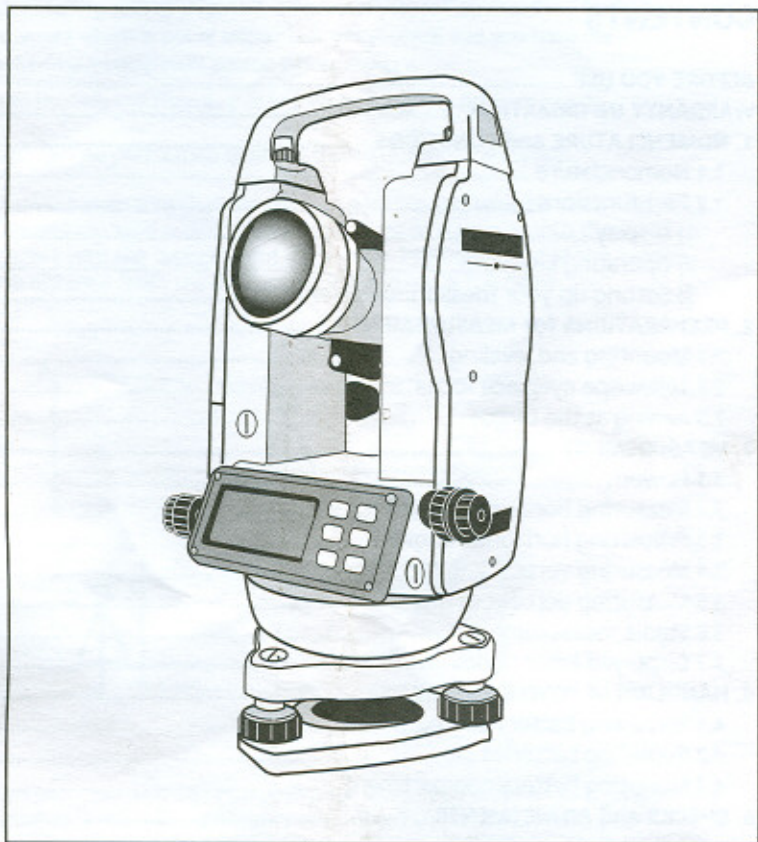


# ***David White***<sup>®</sup>

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## **DWT-10 Instruction Manual**

For Customer Service  
Call (781) 848-7702 or  
Fax (781) 848-8022



Congratulations on your choice of this David White® Electronic Digital Transit. We suggest that you read this instruction manual carefully before using the instrument. By thoroughly familiarizing yourself with the instrument and its operation, you will be able to obtain the full benefit of this superior precision instrument. Save this instruction manual for future use.

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## IMPORTANT! READ THIS BEFORE USING YOUR INSTRUMENT

This quality David White® instrument has been inspected twice for accuracy before leaving the factory. The instrument has also been given the best protection possible against damage during transportation. Even with these precautions, the instrument is subject to rough handling during shipment. To protect yourself against the possibility of using an instrument which is out of adjustment, we suggest that you have the instrument checked by a competent person before using it.

Note: Please read the manual thoroughly before starting the following test.

The following test can be performed to check the instrument's accuracy:

Set up the instrument in an area that is as level as possible and which is about 220 feet long. Place two matching level rods (or drive two pieces of strapping into the ground) about 200 feet apart with the faces toward each other. Position and level the instrument so that the distance from the instrument to each rod is the same (measure; **Fig.1**).

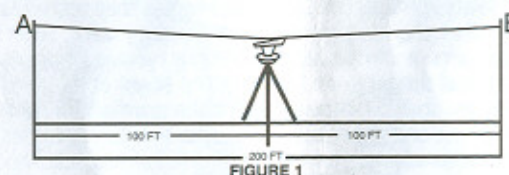


FIGURE 1

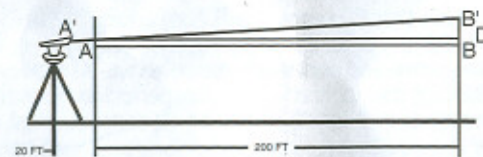


FIGURE 2

Take a reading on each rod with the instrument (or mark each piece of strapping where the crosshair is sighted). Note the difference and record them. Next, move the instrument to another point in line with the two level rods as shown in **Fig.2**. Level the instrument and take readings on the two level rods (or re-mark the two pieces of strapping with the new crosshair sightings). The differences should be the same ( $A - A'$  should equal  $B - B'$ ). The difference between  $A - A'$  and  $B - B'$  is the instrument error at 200 feet.

Correction of instrument error should be performed by a competent repair technician. The instrument should be rechecked periodically to assure continued accuracy.



## WARRANTY

David White® (Seller) warrants the equipment of its manufacture to be free of defects in workmanship and material for a period of one year from date of purchase. If within such one year period the original purchaser (Buyer) notifies Seller, in writing, that the equipment purchased is not as warranted, and provides a bill of sale, receipt, or other proof as to date of purchase, Seller will, at Seller's option, adjust, repair or replace the whole or any part of the equipment which seller finds to be defective, provided:

- A. The equipment is returned transportation prepaid to Seller or its designated warranty service center.
- B. The equipment is in original condition excepting only ordinary wear resulting from normal usage.
- C. The Seller has received prompt written notification and substantiation that the equipment has been stored, installed, operated and maintained in accordance with the recommendation of the manufacturer and has not been subjected to service by other than Seller or an authorized service center.

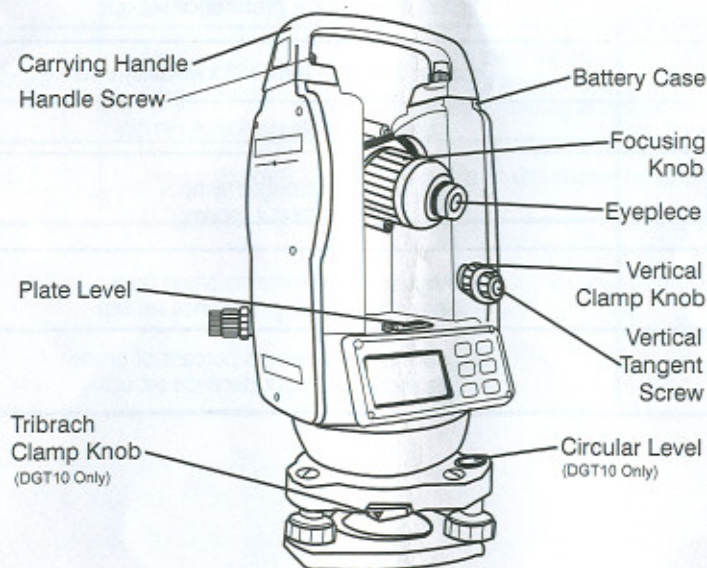
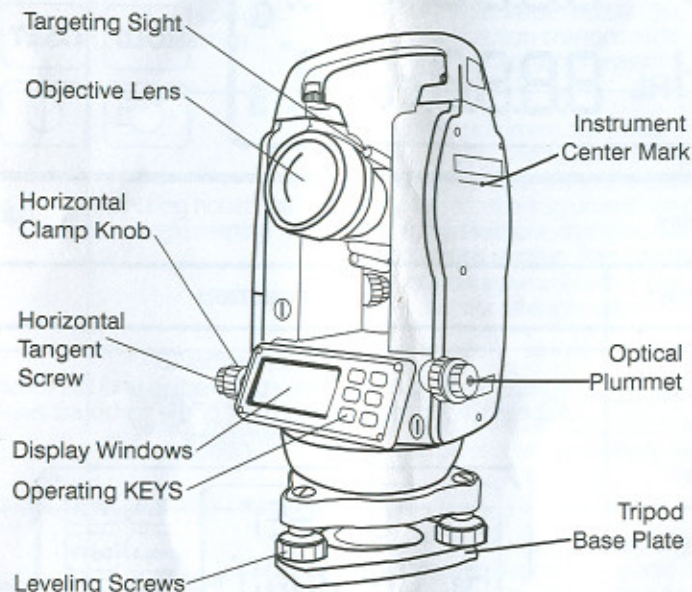
Warranty service does not include cleaning, oiling, or adjustment of the equipment unless required as a result of a workmanship or material defect in the equipment. If, upon examination of the equipment, the Seller determines that such cleaning, oiling, or adjusting is required other than by reason of the warranty claim, Seller shall notify Buyer of the charges for same and after authorization is received from Buyer, Seller shall perform such additional service(s) on behalf of the Buyer at its standard charges then in effect and the Buyer shall be responsible for the payment of such charges in addition to the other charges and expenses referred to above. In all cases, Buyer is responsible for transportation charges for return of goods from Seller to Buyer.

Seller's liability to Buyer (whether in contract or in tort) arising hereunder or as a result of any claimed defect or for any other cause, is hereby expressly limited to correcting the equipment upon the terms and conditions stated above. All liability hereunder shall terminate upon expiration of the applicable warranty period. In no event shall Seller be liable for any loss, expense, or damages direct, indirect, consequential, or special arising from the sale or use of the equipment delivered hereunder.

The foregoing warranty states seller's full liability in connection with the purchase of this equipment, accessories, and parts and is in lieu of and supersedes any and all other warranties and representations, if any, express or implied, including merchantability or fitness for purpose, and shall be void if repairs have been made or attempted by persons other than seller's factory personnel or designated authorized service center. This warranty is not transferrable.

## 1. NOMENCLATURE AND FUNCTIONS

### 1.1 Nomenclature





## WARRANTY

David White® (Seller) warrants the equipment of its manufacture to be free of defects in workmanship and material for a period of one year from date of purchase. If within such one year period the original purchaser (Buyer) notifies Seller, in writing, that the equipment purchased is not as warranted, and provides a bill of sale, receipt, or other proof as to date of purchase, Seller will, at Seller's option, adjust, repair or replace the whole or any part of the equipment which seller finds to be defective, provided:

- A. The equipment is returned transportation prepaid to Seller or its designated warranty service center.
- B. The equipment is in original condition excepting only ordinary wear resulting from normal usage.
- C. The Seller has received prompt written notification and substantiation that the equipment has been stored, installed, operated and maintained in accordance with the recommendation of the manufacturer and has not been subjected to service by other than Seller or an authorized service center.

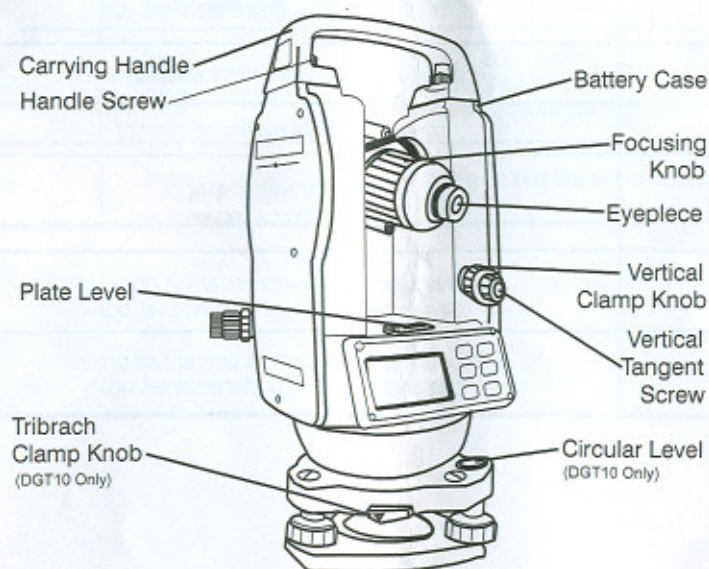
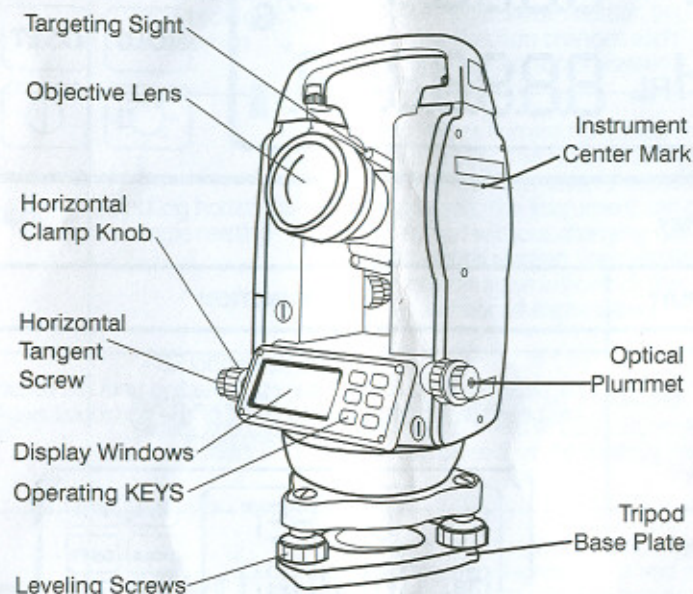
Warranty service does not include cleaning, oiling, or adjustment of the equipment unless required as a result of a workmanship or material defect in the equipment. If, upon examination of the equipment, the Seller determines that such cleaning, oiling, or adjusting is required other than by reason of the warranty claim, Seller shall notify Buyer of the charges for same and after authorization is received from Buyer, Seller shall perform such additional service(s) on behalf of the Buyer at its standard charges then in effect and the Buyer shall be responsible for the payment of such charges in addition to the other charges and expenses referred to above. In all cases, Buyer is responsible for transportation charges for return of goods from Seller to Buyer.

Seller's liability to Buyer (whether in contract or in tort) arising hereunder or as a result of any claimed defect or for any other cause, is hereby expressly limited to correcting the equipment upon the terms and conditions stated above. All liability hereunder shall terminate upon expiration of the applicable warranty period. In no event shall Seller be liable for any loss, expense, or damages direct, indirect, consequential, or special arising from the sale or use of the equipment delivered hereunder.

The foregoing warranty states seller's full liability in connection with the purchase of this equipment, accessories, and parts and is in lieu of and supersedes any and all other warranties and representations, if any, express or implied, including merchantability or fitness for purpose, and shall be void if repairs have been made or attempted by persons other than seller's factory personnel or designated authorized service center. This warranty is not transferrable.

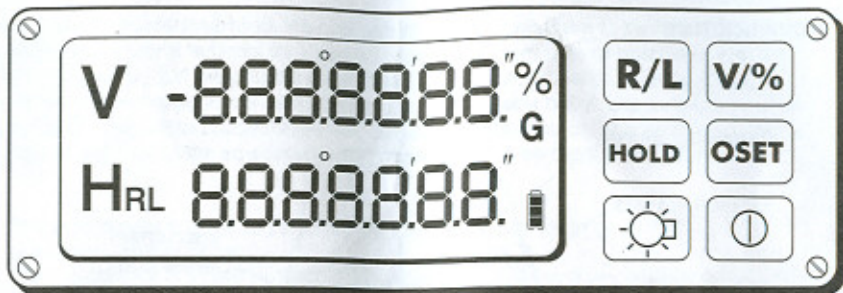
## 1. NOMENCLATURE AND FUNCTIONS

### 1.1 Nomenclature









## 1.2 Part Functions



### 1.2.1 Display

DISPLAY	FUNCTION
V	<p>Vertical angle symbol <b>SEr</b> will be shown in place of the vertical reading until the telescope has been turned past the zero point of the horizontal axis. This sets the zero point.</p>  <p>(See section 1.2.3, preference set up)</p>
Hr	Horizontal angle counterclockwise symbol
H L	Horizontal angle clockwise symbol
	Battery strength symbol (See section 4, power)
G	Angular measurements are in gons (See section 1.2.3, preference set up)
%	Vertical reading shown as percent of grade (see section 1.2.3, preference set up)

### 1.2.2 Operating Keys

KEY SYMBOL	FUNCTION	OPERATION
R/L	Setting horizontal angle rotational direction	Used to switch horizontal angle between clockwise rotation (Hr) and counterclockwise rotation (H L). The direction changes each time the button is pressed.
HOLD	Locking horizontal angle reading	Used to lock current horizontal angle into display. The horizontal angle reading will flash when this button is pressed. The instrument can be turned without changing the horizontal reading. Pressing the button again will unlock the horizontal angle display.
	Illuminating the display and the crosshairs	Used to light the display and crosshairs. Press to light display and crosshairs, press again to shut off the light.
V%	Vertical angle to percent of grade	Used to switch the vertical angle display between degrees/gons and percent of grade. The "%" sign will be shown on the display when percent of grade is active.
OSET	Zero the horizontal angle reading	Used to zero the reading of the horizontal angle display. Press to zero the reading at any point.
	Power ON/OFF	Used to turn the display on and off









### 1.2.3 Setting Up Your Measurement Preferences

A) Turn the power on.

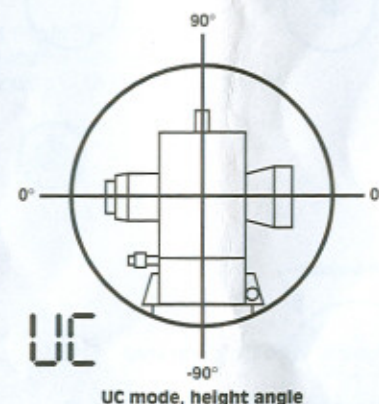
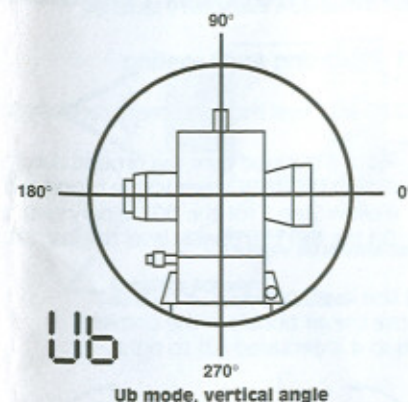
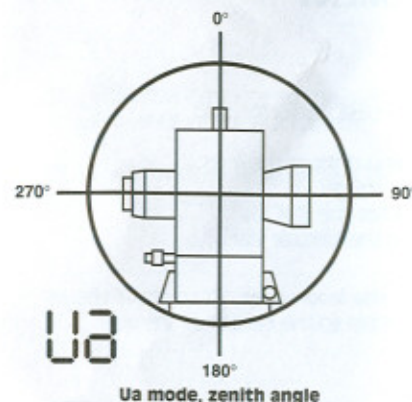
B) Press "R/L" and "V%" at the same time. A tone will be heard and the display should look similar to what's shown at right.

20	360
0	UC

C) To specify your measurement preferences:

PRESS	TO	DISPLAY				
R/L	Change the readout of the horizontal and vertical angle display to show 10 second or 20 second readings. (The accuracy of this instrument is 20 seconds, not 10 seconds. Changing the readout does not make the instrument more accurate.)	 <table> <tr> <td>10</td> <td>360</td> </tr> <tr> <td>b 0</td> <td>UC</td> </tr> </table>	10	360	b 0	UC
10	360					
b 0	UC					
V%	Change between 360 degree readout or 400 gon readout for horizontal and vertical angle measurement.	<table> <tr> <td>10</td> <td>360</td> </tr> <tr> <td>b 0</td> <td>UC</td> </tr> </table> 	10	360	b 0	UC
10	360					
b 0	UC					
HOLD	Change the time of automatic power shut off for the display. The three modes are "0", no auto power off "20", 20 minute auto power off "30", 30 minute auto power off	<table> <tr> <td>10</td> <td>360</td> </tr> <tr> <td>b 0</td> <td>UC</td> </tr> </table> 	10	360	b 0	UC
10	360					
b 0	UC					
OSET	Change the zero points and angle pattern of the vertical circle. The three modes are Ua, Ub and UC. The following diagrams show the different vertical measurement modes.	<table> <tr> <td>10</td> <td>360</td> </tr> <tr> <td>b 0</td> <td>UC</td> </tr> </table> 	10	360	b 0	UC
10	360					
b 0	UC					
	Change between hearing a tone or not when the horizontal angle reads 0°, 90°, 180°, 270°	<table> <tr> <td>10</td> <td>360</td> </tr> <tr> <td>b 0</td> <td>UC</td> </tr> </table> 	10	360	b 0	UC
10	360					
b 0	UC					

### 1.2.3 Preferences continued



Once all preferences have been input, press the "H/R" and "V%" at the same time. A long tone will be heard and the display will return to normal.



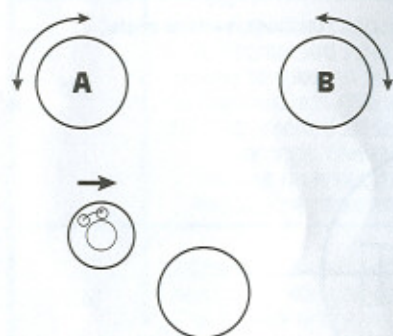
## 2. PREPARATION FOR MEASUREMENT

### 2.1 Mounting And Leveling

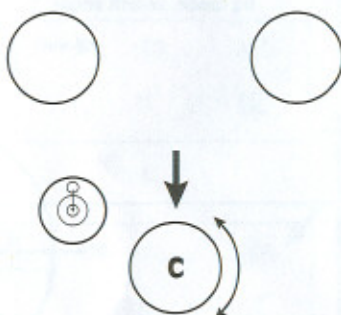
Mount and level the instrument carefully to get the best performance.

1. Place the tripod over the ground datum point and tighten the legs.
2. Attach the instrument to the tripod and tighten snugly (Follow Step 3 for the DGT10 only; skip to Step 4 for the BDT30)
3. On the DGT10, roughly level the instrument with the circular vial

**A)** Use level screws "A" and "B" to move the air bubble in the circular vial so it is centered left to right.

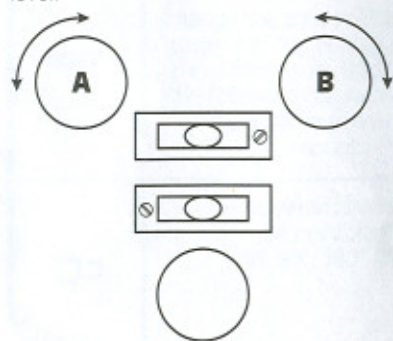


**B)** Use level screw "C" to move the air bubble to the center of the vial.

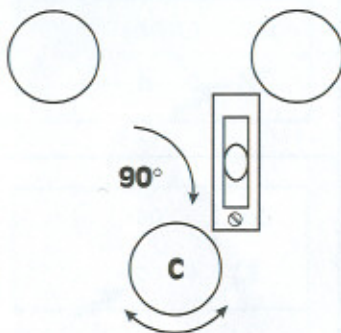


4. Fine tune level the instrument with the plate level:

**A)** Turn the instrument until the plate level is in either one of the positions shown. Then use the "A" and "B" level screws to center the bubble in the level.



**B)** Turn the instrument 90° (100 g) and center the air bubble in the vial using level screw "C".



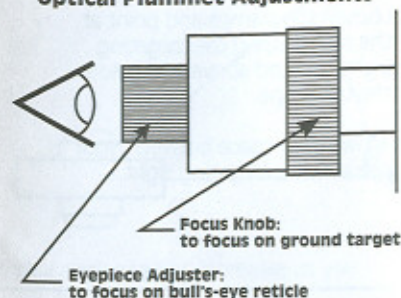
**C)** Repeat steps A and B until the level stays centered in any direction. If the plate level will not stay centered, see section 5.2 to adjust the vial.

5. Centering the instrument using the optical plummet

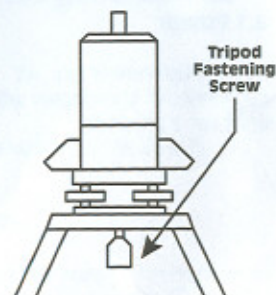
### Optical Plummet Adjustments

**A)** Adjust the eyepiece so the bull's-eye reticle comes into sharp focus.

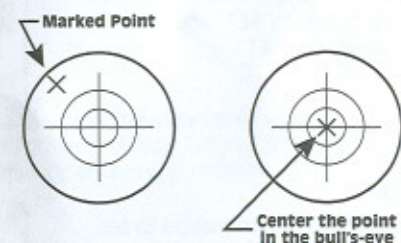
**B)** Adjust focus knob so ground target comes into sharp focus.



**C)** Slightly loosen the tripod fastening screw and move the instrument until the ground target is centered in the optical plummet.



**D)** Tighten the tripod fastening screw and recheck the level vials by following steps 3 and 4 again.



### 2.2 Telescope Eyepiece Focus

Point the telescope toward a bright area and turn the telescope eyepiece until the crosshairs come into sharp focus.

Avoid parallax, the shifting seen between the target and the crosshairs when your eye moves while sighting through the telescope. Parallax will cause inaccurate measurements.

To avoid parallax, perform the following:

1. Focus the telescope on a target.
2. You should be able to move your eye up and down or left and right without seeing the target shift with respect to the crosshairs.
3. If there is parallax, readjust the eyepiece.

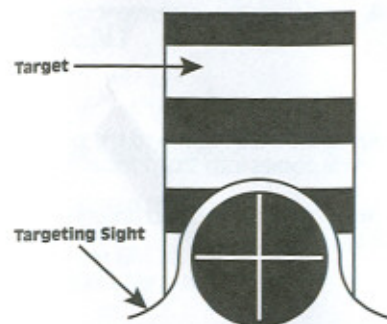
Always remove any parallax before operation to assure accurate measurements.



### 2.3 Aiming At The Target

Loosen the clamps and point at the target using the targeting sights located above and below the telescope.

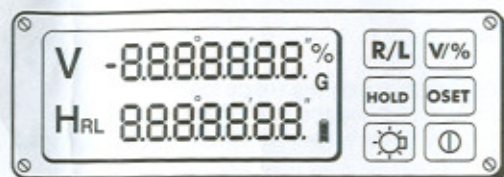
Allow some space between your eye and the targeting sight.



## 3. MEASUREMENT

### 3.1 Power

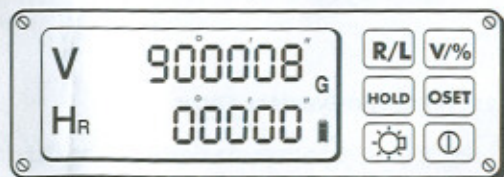
1. Turn the power on. All segments of the display will light for 2 seconds.



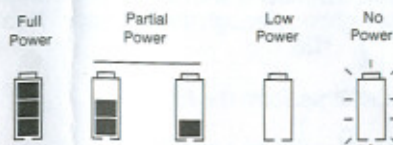
2. The vertical reading will then be shown as SET, which stands for "SET".



3. Rotate the telescope to set the vertical "0" point. This is done to cause the zero pointer to pass a sensor and start vertical angle measurement.



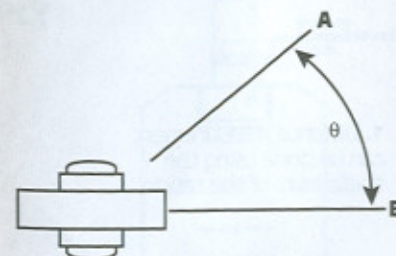
4. Check battery power: Full, partial and low power, measurement is possible. No power, no measurement possible; replace the batteries.



**Note:** Battery operating time will vary depending on type and brand and operating temperature. Be sure to keep an extra set of alkaline type AA batteries in the carrying case. For any other questions about the batteries, see section 4.

### 3.2 Measuring Horizontal Angles

1. Aim at target "A"
2. Press "OSET" key to zero out horizontal angle reading, *HR 0°00'00"*
3. Aim at second target, "B", and the angle between "A" and "B" will be displayed, *HR 30°15'00"*



"HR" shown on the display means that the horizontal angle reading increases as you turn the instrument clockwise.

"HR" shown on the display means that the horizontal angle reading increases as you turn the instrument counterclockwise.

### 3.3 Presetting Horizontal Angles

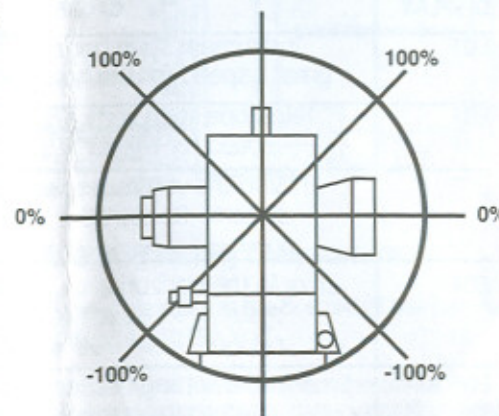
1. Turn the instrument until the desired horizontal angle is shown on the display. *HR 60°00'00"*
2. Press the "HOLD" button. *HR 60°00'00"* will blink on and off.
3. Aim the instrument at the target and press the "HOLD" button again. The horizontal angle will be released from that point. *HR 60°00'00"* will be the start point for horizontal angle measurement.

### 3.4 Measuring Vertical Angles

There are three different vertical scales to choose from when measuring vertical angles. See the three scales in section 1.2.3., performance setup. Choose the vertical angle mode you wish to use from among the performance setup choices.

### 3.5 Measuring Percent Of Grade

By pressing the "V%" key, you can switch from vertical angular measurement shown in degrees to percent of grade shown as 0 to 100% slope. The "%" symbol will be seen on the display next to the vertical reading when in this mode.

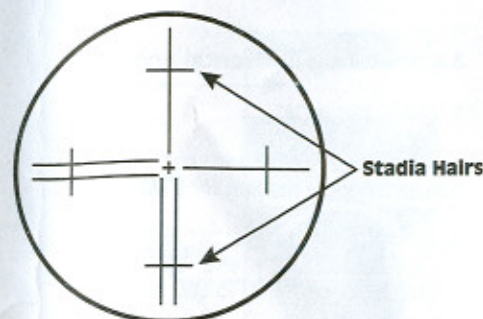


**V%, percent of grade:**  
Any vertical angle exceeding 100% will be shown as "----" on the display.

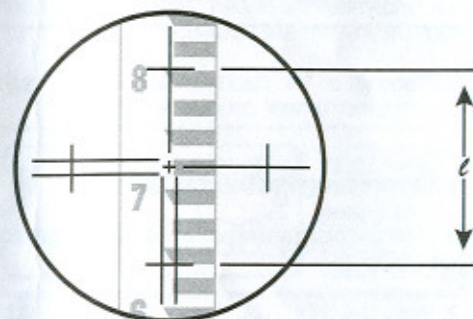


### 3.6 Stadia Measurements

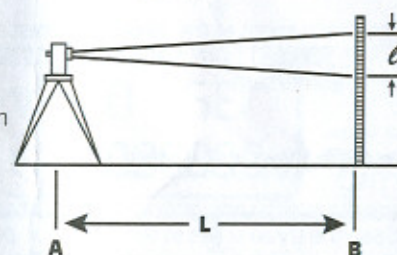
1. Distance measurement can be done using the stadia hairs of the reticle.



2. Read the length " $\ell$ " of a level rod shown between the stadia hairs.



3. The distance to the target is 100 multiplied by " $\ell$ ". The distance between point A and point B is L.  
 $L = 100 \times \ell$



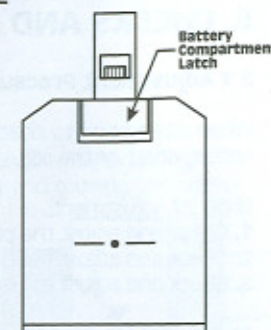
### 3.7 Displayed Error Codes

DISPLAY	CAUSE	PRESS TO CLEAR ERROR
E01	Instrument spun horizontally at too great a speed for the horizontal detector.	<b>OSET</b>
E02	Telescope spun vertically at too great a speed for the vertical detector.	<b>V %</b>
E03	Error in the vertical angle measurement system. Re-start the instrument. If error is still shown, return instrument for repair.	<b>① 2X</b>
E04	Error in the horizontal angle measurement system. Re-start the instrument. If error is still shown, return instrument for repair.	<b>① 2X</b>
E06	Error in the setting of the vertical zero point. Return instrument for repair.	N/A

## 4. HANDLING OF POWER SUPPLY

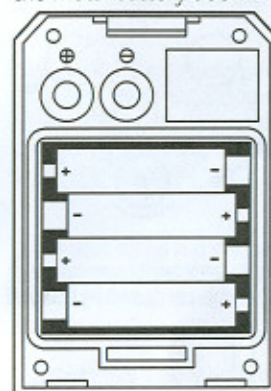
### 4.1 Removing The Battery Compartment

Push down on the battery compartment latch and pull the top of the battery compartment away from the instrument.

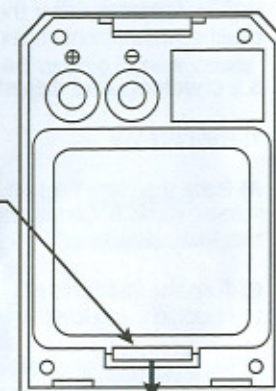


### 4.2 Replacing Batteries

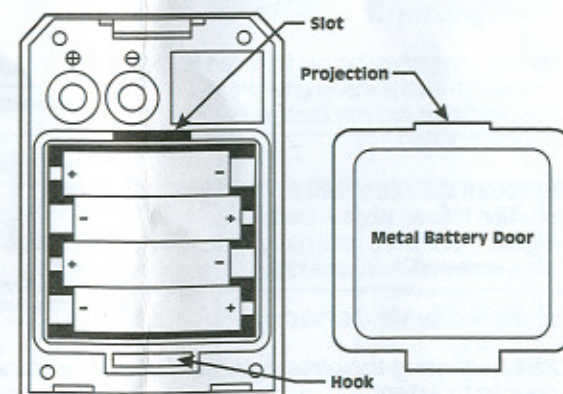
1. Push down on the hook to remove the metal battery door.



2. Install batteries as shown.



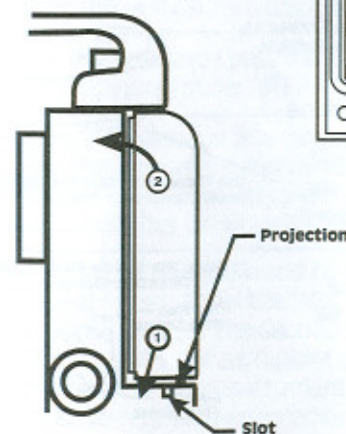
3. Slip the projection shown on the metal battery door into the slot shown and push down on the door until the hook locks the door in place.



### 4.3 Mounting Battery Compartment

1. Slip the projection on the bottom of the battery compartment into the slot.

2. Push the top of the battery compartment toward the housing until the battery compartment latch clicks into place.





## 6. TRIBRACH

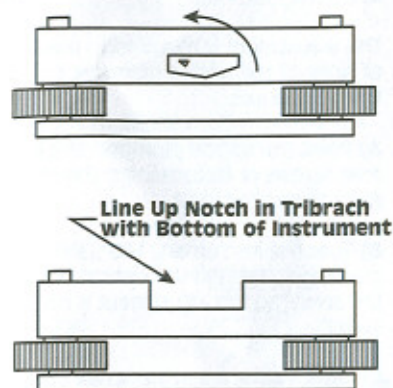
(For DGT10 Only)

### Removal:

Turn the locking lever 180° counterclockwise. The instrument can now be removed from the tribrach.

### Attachment:

Line up the tongue on the instrument with the notch in the tribrach. Turn the locking lever 180° clockwise.



## 7. ACCESSORIES

**Standard Equipment:** Carry case, Sunshade, Tool kit, Rain cover, Drying rag, Plumb bob

**Optional equipment:** Rechargeable battery, Charger, Tripod, Diagonal eyepiece, Level rod, Solar filter, Triangle tribrach, Solar reticle

## 8. HANDLING PRECAUTIONS

- **Use care to avoid shock to the instrument.** Always provide some cushioning to minimize risk of shock during transportation. The instrument cannot be expected to function properly if exposed to heavy shock.
- **Check the battery indicator.** Be sure to check the voltage level before using the instrument.
- **Carrying the instrument.** Always remove the instrument from the tripod when carrying at the job site. If the instrument must be carried on the tripod, hold the instrument as vertically as possible and keep it in front of you. Never carry the instrument horizontally over your shoulder. Any long distance transport should be done with the instrument in the carrying case.
- **Do not expose the instrument to direct sunlight for long periods.** Never leave the instrument exposed to extreme heat longer than necessary. It could affect the instrument's performance.
- **Store the instrument properly.** The instrument should be stored in an area of low humidity and where the temperature will not exceed 110°F (45°C). Always remove the batteries before storing the instrument.
- **Cleaning the instrument.** Any dust on the lenses should be removed first with a small brush, then use a lens tissue or soft clean cloth (use a light touch to avoid scratching the lenses).

Dry the instrument after use in the rain. Do not use harsh chemicals to clean the instrument or carrying case. A mild detergent or water dampened rag is all that is necessary.

## 9. SPECIFICATIONS

TELESCOPE	Overall Length	155mm (6.1")
	Objective aperture	45mm (1.77")
	Magnification	30X
	Image	Erect
	Field of view	1°30'
	Resolving power	2.5"
	Minimum focus	1.3M (53")
	Stadia Ratio	100 to 1
ELECTRONIC ANGLE MEASUREMENT	Stadia constant	0
	Method	Incremental
	Minimum reading	5"/10" (3/5 mog)
	Accuracy**	10" (6mog)
ILLUMINATION	Diameter of circle	82mm (3.22")
		Display & Reticle
OPTICAL PLUMMET	Magnification	3X
	Field of view	5°
	Focusing range	0.5 M to infinity (20' to infinity)
LEVEL VIAL SENSITIVITY	Plate vial	30" per 2mm
	Circular vial	8' per 2mm
DISPLAY OPERATING RANGE	Operating voltage	4-6 VDC
	required	(4) AA Batteries
	Operating time (Alkaline batteries)	15 hrs continuous use @ 20°C (68°F)
	Operating Temperature range	-20° to +50°C (-4° to +122°F)
	SIZE	145x200x300mm
	WEIGHT	4.4 Kg inst only 6.8 Kg w/case

\*\* Standard deviation based on DIN18723.



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