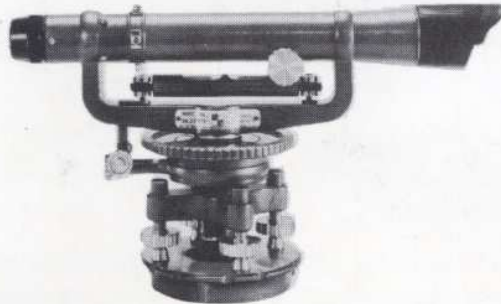


# Owner's Guide



**Universal 8114/8123  
Level**



**Universal 8300/8307  
Level-Transit**



**David White**  
America's Standard of Excellence Since 1900

# With David White your sights are set on precision and accuracy.

Congratulations! You've purchased a David White builders/contractors instrument, American made and known throughout the world for precision and accuracy.

David White has been manufacturing precision instrument and photographic lenses for more than 75 years, ensuring consistent quality control of this most important instrument component. All lenses are coated with an anti-reflection compound for maximum achromatic light transmission and bright, sharp images. All components are designed to provide long and reliable performance.

The purpose of this booklet is to acquaint you with the instrument, its components, proper care and handling.

Our levels, level-transits and transits are constructed to withstand extremely rugged field use. Like all precision instruments, however, they should be treated with reasonable care to prolong life and accuracy. Regular servicing, at least once a year, by a reliable repair station or by David White is recommended. **It is also recommended that only qualified personnel service the instrument.**

Be sure to complete and mail the Guarantee Registration Card for owner identification, and to validate your warranty.



# Specifications.

## Universal 8114/8123 Level Universal 8300/8307 Level-Transit

### Sighting range:

Recommended job range up to 400 feet.

### Accuracy range:

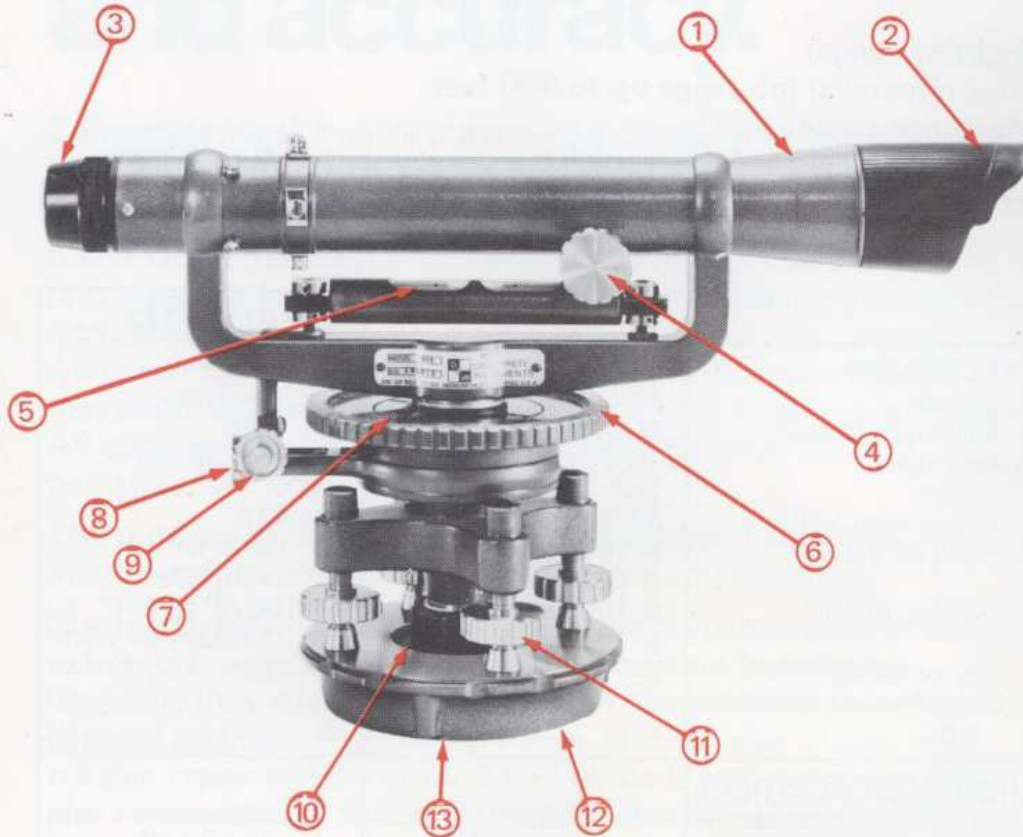
Recommended for jobs requiring accuracy within 0 to 3/16" at 150 feet.

	8300/8307	8114/8123
<b>TELESCOPE</b>		
Length	12", 305mm	12", 305mm
Minimum focus	6', 1.8m	6', 1.8m
Aperture	1.257", 32mm	1.257", 32mm
Power	26X	26X
Power with VIP	24-37X	24-27X
Field of View	@ 100'/1'9", @ 100m/1.7m	@ 100'/1'9", @ 100m/1.7m
Field with VIP	@ 100'/2' to 1'4", @ 100m/2m to 1.3m	@ 100'/2' to 1'4", @ 100m/2m to 1.3m
No. of lenses	7	7
No. of lenses with VIP	8	8
<b>HORIZONTAL CIRCLE</b>		
Graduation diameter	4", 102mm	4", 102mm
Graduations	Ea. 1°, 5°, 10°	Ea. 1°, 5°, 10°
Numbers	Ea. 10°, 0-90-0°	Ea. 10°, 0-90-0°
Vernier	To 5 min.	To 5 min.
<b>CENTER</b>	Double row ball bearings	Double row ball bearings
<b>LEVEL VIAL</b>	110-120 sec. per 2mm	110-120 sec. per 2mm
<b>WEIGHT</b>		
Instrument only	9¾" lbs., 4.4kg	7¼ lbs., 3.3kg
Instrument, case, plumb bob	18¼ lbs., 8.3kg	17½ lbs., 7.9kg
Plumb bob	6 oz., 170g	6oz., 170g
<b>CASE</b>	Fiberglass, safety orange	Fiberglass, safety orange
<b>TRIPOD</b>	Use David White tripod 9010 or 9015	Use David White tripod 9010 or 9015



# General Description.

## Universal 8114/8123 Level



1. Telescope (26X)
2. Telescope sunshade
3. Eyepiece
4. Focusing Knobs
5. Instrument level vial
6. Horizontal graduated circle
7. Index vernier

8. Horizontal clamp screw
9. Horizontal tangent screw
10. Shifting center
11. Four leveling screws
12. 3½" x 8 thread base
13. Plumb bob hook and chain

The telescope (1) provides a sharp image magnified 26 times. This means the object sighted appears 26 times closer than it would with the naked eye.

The telescope comes with a detachable sunshade (2) which protects the objective lens and reduces glare.

To focus on an object, sight through the eyepiece (3) and bring the crosshairs into focus by turning the eyepiece cap. After the crosshairs are sharp and distinct, look through the eyepiece at the object and turn the focusing knob (4) until the object appears sharp and clear.

All focusing is internal. The telescope does not move outward or inward as objects are focused. David White Universal Instruments utilize the smooth precision of a rack and pinion mechanism for focusing. Focus range is from six feet to infinity. For closer focus, turn the knob clockwise. For farther focusing, turn counterclockwise.

For sighting and focusing models with Variable Instrument Power, see page 8.

The instrument leveling vial (5) is factory aligned and is protected by a strong brass casing. It is graduated to facilitate centering the bubble.

The horizontal circle (6) can be rotated for easy angle setting and reading; and is divided in quadrants (0-90 degrees). The circle is marked by degrees and numbered every 10 degrees.

The index vernier (7) permits dividing whole degrees into fractions of  $1/12^{\circ}$  (5 minutes). See pages 12 and 13 for circle and vernier reading instructions.

Approximate horizontal sightings are held firmly in place by means of a clamp screw (8). Then, precise horizontal settings can be made with the tangent screw (9). The clamp screw must be hand tightened firmly before the tangent screw will function.

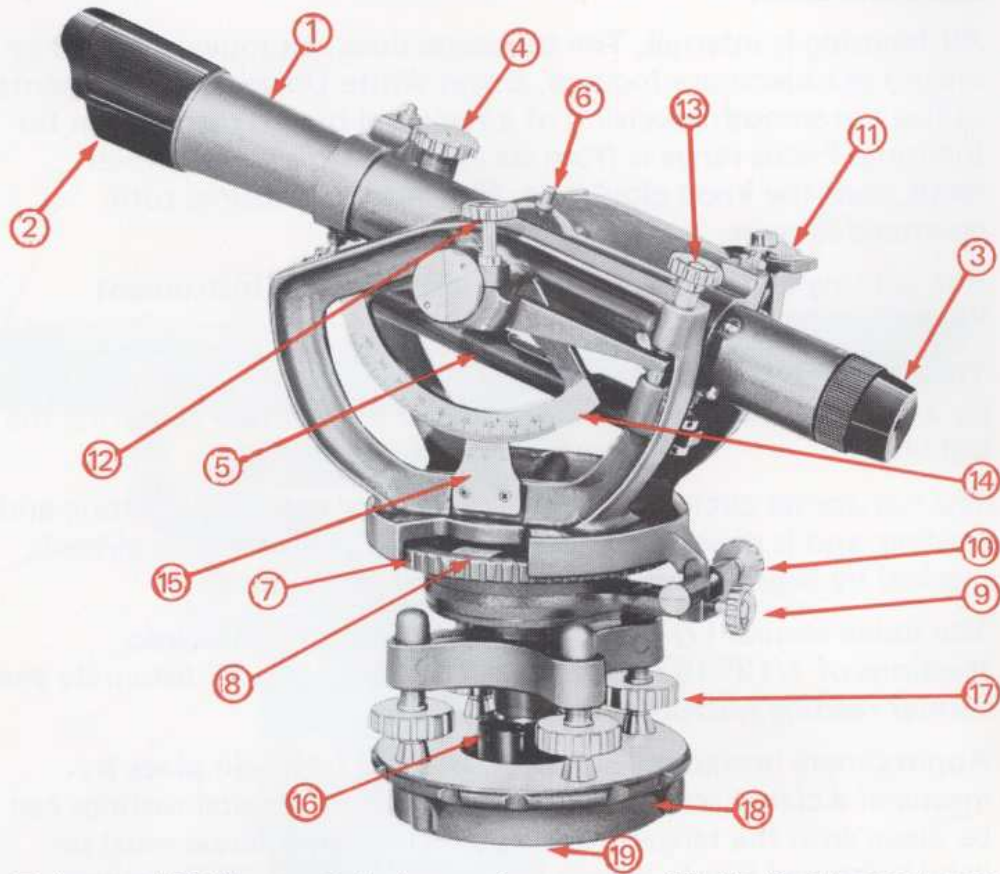
The shifting center plate (10) facilitates accurate placement of the instrument over a point (see page 9). Four screws (11) are used for leveling the instrument. The instrument is mounted to the tripod by screwing the  $3\frac{1}{2}'' \times 8$  thread base (12) to the tripod head. A hook and chain (13) hold the plumb bob cord when setting the instrument up over a point.

**All components not described on pages 4-7, including adjustment screws and capstan nuts, have been factory set and should not require handling or re-adjustment. Tampering with these factory-adjusted components may impair accuracy or damage the instrument. Only trained technicians should service this instrument.**



# General Description.

## Universal 8300/8307 Level-Transit



- |                                |                                 |                              |
|--------------------------------|---------------------------------|------------------------------|
| 1. Telescope (26X)             | 8. Index vernier                | 13. Vertical tangent screw   |
| 2. Telescope sunshade          | 9. Horizontal clamp screw       | 14. Vertical arc             |
| 3. Eyepiece                    | 10. Horizontal tangent screw    | 15. Vernier scale            |
| 4. Focusing Knob               | 11. Telescope lock levers (two) | 16. Shifting center          |
| 5. Instrument level vial       | 12. Vertical clamp screw        | 17. Four leveling screws     |
| 6. Compass stud                |                                 | 18. 3½" x 8 thread base      |
| 7. Horizontal graduated circle |                                 | 19. Plumb bob hook and chain |

The telescope (1) provides a sharp image magnified 26 times. This means the object sighted appears 26 times closer than it would with the naked eye.

The telescope comes with a detachable sunshade (2) which protects the objective lens and reduces glare.

To focus on an object, sight through the eyepiece (3) and bring the crosshairs into focus by turning the eyepiece cap. After the crosshairs are sharp and distinct, look through the eyepiece at the object and turn the focusing knob (4) until the object appears sharp and clear.

All focusing is internal. The telescope does not move outward or inward as objects are focused. David White Universal Instruments utilize the smooth precision of a rack and pinion mechanism for focusing. Focus range is from six feet to infinity. For closer focus, turn the knob clockwise. For farther focusing, turn counterclockwise.

For sighting and focusing models with Variable Instrument Power, see page 8.

The instrument leveling vial (5) is factory aligned and is protected by a strong brass casing. It is graduated to facilitate centering the bubble. For jobs requiring directional readings, a builders' compass (optional) may be attached to the instrument (6).

The horizontal circle (7) can be rotated for easy angle setting and reading; and is divided in quadrants (0-90°). The circle is marked by degrees and numbered every 10 degrees.

The index vernier (8) permits dividing whole degrees into fractions of 1/12° (5 minutes). See pages 12 and 13 for circle and vernier reading instructions.

Approximate horizontal sightings are held firmly in place by means of a clamp screw (9). Then, precise horizontal settings can be made with the tangent screw (10). The clamp screw must be hand tightened firmly before the tangent screw will function.

The Universal Level Transit is a combination instrument. Its telescope moves up and down 45 degrees, and rotates 360 degrees, to measure vertical and horizontal angles.

**BOTH telescope lock levers (11) must be in a closed position when the instrument is to be used as a level;** open when used for vertical sightings. They are shown in the open position.

The vertical clamp screw (12) holds the telescope at a vertical angle. Fine vertical settings can be made with the tangent screw (13). The vertical clamp must be hand tightened firmly before the tangent screw will function.

The vertical arc (14) is divided in degrees and numbered every 10 degrees up to 45 degrees, for both upward and downward angles. A vernier scale (15) permits dividing whole degrees into 5-minute increments. See pages 12 and 13.

The shifting center (16) facilitates accurate placement of the instrument over a point (see page 9). Four screws (17) are used for leveling the instrument. The instrument is mounted to the tripod by screwing the 3½" x 8 thread base (18) to the tripod head. A hook and chain (19) holds the plumb bob cord when setting the instrument up over a point.



# Variable Instrument Power.

**Universal 8123, Level with V.I.P**

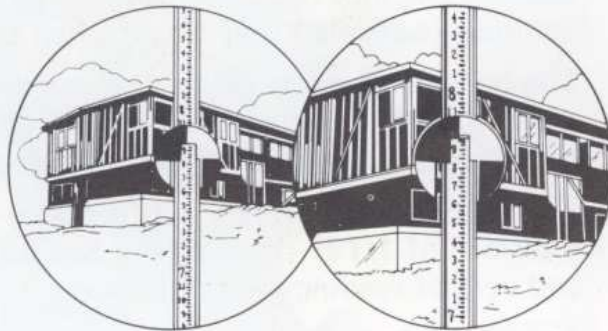
**Universal 8307, Level-Transit with V.I.P.**

All David White Universal instruments are available with a Variable Instrument Power (V.I.P.) zoom lens optical system, which permits a choice of magnification from 24X to 37X.

The V.I.P. increases the effective reading range of the instrument more than 42%. It also permits greater flexibility in matching range, image and light conditions.

Use low power for brighter images in dim light, and for a wider field of view in locating targets. Low power also provides better visibility when sighting through heat waves.

Use high power when sighting under bright light conditions, for long range sighting and for more precise rod readings.

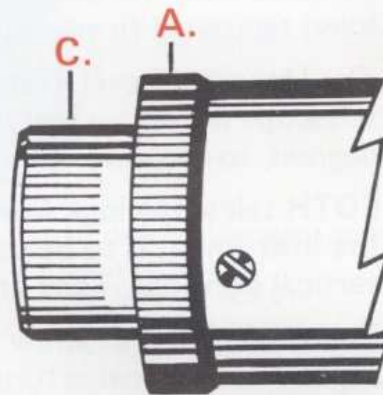


**24X**

**37X**

## Operating instruments with V.I.P.

- A. Bring crosshairs into focus by turning the large brass eyepiece ring.
- B. Focus target image by adjusting the telescope focusing knob. (No. 4 on pages 4 and 6).
- C. Select the magnification you want by turning the eyepiece cap. Turn clockwise for high power, counterclockwise for low power.



**(B. See pages 4 & 6)**

## Stadia Reticle.

**Universal S-8114 Level with stadia**

**Universal S-8123 Level with stadia and V.I.P.**

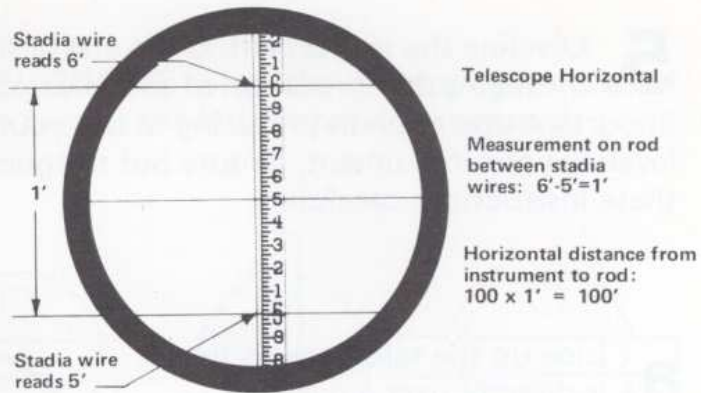
**Universal S-8300 Level-Transit with stadia**

**Universal S-8307 Level-Transit with stadia and V.I.P.**

David White Universal instruments are available with a stadia reticle that has two additional horizontal lines for use in



determining distance. Stadia ratio is 1:100, which indicates that the rod measurement between the upper and lower stadia lines multiplied by 100 is the distance from the center of the instrument to the rod.



## Setting up your instrument.

Each of the following steps is important in preparing to use your instrument.

1. It is important that the tripod is set up firmly. Make sure that the tripod points are well into the ground. On paved surfaces, be sure the points hold securely. The legs should have about a 3½ foot spread, **positioned so the top of the tripod head appears level**. If using a tripod with adjustable legs, be sure the leg clamp wing nuts are securely hand tightened.

David White tripod heads (Models 9010 and 9015) have nylon bearings with constant tension to hold the legs steady from one set up to the next. Tension may be adjusted, but it is not normally required.

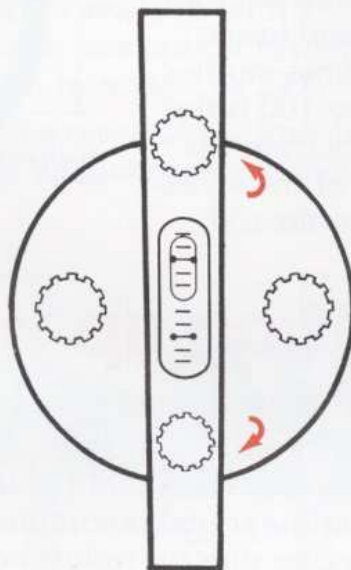
2. Before attempting to set up your instrument, remove and discard the felt shipping pads under the leveling screws. Be sure clamp screws are loosened. If using the Level-Transit, **both** telescope lock levers should be in the closed position.
3. Attach the instrument to the tripod securely, **hand tightening** the instrument base to the tripod head.

If setting up over a point, attach the plumb bob and move the tripod and instrument over the point, approximately. Be sure the tripod is set up firmly again, as described in Step 2. Loosen leveling screws and shift the instrument laterally until the plumb bob is directly over the point. Then set the instrument leveling screws as described in Step 4.

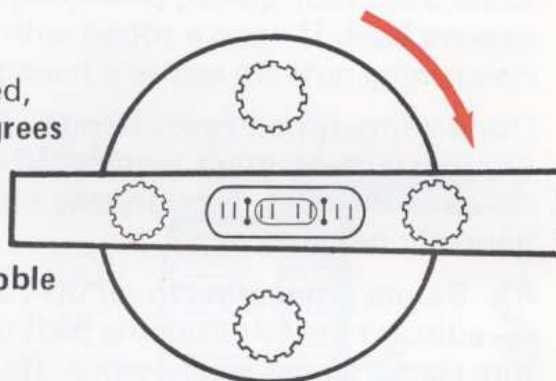
4. Turn down the leveling screws until firm contact is made with the instrument base. A word of caution. It is very possible to overtighten the leveling screws. You want only a firm contact between the screws and the base. If the instrument shifts on the base, turn down the screws more firmly **by hand**. If no shifting occurs, the instrument is ready for Step 5.

**5.** Leveling the instrument so the vial bubble remains centered through a 360° rotation of the telescope is the most important operation in preparing to use your instrument. When leveling your instrument, be sure not to touch the tripod. Follow these instructions carefully.

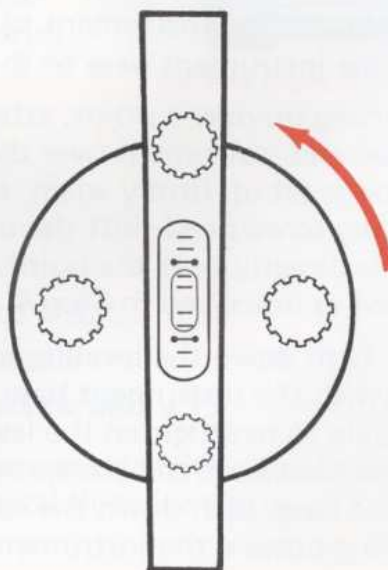
**a.** Line up the telescope so that it is directly over a pair of leveling screws. Grasp these two leveling screws with the thumb and forefinger of each hand. **Turn both screws at the same time** by moving your thumbs toward each other or away from each other, until the bubble is centered.



**b.** When the bubble is centered, rotate the telescope 90 degrees over the second pair of leveling screws and repeat the thumbs, in thumbs out leveling procedure until the bubble is again centered.

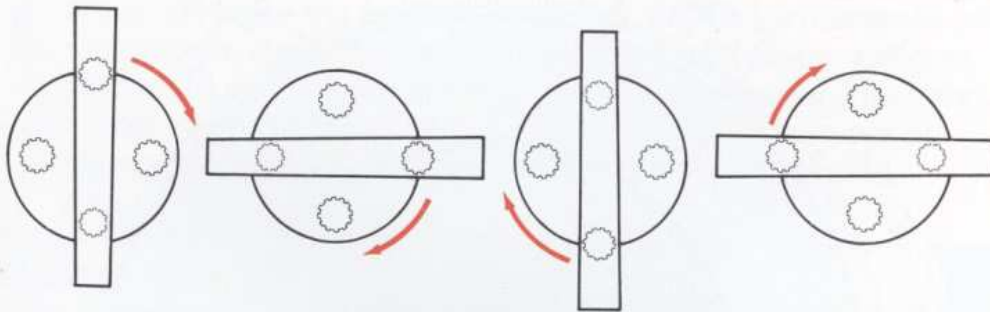


**c.** Shift back to the original position and check the level. Make minor adjustments with the leveling screws if necessary.

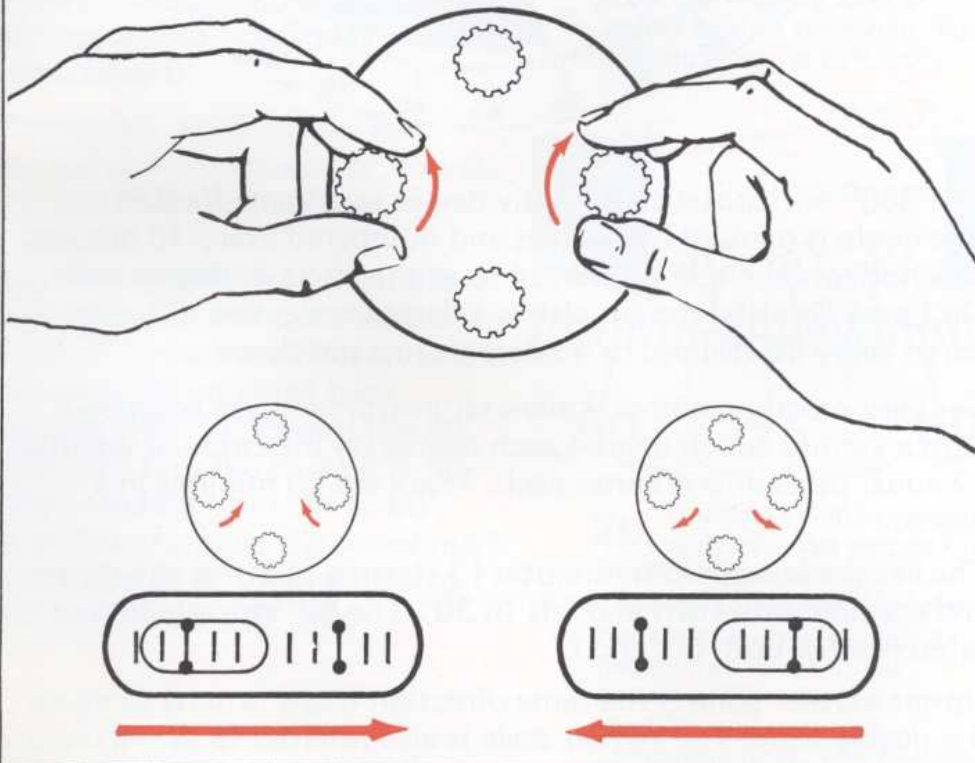




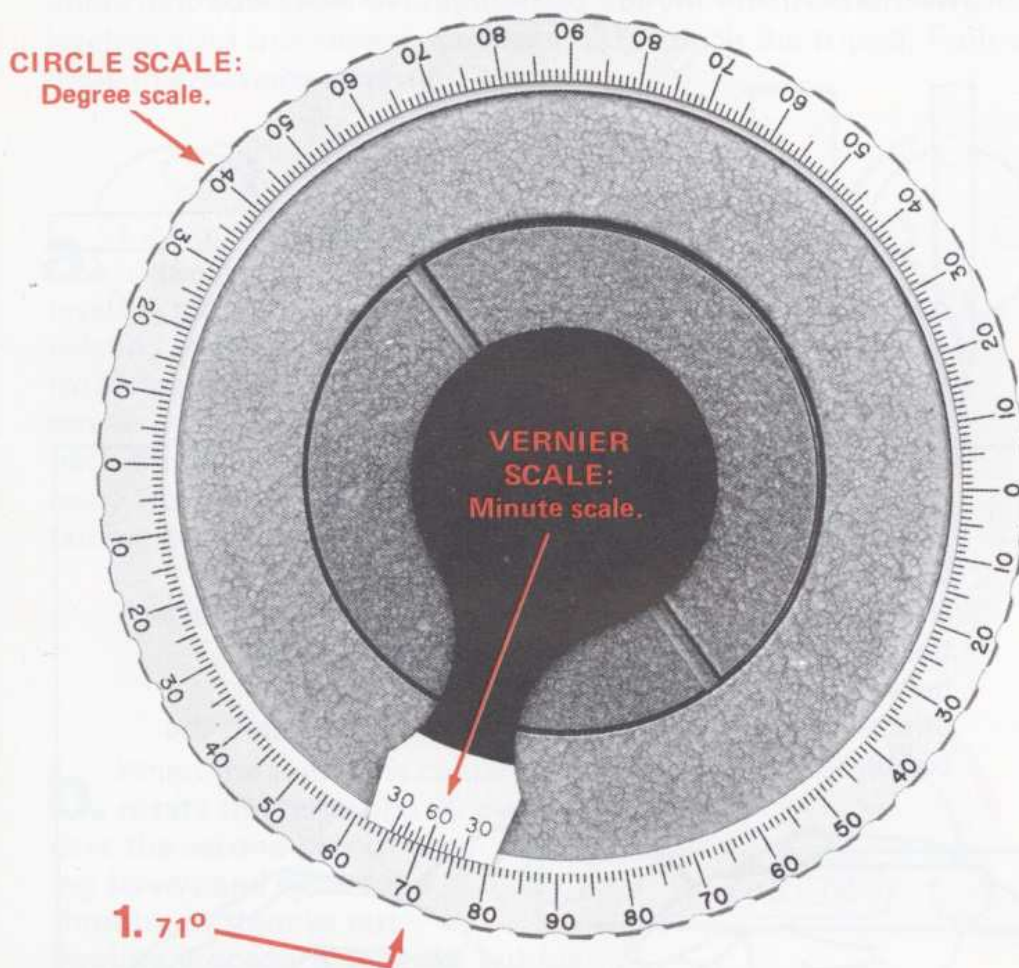
FOR A FINAL LEVEL CHECK, rotate the telescope over each of four leveling points to be sure the bubble remains centered.



The Golden Rule for quick and simple leveling is **THUMBS IN, THUMBS OUT**. Turn **BOTH** screws equally and simultaneously. Practice will help you get the feel of the screws and the movement of the bubble. It will also help to remember that the direction your left thumb moves is the direction the bubble will move.



## Reading the circle, arc and vernier.



The 360° horizontal circle is divided in quadrants (0-90°). The circle is marked by degrees and numbered every 10 degrees. The horizontal circle is referred to as the circle or degree scale. On Level-Transits, the arc also is a degree scale, and it is numbered every 10 degrees to 45 degrees, up and down.

For very precise readings, Universal instruments are equipped with a vernier which divides each degree on the circle or arc into 12 equal parts of 5 minutes each. There are 60 minutes in a degree.

The vernier is marked in minutes (') starting at 60' in the center and reading both right and left to 30'. The 60' index mark is a reference for both 60' and 0'.

Up the vernier scale is the same direction (right or left) as up on the degree scale. The vernier scale is also referred to as the minute scale.



The following examples will explain how the vernier (minute) scale and the circle (degree) scale are read. It's important to note that the index mark can be read as either 60' or 0', as explained below.\*

**1.** (Page 12) Note the point at which 60' on the vernier scale touches the circle. If the 60' coincides exactly with a degree line on the circle, your reading will be in exact degrees. The index mark in all exact degree readings is considered 0'. There are no fractions of degrees, or minutes, to be added to the reading.

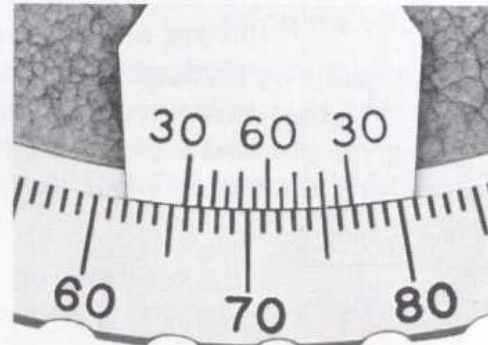
**2.** If 60' on the vernier does not coincide exactly with a degree line, your **degree reading** is the line which the 60' has just passed, reading up the degree scale, **plus** a fraction of the next degree. To determine the fraction, or minutes:

**a.** Start at 60' on the vernier and read up the vernier scale (the same direction as up on the degree scale) until you find a minute line that coincides **exactly** with a degree line. When reading from 60' toward 30', the index mark is considered 0'.

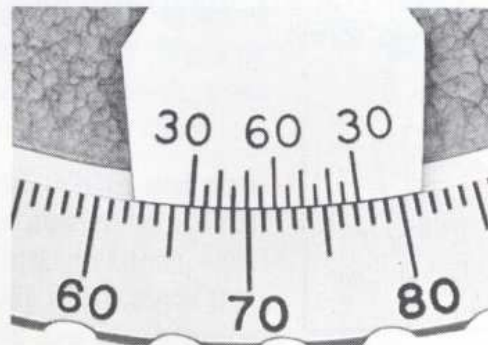
Remember, each line on the vernier scale represents 5', so you will be reading 5', 10', etc.

**b.** If no vernier line from 60' up to 30' coincides with a degree line on the circle, go to the opposite 30' and read back, starting with 30' toward the 60' until you find the exact line up. When reading from 30' to 60', as in this example, the index mark is considered 60'. Your reading will be 30', 35', 40', etc.

\* Instructions are the same for reading the vertical arc on the Level-Transit.



**2a.** Reading up the degree scale, the last degree line the 60' has passed is 71°. On the vernier, the 20' line coincides exactly with a degree line on the circle. The reading, then, is 71°, 20'.



**2b.** Reading up the degree scale, the last degree line the 60' has passed is 71°. There is no vernier line to the right that coincides with a degree line. Start at the opposite 30' and read toward the 60' until you find coinciding lines. The reading is 71°, 45'.

## Sighting and focusing the telescope.

Aim the telescope at the object and sight first along the top of the telescope tube. Look through the telescope and focus the crosshairs. Then bring the object into focus.

Rotate the instrument until the crosshairs are positioned on or near the target. Tighten the horizontal clamp screw and make final settings with the tangent screw to bring the crosshairs exactly on point.

When sighting through the telescope, keep both eyes open. You will find that this eliminates squinting, will not tire your eyes and gives the best view through the telescope. Remember to avoid touching the tripod while sighting.

## Removing the instrument from the tripod.

Unscrew the instrument base from the tripod head. Remove the instrument from the tripod and screw it to the base of the carrying case. Center the telescope in the case and tighten the horizontal clamp screw to prevent telescope movement. On Level-Transits, open **both** lock levers and tighten the vertical clamp screw.



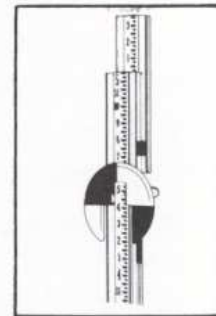
# Work companions for your Universal instrument.

David White builder's accessories add precision to any job and assure you the accuracy you need. Your David White dealer can show you a complete line of instrument work companions, including tripods, rods and targets, plumb bobs, and hand levels.

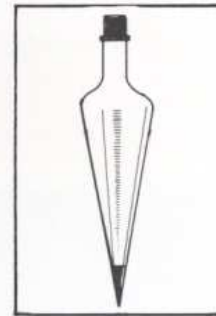
David White tripods provide a solid support for your instrument to give you the most accurate reading possible. The tripods combine the proven superiority of European wide-frame split-leg design with the extra strength of metal construction. Unique, triangular truss, bridge-like construction provides exceptional stability and vibration resistance.



A good quality leveling rod is an indispensable companion for instrument use. David White builder's rods extend smoothly and are marked in easy to read graduations. Your dealer can show you wooden rods with replaceable tapes or the Polyrod, made of durable polyvinyl chloride.



David White offers a complete selection of plumb bobs for easier, faster, and more accurate set-up. Sizes range from 6 oz. to 32 oz. so you can match the right weight to the right job or prevailing wind conditions. Plumb bobs, available in solid brass or economical steel, include removable points plus spare points that store securely within the caps.



Hand-held sighting levels by David White are convenient, pocket-sized tools for establishing a level line of sight. Easily does leveling, grading, and hundreds of construction tasks over a distance that surface levels can't handle. Levels are available in 2½x magnification and non-magnifying models.



David White instruments and accessories are products of Realist, Inc., which designs and manufactures precision optical products. These products include microfilm viewing equipment and photographic products and services.



**David White Instruments**  
DIVISION OF REALIST INC.  
Menomonee Falls, WI 53051 USA

# Care and handling.

1. Keep the instrument clean and free of dust and dirt. Clean the objective and eyepiece lenses using a soft brush or lens tissue. Rubbing with a cloth may scratch the lens coating and impair the view. Do not attempt any disassembly.
2. If the instrument is wet, dry it before you return it to its case.
3. When the instrument is not being used, put the lens cap over the lens and keep the instrument in its carrying case.
4. When moving the instrument over a long distance, by foot or by vehicle, remove it from the tripod and place it in its protective case.
5. When moving a tripod-mounted instrument, handle with care. Carry only in an upright position. Do not carry over your shoulder or in a horizontal position. Improper handling may result in instrument damage.
6. Handle the instrument by its base when removing from the case or attaching to a tripod.
7. Never use force on any parts of the instrument. All moving parts will turn freely and easily by hand.
8. All precision instruments should be cleaned, oiled, checked and adjusted **ONLY** at a qualified instrument repair station or by the manufacturer, at least once a year.



**David White  
Instruments**

DIVISION OF REALIST INC.  
Menomonee Falls, WI 53051 USA

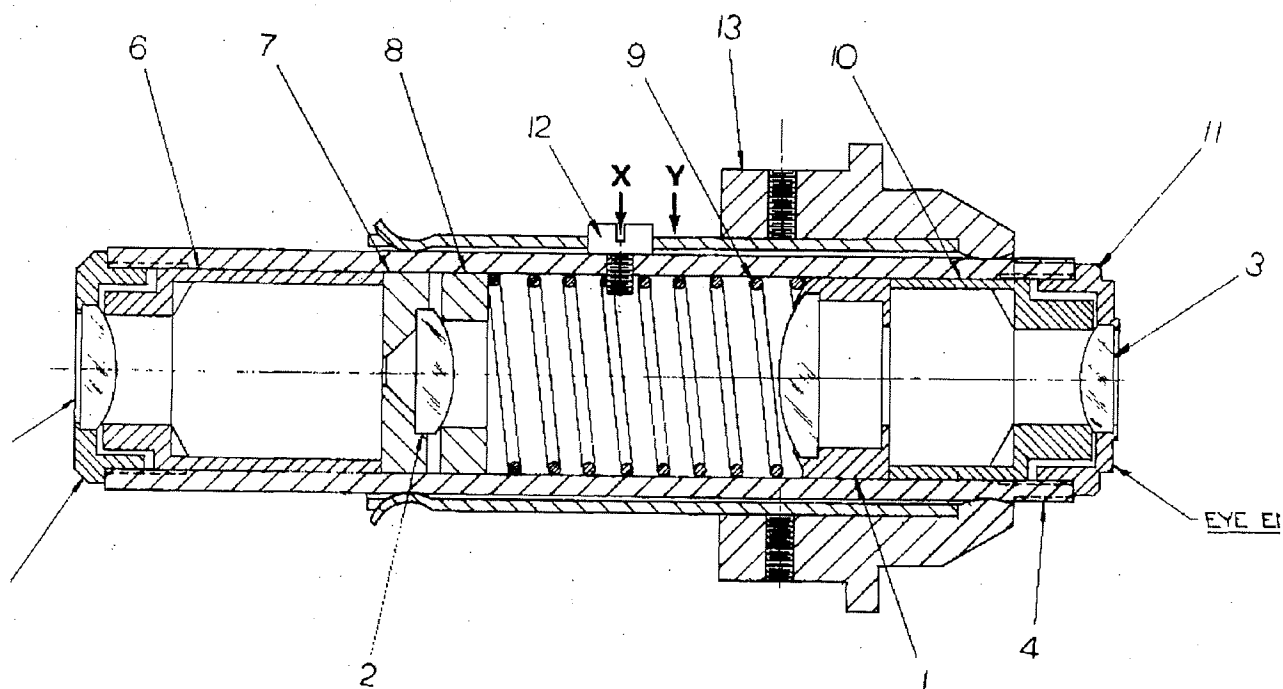
8300 - 806

PRINTED IN U.S.A.



# 8300 Eyepiece Tube Assembly

(Replaces 8300-752)



Item No.	Part No.	Description	No. per Unit
1	8300-753	F — Lens Ass'y	1
2	8300-267	Lens D & E	2
3	8300-272	G Lens	1
4	8300-310	Draw Tube — Eyepiece	1
5	8300-287	Retainer — D Lens	1
6	8300-288	Spacer D & E Lens	1
7	8300-289	Holder & Diaphragm — E Lens	1
8	8300-290	Retainer — E Lens	1
9	8300-291	Spring — Eyepiece	1
10	8300-293	Spacer — F & G Lens	1
11	8300-294	Retainer — G Lens	1
12	8300-093	Eyepiece — Key Screw	1
13	8300-741	Eyepiece — Mounting Ass'y	1

8300-743 Eyepiece Assembly for use with (tungsten) wire type reticle only.

8300-761 Eyepiece Assembly for use with glass type reticle.

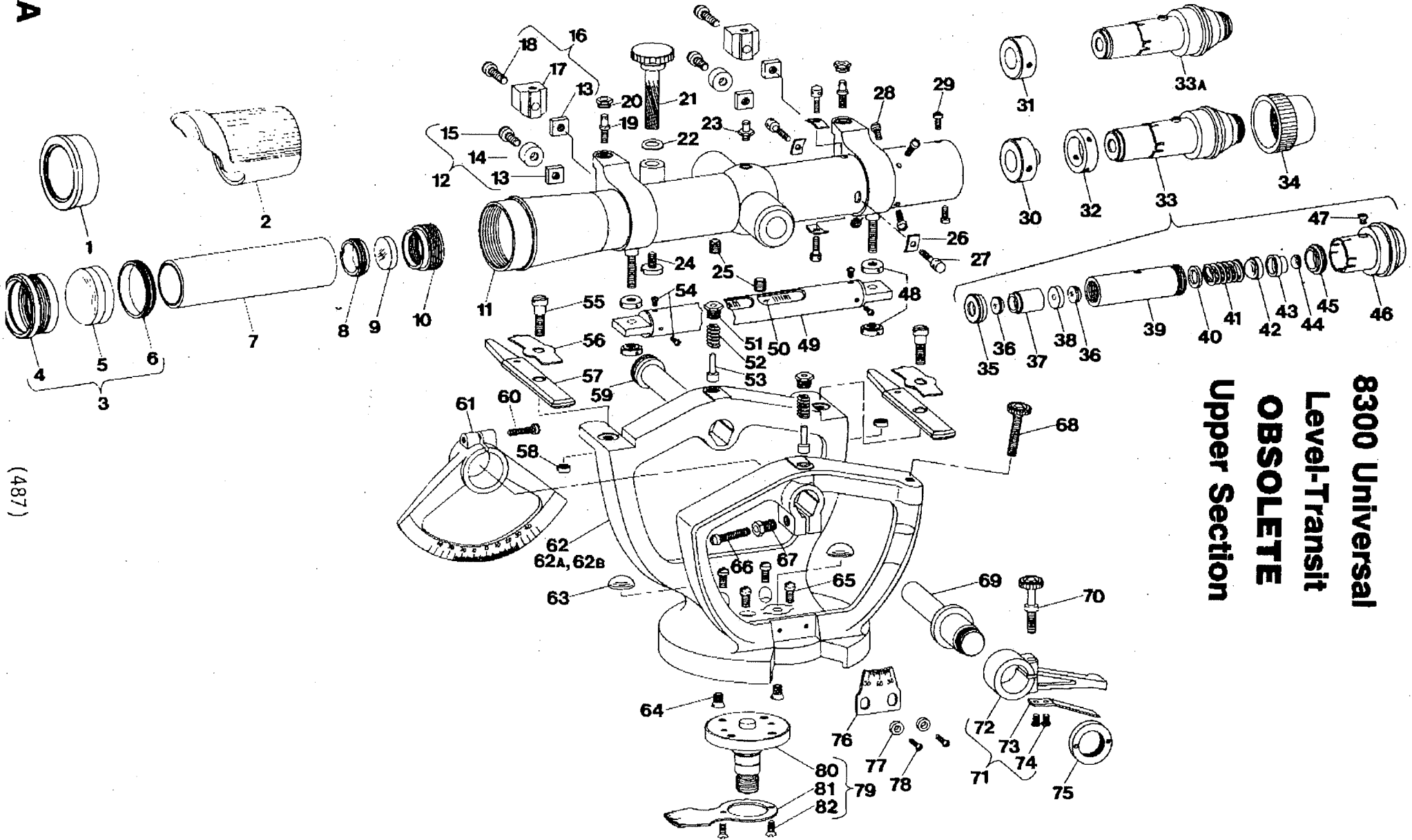
**Note:**

On 8300-761 Assembly, there are two mounting holes on eyepiece draw tube (Item 4). Key screw (Item 12) is mounted on hole farthest from 'eye end' (Position X). 8300-761 can be modified for use with wire type reticle (8300-743) by removing screw from Position X and reinstalling in hole nearest 'eye end' (Position Y).





**8300 Universal  
Level-Transit  
OBSOLETE  
Upper Section**



**8300 Universal  
Level-Transit  
OBSELETE  
Lower Section**

