

The Technical Side - Tribrachs

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If you have been following this column you may have noticed we stress the importance of a good sturdy tripod. What about the tribrach that goes between the tripod and your theodolite or total station? This issue we will cover some of the problems that you, the surveyor, might encounter with tribrachs.

As you know, the tribrach has several uses. The tribrach at the base of your instrument is used to level the instrument. With an optical plummet in the tribrach, it is used for positioning over a point. Most theodolites and total stations have a removable tribrach that allows either the instrument, a target or prism to be set up over a point. This gives both the instrument and the target stable positioning over the same point for traversing.

The most common tribrach form is the Wild forced centering type. This uses a lock ring to pull the base of the instrument against three buttons in the body of the tribrach. There are three mounting studs on the base of the unit placed in the tribrach that this lock ring engages. Three level screws connect the body to the base of the tribrach, which is mounted on the tripod. The level screws are held firmly to the base by a spring plate, keeping tension on the screws while allowing them to turn. The spring plate also provides some give if the instrument is bumped.

Several problems can occur when a tribrach is damaged. The spring plate may bend, letting one or more of the level screws move up and down. The level screws themselves may be bent.

Both of these problems will make an instrument hard to level. The lock ring and the mounting studs can be bent or dented. This can cause the unit in the tribrach to become stuck or the lock ring may not fully engage and force the unit against the locating pads.

The first step in proper tribrach care is a thorough examination. Look for a bent spring plate or damage to the lock ring or instrument mounting studs. Check the level screws to make sure there is no play in their mounts or threads. Securely mount the tribrach and instrument on a good tripod. While observing a target, twist the upper body of the tribrach to one side. Let go of the tribrach and observe whether the crosshairs return to about the same place on the target. As a second check, twist the upper body in the opposite direction, and observe as stated above. You can check for bent level screws by lining one end of the instrument telescope over the level screw in question and rotating the level screw while looking through the telescope. If the levelling screw is bent the image will wander back and forth instead of going straight up and down. The three buttons and the instrument contact points must be clean. The lock level and lock ring have to be clean and lubed so they engage the instrument properly. The level screws should be tight enough to turn smoothly without requiring too much force. One of the holes that the mounting studs go through has a smaller diameter to prevent the instrument in the tribrach from turning side to side.

If this clearance increases, the instrument can turn slightly in the tribrach, degrading accuracy.

The level vial and optical plummet should be checked and adjusted regularly to guarantee proper positioning. The level vial should be checked with a levelling/adjusting ring instead of the instrument vial because the instrument may not be properly seated in the tribrach. Adjust the vial to agree with the levelling/adjusting ring. The optical plummet is also checked with the levelling/adjusting ring to guarantee position accuracy. Place the adjusting ring in one tribrach and put the tribrach in question upside down on the adjusting ring. Then centre the optical plummet reticle with the level screws of the bottom tribrach (it doesn't have to be in level) on a sharply defined target above the tribrach to be adjusted. Rotate the top tribrach 180 degrees and check to see if the reticle is still at the same point on the target. If not, adjust the reticle halfway back with its adjusting screws and move it the rest of the way with the level screws at the bottom of the tribrach. Repeat the process until the optical plummet shoots to the same point when rotated on the adjusting ring.

The information given here should enable you to check your tribrach and insure they are in good working order. If you are not satisfied with the operation and performance of your tribrach then it should be checked or serviced by a qualified technician.



?? TECHNICAL QUESTIONS ??

Feel free to send them in writing to:

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We'll do our best to track down the information for you.