornady projectiles past 800 yards and to reduce the effects of wind. Similar evidence came from West Australia where even slower handloads averaging only about 2600fps caused keyholing of 69 grain Sierras at ranges in excess of 700 yards.



Federal's SS-109 equivalent loads feature a 69 grain Sierra projectile and Federal Benchrest primers.

While commercial bullets have a few problems, the modified SS-109 factory loads shot well at all ranges but here too there is a snag. Steel penetrator bullets are illegal except for military and police use in many countries including Australia and Canada. Once again this points to the importance of the new lead core bullet now under development at Footscray. Eventually it should provide Australian and New Zealand shooters with a cheap, legal bullet capable of good accuracy at 3200fps stability to 1000 yards. One thousand yards may indeed seem a long way for such a small bullet yet only recently a 5.56 was placed second in a recognized 1000 yard combined 5.56/7.62 match in Canada.



Heavyweight .22 calibre bullets now available from Hornady, Sierra and Nosler. Any of these with 25 to 26 grains of Winchester 748 powder will produce velocities around 3,000 fps from long barrelled target rifles.

Rifle conversion is relatively easy. Many shooters are cautious so they rebarrel their most worn rifle. As I mentioned before, the Omark conversion kit consisting of a 5.56 bolthead and barrel retails for about \$380 Aust. At least one other manufacturer is about to begin production of a similar kit for the Australian and Canadian market. A Mauser type rifle will require a new barrel and modification to the bolt face. A small bushing to centre the cartridge case in the bolt face plus a .222 extractor made for the BRNO Model 601 is usually sufficient for reliable operation.

The Parker Hale CGP will not become a production item despite its excellent performance in Australia. The rearlocking CGP action is to be replaced by P-H's Swedish designed Lano action. Lano actions all feature very stiff receivers and three front locking lug bolts. Initial production will see the introduction of a long action made to accommodate 7.62 and short magnum cartridges. According to P-H management an action suitable for .223 type cartridges is a distinct possibility. However continuing involvement with substantial military contracts is sure to retard production of such a relatively low volume item.

Other manufacturers so far do not share P-H's optimism probably because they have not experimented to the same extent. When I

ected Steyr-Mannlicher I was informed there was no immediate aspect of an SSG in 5.56 because no match ammunition is available. Perhaps Federal's 69gr .223 factory load made for high power matches in the US has yet to find its way to Europe. These premium grade Federal cartridges are made on a strictly controlled production line and feature 69gr Sierras loaded to 3000fps.

At present the CGP is in the hands of another editor, this time Jack Bensley of *Australian Rifleman*. Jack and his fellow club members in Canberra are testing the original 24" long 10" twist barrel now fitted with open sights. Having already tested the 9" twist Shilen in four states it seemed more appropriate to try the shorter, slower twist tube. From early testing back in 1988 we already know it performs quite adequately with military bullets to 1000 yards and Sierras to 500 yards. It will be interesting to determine the accuracy potential of the Sierras and hopefully the new 64 grain Footscray bullet to at least 900 yards.

When I first suggested the idea of using 5.56 calibre rifles for competition most shooters seemed to think the village idiot had been let loose on their range. Although many remain unconvinced they should change to the smaller calibre no one has been able to prove the concept is technically impractical. Summing up the CGPs performance in Victoria Jim Wood expressed the view "We are absolutely amazed!"

Table of elevations and velocities

7.62 x 39 Russian						
122gr bullet—muzzle velocity 2450fps						
	300yds	500yds	600yds	700yds	800yds	900yds
Elevation						
in minutes	0	12	20	30	42	54
Velocity						
(fps)	1634	1235	1111	1032	969	914

7.62 x 51 NATO						
144gr bullet—muzzle velocity 2830fps						
	300yds	500yds	600yds	700yds	800yds	900yds
Elevation						
in minutes	0	7	11	16	22	28
Velocity						
(fps)	2193	1818	1649	1493	1354	1238

5.56 x 45 NATO						
62gr bullet—muzzle velocity 3225fps						
	300yds	500yds	600yds	700yds	800yds	900yds
Elevation						
in minutes	0	6	9	13	19	26
Velocity						
(fps)	2275	1887	1672	1476	1309	1176

5.56 x 45						
70gr VLD bullet—muzzle velocity 2900fps						
	300yds	500yds	600yds	700yds	800yds	900yds
Elevation						
in minutes	0	6	10	15	20	26
Velocity						
(fps)	2266	1889	1718	1560	1415	1291

5.56 x 4569gr Sierra Matchking—Muzzle velocity 2950fps						
	300yds	500yds	600yds	700yds	800yds	900yds
Elevation						
in minutes	0	7	11	17	23	31
Velocity						
(fps)	2169	1722	1528	1356	1218	1114

Note. These figures represent typical rather than absolute maximum velocities. For example, some long barrelled 7.62 rifles produce in excess 2900fps with standard NATO loads. Similarly the 69gr Sierra and both 70gr and 75gr VLD projectiles may be driven at over 3000fps according to actual chronograph results.

Editor's Note: Parker-Hale's withdrawal from riflemaking (see Gunshop) means that they will not be pursuing this project.

Parker-Hale's long Lano action will first be produced for .308 and short magnum cartridges. Next will come a short action for the 5.56 cartridge. The Lano has an extremely strong receiver to prevent flexing even in repeater versions, and the action has a modern three locking lug bolt.

