

REPLICA No32 Mk2 RIFLESCOPE by RED STAR MOUNTAIN Co Ltd

by Dennis La Varenne



Fig. 1 – RSM replica of the famous British No32 sniper scope mounted in another replica of the special bracket (mounts) attached via the pads (bases) to the sidewall of a No4 Mk1 rifle.

Through correspondence on another matter regarding reproduction riflescopes, I was informed by Mr Yan Shuzhuo that his company Red Star Mountain Co. Ltd., was developing a replica of the famous British WWII sniper riflescope, the Telescopic Sighting No32 Mk2 OS 1650A, to give it its military designation.

The plans for the project were drawn up after the company managed to buy an original scope which was dis-assembled and measured so that the parts could be remanufactured in the RSM plant in Beijing, China.

Originals of these scopes command premium prices for scopes which are in very poor condition – anything up to \$Aus2000 if you keep your eyes on eBay and elsewhere, and people seem happy to pay for them.

BACKGROUND

Having a serious interest in the Lee Enfield No4 rifle and its capabilities as a sniping rifle during WWII, I had desired to build myself a replica of one of the sniper variants

to use in military rifle competition. Original rifles with their serial number matched scopes and markings cost anywhere from \$Aus3500 and upwards, putting them well out of the reach of people on limited incomes like myself. However, I wanted a shooter, not a collector which I would be reluctant to shoot more than a few test shots through.

I had a Taiwanese replica of one of these scopes already which I had obtained from the US. The special bracket and pads to mount the scope were also available from the US, and from all I could find out through the books of Peter Laidler, the most eminent authority on the LE No4T sniper system, both these mounts and the scope were a pretty good reproduction.

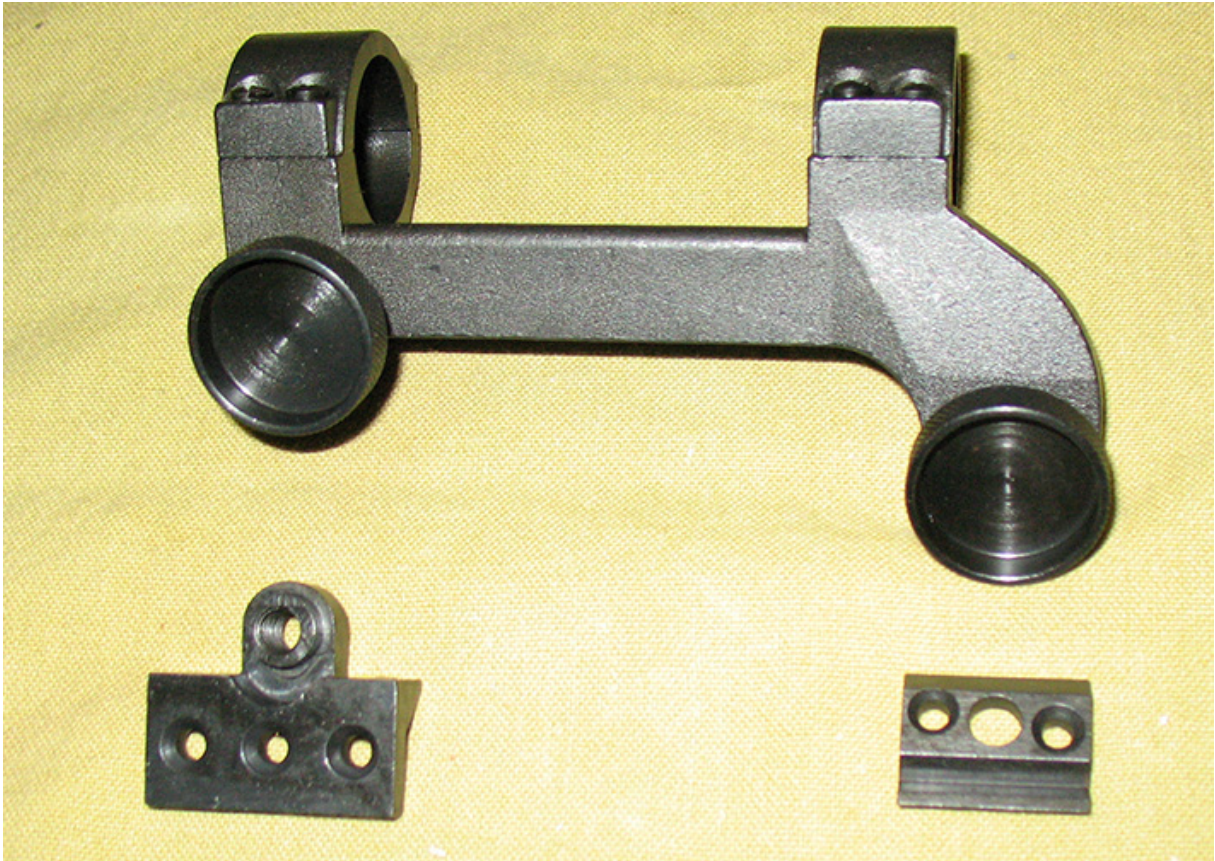


Fig. 2 Bracket and pads used to mount the No32 scopes.

The absolute reliability of these scopes was legendary. Correctly mounted for individual rifles, they were zeroed by the armourers and often supplied to front line snipers in a wooden box on a parachute to be bounced on the ground and still remain zeroed. They remained in service with SAS units right through to the 1970s.

Setting up my rifle from a base standard No4 Mk1 rifle was seriously problematical because of the appalling job done on it by the original 'gunsmith' whom I asked to do the job. The work was close to ruinous.

Happily, Bob De Vries of KUDU SERVICES in the Melbourne suburb of Montrose was able to rectify the badly botched mounting job and the result was a surprisingly accurate setup. After Bob had repaired the original work, I read up about the bedding system of the rifle in both Ian Skennerton's book *'The Lee Enfield Story'* as well as Roger Wadham's excellent book, *'The 2012 Complete Book on Lee Enfield Accurizing'* as well as Jim Sweet's little book, *'COMPETITIVE RIFLE SHOOTING'*

which has some excellent and well researched work on how the old full bore shooters accurised their No4s as well as the standard military bedding.

Peter Laidler remarks in his books, '*TELESCOPE SIGHTING No32*', and '*.303 No4T SNIPER RIFLE*', told how the rifle bedding and mounting of the sighting system were done by Holland and Holland, probably because of their renown as gun makers. Peter Laidler spent a lot of his life as a military armourer working on and setting up both the No32 scope and the rifles which went with it, hence his authority on the subject.

From what I learned from these five sources, I was able to ensure that the bedding on my newly repaired No4 Mk1 rifle was as good as any experienced amateur could make it. And so it proved using the Taiwanese replica scope from Numrich.

THE RED STAR MOUNTAIN REPRODUCTION

Shuzhuo (his given name), emailed me early in his company's attempts at building a No32 from scratch copied minutely from their one original. He began showing me emailed pictures of various parts of the scope body manufactured from brass as were the originals. These pictures showed some pretty good machining, but that told me nothing about how close to the original milspec they were of course.

After a gap of some several months, RSM again contacted me to say that his company wanted me to test an early prototype of their scope because it cannot be done in China because of the restrictions of the ownership of firearms.

I had told him earlier that any scope needed to be utterly reliable under the stress of recoil and the adjustments had to be absolutely so, with no change in zero no matter how heavy the recoil. But, there was no way in which that testing could be done in China other than building a machine which could replicate that recoil innumerable times and have the scope remain intact. He asked me if I would be prepared to test a scope if he were to send me a prototype and write up a report on how it functioned, to which I agreed. I told RSM that I would only write up a report which was truthfully reported from my testing and if there were faults which I could find, these would be brought to RSM's attention.

I stressed also that RSM should not make a scope which could be mistaken for an original and that their company logo at the very least should be conspicuous on their reproduction. If they wanted a market for their scopes, it would be best if they marketed their scope for what it actually was rather than risk trying to pass them off as originals and bring them into disrepute. That concern was taken on board by RSM.

The point about doing this voluntary work for RSM, was to get around the problem of supply of No32 riflescopes for military rifle enthusiasts who would like to have a No4T rifle but not able to afford the real thing or afford to buy and use an original No32 scope which are probably better kept in collector's vaults as exhibits of scopes from a bygone era. I do have an original No32 scope, but I was not prepared to mount it on my rifle because of its historic value.

This was in my mind when I undertook to do the testing for RSM. It would also give them a consumer's view of their product. As well, having an original would allow me to compare the two scopes externally.

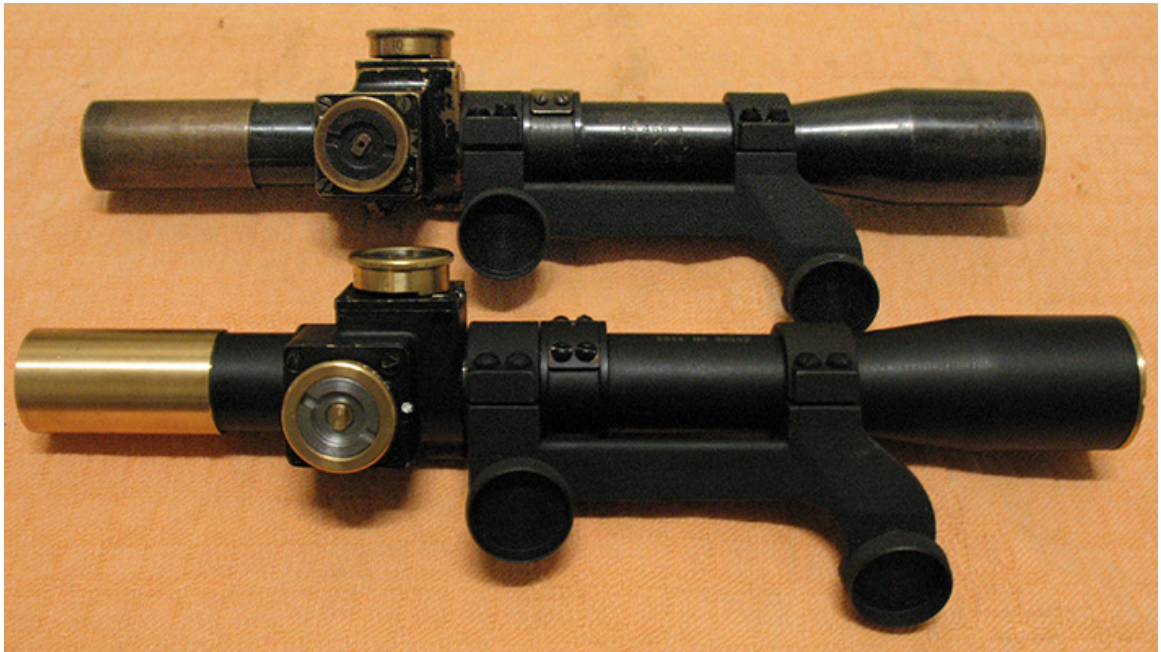


Fig. 3 – An original No32 Mk1 scope (background) and the RSM replica (foreground).

Externally, there are obvious differences, but they are cosmetic only. The finish on the RSM scope is not the roughly painted flat-black of the originals. But it does have a steel tube like the originals, including the ocular bell which had a sliding sunshade on the earlier Mk1 version but the front tube was turned from brass tubing and on this prototype, highly polished. The finish on the main tube and ocular bell is what looks like a flat black anodising of some sort. There are rotational machining marks on the main tube and ocular bell as well, but I do not know if this is intentional or just something left on a prototype but not to appear on production models.

The main tube is 1 inch diameter and sits 1.75 inches above the line of the bore when mounted.

There is nothing that I could do to assess the internals of the scope other than to mount it and take it to the range with a lot of PRVI PARTIZAN 174gn FMJ ammunition to test it with.



Fig. 4 – Prvi Partizan 174gn FMJ BT ammunition used in the test.

I chose the PRVI PARTIZAN (Highland) ammunition because it is loaded to give close to the same trajectory as the original MkVII ammunition. The claimed velocity is just under 2400fps which is slightly slower than the 2450fps of the MkVII ammunition. But, because theirs is loaded with a boat-tailed bullet, it could be driven a little slower and still match the original trajectory. This was important in the testing of the RSM scope for the following reason.

The No32 series of scopes, like most scopes, have both an elevation turret and a windage turret. In the British military parlance of the time, they were referred to as the *ranging* drum and the *deflection* drum.



Fig. 5 – Range and deflection drums on the No32 scope (from behind).

The ranging drum has numbers around it from 0 to 10 which translates to 0 yards to 1000 yards. The click adjustments are in 50 yard increments. The deflection drum is marked in minutes of angle. The early Mk1 scope was marked in 2MoA clicks, but the later Mk2 was recalibrated to 1MoA clicks. More on this deflection drum later.

Because the ranging drum is calibrated in Imperial yards which are 0.914 metres, or close to 10% less than a metre, it is necessary to shoot ammunition which is as close as possible to the original British MkVII round. The 'rule of thumb' conversion is – Metres = Yards + 10%, and Yards = Metres minus 10%.

Also, PRVI PARTIZAN has brass casings which are perhaps the closest made to the original British military round with the shoulder well set back to allow for a dirty chamber and still feed and fire in a dirty rifle. So, my guess is that the expansion of the case to fit the chamber on firing with a slight fall in breech pressure, would better approximate the British round than American factory ammunition available here which does not load a FMJ in any case and has the shoulder closer to the fired shape than milspec ammunition.

So, with ammunition with a trajectory close to or matching the original milspec ammunition, I had a good prospect of matching the reading on the ranging drum with shooting distance. In other words, I could adjust the ranging drum to 4 which is 400 yards and shoot to the point of the picket as these scopes were meant to do.

Peter Laidler wrote his No4T book that these rifles were often factory zeroed at 400 yards, which allowed a body hold from 0 to 600 yards and still get a hit, which makes sense if you are a sniper I suppose.

AT THE FIRING RANGE

So, with enough factory ammunition and a rifle as well set up as I could do, I went to the SSAA range at Little River between Melbourne and Geelong. Unusually for that range, the wind was a pretty mild westerly breeze coming from right of range. I have been at this range at times where the wind was so strong it actually blew rifles off their rests onto the ground. So, that particular Saturday was very mild indeed compared to the majority of times I had spent there over the years – maybe 5 -10 knots or so.

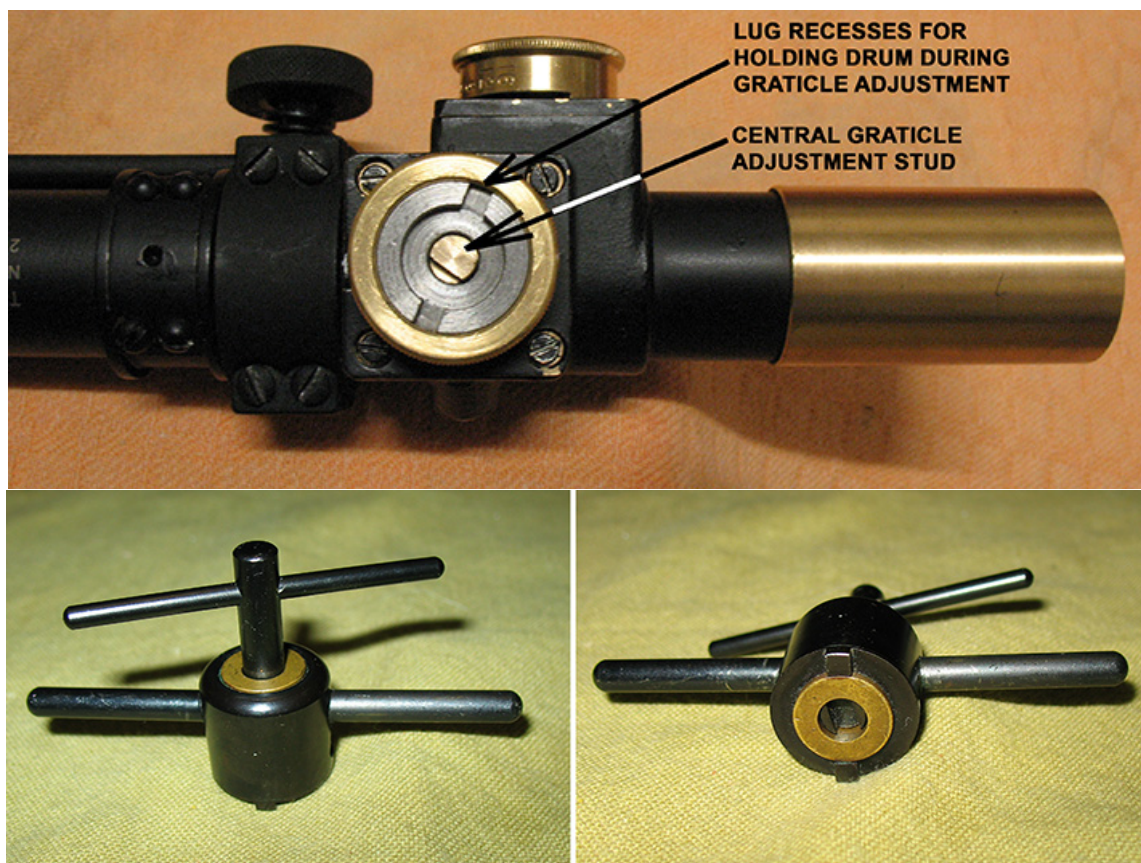


Fig. 6 - Adjustment tool for zeroing the No32 scope when on the rifle. The lower part which has 2 lugs retains the drum whilst the central key engages the central lug in the drum to move the graticle position.

Like all sensible shooters who take an unsighted rifle to the range for the first time, I set up a target at 25 yards. It is amazing the number of people who set their targets out at 100m because the rifle was bore-sighted at the shop, and completely miss the target, then complain about the rifle's accuracy.



Fig. 7 – Zeroing at 25 yards. The 3 bullet holes on the middle circle (arrow) are the final adjustment after getting used to how the drums shifted the graticule.

Adjusting the No32 scope is very different to normal scopes and requires a special tool to do the job. Peter Laidler complains in his book on the No4T rifles about what a nuisance of a job it is to do and often requires three hands. I do not find it quite that bad, but it is a lot more work and very, very fiddly. The RSM scope has these same targeting adjustments as the originals and I have advised them that they will need to supply one of the special tools with each scope they sell.

The first shots were well wide left but a little low at 25 yards, so I had to use the adjustment tool to bring the graticle over. Unlike modern scopes, these have the old style moving graticle, so it took a bit of mental juggling to bring the graticle in the correct direction to bring the point of impact over to centre.

What made it worse was that I kept forgetting which clockwise I have moved the graticle last time and kept winding the wrong way. Finally, though, I got it right and would the ranging drum to put the point of impact dead on with three shots into half and inch (see Fig. 7 above).

British milspec required a 3 inch x 3 inch group at 100 yards or a 1 inch group at 30 yards to be acceptable for a sniper rifle. The final 3-shot group at 25 yards was more than acceptable.

Pretty good, I thought.

Using the special adjusting too, I left the deflection drum on 0, and bore sighted the scope at 25 yards with the ranging drum also on 0. The graticle on the No32 is a picket post with a point with 45° shoulders and a thin crosswire. The prototype under test had a single tapering picket post with no crosswire at all which I pointed out to RSM. I sent them a picture of the correct graticle along with the dimensions of the wire used from Peter Laidler's book (See Fig. 8 below).



Fig. 8 – Graticule on the prototype scope (left) compared to the correct graticle from author's original scope (right).

I was return emailed to say that RSM would install the correct graticle on production models. They had just copied the graticle from the specimen they had purchased which had obviously been converted after most of these scopes had been sold off to the civilian market after WWII.

TEST SHOOTING

I made a presumption that with the rifle zeroed at 25 yards, the rifle should shoot very close to the numbers on the ranging drum. It was close, but in reality, I should have had the point of impact below the aiming point by the same distance between the line of the bore and the sight line which is 1.7 inches.

At distance, the rifle shot very high which puzzled me until I realised what I had done. The point of convergence between the bore line and sight lines was too steep at 25 yards, hence the overshooting.



Fig. 9 – Inset shows the pole at 400m or 440 yards from shooting bench. The front targets are at 25 yards and the second row is a 75 yards. At extreme picture right is a green hanging gong at 100 yards.

Correcting the problem, my next shots were at a standing pole target at 400m. Allowing for the 10% discrepancy between metres and yards, I set the ranging drum to 450 yards and aimed at the base of the pole. The picket post was wider than the pole at that range and the fairly blunt graticle on this prototype did not allow for a really precise hold, so I centred the graticle as best I could on the pole.



Fig. 10 – Author posing for camera and about to fire.

It was surprising just the same at how clear the image was at that range when you consider that the scope was a bit over 4x. The originals were a 3.5x. Two range officers were watching me with interest and spotted for me with range telescopes.

The first shots at the base of the pole were almost dead on but a little left, so I centred the picket on the right hand edge of the post and hit dead on. It was very pleasing to hear the gong with the hit, but you could have rolled a smoke in the time it took for the bullet to get there, or so it seemed.



Fig. 11 – Author's rifle pointing to the pink gong (inset) at 500m or 550 yards.

The range officers then suggested I hold halfway up the pole while they watched through their range scopes. Gong! Gong! Gong! I could hardly believe it. I was hitting

exactly where I aimed, or as close to that as a 4x scope could distinguish in late afternoon winter light.

Becoming more adventurous, and at the invitation of one of the Range Officers, I decided to have a few shots at the gong set out at 500m. Allowing for the 10% difference, I set the ranging drum to 550 yards and began. There were a few gong sounds, but the wind was clearly stronger at that range and about one third the way up the north-east facing side of the hills of the You Yangs ranges.

I did aim off to the right hand edge of the gong, but dropped a few into the dirt below and in line with the centre of the gong. At that range, the wind would have required something like 4 – 6 MoA deflection into the wind to compensate depending upon gusting variations.

At that stage, I had put 60 rounds of factory ammunition through the rifle and the RSM scope was working fine and holding zero. The only other thing which needed to be done was some fine tuning of the ranging drum to bring it to spot on a longer ranges. It was very good out to 400m, but the additional 100m showed the need for the fine tune.

That is not a fault within the scope of course. That is a matter of adjustment by the shooter and I must say that I am very satisfied with the scope and have no reservations about its reliability and functionality after 60 rounds.

PROBLEMS and RECOMMENDATIONS

- 1. BACKLASH IN ADJUSTMENT DRUMS** - Another problem is that there seems to be a tiny amount of backlash in the click adjustments where one needs to adjust a click or two past the desired setting and wind it backward to that setting to 'take up the slack' so to speak. This also was a problem with the Mk1 version rectified in the Mk2 by changing the graticle compression spring to a different design. These two problems are what prompts me to think that the original scope from which this prototype was copied was in fact, a Mk1, not a Mk2.

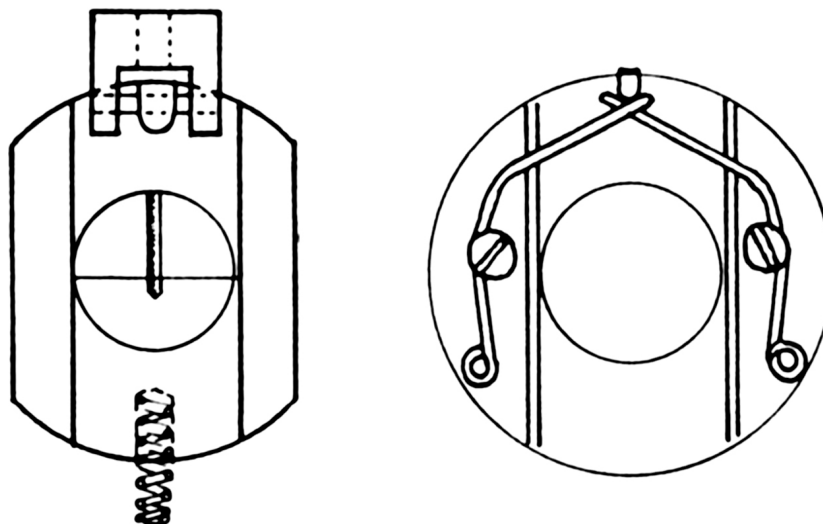


Fig. 12 – The early Mk1 graticle spring (left) and the later Mk2 anti-backlash spring (right).

2. DEFLECTION DRUM ADJUSTMENT - This scope is meant to be a replica of the No32 Mk2 scope used by British snipers in WWII. However, it appears that the adjustments of the deflection (windage) drum are those for the Mk1 version at 2 MoA per click. According to Peter Laidler, apart from 'blooming' the lenses for better light gathering, the Mk2 version had its deflection increments modified to 1 MoA per click. The RSM replica has the same graduations that my original No32 Mk1 has of 2 MoA.

3. MAGNIFICATION - The magnification is significantly higher than the 3.5x of the original scopes. I compared the field of view of this prototype with other 3x and 4x scopes I own against objects of known size around home. This prototype had a significantly larger image and narrower field of view. I would have judged the magnification at closer to 5x. I have already pointed this out to RSM who informed me that that would be corrected in production models.

4. DRUM ADJUSTMENT TOOL – As mentioned above, initial adjustment of the scope to zero it requires the use of a special tool pictured in Fig. 5 above.

Without this tool, it will be near impossible to sight the rifle accurately. It is a difficult enough job as it is with the tool. My recommendation would be to ask RSM to include one of these with every scope sold and to put this fact in their advertising so that unscrupulous dealers do not separate them from the scope and try to sell the separately.

Adjustments could be done with a screw-driver ground to fit the fine adjustment screw in the middle of the drum, but moving it will rotate the drum as well unless you can use a third hand to hold the drum in position whilst setting the fine adjustment screw to collimate the graticule to the rifle's bore.

5. RANGING DRUM MOVEMENT – Unlike the deflection drum, the ranging drum does not have the full range of movement from 0 to 10 as it should have. It binds when the drum is turned to 8 and cannot be moved further. This is a fault which needs to be corrected in production scopes.

The likelihood of the scope ever being used at such long ranges is remote, but the scope should have the same range of movement of the originals.

5. INSTRUCTIONS – This kind of scope is unique in its setup. It is critical that there be included with the scope, a clear set of instructions about how to mount these scopes correctly, and that their owners understand how they must be mounted.

The ranging drum is on top of the scope whilst the deflection drum is on the shooter's left hand side. This allowed the free hand to adjust the deflection from a firing position whilst the rifle was supported on a rest without having to take the rifle down – an important consideration in a battle situation. The Russian PE and PU and sniper scopes had this feature for the same reason.

However, in setting up the No32 scope, special consideration needs to be given to how it is mounted because of the graticule moving feature.

Basically, the correct bracket and pads need to be mounted on the scope with its graticule properly centred ex factory and the whole squared to the horizontal axis of

the rings and then fixed to the rifle's action taking great care to ensure that this side-mounted system is correctly collimated to be centrally located over the bore's axis and parallel to it horizontally. The position of the drilling holes in the action need to be marked very accurately first.

After mounting and screwing the assembly to the action, this can mean removing metal from either or both of the pads to bring the scope centrally over the boreline through a series of 'try' fits. The original milspec required that the point of the picket post in its centralised position should be within 1 MoA left or right of dead centre.

Mounting the system horizontally and parallel with the bore line allows the maximum amount of adjustment for the ranging drum. The scope comes from the factory with the ranging drum set have the point of the graticle centred with the drum set at 300 yards. This setting ensures that the point of the graticle never moves out of the area of the sighting picture toward an edge where the image of the graticle becomes fuzzy.

This is important, because these scopes have NO focussing adjustment and a short eye-relief and rely entirely on keeping the shooter's eye exactly centred on the graticle point. This is how the old scopes were made, and this is what you are buying – a replica of one of those scopes.

SUMMARY

The prototype scope is almost up to the mark save for the issues outlined immediately above and which will go to RSM for their consideration for incorporation in production models. The prototype is sturdy, reliable and completely functional, but needs some improvements to match the originals.

Many of the originals unfortunately are already internally damaged from misuse or lack of use and require very expensive repairing and restoration at prices around \$1000 for a restoration job.

For the needs of the military rifle shooting fraternity, these replica No32 scopes will be as close to the 'real thing' that an average shooter on wages will reasonably be able to afford and keep the originals where they belong on the collector shelf. The scope itself with its brackets is about twice the weight of a modern scope of equivalent power and they are not beautiful. They were built for reliable function and did that job extremely well.

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