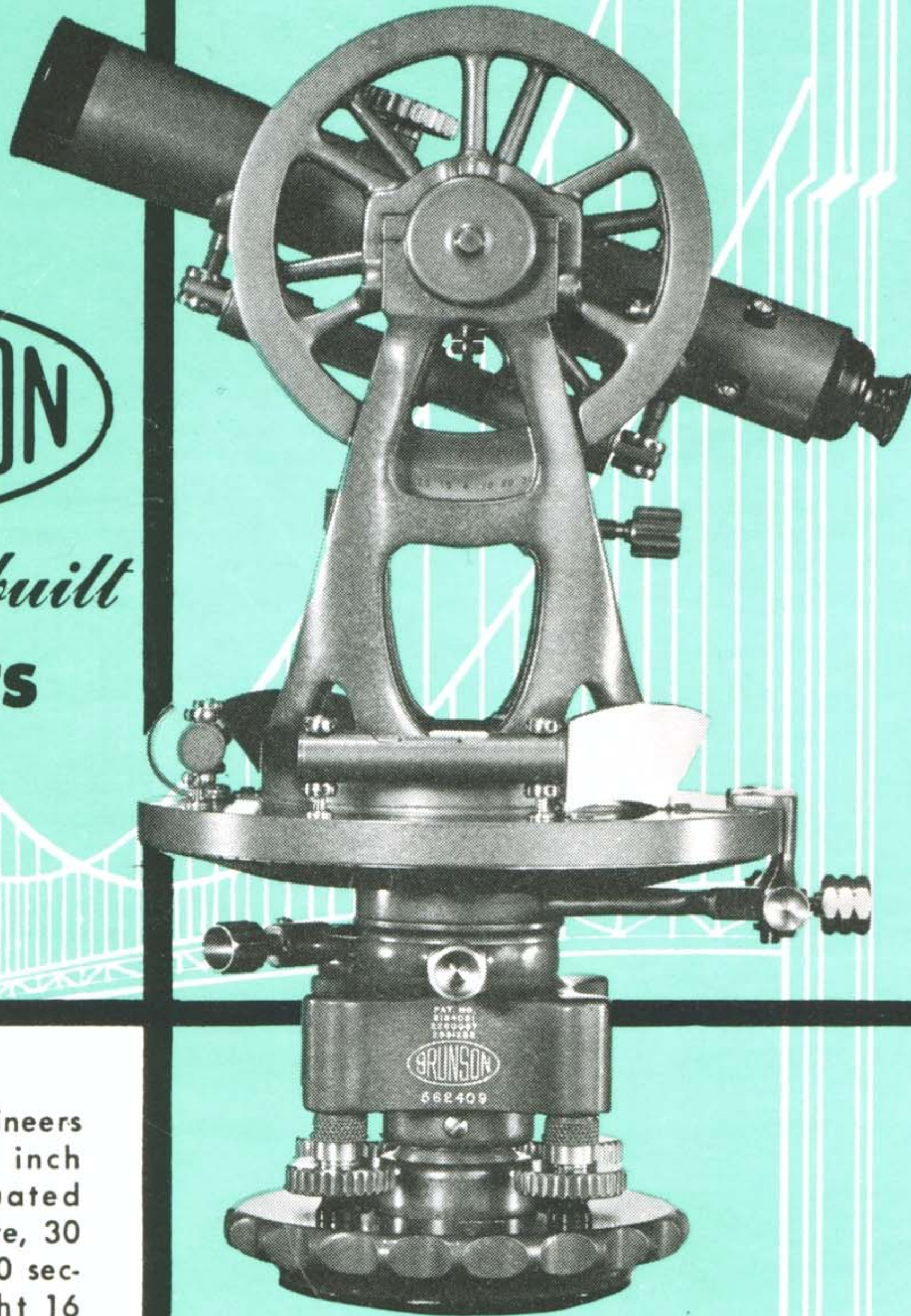


T
R
A
N
S
I
T
S

BRUNSON

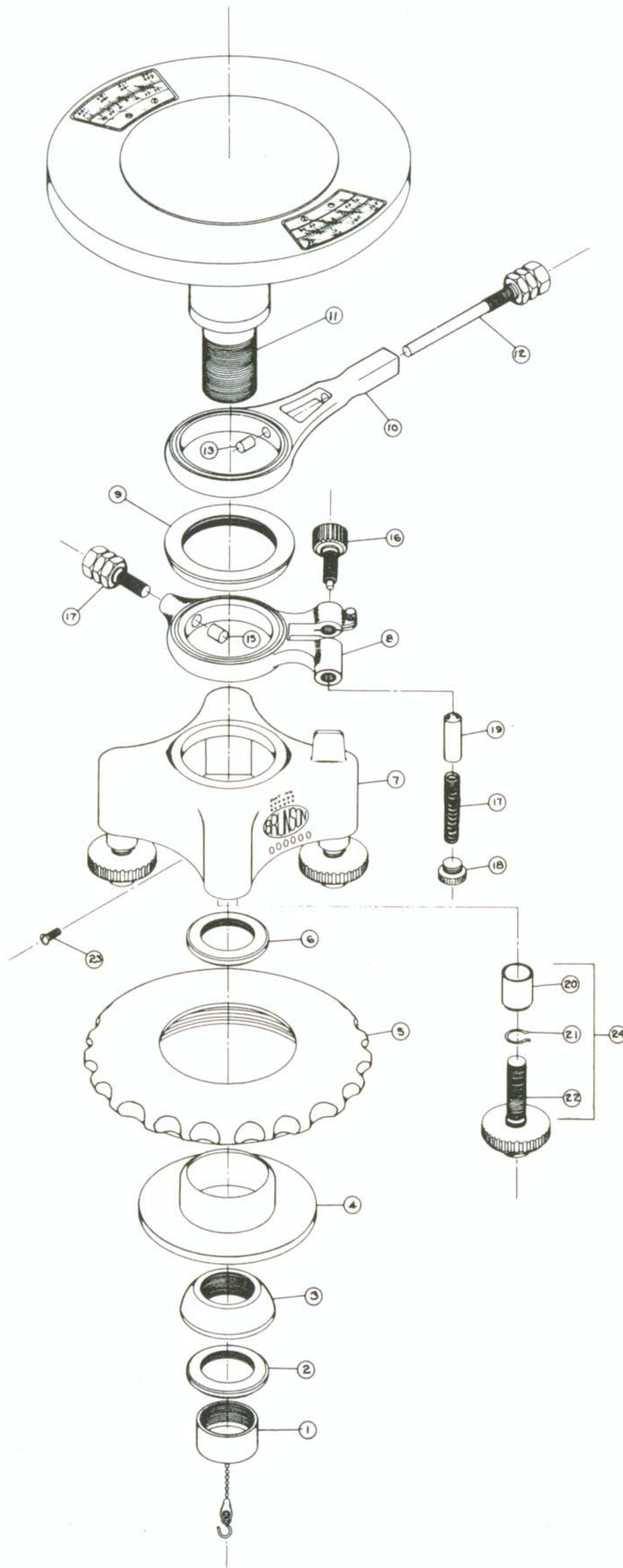
precision built
TRANSITS



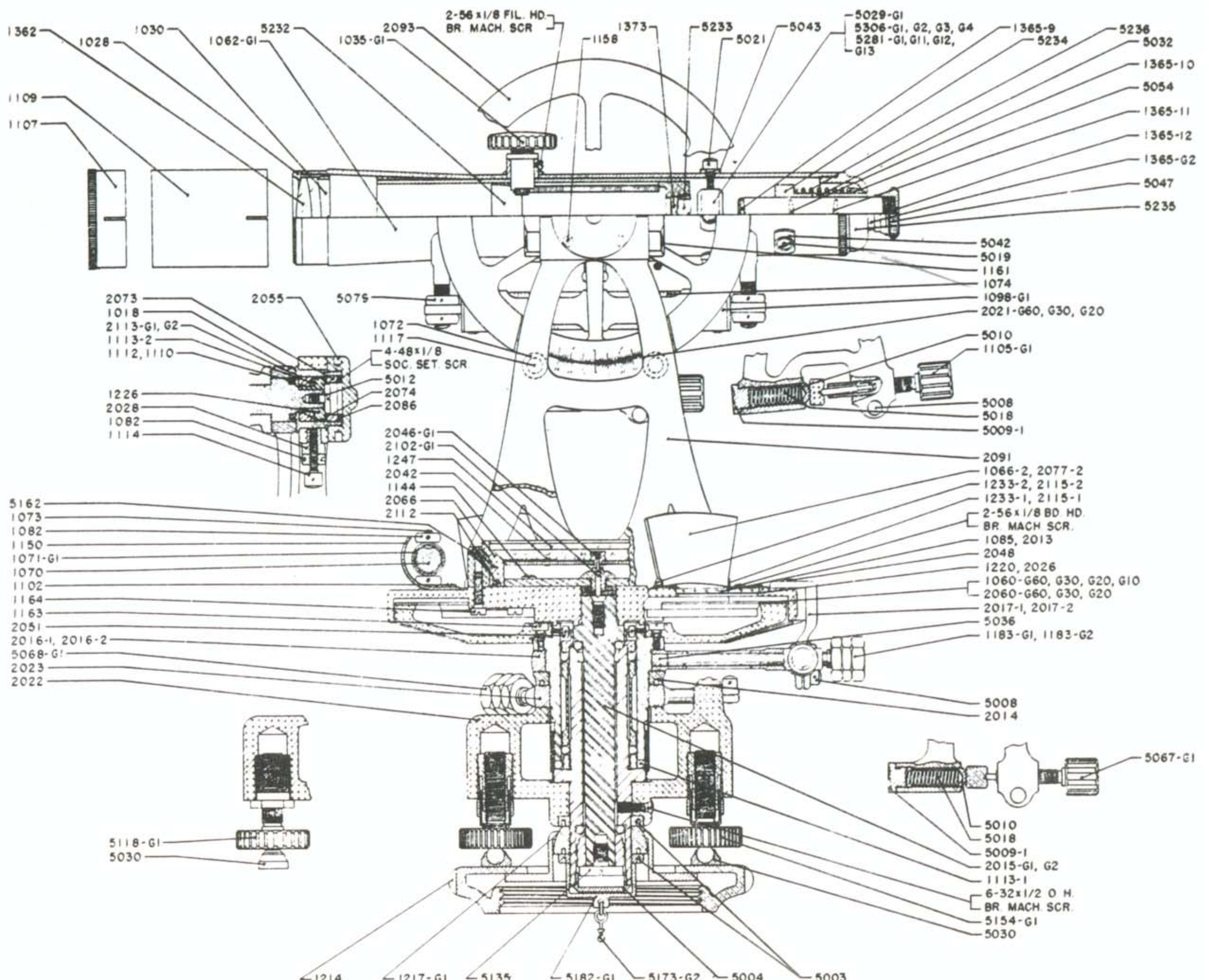
No. 50 Engineers
Transit 6¼ inch
limb. Graduated
to one minute, 30
seconds or 20 sec-
onds. Weight 16
pounds.

TO DIS-ASSEMBLE THE LEVELING HEAD OF A BRUNSON TRANSIT

(See exploded view opposite)



1. Unscrew plummet chain cup, No. 1, by hand.
2. Unscrew lock ring, No. 2 using spanner wrench.
3. Unscrew half-ball, No. 3, using same spanner wrench.
4. Shifting center, No. 4, and bottom plate, No. 5, can then be removed.
5. Unscrew lock ring, No. 6, using spanner wrench.
6. With screwdriver, remove lock screw, No. 23, from side of spider.
7. Pull spider, No. 7, assembly straight off of center.
8. Unscrew knurled cap, No. 18, from clamp and pull out spring, No. 17 together with plunger No. 19.
9. Pull clamp assembly, No. 8, from sleeve.
10. Unscrew lock ring No. 9, using spanner wrench. This can also be removed by placing a pin in one of the holes and tapping lightly. Care must be taken not to raise a burr around the hole.
11. Remove knurled cap and coil spring from tangent the same as described above in paragraph 8. These are not shown on the drawing.
12. Pull clamp No. 10 from sleeve.
13. This completes field stripping at the base. The bearings enclosed in tube No. 11 are not exposed and should not be opened.
14. The leveling screw assembly may be removed by unscrewing sleeve No. 24 from the spider.
15. Parts may be replaced in reverse order. When replacing clamps No. 12 and No. 8 be sure and replace small plungers No. 13 and No. 15 respectively.
16. It will be necessary to rotate sleeve No. 11 inside of spider No. 7 to match the holes before replacing screw No. 23.



1018	Clamp, telescope	1233-2	Retainer, reflector & window, left hand (Model 50)	2093	Guard, verticle circle
1028	Mount, objective	1247	Window, compass	2102-G1	Pivot & holder, compass, assembly
1030	Ring, objective lock	1362	Lens, objective	2112	Ring, O, compass
1035-G1	Pinion assembly	1365-G2	Eyeiece cell assembly	2113-G1	Race, housing, assembly (clamp side)
1060-G60	Limb & Vernier assembly, 1 minute (Model 50)	1365-9	Lens I, eyepiece	2113-G2	Race, housing, assembly (left side)
1060-G30	Limb & Vernier assembly, 30 sec. (Model 50)	1365-10	Lens II, eyepiece	2115-1	Retainer, reflector & window, right hand (Model 30)
1060-G20	Limb & Vernier assembly, 20 sec. (Model 50)	1365-11	Lens III, eyepiece	2115-2	Retainer, reflector & window, left hand (Model 30)
1060-G10	Limb & Vernier assembly, 10 sec. (Model 50)	1365-12	Lens IV, eyepiece	5003	Ring, lock, spindle
1062-G1	Barrel & Axis assembly	1373	Lens, focusing	5004	Cap, seal
1066-2	Reflector, vernier (Model 50)	2013	Window, vernier (Model 30)	5008	Screw, tangent tension
1070	Vial, Plate Level	2014	Ring, lock, clamp	5009-1	Cap, clamp
1071-G1	Plate, Vial & Case assembly	2015-G1	Plate & Spindle assembly (Model 30)	5010	Plunger, spring
1072	Nut, vernier adjuster	2015-G2	Plate & Spindle assembly (Model 50)	5012	Screw, axis end
1073	Post, Plate Level	2016-1	Clamp, plate (Model 50)	5018	Spring, tangent
1074	Vial, Telescope Level (reversion)	2016-2	Clamp, plate (Model 30)	5019	Screw, eyepiece adjuster
1082	Nut, plate vial adjuster	2017-1	Bracket, tangent (Model 30)	5021	Screw, reticle adjuster
1085	Window, vernier (Model 50)	2017-2	Bracket, tangent, (Model 50)	5029-G1	Reticle assembly (single cross)
1098-G1	Level, Telescope, vial & case assembly (reversion)	2021-G60	Vertical circle & vernier assembly, 1 min.	5030	Shoe, leveling screw
1102	Screw, bumper	2021-G30	Vertical circle & vernier assembly, 30 sec.	5032	Screw, eyepiece spiral
1105-G1	Screw, telescope tangent	2021-G20	Vertical circle & vernier assembly, 20 sec.	5036	Gib, clamp
1107	Cap, objective	2022	Spider	5042	Collet, eyepiece
1109	Sunshade	2023	Clamp, lower	5043	Collet, reticle
1110	Seal Ring (left side)	2026	Gasket, vernier window (Model 30)	5047	Cap, eyepiece
1112	Seal Ring (clamp side)	2028	Bushing, axis adjuster	5054	Half ball, eyepiece
1113-1	Balls, steel, 5/32 (set of 102)	2034	Spacer, compass lever (not illustrated)	5067-G1	Screw, tangent, assembly
1113-2	Balls, steel, 3/32 (set of 17)	2036	Spring, compass needle lifter (not illustrated)	5068-G1	Screw, clamp, assembly
1114	Screw, axis adjuster	2037	Lever, compass needle lifter (not illustrated)	5079	Nut, telescope level vial adjuster
1117	Nut, vernier adjuster (small)	2039	Screw, compass needle lifter (not illustrated)	5118-G1	Screw, leveling, assembly
1144	Screw, Declination Plate Retainer	2040	Nut, compass needle lifter (not illustrated)	5135	Screw, spindle
1150	Bumper	2042	Balance, compass needle	5154-G1	Screw, shielded leveling assembly
1158	Screw, vertical circle	2043	Gib, compass needle lifter (not illustrated)	5162	Screw, compass circle retainer
1159	Screw, standard top (not illustrated)	2044	Stirrup, compass needle lifter (not illustrated)	5173-G2	Chain, plumb-bob, assembly
1161	Screw, circle guard	2046-G1	Needle, compass, assembly	5182-G1	Cap, suspension & chain assembly
1163	Screw, limb & socket	2048	Screw, tangent bracket	5232	Slide, focusing
1164	Screw, vernier shelf, plate & standard	2051	Screw, limb adjuster	5233	Retainer, focusing lens
1183-G1	Screw, plate clamp, assembly (Model 50)	2055	Cap, axis end	5234	Sleeve, eyepiece adjuster
1183-G2	Screw, plate clamp, assembly (Model 30)	2060-G60	Limb & vernier assembly, 1 min. (Model 30)	5235	Nut, eyepiece lock
1214	Plate, bottom	2060-G30	Limb & vernier assembly, 30 sec. (Model 30)	5236	Spring eyepiece
1217-G1	Shifting center & half ball assembly	2060-G20	Limb & vernier assembly, 20 sec. (Model 30)	5281-G1	Reticle, glass, assembly (single cross)
1220	Gasket, vernier window (Model 50)	2066	Ring, compass (graduated)	5281-G7	Reticle, glass, assembly (1/2 cross-1/2 bi-filar)
1226	Race, inner axis bearing	2073	Nut, brake, axis	5281-G11	Reticle, glass, assembly (stadia)
1233-1	Retainer, reflector & window, right hand (Model 50)	2074	Spring, axis brake	5281-G12	Reticle, glass, assembly (quarter stadia)
		2077-2	Reflector, vernier (Model 30)	5281-G13	Reticle, glass, assembly (solar square)
		2086	Nut, brake lock	5306-G1	Reticle assembly (stadia)
		2091	Standard, Transit	5306-G2	Reticle assembly (solar square)
				5306-G3	Reticle assembly (quarter stadia)
				5306-G4	Reticle assembly (diagonal & stadia)

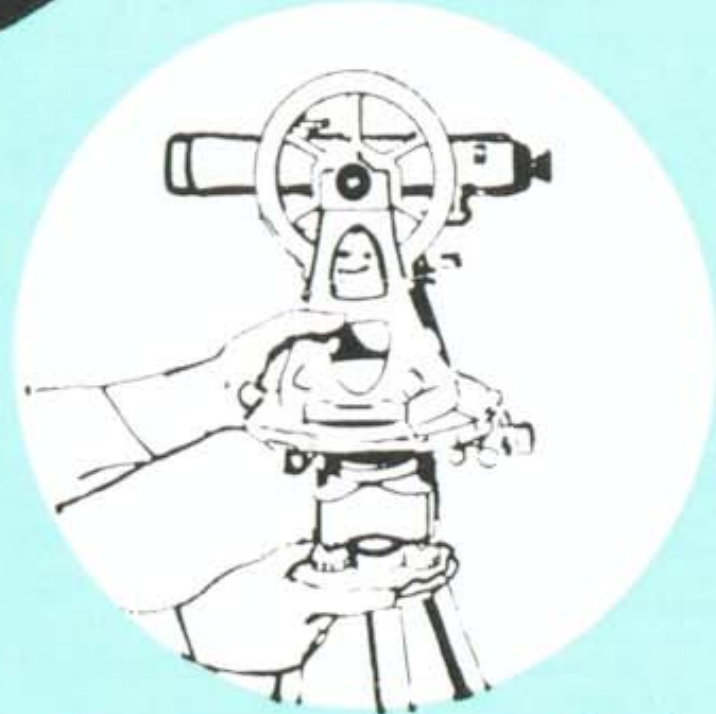
*Checking
YOUR
BRUNSON*

Care and Use
OF TRANSITS

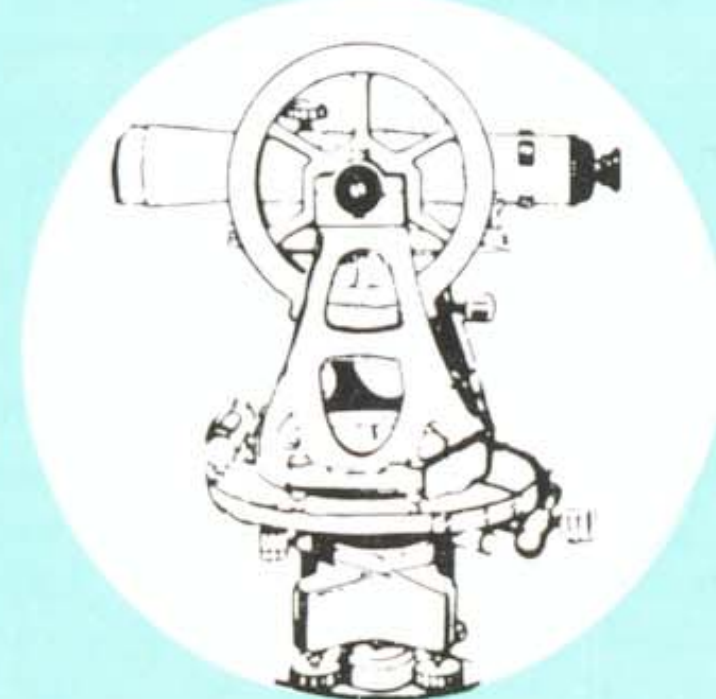
Before removing your transit from the case, set up the tripod in a location where it is not likely to be upset. The shoes should be firmly pressed into the ground, and the wing nuts on the tripod head loosened and retightened. The instrument is screwed to a board and is easily removed from the case by sliding forward. Loosen the lower clamp before removing. When unscrewing the transit, grasp the standards with one hand while turning the base with the other. Set the instrument squarely on the top of the tripod and turn only the base—until it is screwed tight. The threads engage without any special manipulation.

Carefully try all clamps and motions to make sure that the instrument is in good operating condition. If it is not, a claim should be filed at once with the transportation company, to insure reimbursement for damages. All instruments are carefully checked before they leave the factory. If there is any tightness or binding, return your transit at once to the factory.

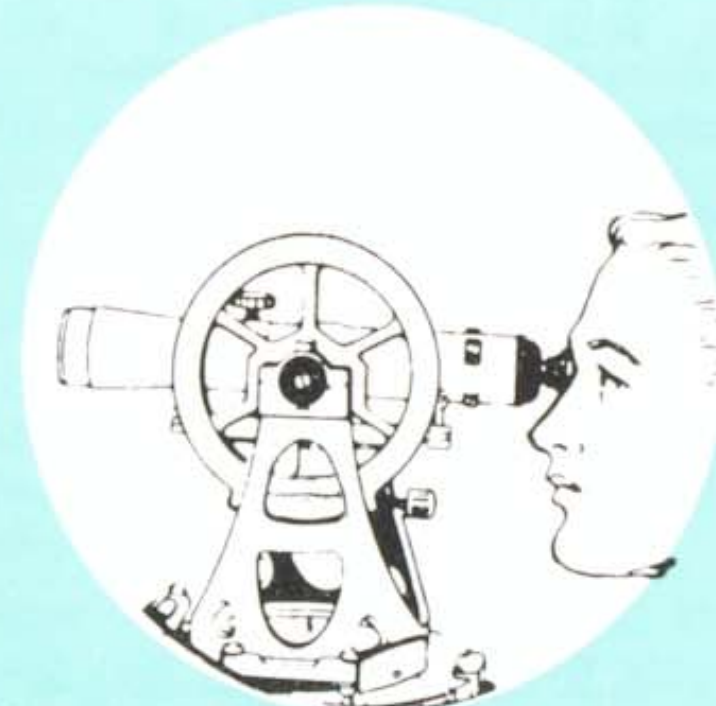
Firm tension on the leveling screws will give you the right leveling adjustment. Screws that are too tight cause creeping, and screws that are too loose do not give the instrument firm support.



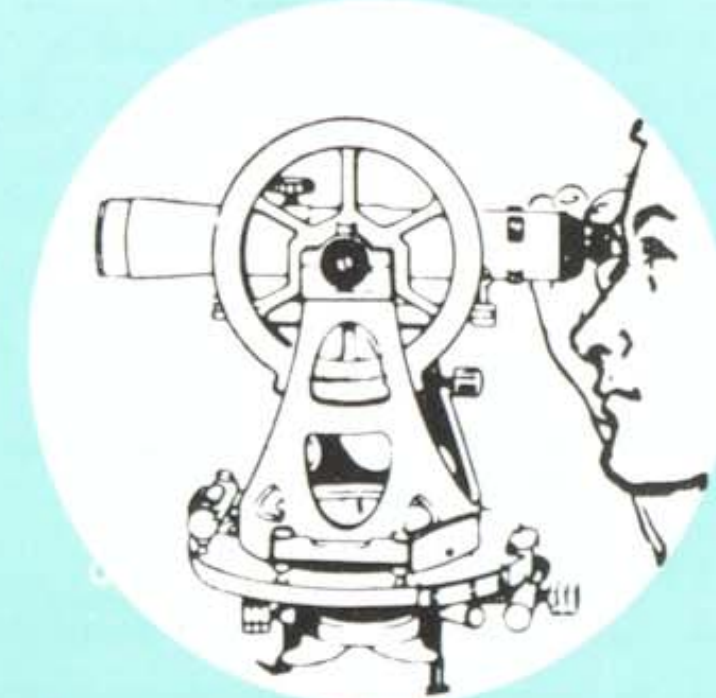
Mounting transit on tripod



Return damaged instruments.



Keep both eyes open.



Focusing eyepiece on cross wires.

FOCUSING YOUR TRANSIT

Remove the objective cap and attach the sunshade. To focus the eyepiece on the cross wires, turn the knurled eyepiece cap. To focus the objective upon a target turn the knurled pinion head on the top of the telescope. You'll get better results in using a telescope if you leave both eyes open.

POINTING YOUR TRANSIT

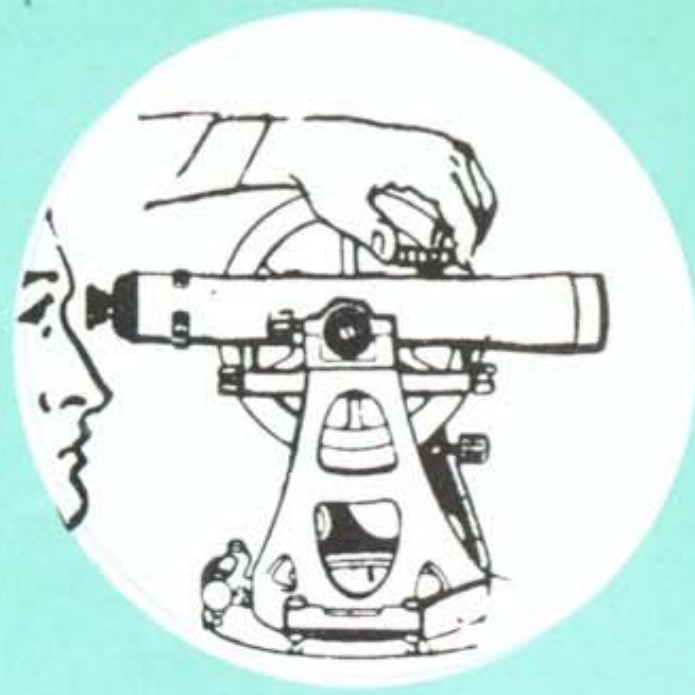
When pointing on a target or when setting verniers for a particular reading, always turn the tangent screw in a clockwise direction so that the screw is pushing. This avoids any error due to possible lagging of the opposing spring.

CLEANING YOUR TRANSIT

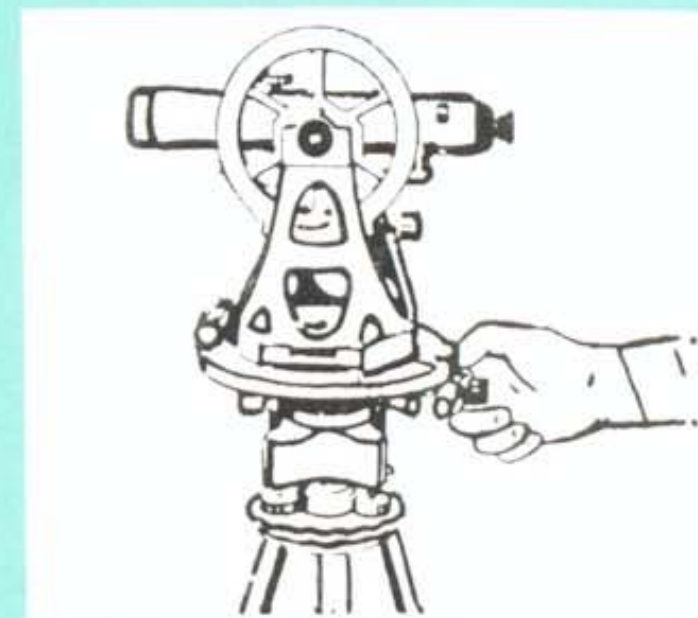
Whenever your instrument has been exposed to dust, brush the dust from all the screws before returning it to the box. A toothbrush is convenient for this purpose. If regularly brushed clean, screws will operate much longer without serious wear. If they become dry, apply a small amount of light grease. (Do not use oil.) A suitable grease may be obtained from Brunson Instrument Company. After running screw back and forth a few times, wipe off all free grease with a lint-free cloth.

If lenses are dirty, blow off the loose dust and wipe them gently with a soft lens tissue, or face tissue. Before returning your transit to its case, be sure to shake all loose dirt from the box.

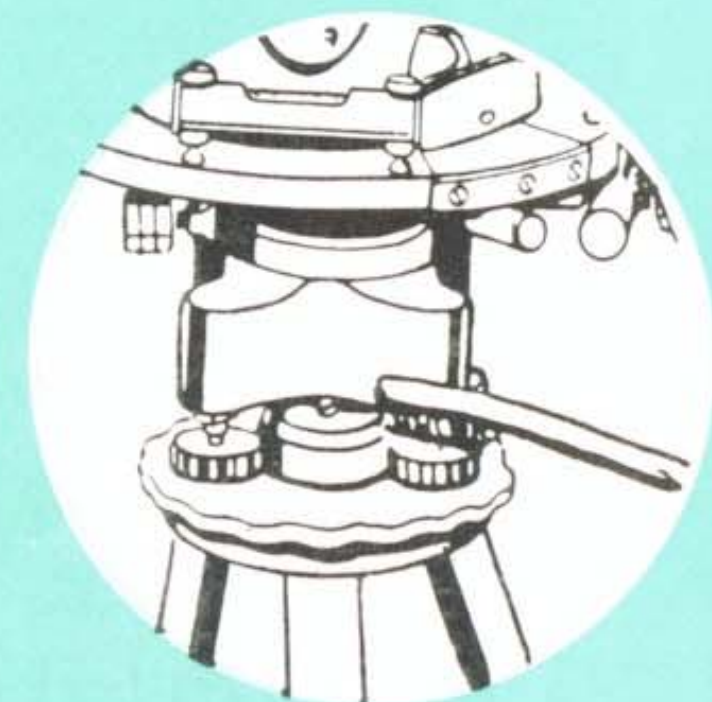
Transits hold adjustment better if not subjected to great temperature changes. When working on cold days, try not to store the instrument in a warm room.



Focusing objective on target.



Turning tangent clockwise.



Remove all dust.



Use no oil.

Adjustments of

BRUNSON ball-bearing TRANSITS

More permanent adjustments are obtained by gradually eliminating part of the error at a time. When the reading is almost correct, it is better to wait until the next day before making any further adjustment.

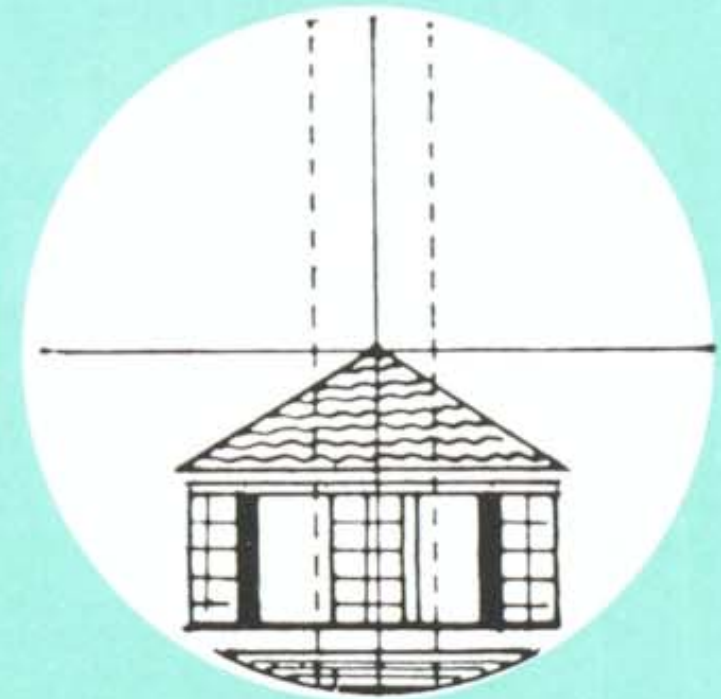
I. FOCUS EYEPIECE

To Focus Eyepiece, and Eliminate Parallax Error.

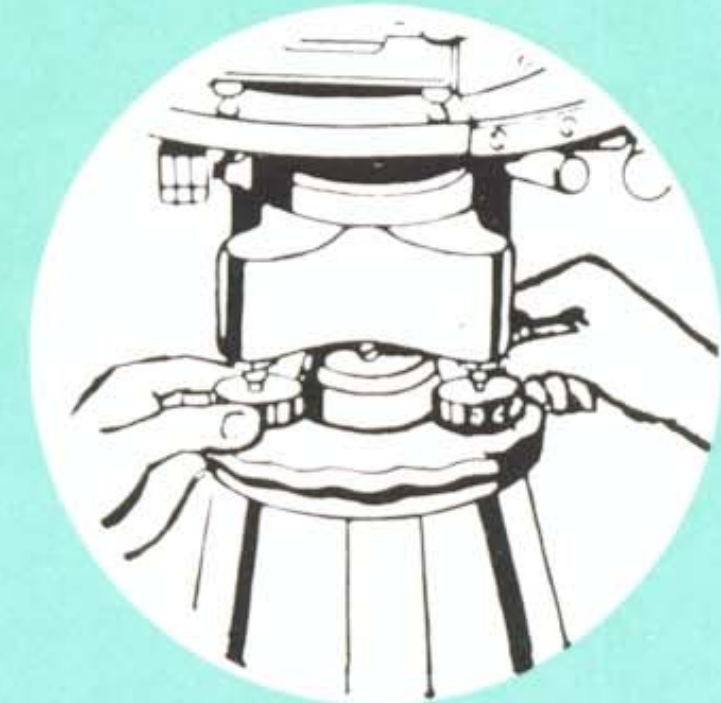
- 1 Point telescope toward light background and make preliminary focus of eyepiece on cross wires.
- 2 Sight on a sharp target at least 100 feet distant.
- 3 Focus slowly back and forth until there is no movement of the wires on the target as you move your head from side to side.
- 4 If necessary, refocus eyepiece until target and wires are sharp. *This eyepiece focus need not be changed while the same man is using instrument.*

Whenever sighting on a target, you should always check focus for "no movement of wires" when moving your head.

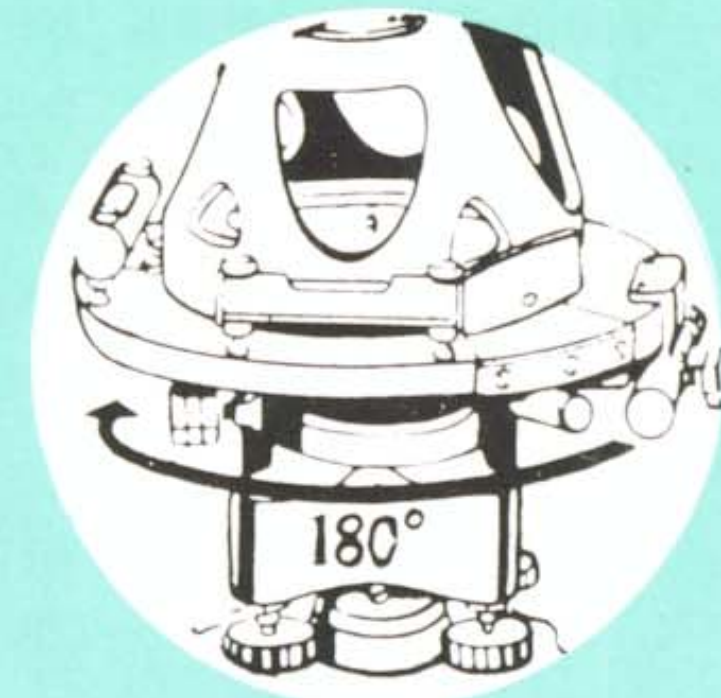
Learn to use telescope with both eyes open.



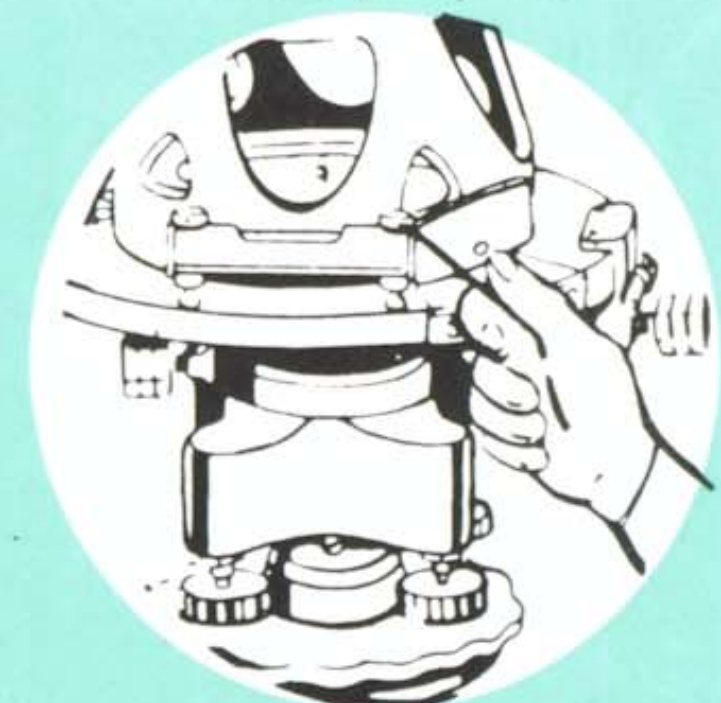
Incorrect focus.



Center bubbles in vials.



Rotate plate 180°



Level adjustment centers bubble.

II. PLATE VIALS

To Make Plate Vials Perpendicular to Spindle.

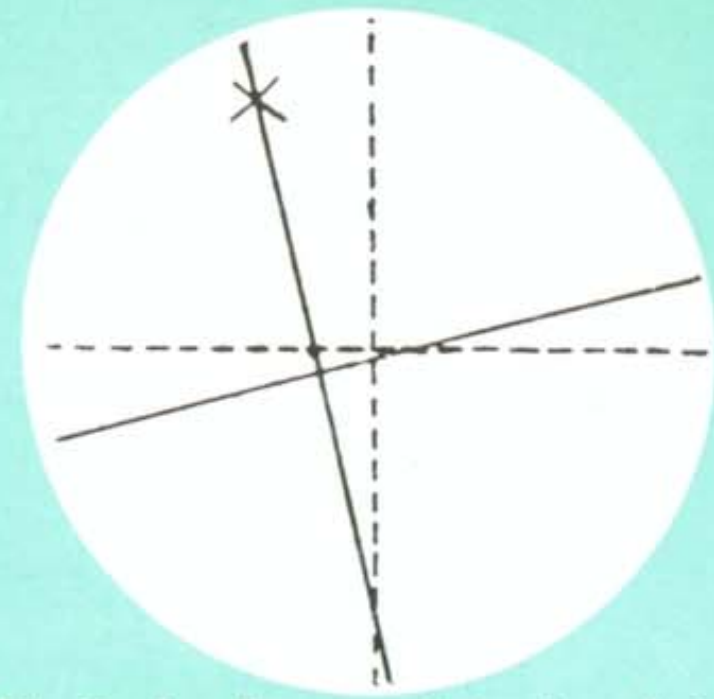
You should maintain constant care to avoid uneven heating of the level vials while using your instrument. Even the slight warmth of a finger at one end of the vial provides enough expansion to throw the vial temporarily out of adjustment. Direct sunlight on one end and shadow on the other for any length of time will cause a temporary "run" of the bubble.

- 1 Set up transit on tripod.
- 2 Rotate plate so that each vial is in line with a pair of opposite leveling screws.
- 3 Use leveling screws to bring bubbles to center in both vials. (The bubble will move the same direction as the left thumb.)
- 4 Rotate plate 180 degrees.
- 5 If bubbles are off center, bring back half of the error with leveling screws.
- 6 Bring bubbles to center with tube adjustment. (Do not set nuts too tight.)
- 7 Repeat operations 3 to 6 until bubbles remain in center with transit in any position.

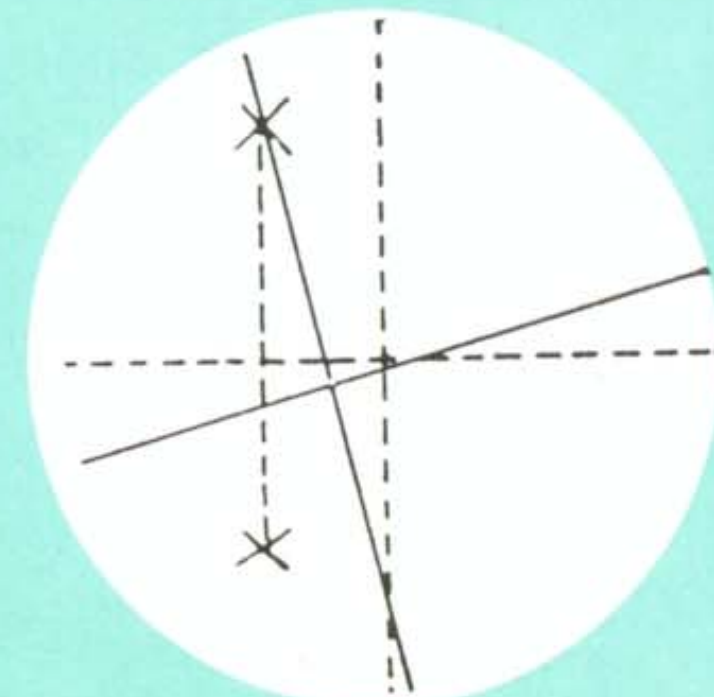
III. VERTICAL WIRE

To Make Vertical Wire Perpendicular to Axis.

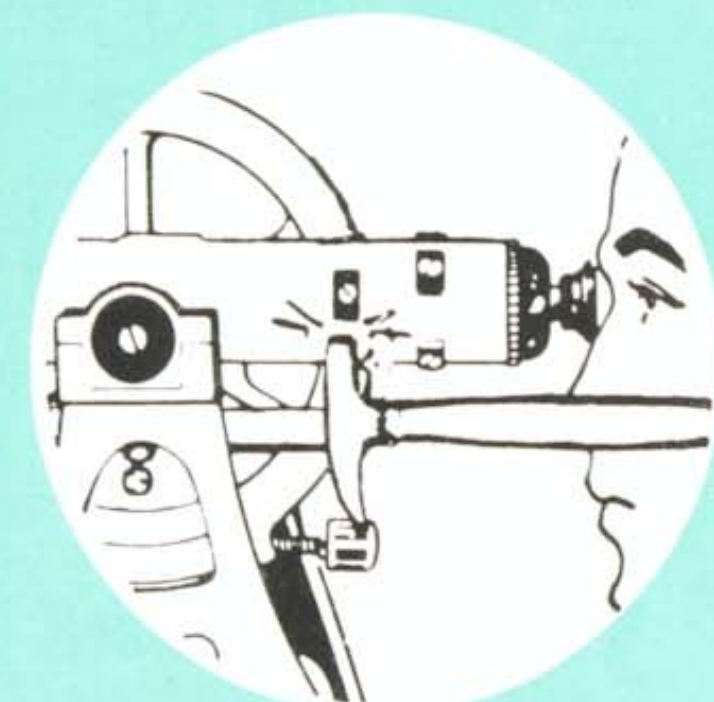
- 1 Set one end of vertical wire on distinct point.
- 2 Move telescope up or down. If wire stays on point, it is correctly set.
- 3 If it does not, slightly loosen capstan screws and tap each one gently, in order to rotate position of wire, until it will stay on point.



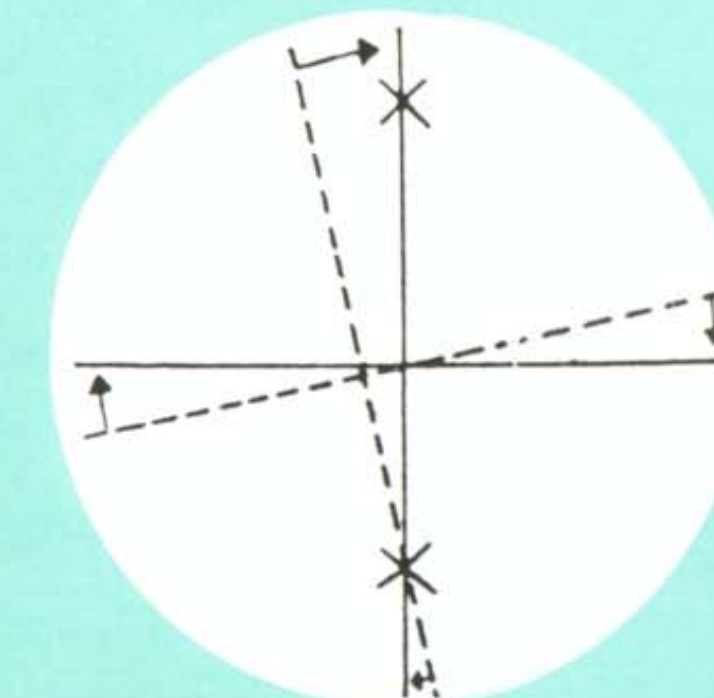
Vertical wire on distant point.



Vertical wire incorrectly set.



Tapping capstan screws.



Vertical wire correctly set.

IV. COLLIMATION

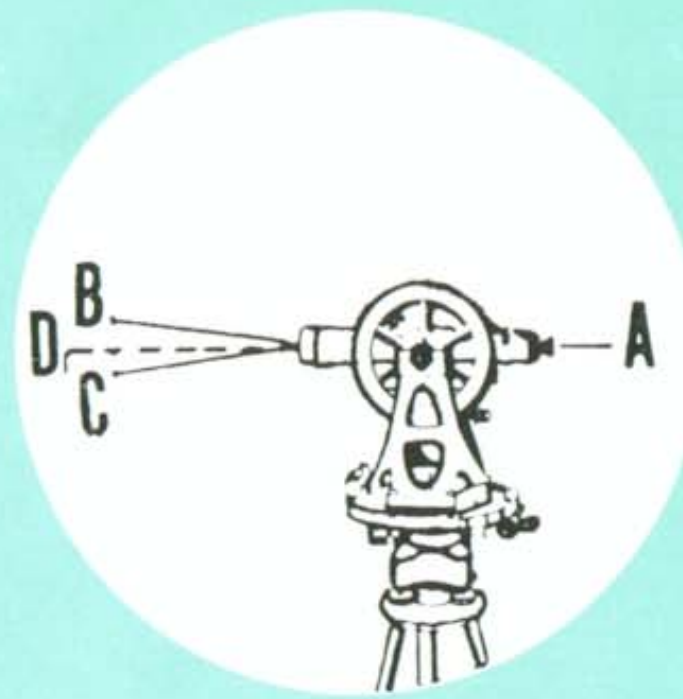
To Make Collimation Perpendicular to Axis.

- 1 Set vertical wire on distinct point (A), at least 100 feet away, approximately level with instrument, and clamp plates.
- 2 Plunge telescope and sight on a point in opposite direction, same distance from transit, approximately level with instrument. (A horizontal level rod makes a good target.)
- 3 Unclamp and rotate top plate and sight on first target (A), and again set clamp.
- 4 Again plunge telescope, and sight toward second (opposite) target.
- 5 If wire is not on target, move vertical wire $\frac{1}{4}$ of the error. If wire is on right side (C), loosen left hand capstan screw, and tighten right hand screw. If wire is on left side (B), loosen right hand capstan screw and tighten left hand screw.
- 6 Repeat operations 1 to 4.

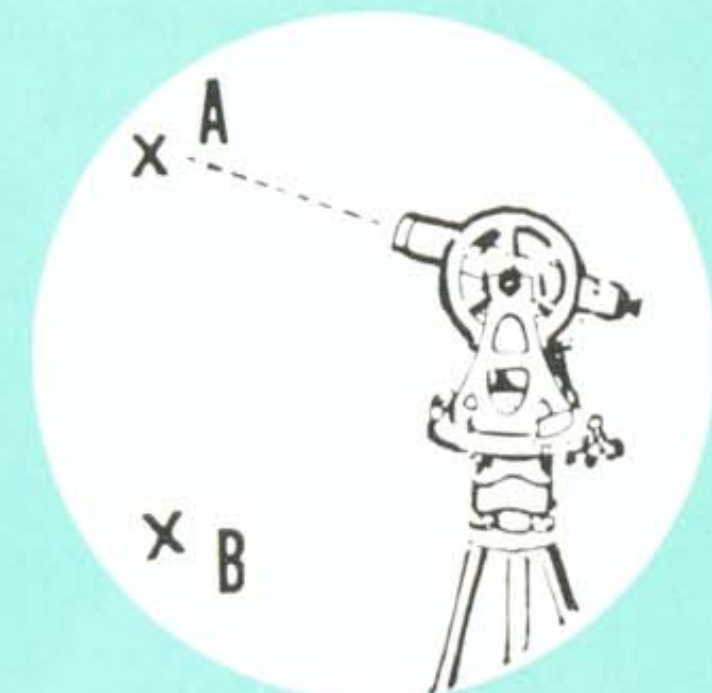
V. TELESCOPE AXIS

To Make Telescope Axis Perpendicular to Spindle.

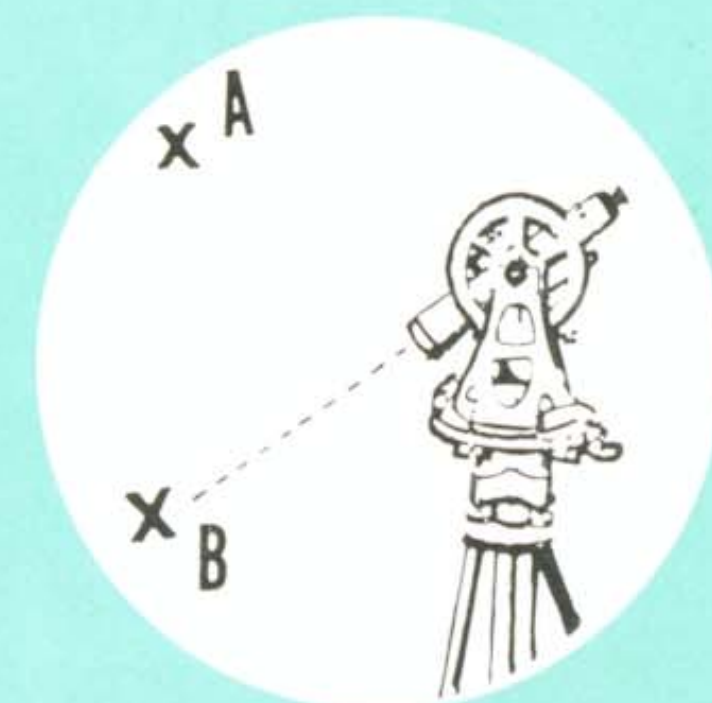
Brunson ball-bearing instruments have little or no wear on the telescope axis. This adjustment is made in the factory and need not be touched, except in case of accident or mistreatment. The method is described here, however, for the benefit of those who may have instruments with older type trunion bearings.



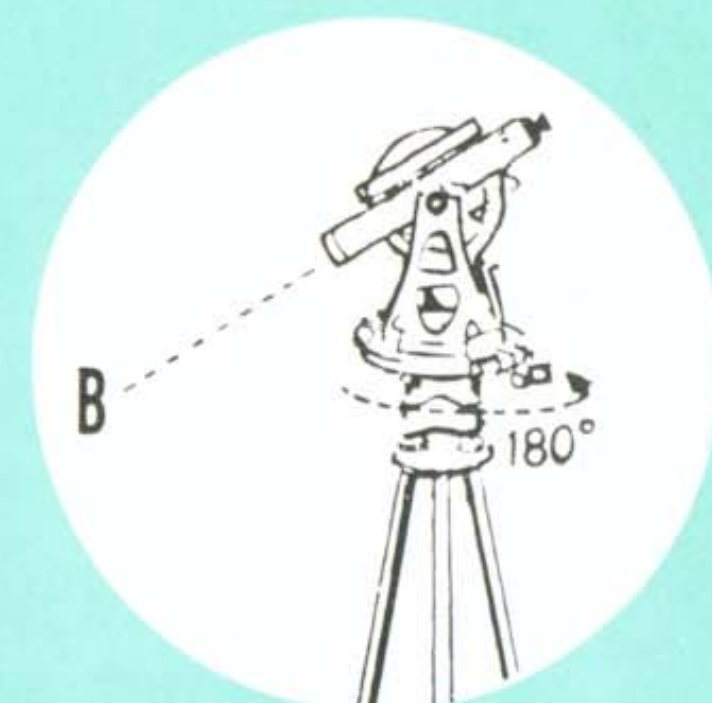
Setting collimation perpendicular to axis.



Sight on high point "A."



Sight on low point "B."



Plunging telescope to "B."

- 1 Sight transit on high point (A), with vial underneath telescope, and clamp plates. See illustration.
- 2 Depress telescope and sight on lower point (B). (This point should be at as low an angle as possible.)
- 3 Unclamp plates, plunge telescope, again sight on low point (B), and clamp plates.
- 4 Elevate telescope to target (A).
If wire is to right of point (A), the adjustable end of axis, opposite the vertical circle, must be lowered. If wire is to left of (A), raise end of axis.
- 5 To lower axis, release capstan screw under head of standards opposite vertical circle, tighten cap screws on top of standards. To raise axis, loosen screws on top of standards, loosen lock nut under standard head, turn capstan screw upward. After adjustment is completed, make sure screws on top of standards and lock nut are tight.
- 6 Repeat operations 1 to 4.

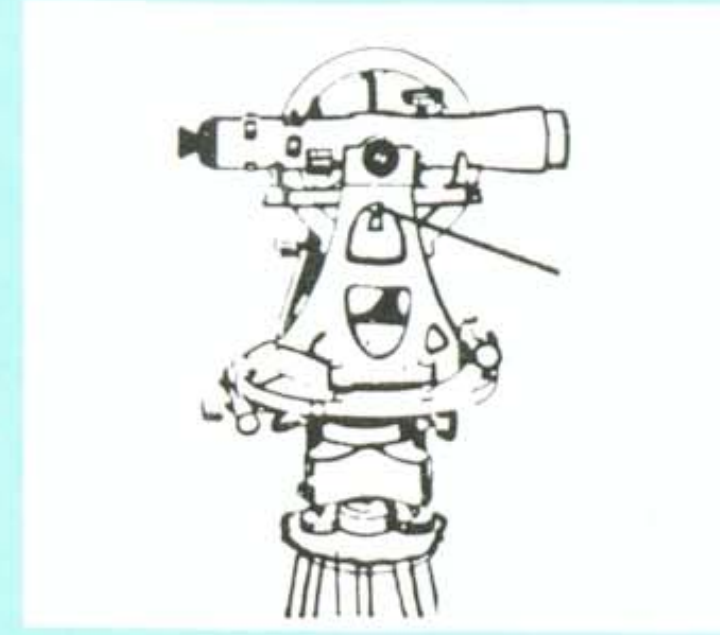
VI. TELESCOPE LEVEL VIAL REVERSION TYPE

To Make Telescope Level Vial Parallel to Collimation.

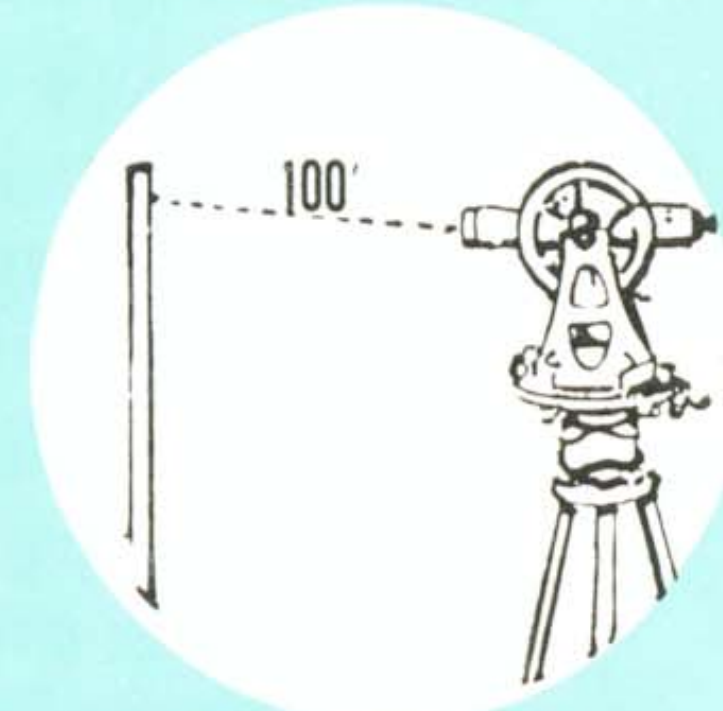
- 1 Center telescope bubble and sight on level rod at least 100 feet distant.
- 2 Plunge telescope, again center bubble, and again sight on rod.
- 3 If reading is not the same, set horizontal wire to average reading on rod. Adjust level bubble to zero.



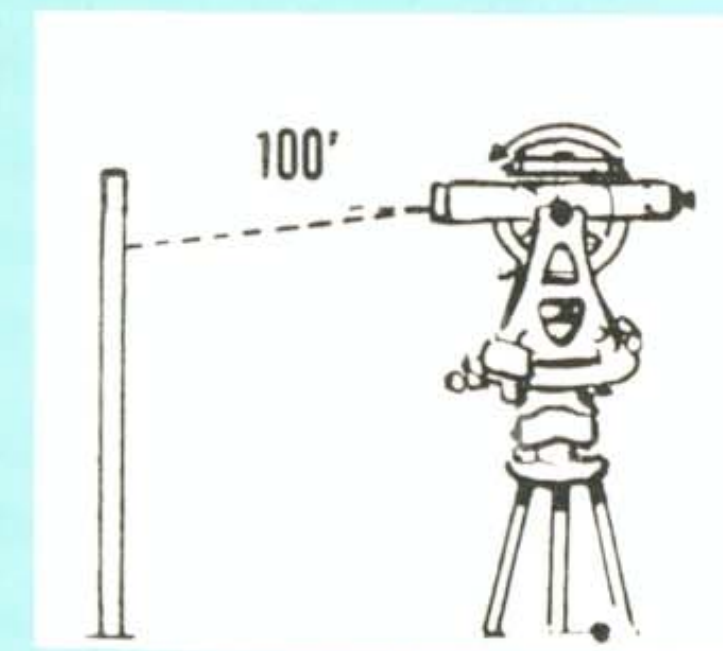
Elevating telescope to "A."



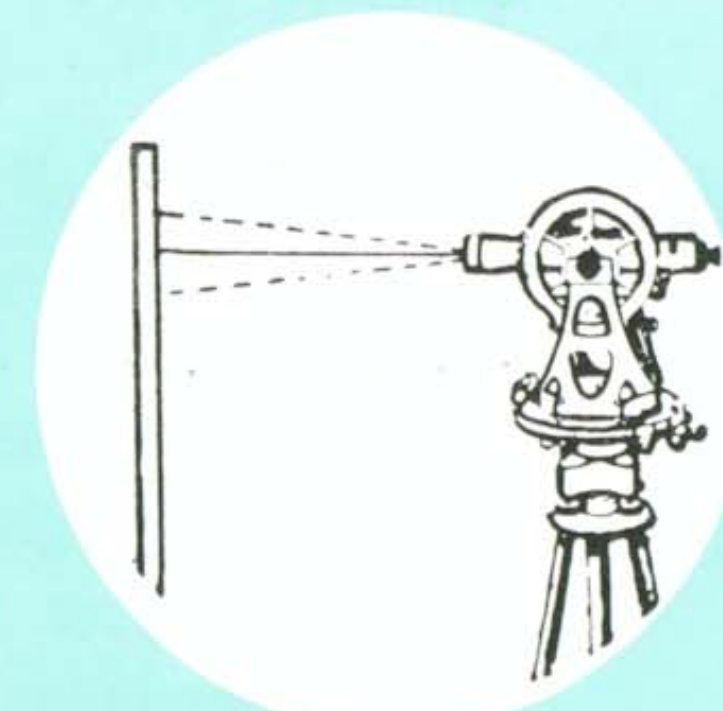
Setting Capstan Screws.



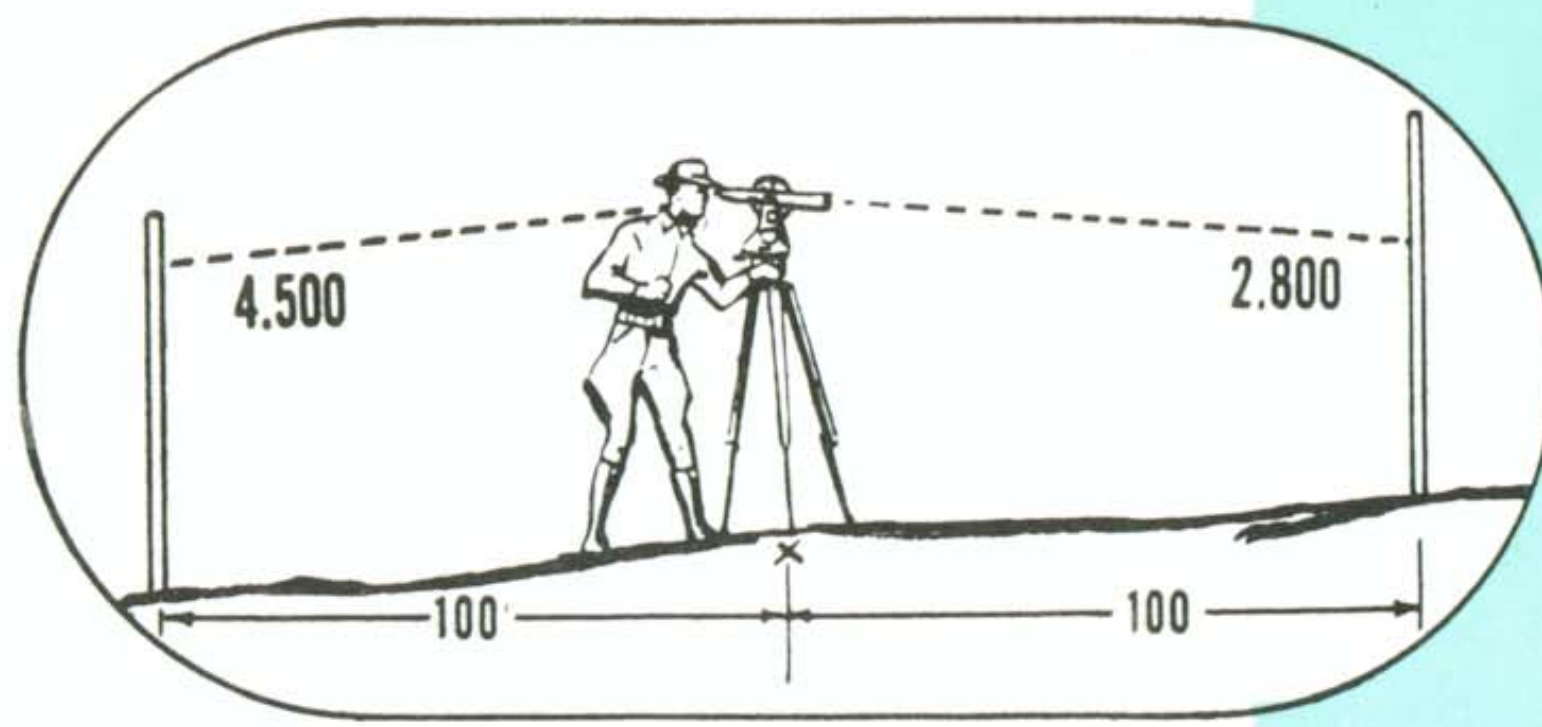
Sighting telescope on rod.



Plunge telescope.



Correct one-half of error.



No. 1 and No. 2 under paragraph 7.

VII. TELESCOPE LEVEL VIAL PLAIN TYPE

To Make Telescope Level Vial Parallel to Collimation.

- 1 Center bubble and sight on level rod at point No. 1 at least 100 feet distant. Record reading on rod. (Example: reading 2.800.)
- 2 Set rod on point No. 2 in approximately opposite direction, the same distance from transit. Read rod number two. (Example: reading 4.500.)
- 3 Subtract rod reading at point number two from reading at point number one. (Example: difference in elevation equals $2.800 - 4.500 = -1.700$.)
- 4 Set instrument close to rod at point number two with eyepiece almost touching rod. Center bubble and note height of instrument at center of eyepiece. (Example: reading 4.795.)
- 5 Set rod on point No. 1 and sight telescope on level rod, at height of instrument plus difference in elevation. Example: $4.795 + (-1.700) = 3.095$.)
- 6 Adjust telescope level until bubble is in center.

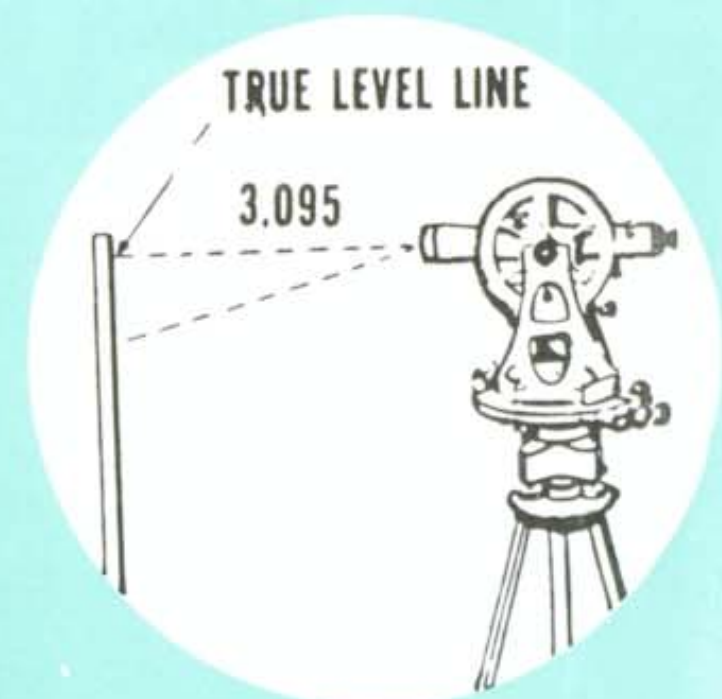
Brunson precision transits are built by master craftsmen. By following the instructions given on the preceding pages, your Brunson will give years of maximum working efficiency without need of repair or lubrication.



Moving instrument to rod.

$$\begin{array}{r}
 2.800 \\
 - 4.500 \\
 \hline
 - 1.700
 \end{array}$$

Subtract rod readings.



Correct to true level.

BRUNSON PROGRESS

A. N. Brunson began his unusual career in the surveying instrument field some twenty years ago in a small instrument repair shop in Kansas City, Missouri. As he worked over the many makes of instruments on his bench, he not only determined the cause of each breakdown, but also built new parts which would guard against similar breakdowns in the future. One after another, Brunson patented these improvements. As time went on, he offered to equip various instruments coming into his shop with the features he had developed. Eventually, as the list grew, it became apparent that a new line of instruments which included all the Brunson advancements would be vastly superior to anything on the market.

Your Brunson instrument is the result of decades of study and research; it is the product of the most modern production and assembly methods. It is built to give you . . . **LASTING ACCURACY.**

LASTING

BRUNSON

ACCURACY

Brunson Improvements For the Field Man

Dustproof Bearings.

Tangent Adjustment "Wobble Pin".

Leveling Screw Inserts.

Heat-Treated Cast Truss Standard.

Extra Strong Cross Wires, not affected by humidity.

Ball-Bearing Spindle Base.

Ball-Bearing Telescope Axis.

Sharp Focus Lens System.

Improved, Extra Stiff Extension Tripod.

Adjustable Vernier.

Adjustable Vernier Reflectors.

Hammertone Heat-Resistant Finish.

Flush-Filled Graduations.

} Permitting extreme low

} temperature operations

LASTING

BRUNSON

ACCURACY

BRUNSON INSTRUMENT COMPANY

P. O. Box 7951

8000 East 23rd Street, Kansas City 29, Mo.