From the left; .316" Taipan 125 grain internally lubricated projectile, CBE 320-120 heeled projectile externally lubricated with Lee Liquid Alox, a loaded round – note that the case is the same outer diameter as the projectile, and right, a .22lr which is also externally lubricated with a heeled projectile.

Shooting the .310 Cadet – Part II

JUSTIN BULLING

ED; FOLLOWING JEFF BROWN'S ARTICLE IN ISSUE #132 SEPT/OCT 2012, JUSTIN COMPLETES THE CADET STORY...

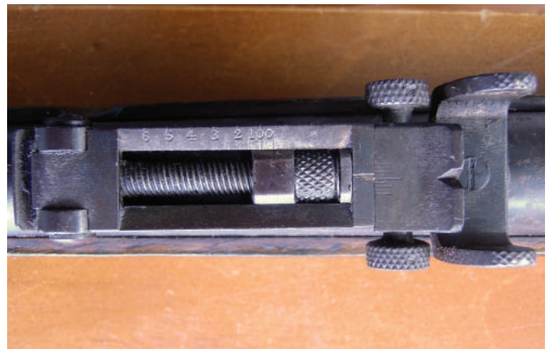
A look at gun shop racks often reveals rifles based on the small frame Martini action. These range from beautiful custom varmint rigs chambered in .22 or .17 rimmed centrefire cartridges to original rifles that have been re-chambered. There are also many original .310 Cadet rifles still around, but most are never fired due to the difficulties of obtaining ammunition. The cartridge is obsolete and factory ammunition is unavailable. This is a shame because these are nice little rifles, have mild recoil, can be very accurate, are simple and reliable, and are ideal for introducing young shooters to centrefire rifle shooting.

The small Martini action is a miniaturized version of the British military Martinis. This action was originally designed with an external hammer in 1862 by the American Henry Peabody, but was modified to a striker-fired design in 1870 by the Swiss Friederich von Martini. In 1878 the prolific Belgian gun maker and designer August Francotte patented a modification of the action so that with the removal of one pin, the whole mechanism drops out from the receiver. Some British gun makers, most notably Westley Richards made large bore single shot hunting rifles using the full size Francotte action. Francotte later designed a miniaturized version and it was this action that was used in most of the Cadet rifles.

"The .310 is (arguably) not powerful enough for deer but it is suitable for wallabies as well as smaller pigs and goats..."

The rifles have a 19th century military appearance with a 25 inch barrel, a full length and very slender fore-end and a straight grip stock with steel butt plate. The front sight is a simple blade, and the rear is a very nice unit with screw adjustable windage and elevation, calibrated from 50 to 600 yards. The fore-end is held on by a rear pin and a front barrel band, which also has a sling swivel. When the action is cocked a rounded metal tab protrudes from the top of the action on the right side between the breech block and the receiver, giving a visual and tactile indication.

With the single split pin tapped out (right) the Cadet's internal components can be removed for cleaning and maintenance.



A standard Cadet rear sight showing windage and elevation adjustments out to 600 yards.

The action can be de-cocked by pressing the trigger as the action is being closed.

To remove the action from the receiver a punch is used to tap the retaining pin from left to right. Although the end of the pin on the right side looks like a screw it is actually a spring steel split pin. The barrel must be cleaned from the muzzle although most custom Martinis have had a hole drilled in the rear of the receiver to allow cleaning the barrel from the chamber. This is handy, but it is not advisable to modify original Cadets as it will affect their value in the future.

In 1902 the New South Wales Government bought a quantity of Westley Richards .310 Cadet rifles. These did not have the Francotte patent action and had the teardrop shaped cocking indicator protruding from the right side of the receiver as seen in Martini Henry rifles. Later in 1909 over 60,000 Francotte-actioned Cadets were bought for distribution to the individual states for training military cadets. Most of them were made by BSA and have a kangaroo stamped on top of the breech. Smaller numbers of Greener made rifles also exist. The New Zealand Government also issued the Cadet rifles. I have found that the initial batch of Australian Government issue ammunition came from Eley in England via the Colonial Ammunition Company in New Zealand, and also that they were later manufactured by CAC in New Zealand and Melbourne.

After the 1st World War the Australian Cadet rifles were replaced with SMLEs and put into storage. With possible Japanese invasion imminent during WW2 they were re-issued to home guard units. At this time full metal jacket ammunition had to be manufactured, as the original lead bullet loads did not comply with the Geneva Convention. In the 1960s the rifles were sold off to the public.

Mick Smiths Sports Store in Sydney sold them for $15 and there are anecdotal stories of people walking out of the shop with an armful. Quite a lot were exported to the USA where many were rechambered by the importers to .32/20 and .32/40, and they are still very popular.

COLLECTOR VALUE

The renewed interest in these rifles has meant that good originals have become valuable and the number available has started to wane as the good ones go into collections and the not so good are used as the basis for custom rifles. In 2002 I personally saw a nice Australian marked BSA come up for auction at Bonhams in London and it brought close to £800 which at the time was around NZ$2400. In light of this I think it would be wise for owners of original Cadets to keep them in original condition and forget about re-chambering them. Look for an old or already modified one if you must build a custom Martini.

AMMUNITION

The scarcity of ammunition has lead people to re-chamber Cadets to .32/20 Winchester, a very similar cartridge with almost identical rim diameters, although the Cadet rim itself is thinner. The reamer was just run into the chamber with no

A standard BSA Cadet receiver. Note the head of the pin which is punched out to remove the action and trigger group etc.

From the left: New Winchester .32/20 case, .32/20 case with rim trimmed to .044", case trimmed to 1.2" sized and fire-formed, factory Kynoch .310 case for comparison.

modification to the extractor necessary. The disadvantage of this chambering is that while the .32/20 uses a projectile of .312"/.314" the groove diameter of the Cadet rifles is in the order of .318"/.320" so obtaining decent accuracy is unlikely unless you reload using projectiles of the correct size. Another re-chamber, which was common, is to .32/40. This makes more sense in that the projectile size of the .32/40 is .321" but it is a much more powerful round and would have had to be loaded down to be comfortable in such a light rifle. The extractor would also have to be modified for the larger rim.

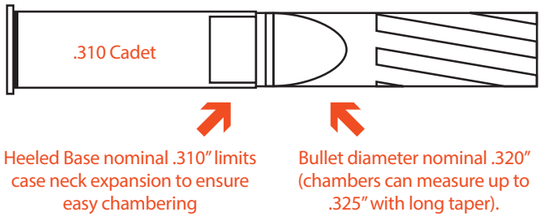
The .310 cartridge was originally designed by Greener in 1900 for Martini action target rifles but was also chambered in commercial "Rook Rifles". The cartridge was initially called the .310 Greener in Britain but is commonly called the .310 Cadet in Australia and New Zealand and this later became the accepted name. Its rimmed case has a slight taper which differentiates it from similar revolver cartridges which have parallel sides. When full length resized the case has a short visible neck. The tapered sides of the case were to assist extraction as the poor inherent leverage of the action results in very weak extraction. Despite this, a quick flick of the lever will cause most cases to flick up the curve in the loading block and over your shoulder like an ejector, so I tend to put my hand over the top of the receiver to catch them as they come out.

Any fired cartridges that are slightly over dimension or loaded to excess pressure may fail to extract so Cadet shooters should take a cleaning rod to any range sessions and take great care in loading cartridges for field use where a stuck case would be a nuisance.

The .310 Cadet was loaded with a heeled, externally lubricated projectile of around 120 grains. In a heeled projectile type cartridge the external diameter of the projectile is around the same as the case so the projectile has a reduced diameter towards the base that fits inside the case. It was a fairly common system in small rifle and revolver cartridges in the late 19th century but the only cartridges to survive using this system are the .22 rimfire short and long rifle.

RIGHT: Left, the action closed and cocked – right, the action open with the extractor and chamber visible.

Mould No. 320-310 (Heeled Base)



A chamber diagram showing the relationship between the heeled bullet, case and chamber (courtesy Jim Allison – Cast Bullet Engineering).

RELOADING

The first thing with shooting any obsolete rifle is obtaining the brass cases. Quantities of .310 Cadet cases or old packets of factory ammunition often turn up at gun shows. The main brand available 40 odd years ago was Super which was made in Australia. Theses cases have no head stamp. Kynoch and older Australian, New Zealand and British issue ammunition is also sometimes seen but be aware that they are Berdan primed so unless you can find a large lot which makes it worth sourcing Berdan primers and a suitable decapper they are probably not worth bothering with.

The good news is that if you can't find any fired cases then new ones are available. The Bertram Bullet Company in Australia manufactures many obsolete cases including the .310 Cadet. They should be available for a little over a dollar each through Magnum Imports, their New Zealand agent. (Ed: See the Magnum Imports listing in this issue's Trade Directory.)

For those with access to a lathe there is another alternative. This was covered in Jeff Brown's recent article however (issue # 132), so I won't repeat the info here. I would add though that the new .327 Federal Magnum revolver round has a case length of 1.20". Lee do not yet list a pilot for it, but their custom department would make you one in order to easily trim converted cases to length.

Note that there is a marked difference in case wall thickness between the different brands. The Super are .010", Kynoch and converted Winchester .32/20 are .006" and Bertram are .013". In light of this I would suggest that new Cadet shooters obtain a quantity of brass of the same brand and stick with it.

The next thing is projectiles. The barrels of BSA Cadets are marked .310 12 – 120 indicating the bore (not groove) diameter, the charge of a special fine Cordite, and projectile weight. When I first started reloading for my Cadet I bought some 125 grain .316" Taipan projectiles which were sold as .310 Cadets although they are not a heeled design. Accuracy was poor with 150mm groups at 50 metres the norm probably due to them being undersize. The other problem is that because they don't have a heel, with Super cases the cartridge was sometimes too large in diameter to chamber fully or the fired case difficult to extract – the thicker Bertram cases could not be used at all. All of these problems were overcome by obtaining the correct mould.

The Martini Cadet is pleasant to shoot and capable of excellent accuracy.

While some shooters on the internet forums maintain that you can get a Cadet to shoot fine with non-heeled internally lubricated projectiles my experience is that it's best to get the correct heeled bullets to begin with. Hawkesbury River Projectiles in New South Wales manufacture heeled bullets in 128 grain weight. These are widely used although I have no personal experience with them.

Once again Jeff has covered the subject of bullets and moulds, and anybody who needs more info can contact me at the email address at the end of this article, so let's move on to die sets. Super Simplex in Australia makes .310 dies in both 5/8" for their turret presses or 7/8" standard size. I had a 5/8" die set and press which worked but had a tendency to break decapping pins. I replaced it with a Lee set which are available in gun shops occasionally but aren't listed in their regular catalogue. RCBS and CH also list them as special orders, but at much higher prices. I found that my Lee dies were great for sizing and neck expanding but while the seating die worked with the .316" bullets my moulded .320" bullets would jam in the die. When I forced one through and measured the diameter it showed that the internal diameter of the die was only .317".

Jim Allison had told me that this was a common problem with production die sets as they were obviously set up to allow the use of smaller diameter non-heeled bullets. I ended up sending the seating die plus two bullets back

BULLET WEIGHT (GRAINS)	CASE	PRIMER	POWDER TYPE	POWDER WEIGHT (GRAINS)	VELOCITY (FPS)	50M ACCURACY (5 SHOT GROUP)	POWDER WEIGHT (GRAINS)	VELOCITY (FPS)	50M ACCURACY (5 SHOT GROUP)
110	?	CCI SMALL RIFLE	AR2205	–	–	–	11	1500	ADI MANUAL
120	?	CCI SMALL RIFLE	AR2205	–	–	–	9	1270	ADI MANUAL
113	SUPER	CCI SMALL RIFLE	AR2205	9	1120	47	10.5	1360	70
113	SUPER	CCI SMALL RIFLE	AP70	4.5	1165	37	5.6	1480	68
113	SUPER	CCI SMALL RIFLE	AP90	5.0	1185	19	6.0	1440	45
113	SUPER	WINCHESTER SMALL RIFLE	AP100	6.0	1190	22	6.6	1480	50
113	SUPER	CCI SMALL RIFLE	FFF BLACK POWDER	–	–	–	8.0	670	43

to Lee where it was opened up to a usable diameter for US$5 plus postage with a very quick turnaround.

I'm now very happy with the dies which are great value when compared to the much higher prices from the other suppliers.

SHOOTING

I fired over 1000 rounds, using only the original sights, both for velocity and accuracy using ADI AP70N, AP90, AP100 and AR2205 behind the moulded CBE .310-120 bullet in Super cases with either CCI or Winchester Small Rifle Primers. Both chronographed velocities and ease of extraction were used as indicators for safe working loads and I have come up with the loads shown in the accompanying table.

Starting Loads Maximum Loads. (See table above).

ACCURACY & VELOCITIES

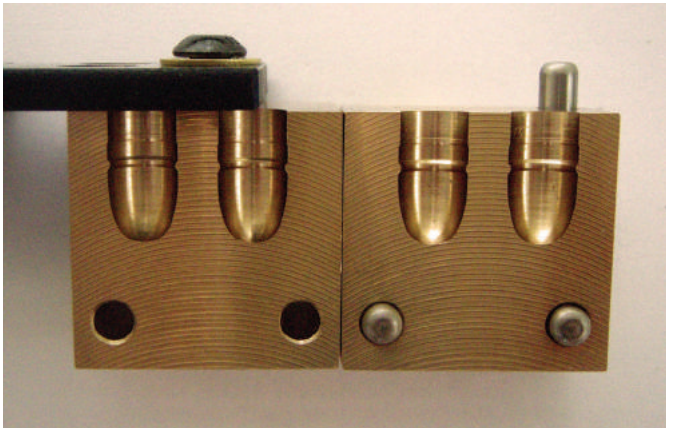
I found that AR2205 resulted in considerable quantities of unburnt powder left in the bore and action, and it was the least accurate powder. Accuracy became very poor over about 1350fps so I listed this as maximum with this projectile despite the higher load listed in the ADI manual. I would not recommend AR2205 unless this is all you have and don't want to buy powder specially to use in the Cadet.

The most consistently accurate powder across a range of velocities was AP90 but this was unfortunately discontinued some years ago. AP100 showed a small amount of unburnt powder and mediocre accuracy until velocity approached 1200fps when the powder granules disappeared and accuracy became very good.

The black powder load was loaded with a milk carton card over the powder then a beeswax/lard wad then another card before loading the projectile – 8 grains was the maximum load that would fit in the case. More powder could be used if the beeswax wad was omitted. Velocity was very low but the cases were only around 1.065 long so anyone who wanted to load black powder would do well to make some 1.2" converted cases to maximize powder capacity and achieve higher velocities. The load showed potential with the first three shots in a jagged hole of around 10mm before the last three shots opened the group up.

Black powder experts (and I'm not one) will tell you that much experimentation with wads, lubricants and loads must be done to achieve the best accuracy so I was very pleased with the first time result. Anyone who wants to start in black powder cartridge shooting would do well with a Cadet as they have great accuracy potential and the design of the Francotte action makes cleaning a breeze.

With all powders best accuracy was obtained at velocities around 1200fps with groups often less than 1", which is excellent considering the fairly coarse front sight. With maximum loads at 1400-1500fps, accuracy tended to worsen, and



A Cast Bullet Engineering (CBE) 320/120 mould.

while I was cleaning the barrel a few tiny fragments of lead were evident on the patch, indicating that leading was occurring – not surprising considering the fairly soft alloy I'd used. The barrel was always easy to clean however and the groups have not continued to enlarge with further shooting.

The .310 is (arguably) not powerful enough for deer but it is suitable for wallabies as well as smaller pigs and goats and its level of accuracy is adequate for these species at the ranges it would be used at. I would suggest one of the more accurate loads at around 1200fps for small game or target shooting, and one of the 1400-1500fps loads for larger game.

Using the above information, owners of these little rifles should be able to get them shooting effectively and accurately. The Cadet is a great rifle for teaching young shooters hunting skills. Once you are set up, and especially if you buy a mould you can shoot your Cadet regularly for just cents per shot.

Justin

Ed: Some data relating to cases and cast bullets etc has been abridged from Justin's article – readers who would like the complete text should contact him at: **justinbulling@hotmail.com**

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