

**TRANSITS AND THEODOLITES**  
**Final as of March 19, 2006**

TR 3, **Single Vernier Surveyor's Transit**, Edmund Draper, maker, Philadelphia, PA, Serial No. 174, c. 1860.



This instrument is 12 1/2" tall and has a 6" horizontal circle, a 5" vertical circle, a 4.6" needle, and a 10.6" long telescope. There is no clamp mechanism to the telescope. It comes with the original tripod but has no case. The upper clamp mechanism on the horizontal circle was missing, and a contemporary replacement was furnished by Robert Miller. The mechanism with attached using modern machine steel screws. The compass box is inscribed "Edmund Draper, Philadelphia, 174."

TR 4, **Single Vernier Surveyor's Transit**, W. & L.E. Gurley Co., maker, Troy, NY, c. 1870.



This 14" tall instrument has undocumented provenance to 19th century surveyors Hatch & Eaton in Nevada. It was reportedly used by them in 1871 on public land surveys and for the early layout of the NCO Railroad. Hatch was president of the railroad in 1870.

The compass dial is inscribed "W. & L.E. Gurley, Troy, N.Y., Chas. G. Ewing, Agent, San Francisco, Cal." It has a 6.6" horizontal circle, a 3.6" vertical circle, a 5" magnetic needle, and an 11" telescope. The leveling base is detachable from the upper portion of the instrument. Charles Ewing was the S.F. agent for Gurley during about 1869-1882.

This instrument is pictured on page 31 in *Chaining the Land*. The tripod pictured in the book is not the one currently paired with the transit.

TR 5, **3" Traveller's Transit Theodolite**, L. Casella, maker, London, Serial No. 3712, c. 1875.



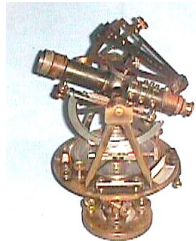
This tiny instrument comes with several accessories including a separate high-power eyepiece. It is brass construction finished in black and brass finish. It has a wood case plus a cloth case for the wood. It has a 2.75" horizontal circle, a 2.5" vertical circle, a 1.5" needle, and a 6" telescope with the low-power eyepiece. The compass box is inscribed "L. Casella, Maker to the Admiralty & Ordnance, London, 3712." The graduations to the horizontal circle are external. The tangent screws are not spring-opposed. It is modified from Casella's first model of the Traveler's theodolite.

**TR 6, Light Mountain and Mining Transit, W. & L.E. Gurley Co., maker, Troy, NY, c. 1885.**



This 10 1/2" tall transit has a 6" horizontal circle and a 4" needle. It is missing the 4" diameter vertical circle it once had. The vertical slow-motion screw is spring-opposed and is possibly a retrofit. The horizontal slow-motion screws are not spring-opposed. The instrument has a black finish. Inside the transit is scratched "WEH Seattle 8/8/92."

**TR 9, Light Mountain Transit w/Burt Solar Attachment, W. & L.E. Gurley Co., maker, Troy, NY, c. 1899.**



This instrument has a 5 3/4" horizontal circle and a 4" needle. It has a partial vertical circle. Inside the instrument is scratched "Wood 4-19-07 Wenzel, Seattle 5/6/1908." The transit with attachment is 13 1/2" tall. This instrument is complete with a leather covered mahogany case and extension-leg tripod.

**TR 10, Mountain Solar Transit, Young & Sons, maker, Philadelphia, PA, Serial No. 8375, c. 1909.**

This 13" high transit is Catalog No. 10. It is of aluminum and brass construction and is fitted with a Smith Telescopic Solar Attachment. It has a 4 1/2" horizontal circle, a 4" vertical circle, a 3.3" needle, and a 10" main telescope. The telescope on the Smith solar unit is 7" long, and is inscribed "Pat Sep 16, 1902." There is a counterweight on the standard opposite the side with the solar unit. The leveling base is from a 1908 patent. It is complete with case and tripod. This instrument is pictured in the middle of page 16 in the 1980 illustrated price guide.





TR 11, **Wet Mining Transit**, C.L. Berger & Sons, maker, Boston, MA, Serial No. 7814, Catalog No. 4C, c. 1915.

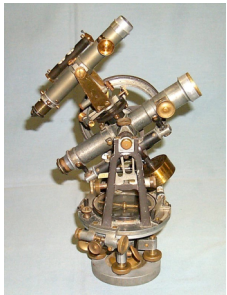
This 12" high instrument has a 4" horizontal circle, a 4" replacement vertical circle, a 2½" magnetic needle, a 7½" main telescope, and a 4½" auxiliary telescope. This instrument was ordered from the Berger factory on Jan. 20, 1909 by the Salt Lake Blue Print Co., Salt Lake City, UT. It is a Berger 4C Mining Transit.

TR 12, **Stadia Hand Transit**, Keuffel & Esser Co., maker, New York, c. 1925.

This instrument is K&E catalog no. 5376S. It has a leather case and the ball & socket attachment also has its separate leather case.



TR 16, **Mountain & Mining Solar Transit**, A. Lietz Co., San Francisco, SN 1221, c. 1900



This is a Lietz No. 12 aluminum transit. The top of the telescope is fitted for a Saegmuller-type solar attachment and counterweight that come in separate case. The transit has a 4" horizontal circle, a 4" vertical circle, and a 2 1/2" compass needle. It is serial number 1221. There is a wood case with canvas cover but no tripod. The solar attachment is serial number 1396.

TR 17, **Solar Transit**, C.L. Berger & Sons, Boston, SN 15267A, c. 1925.



This transit is brass with a black finish. It is 13 3/4" tall without the solar attachment. The solar unit is Berger's version of the Saegmuller unit and is contained in a separate case. The transit has a 12" telescope and the horizontal circle is 6 1/4" in diameter. The original owner's name was Zumwalt and the owner I got it from was Mike Artus. The transit is catalog number 1-S.

TR 20, **Cradle-type Plain Theodolite**, J.M. Hyde, Bristol, England, c. 1845.



This is the classic English plain theodolite used in America for angular measurement until the mid 19th century. It was then being replaced by the surveyor's transit although the popular Davies Surveying text continued to include the

theodolite until the 1883 edition. This 11 1/4" tall instrument has a 12-inch telescope set in wye supports with a 4 1/2-inch level mounted underneath. There is also an exterior 5 1/2-inch horizontal circle reading by vernier to one minute of arc, a 6-inch diameter vertical half circle reading to one minute, and a 2 1/4-inch compass needle. The clamp screw for the vertical motion is missing. Two small screws are also missing from brackets on the telescope. The telescope image is inverted as typical of the period and the lenses are clouded and dirty although the crosshairs are present. There is a partial chipping to the objective lens. There is no case or tripod.

TR 21, **Boundary Precision Theodolite**, A. Lietz Co., San Francisco, Serial No. 8990, c. 1922.



This large surveying instrument is Lietz's Model No. 5 U.S. It has been used on the Doulton Tunnel survey that brought water to Montecito. The tunnel was completed in 1928. The circle diameters are 7 inches horizontal and 5 inches vertical. Both circles have two verniers. They are read to 10 seconds and 30 seconds of arc, respectively, using four individual built-in microscopes. The telescope is 12 inches long with inverting image. A striding level mounts across the standards to assist in final leveling, and extra eyepieces and an additional reticle are included inside the telescope case. An oil-burning lamp illuminates the telescope cross hairs when working under low light conditions. The lamp mounts near the top of the left standard and shines light through the hollow axle into the telescope. Most case accessories appear to be present, including an original hand-held penlight for illuminating the scales. It is complete with original tripod although the wood is dry. The brass tripod head is thickly oxidized. Because of the large size the instrument comes packed in two wooden cases.

TR 22, **Solar Transit**, Buff & Buff Mfg. Co. Boston, MA, Serial No. 14240, c. 1920.



This is a USGLO Model-A Solar Transit, Model of 1914 and was purchased new by the USGLO in 1920. The telescopic solar attachment is a modification of the Smith design. The transit is 11" tall and has a 2-inch magnetic needle, a 4 1/2-inch horizontal circle reading to one minute of arc, a 4-inch vertical circle also reading to one minute of arc, a 9-inch main telescope with level underneath, and a 6-inch side-mounted solar telescope. Small tools and various levels are included for adjusting the apparatus.

TR 25, **Builders Transit**, A. Frese, Los Angeles, Serial No. 900, c. 1910.



This is a builders transit with a non-repeating horizontal circle. It is made of brass and complete with case and tripod. Both horizontal and vertical arcs read to 5 minutes of arc.

**TR 27, Wooden Theodolite, English, c. 1910.**



This 10 1/2"s tall instrument is believed to be a training model. The 8" long tubular peep sight has no lenses, and both horizontal and vertical scales are graduated in degrees. Horizontal circle is 6 1/4" diameter, vertical is 3 1/2". There are 3 leveling screws and one spirit level with green fluid. It has the appearance of an older work although the printed numbers and construction of the spirit level suggest late 19th or early 20th century.

**TR 29, Cradle Theodolite w/Geared Vertical Limb, M. Berge, maker, London, c. 1818.**



This is the type of telescopic angle-measuring instrument used prior to being replaced by the transit. It is 9 1/2" high with a 10-inch erecting-image telescope. Matthew Berge was a noted English maker of quality scientific instruments. He reportedly worked for and was successor to the firm of Jesse Ramsden when Ramsden died in 1800. Berge reportedly died in 1819. The instrument has a 5" horizontal circle and a 5" vertical geared arc, both reading to one miinute. There is a 2 1/2" long telescope level and two plate levels. There is no close-focus mechanism as typical of later instruments. The pins used for locking closed the wye mechanism are missing.

**TR 30, Surveyor's Transit, William Schmolz, San Francisco, c. 1858.**



This is a unique design of surveyor's transit known as "Pre-1862 Surveyor's Transits" and is described in Robert Miller's article in *Rittenhouse*, Vol. 7, Issue 28, August 1993, titled "The First Surveyor's Transits, 1852-1862." This style has the standards attached to the lower horizontal plate instead of the upper. It was intended for retracing land boundaries rather than for engineering purposes. The transit was made by William Schmolz of San Francisco who was in business from about 1853 to 1891. It is signed "William Schmolz San Francisco" in script on the compass face. and there is no serial number. It is believed that Schmolz started signing instruments Wm. instead of William in about 1860. Later Schmolz instruments had serial numbers. These special instruments were constructed so that the compass card and needle ring remain stationary when the transit is rotated in azimuth with the lower plate clamped. The transit has a telescope 10 3/4" long, a 6 1/4" telescope level, and a 4 3/4" long compass needle. The horizontal circle is 6 inches in diameter reading by vernier to one minute of angle. There is one spirit level located just below the horizontal plate, another on one of the standards, and a third affixed underneath the telescope. There is a vertical arc

but no vertical circle. The transit has no leveling base but instead is the type that sits on a spindle affixed to a tripod. The spindle has its own leveling mechanism with 4 screws. The instrument is detached from the tripod in the same manner as a compass. This instrument is one of only three known Schmolz "Surveyor's Transits". The horizontal limb reads to one minute on the vernier, and the vertical arc reads to three minutes with an angle range of 50 degrees each way. The case as well as the tripod with leveling head are missing.