

The Technical Side - Tripods

By Doug and Marty Crook

We have been asked by a reader to give a more detailed "care and repair" discussion about tripods. Perhaps he will find this information as supportive as tripods that are well cared for.

Tripods are the greatest cause of field errors. Many errors caused by tripods are seen as errors created by the instrument, or are attributed to the tripod settling. Too often these tripods are not treated like the precision equipment they support. They are treated only as well as the hammers and shovels thrown in the back of a pickup.

Aluminum tripods are generally sturdy in their construction, but are subject to a high rate of temperature related expansion and contraction. This type of tripod is not recommended for use with instruments weighing more than four to five pounds, or non compensated instruments with an accuracy of better than five minutes.

Wood extension leg tripods are most commonly used for today's instrumentation. Although there are many different brands of tripods, most are similar in construction. The top surface of the head should always be protected by a cap to prevent nicks and scratches. These nicks and scratches inhibit smooth level movement of the tribrach or theodolite for ground point alignment. Marks in the head can be removed individually or the whole head can be resurfaced with a lathe.

From the head down, problems can be detected by twisting the tripod. Set up the tripod with the legs completely extended, grab the head with both hands, and twist. There should be no movement at all. If the head moves, determine where the components are separating or moving. The most common area for movement is where the gib (the round dowel) is attached to the hinge, just below the head. Many tripods have a "wedge" type of clamping system inside the hinge and, if this is loose, it needs only to be tightened.

But, if the gibs are compressed, the bolt through the wedge may become too long for the assembly and damage the hinge permanently. The length of the bolt can be seen on the backside or inside the hinge. If the gibs are compressed, shims (in the form of business cards or thick paper) can be used to restore original gib diameter. Another type of clamping system simply wraps around the gib with a nut and bolt through the face of the hinge. If loose, tighten shim with paper, or, in the worst case, cut off the top of the compressed gib and re-insert into the hinge.

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Almost all hinges have a nylon or plastic bushing which requires periodic adjustment. A bolt or Allen screw under the head will adjust tension. A common

procedure to gauge tension is to set up the tripod and adjust the bushings so that a raised leg will slowly fall under its own weight. These bushings do not need any lubrication.

Clamps are not usually at fault as long as they're tightly attached to one of the gibs. They either work or they don't. To check the clamping system set up the tripod and tighten clamps securely. Then push down on each leg in turn with about thirty or forty pounds of force; it should hold. If it fails, the clamp may be bad or the surfaces of the gib may be glazed and should be cleaned.

On the bottom of the legs are shoes which can also become loose. Most shoes have one or two bolts which only need to be tightened. Others may require that the shoe be glued or epoxied, and bolted to the slider. Hardened steel points on the very end should remain sharp and tight in the shoe.

The tripod is the base of all measurements taken, so support it.



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Questions:

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