Model 290
Variable Wedge

Operation, Maintenance, and Parts Manual

Instrument Company

Helping the World Measure™

Since 1927

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Thank you for purchasing a Brunson Optical Wedge. Remember that our customer support does not stop after shipment of a product—we are here to help you with any measurement challenges that you may have.


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Model 290 Optical Wedge

This maintenance manual applies to the Brunson Instrument Company **Model 290 Variable Wedge**.

Operation

The Variable Wedge is very simple to use. It shifts (angularly) any line of sight passing through its aperture. This allows you to measure angles of deviation (from straight) during calibration procedures. Further, the wedge will measure horizontal or vertical displacement angles, depending upon how the graduated dial is oriented.

Let's use a simple example to demonstrate its function. Let's say that the zero mark (on the graduated dial) is aligned with the index mark at the 12:00 position. Now, think about looking through the telescope of an instrument, through the aperture in the wedge, and focusing on a target that is far away. If you then move the zero point of the dial to the right and left of center, the image of the target will also seem to move to the right and left of its original position. You are *angularly displacing the image in a horizontal plane*, and the graduated dial will indicate the amount of the displacement in arcseconds. Now let's do this experiment again, but this time having the zero mark on the dial aligned with the index mark which is at the 3:00 position. Now, moving the zero point of the dial above and below the index mark will appear to move the image up and down. This time, you are *angularly displacing the image in a vertical plane.*

You can measure angular displacement in a horizontal or vertical plane, depending upon whether you align the zero point on the dial with the index mark at the 12:00 position (for horizontal displacements) or the 3:00 position (for vertical displacements).

Now let's look at an example of practical use— calibrating the horizontal collimation of a transit (i.e., determining if line of sight is perpendicular to the horizontal axis when focused at infinity). We will consider the case when performing this check using two infinity collimators (telescopes focused at infinity) which are facing each other, with the transit positioned in between.

The two collimators provide targets at infinity, and the transit is positioned on a line between the targets. The 290 Wedge is set up securely in front of one of the collimators, *and the dial is set so that the zero mark is aligned exactly with the index mark at the 12:00 position*. This allows us to measure in a horizontal plane. The 290 must also be oriented so that the front plane of the unit is nominally perpendicular to the line of sight.

We point the transit's vertical crosswire directly at the infinity target in the *other* collimator (the one not having the 290 in front). Then, we rotate the telescope around the horizontal axis only, and bring it up to point at the other collimator. If the transit's horizontal collimation is correctly adjusted, the telescope will come up pointing directly at the second collimator's vertical crosswire.

However, if it's not, we can measure the deviation using the 290. Simply turn the control knob on the front directly or by using the cable until the transit's vertical reticle wire appears to be superimposed directly over the collimator's infinity target. Now, read the deviation from the graduated scale. With the 290 Wedge, you are optically moving the collimator target to compensate for the improper adjustment of the telescope's reticle. In this case, because of the geometry of the setup, the number on the dial indicates twice the error in the transit's telescope. That is, if you read 6 arcseconds on the 290's graduated dial, the actual horizontal collimation error of the transit is 3 arcseconds.

Always make sure that the 290 is securely fastened down and cannot move prior to starting any optical test.

Other similar optical checks can be made in a vertical plane simply by orienting the graduated dial to the index mark in the 3:00 position.

You can see that it's very important for the 290 to remain absolutely stationary during any type of optical test. Moving the 290 during the course of a test can cause erroneous readings because such a movement changes the position of the glass in the unit relative to the line of sight. Securing the 290 may be accomplished by using a clamp or installing bolts through the 5/16″-18 tapped holes in the base of the unit.

Maintenance

The Variable Wedge is designed to measure the angular deviation of a line of sight along either the horizontal or vertical axis. The scale is graduated in one arcsecond increments. Because the wedge cannot be adjusted in the field, maintenance is limited to keeping the wedge clean.

There are two areas on the Variable Wedge you need to keep particularly clean: one is the glass itself, the other is the machined contact surface the wedge rests on when it's in use. If the wedge is not solidly in contact with the mounting surface, readings taken will not be repeatable. Keep the machined surface free of nicks and grime which would cause the wedge to ride above the surface it rests against. To avoid line-of-sight errors at the glass, use a non-abrasive lens cleaner and a non-scratching lint-free cloth to wipe the wedge glass.

If you have any questions about this wedge, its calibration or its use, please call us using the contact information listed at the beginning of this manual.

Specifications

Range: ±30 arcseconds

Accuracy (NIST traceable): ½ arcsecond

Graduations: 10 arcseconds (major); 1 arcsecond (minor)

Aperture diameter: approx. 1.8" (47mm)

Control Cable Length: 30"

Unit height: 4.75" (121mm)

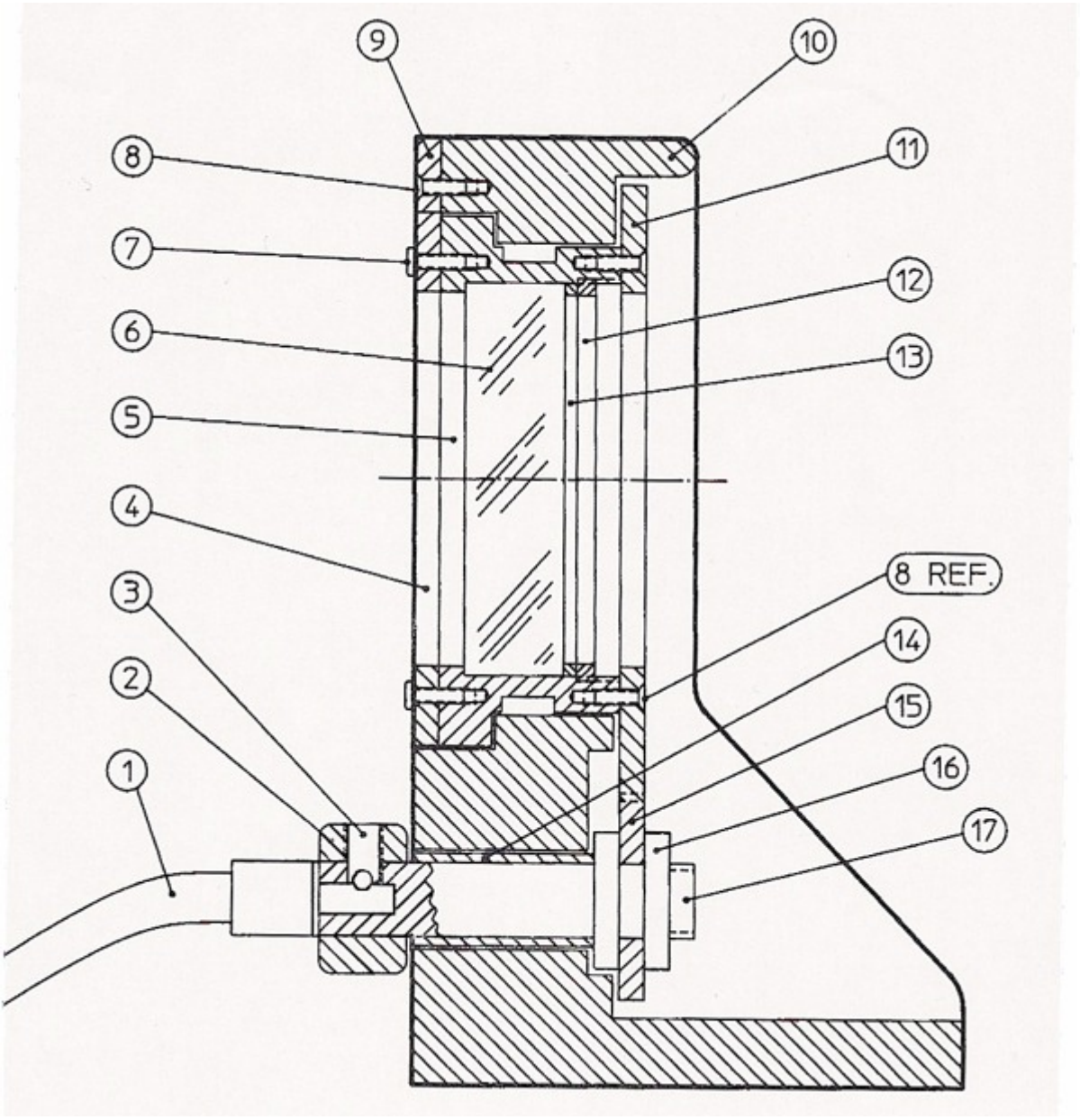
Footprint: 3½" wide x 2¾" deep (89mm wide x 70mm deep)

Tapped mounting holes: Two holes in base of unit, tapped 5/16"-18 UNC-2B. Holes are 1" (25.4mm) on either side of the centerline, 0.660" (16.7mm) from the back edge

Approximate weight: Wedge, 6 lbs (2.7 kg); Wedge and case, 8 lbs (3.6 kg); Shipping, 10 lbs (4.5 kg).

Finish: Gray textured polyurethane enamel

Exploded Parts Diagram (see parts list on next page)



Parts List

	Description	Part No.		Description	Part No.
1	Control Cable Ass'y	6454-G1	10	Main Housing	8927
2	Knob	8935	11	Spur Gear	8928
3	Ball Plunger: 4-48 x 5/16"	13743	12	Retainer Ring	8929
4	Graduated Plate	8936	13	Spring Washer	8940
5	Wedge Mount	8937	14	Sleeve	8934
6	Wedge	8938	15	Spur Drive Gear	8930
7	Screw, 1-72 x 1/4" pan head	COMM	16	Gear Retainer	8932
8	Screw, 1-72 x 1/4" flat head	COMM	17	Spur Gear Drive Shaft	8931
9	Vernier	8939	18	Carrying Case (not shown)	7489-G1