



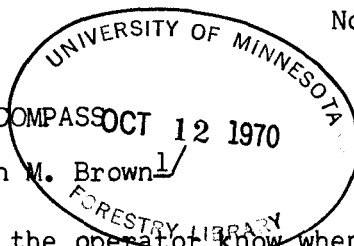
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ADJUSTING THE STAFF COMPASS OCT 12 1970

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The proper use of any instrument requires that the operator know when it is not in proper adjustment. Because the staff compass is a relatively simple instrument, it is oftentimes assumed to be in working order when, in fact, adjustment is needed. Some malfunctions can be compensated for by procedures of operation while others cannot. It is advantageous to know when repairs are necessary. Except for ordering parts, any compass can be repaired in thirty minutes or less. Generally, hesitation to make these repairs results from the lack of information on how to accomplish them.

Most surveying textbooks adequately discuss the topic of adjusting transits and levels. However, they neglect compass adjustments. Foresters and geologists use the staff compass in many situations. This use warrants a brief discussion of adjustments which can be made outside the factory. A well adjusted instrument will provide better results in less time plus prolonging the useful life of the instrument. It will also instil more reliance on and confidence in the results obtained from its use.

Adjusting Vertical Alignment of Sight Vanes

This adjustment results in making the front and rear sights vertical while the level bubble is accurately centered. To accomplish this the hair and slot sights may be compared to a long plumb line suspended from a branch or corner of a building. This line should be long enough to fill the field of vision along the full length of the hair and slot sights. If either of these sights is not parallel to the plumb line, the vane can be adjusted by filing the base until the slot and hair are vertical. This must be done carefully to prevent removing too much metal which would then require filing the other side of the base.

Adjusting a Bent Needle and/or Pivot

The remaining adjustments are concerned with the needle and pivot. When both are in proper adjustment, the readings at one end of the needle will consistently differ by exactly 180° from that of the opposite end. As a check several readings should be made in different sectors of the circle. When the difference between the two end readings is constant but not 180°, the needle is bent. If an inconsistent difference occurs, the pivot is bent and the needle may, or may not be. Under these conditions, a check is first made for a bent pivot and the adjustment made if needed.

Bent Pivot Adjustment

First find the position that gives the maximum difference in needle end readings from 180°. When the pivot is bent off center, it must be bent back at right angles to the direction of the needle where this maximum discrepancy occurs. This can be done by tapping the pivot lightly with a small instrument hammer. Be certain not to strike the pivot tip. The pivot may also be bent with pliers. Using either method extreme caution must be used to prevent unseating the pivot. When half the discrepancy in end readings is removed, the pivot is correctly adjusted. When the difference in end readings in different sectors of the circle

Once the pivot is centered, the needle should be free to rotate within the circle without touching at any point. It should be of equal length on opposite sides of the pivot and long enough to reduce the possibility of parallax when reading the circle.

Bent-needle Adjustment

After the needle length is satisfactorily adjusted by sharpening the point back and the pivot is centered, the end readings should be 180° apart. If they are not, bend the needle so they read 180° from each other. Straightening the needle should always follow the pivot and needle length adjustments because these adjustments can result in a bent needle.

Sluggish-needle Adjustment

A sluggish needle can result from a number of maladjustments. It is also the cause of inaccurate readings even though great care was used in making these readings. Any one or a combination of the following repairs may be necessary to correct this sluggishness.

Counterweight Adjustment

In the northern hemisphere the counterweight is on the south end of the needle. The brass or copper weight counteracts the dip of the needle caused by the magnetic pull of the earth. When positioned properly, the needle will be horizontal on the pivot and swing freely.

Jewel Repair

A cracked jewel increases friction and therefore impedes needle movement. It will also cause a jerky motion of the needle when swinging slowly. A crack can be detected by focusing a bright light on it and examining it with a hand lens. A damaged jewel can be removed by pressing it out from the top. When ordering a jewel, a careful description and compass serial number must be sent to the supplier. The new jewel can be inserted, using one drop of glue if the fit is not adequately tight. The cracked jewel results from careless handling of the instrument when setting it up or carrying it without raising the needle off the pivot.

Pivot Repairs

A worn or bent pivot also causes a sluggish needle. Excessive pivot wear results from carrying the compass without lifting the needle. A pitted pivot can be caused by consistent moisture accumulating inside the compass. A burred or pitted pivot can also gouge the jewel. A careful inspection of the pivot tip with a hand lens will determine if it should be sharpened. Sharpening can be done easily with a fine-grained whetstone as follows: Remove the pivot and fix it in the end of a split stick. Holding the stick so the pivot will be about 30° to the face of the whetstone, gently spin the stick. After the point is as sharp as possible, it should then be polished on a piece of leather or fine crocus cloth. Protect the point.

Remagnetizing the Needle

After completing the previous adjustments, if the needle is still sluggish loss of magnetism may be the cause. Remagnetizing the needle with a permanent magnet is a simple procedure. The North end of the magnet, the end which attracts the South end of the needle, is stroked lightly over the South end of the needle starting at the center and stroking toward the tip. Using the other end of the magnet, stroke the opposite end of the needle in the same manner, center to tip, about the same number of times. A strongly magnetized needle is a lively one, but it will settle quickly. If too strongly magnetized, it will be overly sensitive to nearby metallic objects and give incorrect readings. Five or six swings before settling are best when the first swing is around 45° . Anything less than this indicates a too sensitive needle.

Touching the glass on the compass with a moistened finger will discharge static electricity should the needle become charged. Although not an adjustment, this can be a big help.

Operator knowledge of adjustments has its main value in that he knows when certain repairs are needed. Lack of this causes unjust condemnation of the instrument. The instrument is designed to provide a certain degree of precision. It cannot do this, no matter how skilled the operator might be, if not properly adjusted.