

The Technical Side Instrument Maintenance

By Chris Cothrun, Service Technician, Ingenuity, Inc.

A couple of survey firms asked us what happens when their instrument is brought in for "a cleaning" or "an overhaul," so we thought that would be a good subject for this edition of *The Technical Side*. We will discuss why cleaning an instrument is necessary and what happens when your instrument comes in for service.

First we will cover the reasons why an overhaul is necessary. The instrument is used on job sites where it is exposed to blowing dust and the occasional inclement weather. Dust and dirt collect on and inside the instrument, especially around the bearings that have oil or grease exposed. The dirt increases the wear on critical components, reducing accuracy. The lubricants in the instrument dry out and must be replaced. Over time, the instrument optics and electronics lose adjustment.

In the service procedure, the instrument is cleaned and reassembled with new lubricants in all the moving parts. This reduces wear and improves the accuracy in the bearings. All angle measuring systems are fully adjusted, whether optical or electronic. Having your instrument serviced ensures that it will continue to function properly as an accurate measuring device for years to come.

We typically perform two types of service on an instrument, a "complete overhaul" and a "minor cleaning." The overhaul involves complete disassembly, cleaning the parts, relubrication, reassembly, and adjustment of the instrument. A minor cleaning involves only the parts of the instrument that are most exposed to the elements and get the most wear - the tribrach, the tangents, and the focus assembly. Which one of these services should an instrument get? We typically alternate between the two services. This lets us perform the quicker and less expensive "minor clean" on the parts of the instrument that need it the most. The next time the instrument is in for service, it will get the "complete overhaul." Of

course, we evaluate each instrument before starting the service to make sure it gets the service it needs.

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So, how often should an instrument be serviced? That depends on how much use it gets and the conditions it is exposed to. Total stations used in open pit mines are used every day no matter what the weather conditions are. They are exposed to more dust and moisture than the typical survey instrument. These instruments are scheduled for service every six months. If they go any longer, critical components wear too much and can fail. On the other hand, we know of several archaeological companies that use total stations in recording the position of artifacts on a dig. The instruments are handled very carefully, not used more than six months out of the year, and are kept very clean. These instruments can go several years between services with no adverse effects. The typical survey instrument's use probably falls between these two extremes. In our experience, having your instrument serviced once a year is necessary to keep it in good condition. Again, we alternate the services so your instrument gets a complete overhaul about every two years.

There are several signs that your instrument is overdue for service. Tangent or tribrach screws that feel loose and turn very easily may have no lubrication left and need to be cleaned and lubricated to avoid further problems. On the other hand, tangent or tribrach screws that are tight indicate threads are binding up and need immediate cleaning and lubrication. These problems can be corrected by the minor cleaning described above.

Some symptoms indicate more serious problems are developing. Check

your telescope for side play by gently moving it side to side. If there is excessive movement, the bearing lubrication is drying out, or the bearings are worn and the instrument needs to be serviced. Any unusual noise in any of the motions usually indicates excessive dirt. The instrument may display an occasional error message that appears to be unrelated to your current operation. Any of these symptoms indicate the instrument may need the complete overhaul.

Before you balk at the cost of having your instrument serviced, consider a few points. If you let the instrument go long enough, you might be looking at replacing parts such as bearings. This means repair bills approaching half what the instrument is worth. Instrument failure when your crew is under the gun can be costly. The trip to the repair shop and the wait for the rental instrument means down time, not to mention the damage to your reputation. Finally, our favourite comparison is that to your vehicle. You wash it occasionally, you get the oil and filter changed several times a year, and you might tune it up every couple of years. If this doesn't happen, the vehicle doesn't go anywhere after a certain point. You know that changing the oil regularly is much cheaper than rebuilding an engine and replacing crankshaft bearings. I'll let you draw the parallels to your total station.

Our next column will go into detail on the service procedure followed in a major overhaul. In the meantime, check your instrument or take it to your local instrument shop for an evaluation. A trained service technician can give you the best appraisal of the condition of your instrument.

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