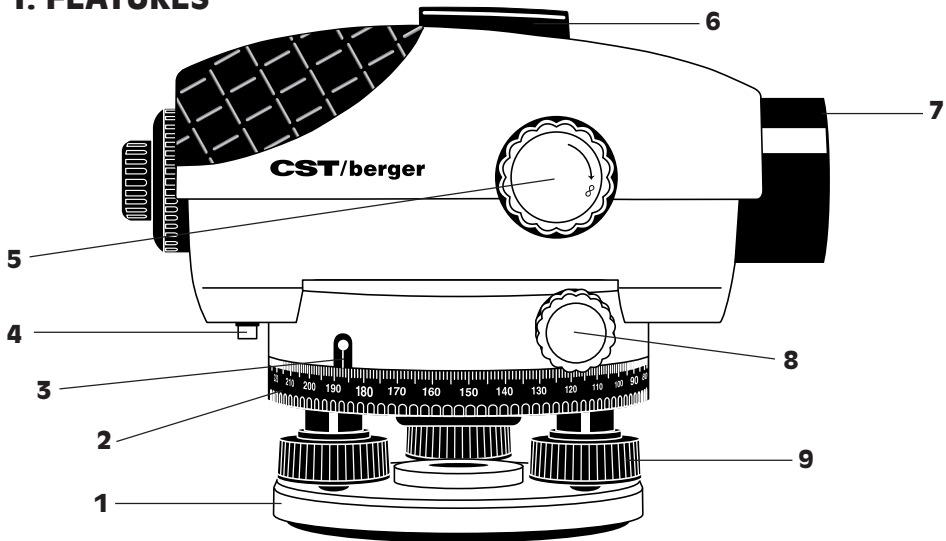
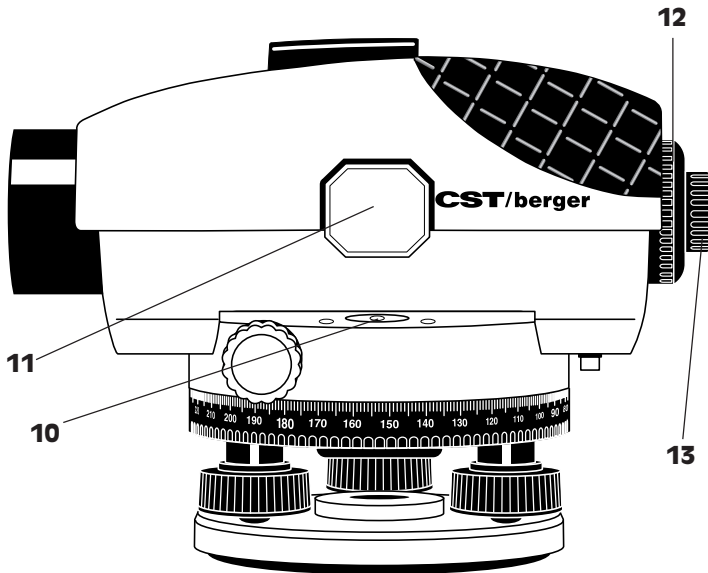

CONTENTS

1.	Features	2
2.	Using the instrument	5
2.1	Setting Up and Centering the Bubble	5
2.2	Focusing the Instrument	6
2.3	Reading Measurements Using a Leveling Rod	7
2.3.1	Height Reading	7
2.3.2	Distance Measurement	7
2.3.3	Angle Measurement	7
3.	Calibration	8
3.1	Compensator Lock Button	8
3.2	Circular bubble	8
3.3	Line-of-sight.....	10
4.	Maintenance of instrument	12
5.	Technical data	13

1. FEATURES





- 1. Base Plate
- 2. Horizontal Circle
- 3. Horizontal Circle Reference Mark
- 4. Compensator Lock
- 5. Focusing Knob
- 6. Optical Peep Sight
- 7. Sunshade/ Objective Lens
- 8. Horizontal Drive Screws
- 9. Leveling Screw
- 10. Circular Bubble Vial
- 11. Vial Sighting Prism
- 12. Eyepiece Cover
- 13. Eyepiece Focusing Knob

1. FEATURES

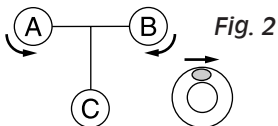
- Wire-hung, magnetically dampened compensator for optimum range and accuracy
- Compensator lock protects instrument during transport or storage; the lock can also be used as a handy compensator checking tool
- Large effective aperture and minimum focus of 0.3m
- Top-mounted optical peep-sight for quick reference
- Large, easy-to-use precise focusing knob
- Easy-to-read horizontal circle
- Penta prism for easy bubble viewing
- Sealed, dust-protected leveling screws
- Water resistant, sealed construction plus sunshade for use in various weather conditions
- Fine adjustment knobs on left and right sides with friction-braked rotation, endless horizontal drive
- 1:100 stadia for distance estimation
- $\frac{5}{8}$ " x 11 threads to fit standard tripods

2. USING THE INSTRUMENT

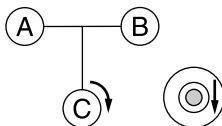
2.1 Setting Up the Instrument and Centering the Bubble

1:
Set up the tripod and attach the level using the tripod mounting screw (*Fig. 1*).

2:
Adjust the tripod legs until the tripod head is roughly level. Center the bubble within the vial by turning the leveling screws as shown in *Fig. 2*.



Turn screws A and B to move the bubble to the right side.



Turn screw C to center the bubble.

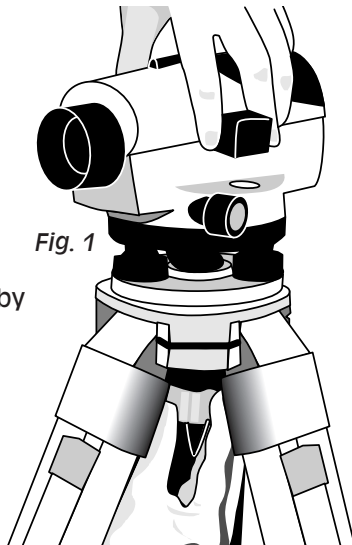


Fig. 1

2.2 Focusing the Instrument

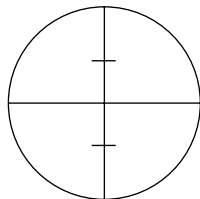
1:

Focus the cross hairs (*Fig. 3*) by pointing the telescope towards a bright background or holding a white sheet of paper in front of the objective lens, then turning the eyepiece until the cross hairs are sharp and black.

2:

Focus the telescope by locating a target, such as a leveling rod, using the optical peep sight. Looking through the eyepiece, use the focusing knob to bring the target into sharp focus. Center the vertical hair within the target using the horizontal drive knobs on either side of the instrument.

Fig. 3



2.3 Reading Measurements using a Leveling Rod

2.3.1 Height Reading

Read the rod where it is intersected by the horizontal hair. For example, the height reading in *Fig. 4* is 2.0 ft.

2.3.2 Distance Measurement

Read the rod where it is intersected by the upper and lower stadia hairs; in *Fig. 4* these readings are at 1.9 ft. and 2.1 feet. The stadia ratio is 1:100; therefore, the distance from the instrument to the rod is: $(2.1 - 1.9) \times 100 = \mathbf{20 \text{ feet}}$

2.3.3 Angle Measurement

As shown in *Fig. 5*, sight point A and note the reading on the horizontal circle. Rotate the level and sight point B; the angle turned is the difference between A and B. The angle $AOB = x^\circ = A - B$.

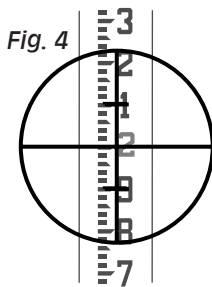


Fig. 4

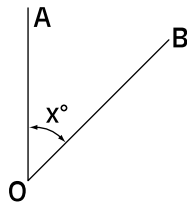


Fig. 5

3. CALIBRATION

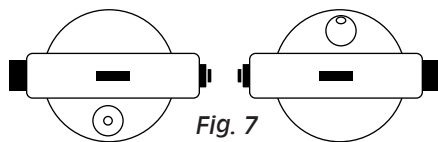
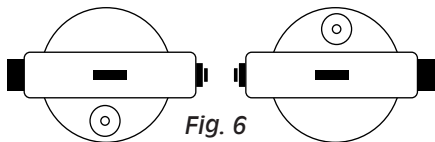
Your PAL Automatic Level has been factory calibrated; however, you should occasionally check your level for errors caused by shipment or rough handling.

3.1 Compensator Lock Button

Check the compensator for proper operation before use or anytime the operation of the instrument is in question. Push and release the compensator lock button to shake the compensator. The compensator should return to the exact horizontal position sighted before the lock button was pressed.

3.2 Circular Bubble Vial

Center the vial bubble using the leveling screws, then rotate the instrument



180°. The bubble should remain centered (*Fig. 6*). If the bubble moves out of center, the vial needs adjustment (*Fig. 7*).

Turn the leveling screws to bring the bubble halfway to center (*Fig. 8*). Using the Allen wrench, turn the two vial adjustment screws to center the bubble (*Fig. 9*).

Repeat the above procedure until the bubble remains centered when the level is rotated 180°.

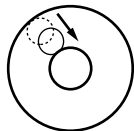


Fig. 8

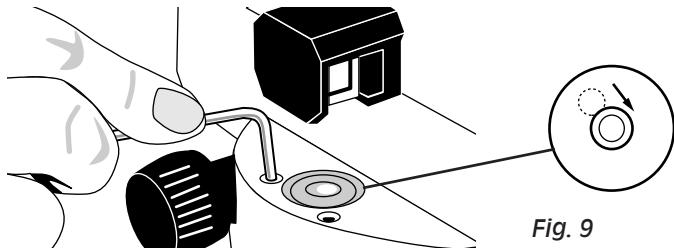
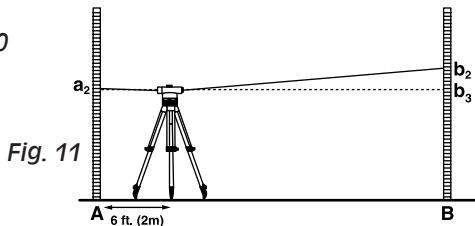
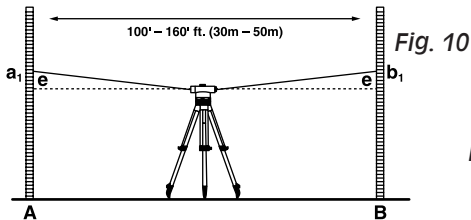


Fig. 9

3.3 Line-Of-Sight

The line-of-sight needs to be horizontal within 3mm of level to be accurate.

Set up and level the instrument on a tripod midway between two leveling rods set approximately 100 ft. to 160 ft. (30m to 50m) apart. Sight rods A and B; the height readings are a_1 and b_1 (Fig. 10). The value "H" is equal to $(a_1 - b_1)$. Move the instrument to within 6 feet (2m) of rod A and re-level. Again sight rods A and B; these height readings are a_2 and b_2 (Fig. 11).



If $a_1 - b_1 = a_2 - b_2 = H$, the line-of-sight is horizontal. If not, the level should be adjusted as follows.

Because the instrument is set halfway between A and B, any error in the line-of-sight causes both readings to be erroneous by the same amount. Error e cancels out, so the value $a_1 - b_1 = H$ is correct. Therefore, $a_2 - H = b_3$, the adjusting value.

To adjust, unscrew the eyepiece cover. Turn the adjusting screw with the adjusting pin (*Fig. 12*) until the horizontal cross hair gives the reading b_3 on rod B. Repeat the above procedure until $\{(a_1 - b_1) - (a_2 - b_2)\} \leq 3\text{mm}$.

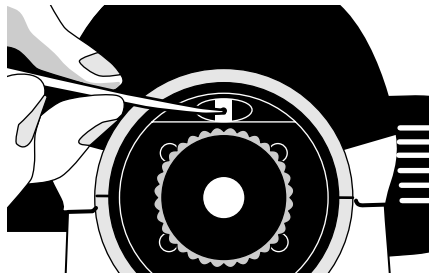


Fig. 12

4. MAINTENANCE

Care must be taken to maintain the accuracy of the instrument.

- After each use, the instrument should be wiped clean and kept in its carrying case.
- Remove dust from the lenses with a soft brush or a nonabrasive wipe. Never touch the lenses with your fingers.
- Store the instrument in a dust-free area with low humidity.
- A bag of silica gel dryer is included with each instrument; if it has stopped working effectively, bake it to remove moisture or replace with a new bag.
- Any damage to the instrument must be repaired by an authorized CST/ Berger service technician.