



Assembly and tuning

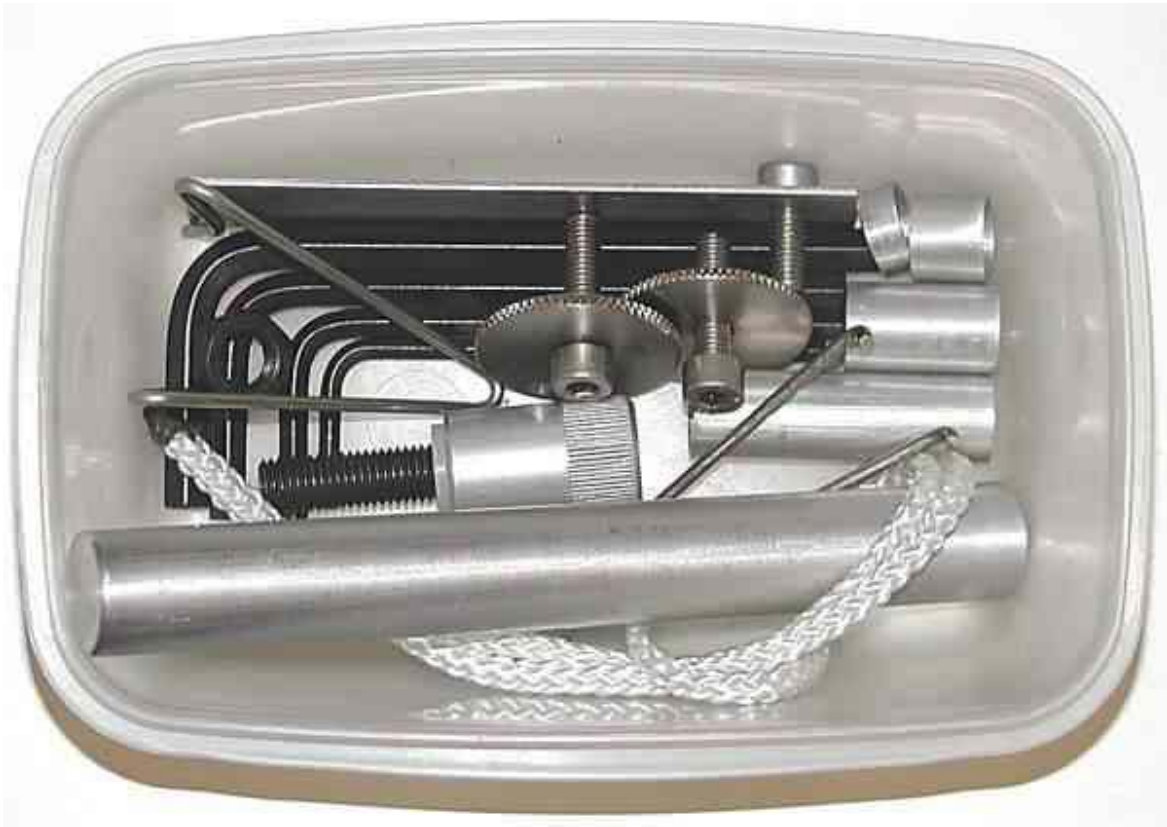
Ver. B2002

by Claes Colmeus

Parts checklist:

- Riser with: Screws for handle, stainless M10x30, 2pcs
Adjustable limb bolts (9 parts each), 2pcs
- Handle with: Mounting rod, sling and wooden grip
Grubscrew for sling, stainless M6x9, 1pc
- Bracket with: Mountings for plunger, arrow rest, hand protection bracket and hoop
Hand protection bracket, stainless steel sheet plate, 1pc
Screws for hand protection bracket, stainless M3x8, 2 pcs
- Box containing: Excentric mounting washers for the bracket, stainless Ø27, 2pcs
Screws and washers for the bracket, stainless M5x20, 2pcs
Protection hoop for plunger, stainless wire, 1pc
Screws for protection hoop, stainless M3x12, 2sps
Clicker plate, stainless, 1pc
Screw for clicker plate, stainless, M5x12, 1pc
Screw for sight mount, stainless, M5x16, 2pcs
Screw for V-bar, stainless M6x16 with turned flange, 1pc
Safety sleeves Ø12 for handle, aluminium, length 5, 10, 20 and 40 mm
Stabadapter UNC 5/16x24
Tool for limb adjustment, stainless wire, 1pc
Hex socket wrenches, 3, 4, 5, 6 and 8 mm.
Extra sling

V-Bar

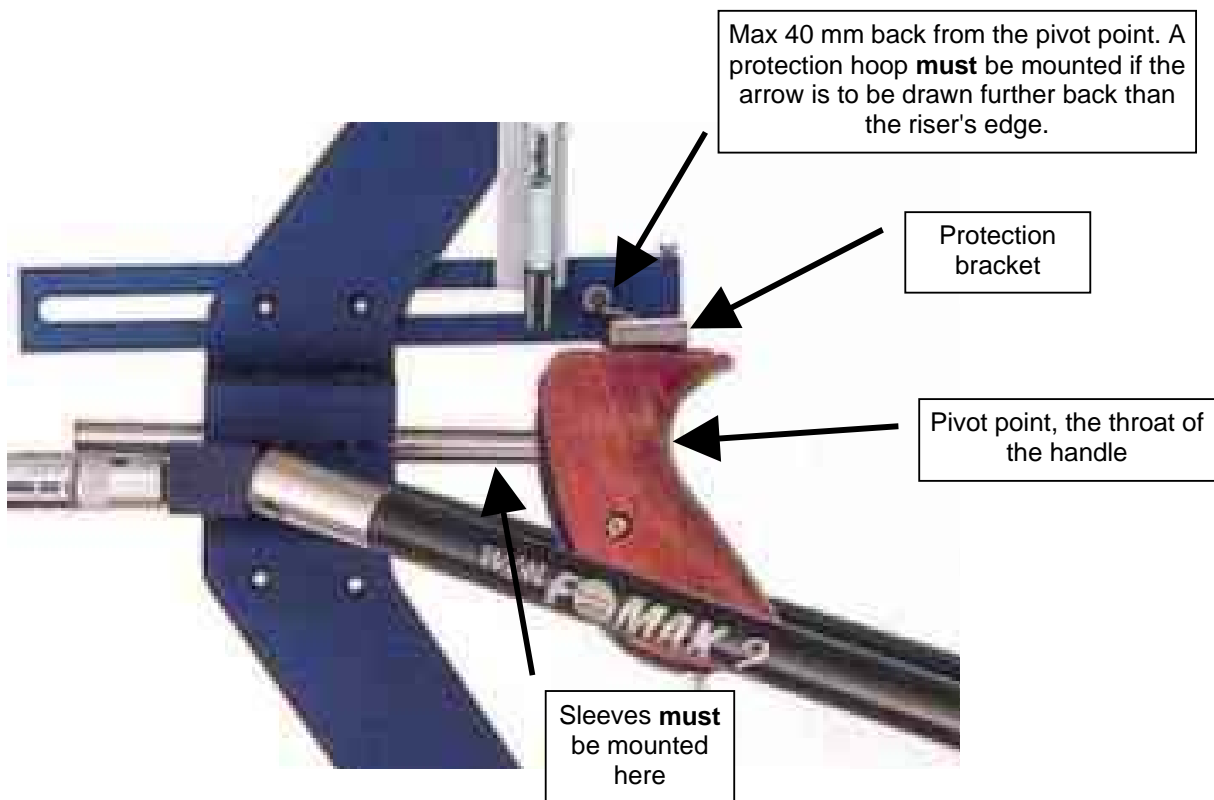


Approval

The FITA technical committee considers the Variable bow to be a bow in the sense described in the FITA rule book, for the Recurve Division. It does not fulfill the requisites for the FITA barebow class, as the riser cannot pass the 122 mm ring. It is possible to shorten the handle rod and the mounting bracket enough, however, their adjustment ranges will be severely restricted.

Furthermore, the FITA technical committee has emphasized the following:

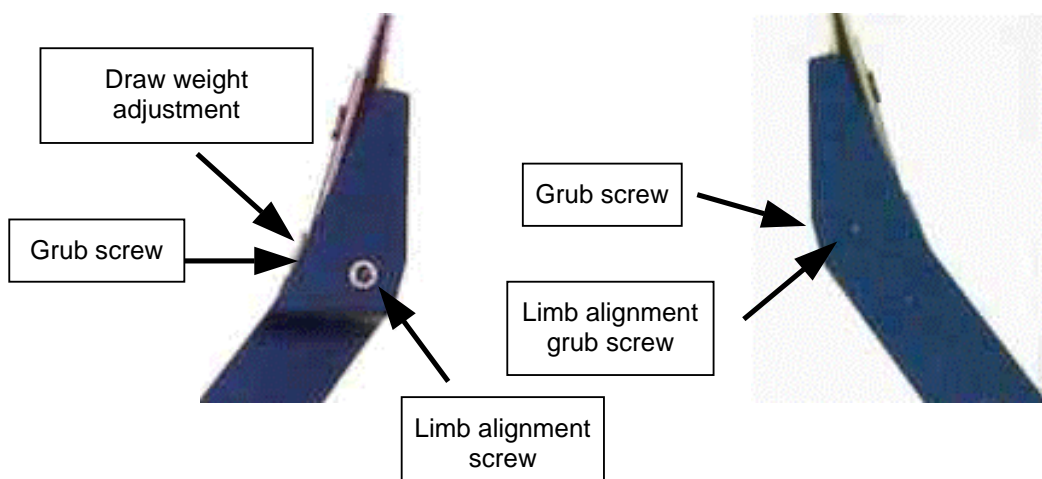
1. The plunger can be placed no more than 40 mm back from the pivot point, according to rule 7.3.1.3.1 and others.
2. The bow can be shot only if the handle is well fixed to the riser, no pivoting in any direction is allowed.
3. The handle must have a safety device, preventing it from sliding into the riser if any screw should fail or be insufficiently tightened.
4. The bow must have a safety device preventing the arrow from hitting the shooter's hand or the riser in case it falls off the arrow rest.



Assembly and preliminary adjustments:

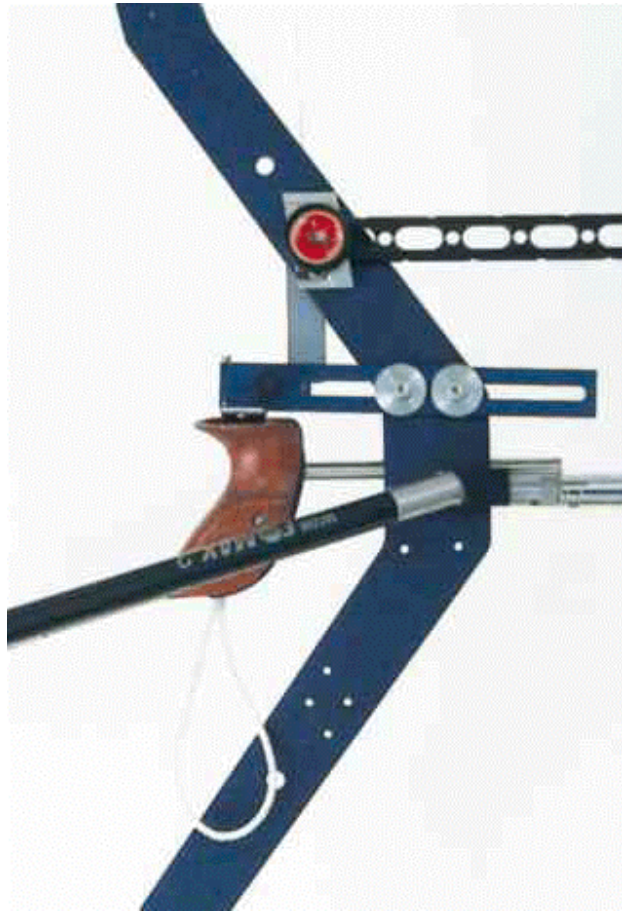
Limb centering

To enable the limb alignment, check that the draw weight adjustment screw (the limb bolt) is not set tightly against the limb pocket's bottom. If needed, use a 4 mm hex wrench for the grub screw, and the small wire tool (or your fingers) to unscrew the limb bolt a little. Tighten the grub screw again, mount the limbs and string the bow. Do not mount anything else on the bow. The limbs must be set tightly in their pockets. Check that they are not sideways movable. To make sure, draw the bow a bit and dry fire. If you hear a loud bang, the limbs probably just moved into position. New limbs may be pretty tight and you may need to shoot an arrow.



Put the bow on a FLAT surface. Measure the distance from the table to the center of the string at both ends. The width of the riser is 48 mm, thus the string should be 24 mm over the table surface. If not, most limbs can be adjusted. If you don't have a large, flat surface, a long ruler held against the riser's side will do the job.

To adjust, loosen the grub screw under the limb pocket and the small screw on the side of the pocket. Turn the large screw on the other side until the string is 24 mm from the table. This screw is spring loaded, thence it should be possible to adjust both ways. However, it's recommended to first unscrew it a bit and then make the adjustment by screwing it back in. Tighten both grub screws, turn the bow over and check for 24 mm again.. If needed, make a final small adjustment. If it's not possible to adjust to 24 mm both ways, your table is probably not flat enough. Try the ruler method instead.,



Mount the clicker, either directly against the riser, or with the clicker plate if you will draw past the riser. A piece of double-stick tape under the plate may help to keep the noise level down.

Use the M5x16 screws supplied to mount the sight.

Mount the V-bar, using the flanged screw and the long rod adapter. The inherent stability in this rather heavy riser means that you can get away with a relatively short long rod. A long and largish rod may be a problem, coming into the line of sight when shooting long distances with low draw weight and/or drawing with three fingers under the arrow. Also, a multi rod stab may have too large diameter. A conventional V-bar may be used, mounted on an extension. The fact that the stabilizers are asymmetrically mounted does not cause any imbalance, contrary, it will at least partly compensate for the riser's mass being asymmetric.

Basic settings

Before making any serious tuning, set the brace height, tiller and nocking position to minimize the noise and vibrations. Please do not mount any kind of vibration dampers at this stage.

The brace height, as it is normally measured, between pivot point and string, is not relevant when the handle can be adjusted lengthwise. You may either measure the distance between the string and the limb where it emerges from the limb pocket, taking the mean of both sides, and adding 40 mm. As an alternative, measuring from the pivot point with the handle set 50 mm from the riser will give about the same result. If you already have set the handle where you want it, measure from the pivot point and add the difference between your setting and 50 mm. Start with the brace height somewhere near the center of the limb maker's recommendation.

The tiller, the difference between the distance from string to riser at the limb pockets, is usually between + 15 and - 5 mm. Some limbs are made for a + 5 mm tiller (the upper distance 5 mm more than the lower) when the limb bolts are set the same (Border, Samick) while others have 0 tiller (Hoyt, W&W). Thus, make your preliminary setting 0 or 5 mm, depending on your limbs.

Final assembly

Mount the handle now, if you haven't done it already. Use the safety sleeves to set it's distance from the riser. Tighten both screws alternately. Some oil or grease on the threads will help a lot. Adjust the length of the sling after unscrewing it's set screw, reachable from the bow side of the handle.

Mount the support bracket. Use the two excentric washers to set the plunger height. Start with a reasonably low setting, both the washer's markings at the same height, pointing down or away from each other. Note that you must not turn the washers so that the markings point towards each other, the washers will interfere.

Mount an arrow rest. A very stiff wire rest is included, and works well. If you prefer another variety, make sure it is adjustable enough sideways. Most magnetic rests can be used, most simple glue-on models can't, at least not without some kind of adapter.

The basic plunger lengthwise setting should be just above the pivot point, by many shooters considered to be the most forgiving position. You can easily adjust this later, the only non physical limitation is the FITA rule stating the plungers's position not to be more than 40 mm behind the pivot point. Please check this if you adjust the handle or the support bracket.

If you will draw your arrow's point past the riser's edge, you **MUST** mount the hand protection bracket and the plunger hoop, to prevent the arrow from penetrating your hand or being smashed by hitting the rear side of the riser, should it fall off the rest or be shot resting on top of the plunger.

The nocking position on the string should be a bit above the plunger, the arrow pointing slightly down. Use a bowsquare to set the lower edge of the upper nock position 10 - 12 mm above the arrow rest, depending on the arrow size. **After every adjustment which affects the arrow position, check that a nocked arrow will not hit the riser when drawn resting on the hand protection bracket or on top of the plunger. Adjust the protection bracket and/or the plunger hoop as needed.**

The plunger's side position should be set to 31 - 31.5 mm, minus half the arrow diameter, from top to lock nut, giving the arrow some 3 mm of offset at the point. Alternatively, use the old faithful sighting method, aligning the edge of the arrow with the string.

If you have used your limbs with another riser, and had a reasonably good tuning, try to copy your old settings. However, the limb pockets may have different angles on different risers. Thus, the draw weight adjustment may be different and should be checked with a bow scale.



Basic tuning

Now it's time to start shooting arrows and change brace height, tiller and nock position. The most important things to observe now are noise, limb flutter and arrow clearance. Also, you need at least a rough tuning, using plunger position, plunger spring and maybe draw weight to get arrow clearance and clean arrow flight.

The draw weight is in most cases adjustable some 2 - 5#, but you must be aware of some not very obvious limitations. The following is for limbs with "International" mount, Hoyt, W&W and many others.

The limb's side position is controlled by a slot in its end with a tight fit on the limb bolt, and a short cylindrical peg with a conical flange. A small spring loaded peg prevents the limb from falling out of the pocket before the bow is strung. It does not contribute to the limb alignment at all. When stringing, or at the first shot, usually with a loud bang, the limbs will move until the peg hits the rounded end of the slot, which will define its position accurately. The limb forces are taken by the very end of the limb against the bolt and the other side of the limb against the pocket, on both sides of the slot. The limb bolt on the Variable can be adjusted to make sure it's flush against the limb, if the grub screw under the limb is loosened, the bolt is tilted, and the screw retightened. This adjustment isn't very important as the limb contact with the bolt is near its center, causing no bending forces.

The limb side which rests against the pocket has a cylindrical shape, rolling against the pocket if the limb bolt setting is changed. If the bolt is too far unscrewed, the line of contact will move to the very edge of the pocket. Unscrewing the bolt further will cause ugly marks and wear on the limb. Also, the peg's conical flange will begin to take up load against the inner edge of the slot, causing damage to the limb pocket, the limb and the peg. Furthermore, the limb force will be taken up by a very short thread length of the limb bolt, risking stripping of the threads and the limb leaving the bow. Unscrewing the limb bolt no more than 3 full turns from the innermost position should be totally safe, if you need more you must really know what you are doing.

Shoot fletched and unfletched arrows from a reasonable distance, 15 - 25 m, and adjust the plunger spring, the draw weight or the draw length (handle position!) until the unfletched shafts consistently hit slightly left of the fletched arrows. Also, make sure that the unfletched ones hit lower, by adjusting the nocking point.

When you are satisfied, it's time to find the best brace height and tiller. Try to minimize limb flutter, noise and vibrations. Limb flutter is probably the most important of these factors, as it reflects a condition which may affect the arrow flight. If the limbs aren't stopped cleanly by the string, both limbs reaching their resting positions simultaneously and with the same speed, there may be a vertical string movement before the arrow is released, causing vertical arrow wobbling, porpoising. Also, the limbs may vibrate with low frequency for several seconds. Some factors that can affect this are, except the shooter's (lack of) release form, brace height, tiller and nocking position. Try changing these within reasonable limits. Keep the bare shafts hitting low. It is not enough to adjust to the same nocking height after setting the tiller, the angle between string and riser is changed, causing errors in measuring with the bow square.

If you can't eliminate or even slightly affect the limb flutter, the reason may be a resonance between the stabilization and the bow/limb system. Try to get rid of the vibrations without stabilizers or with much reduced front weight. Then add some kind of vibration damping on the stabilizers: TFC, Doinkers or similar. A Beiter O-ring or a rubber washer can do wonders.

A loud, sharp bang is normal in the first shot after bow assembly and stringing. If this noise persists, the reason is probably the limbs lifting from the pockets, and falling back with a bang. The only effective way to straighten this problem seems to be to increase the bracing height until the bow is quiet. This kind of noise may come back if you increase bow speed with a lighter string or lighter arrows. It may also be caused by noise dampers! Mounting rubber mushrooms (Limb Savers) too far out on the limbs increases the moving mass, causing more bending of the limbs when they are stopped by the string. Having said this, these mushrooms, correctly mounted, will make your bow so quiet that it's almost embarrassing.

When the bow is quiet and vibration free, fine adjust the arrow flight and grouping. Use your favourite tuning method and adjust the plunger spring and the nocking position. Some careful bare shaft shooting and some work on the groups will do the trick. Adjusting the nocking position can be achieved by setting the vertical position of the arrow rest and plunger bracket, turning one of the excentrics slightly. This will not upset any of your earlier tuning, and is of course an exclusive feature of the Variable.

High speed video has shown a possible clearance problem. The rear end of the arrow may pass very close to the bent-up end of the hand protection bracket. Some factors causing hits here may be: weak arrows, large fletchings, high bracing height (more than 25 cm), low nocking position, a fast lower limb or a tiller error. Check for hits by painting the edge and the inside of the bracket with a whiteboard pen. If there are marks, try to eliminate the tuning problem(s) first, if that doesn't help, bend the bracket or it's end a little bit, not forgetting to check that it still prevents the arrow from hitting the riser.