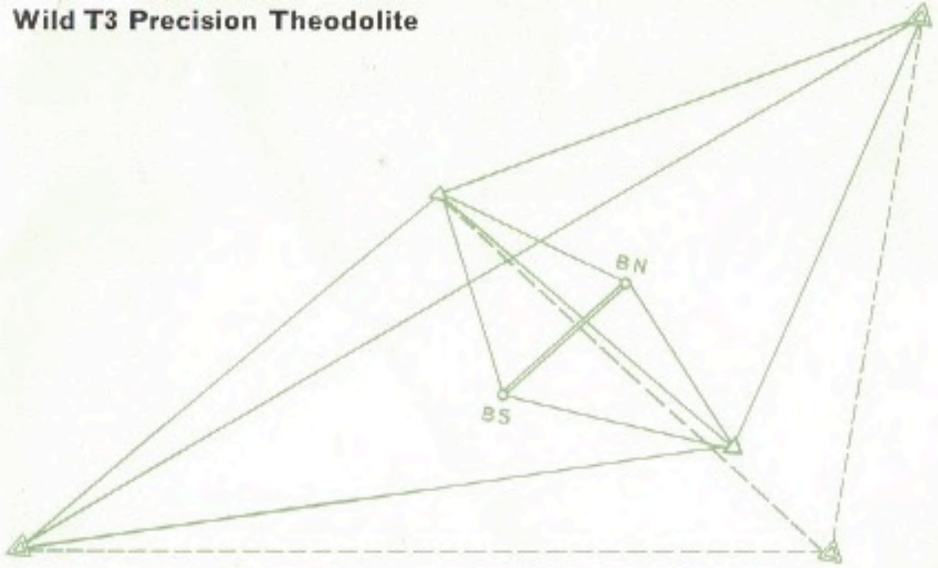
Wild T3

Precision Theodolite for Triangulation, Industry and Engineering



Wherever there is talk of 1st and 2nd order **Triangulation,** mention will be made of the Wild T 3 – an instrument of world-wide repute and famous for its precision and astonishing resistance against blows and falls. In this connection the term "stability of adjustment" is frequently used; with the Wild T 3 this is a foregone conclusion and need not be discussed further. Because of its high precision the T 3 is also being used increasingly in industry for measurements of high accuracy.

The instrument's stability is due to its favourable design and to the use of steel components. The telescope is made from a solid steel shaft and the major mechanical components all have the same coefficient of expansion so that the instrument is not influenced by extremes of temperature.

The circles are made of optical glass and are read at diametrically opposite points – an essential feature-for a precision theodolite. The optics for the illumination and imaging of these circle points are arranged symmetrically. Only in this way can the observer see in the reading microscope two exactly equal images which can be observed without error and which give the well-known high accuracy of Wild precision theodolites.

A single optical micrometer of extremely stable construction, produces immediately the arithmetic mean of the diametrically opposite readings of both the horizontal and vertical circles. By simply turning a change-over knob, either circle can be seen in the reading microscope as required. The microscope eyepiece is parallel to the telescope eyepiece so that no loss of time nor eye accommodation results from pointing to circle reading.

The lens telescope has a clear objective aperture of 2.4 in. and is equipped with three interchangeable eyepieces giving magnfin cations of 24, 30 and 40×, respectively. Even with 40× magnification, the eyepiece still has an exit pupil diameter of 0.06 in. which, together with the antireflection coated lenses, produces an exceptionally bright image. This excellent luminosity is normally attainable only with mirror-type telescopes, but the mirror telescope has the disadvantage that its line of sight is less stable.

Each circle is illuminated by a movable mirror, but the instrument is also wired internally for electrical illumination. For this, the mirrors are pulled out of their sockets and replaced by plug-in lamps. A cable and plug connect the battery box, which is fastened to a tripod leg, to the socket of the instrument. A control knob on the battery box serves as a combined switch and rheostat, by means of which the illumination of the circles and the telescope reticule-plate may be regulated.

The vertical circle is so numbered that one obtains immediately the mean vertical angle β from the difference of the face left and face

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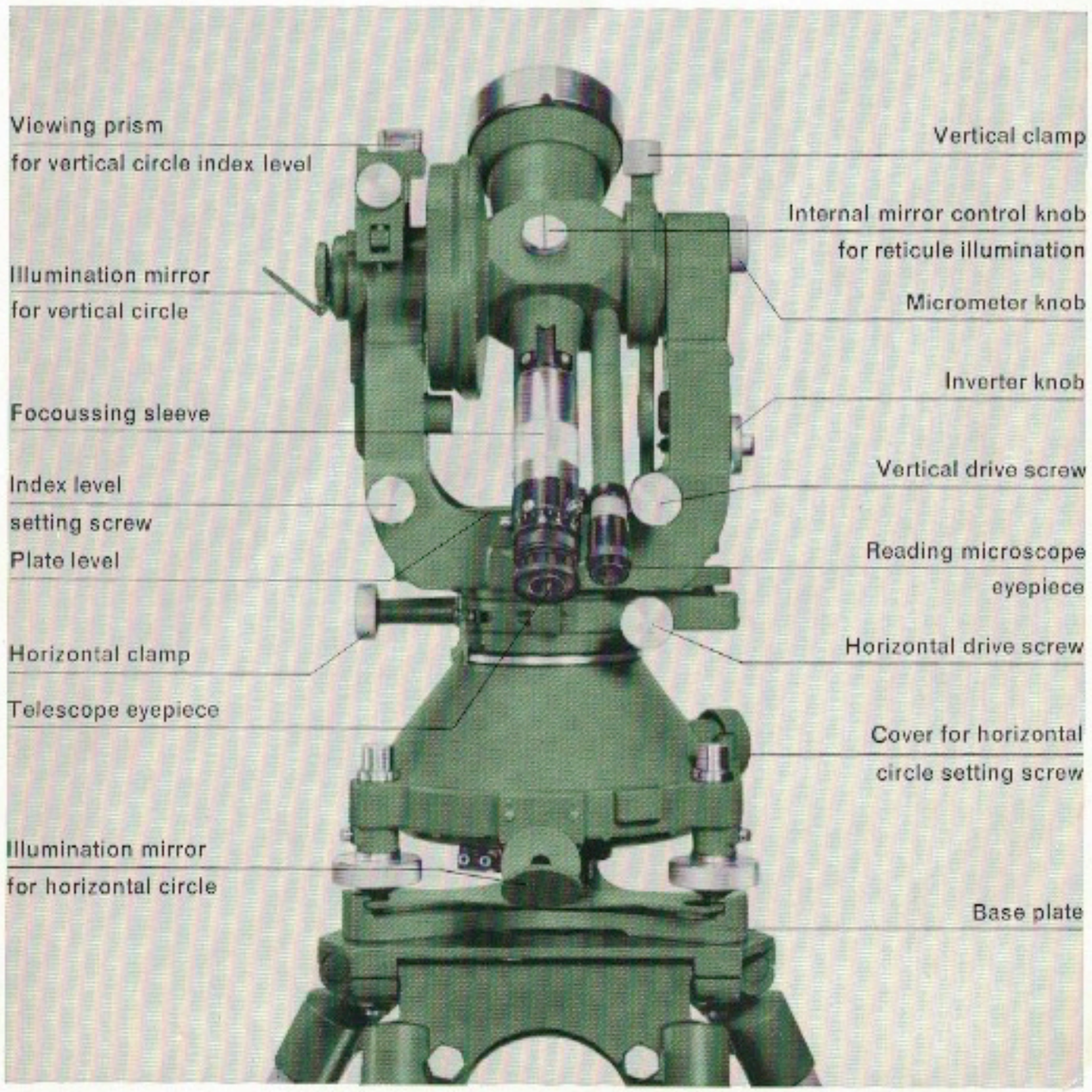
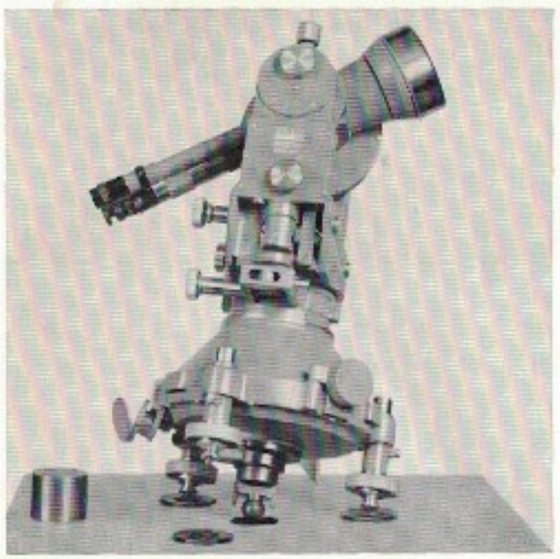
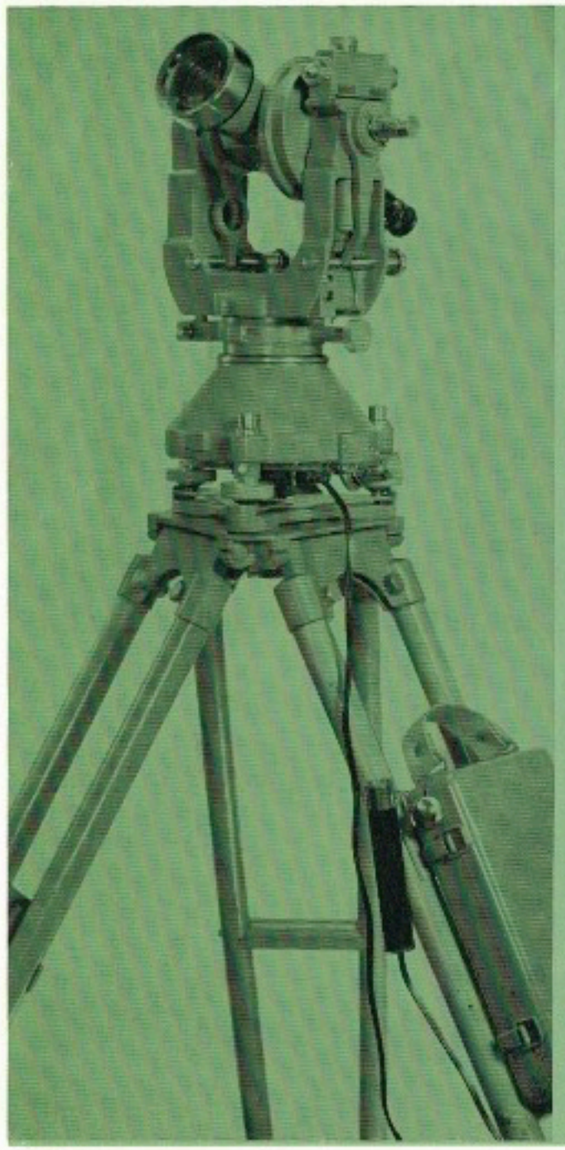


Wild T3 Precision Theodolite, standard model



Wild T3 Precision Theodolite with ball-centring for accurate setting-up on pillars for deformation measurement.

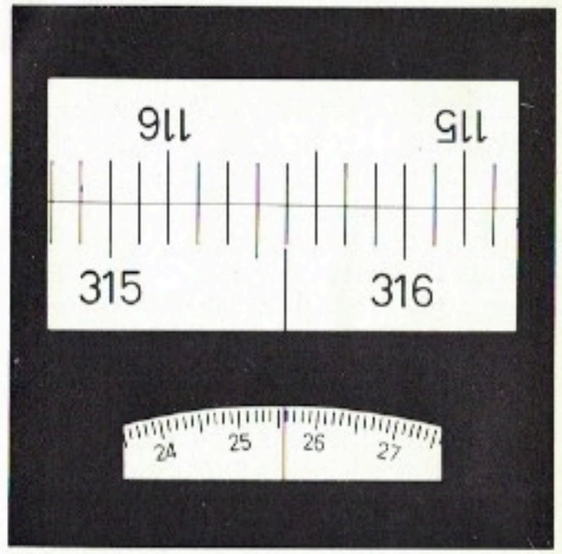


right readings A_I and A_{II}, i. e. $\beta = A_I - A_{II}$. This eliminates the reduction and meaning of readings which would otherwise be necessary.

For pointing to elevated targets up to a limiting angle of 65°, special eyepiece prisms can be attached to the telescope and reading microscope eyepieces. For astronomical determinations of time and latitude a prismatic astrolabe attachment may be placed over the telescope's objective mounting. With this accessory the observational procedure is simplified and gives good results.

Wild T3 Precision Theodolite with electrical illumination

For the measurement of structural deformations, particularly of power dams, the T 3 may be used to great advantage. In principle the method consists of measuring the directions to a series of targets set rigidly into the dam's concrete from a number of suitably located instrument pillars. From the changes in these directions, measured periodically over a given time, the deformations can be calculated. It is imperative that for repeated set-ups at each pillar, the instrument is centred exactly over the same station mark. To achieve this a special centring device is available, consisting of a detachable ball-tipped bolt at the base of the instrument which fits exactly into a hollow cylinder cast into the pillar's concrete.



Examples of circle reading

1st example: horizontal circle with **360°**

Circle reading	73°26'
Drum reading	1'56.7"
	73°27'56.7"

2nd example: horizontal circle with **400g**

Circle reading	315.60g
Drum reading	2558
	315.62558g

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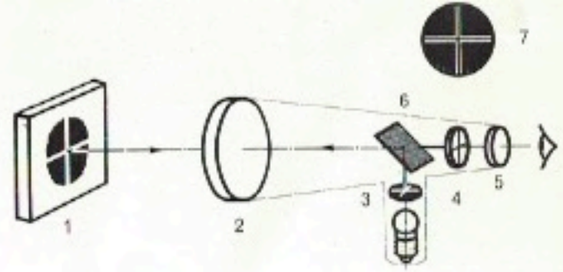
Model T3-A for autocollimation

The T3 is also used in **Industry** for test measurements of very high accuracy, particularly for machine tooling and installation. In addition to making measurements to special targets and collimators, autocollimation observations can also be applied, and for this purpose Wild have developed the **Model T3-A.** Because of the high accuracy requirements the autocollimation device is built into the telescope. In front of the reticule plate is a beam splitter, with a partly-silvered diagonal face inclined at 45° to the optical axis. Below this beam splitter is a holder for a second reticule plate with a translucent (negative) cross, which is illuminated by a lamp plugged into a socket on the holder and connected automatically to the internal electric circuitry of the theodolite. The translucent negative cross is projected on to the partly-silvered diagonal face of the beam splitter which deflects the cross towards and through the objective lens of the telescope focussed for infinity. If a plane mirror is placed somewhere in front of the objective lens, then the light rays will be reflected back into the telescope through the unsilvered parts of the diagonal prism face to form an image of the translucent cross in the plane of the telescope reticule cross-hairs. By turning either the telescope or the plane mirror, the black reticule cross-hairs can be made to coincide exactly with the translucent cross, i.e. autocollimation is achieved. This signifies that the telescope's line of sight is perpendicular to the plane mirror. Thus it is possible to place either the plane mirror perpendicular to a fixed oriented line of sight, or to establish the line of sight perpendicular to a fixed plane mirror. If either the telescope or the mirror moves a fraction then the mirror reflected rays will re-enter the telescope at **double** the angle they formed when first striking the mirror; hence the accuracy of pointing achieved by autocollimation is twice that which is obtained by normal methods.

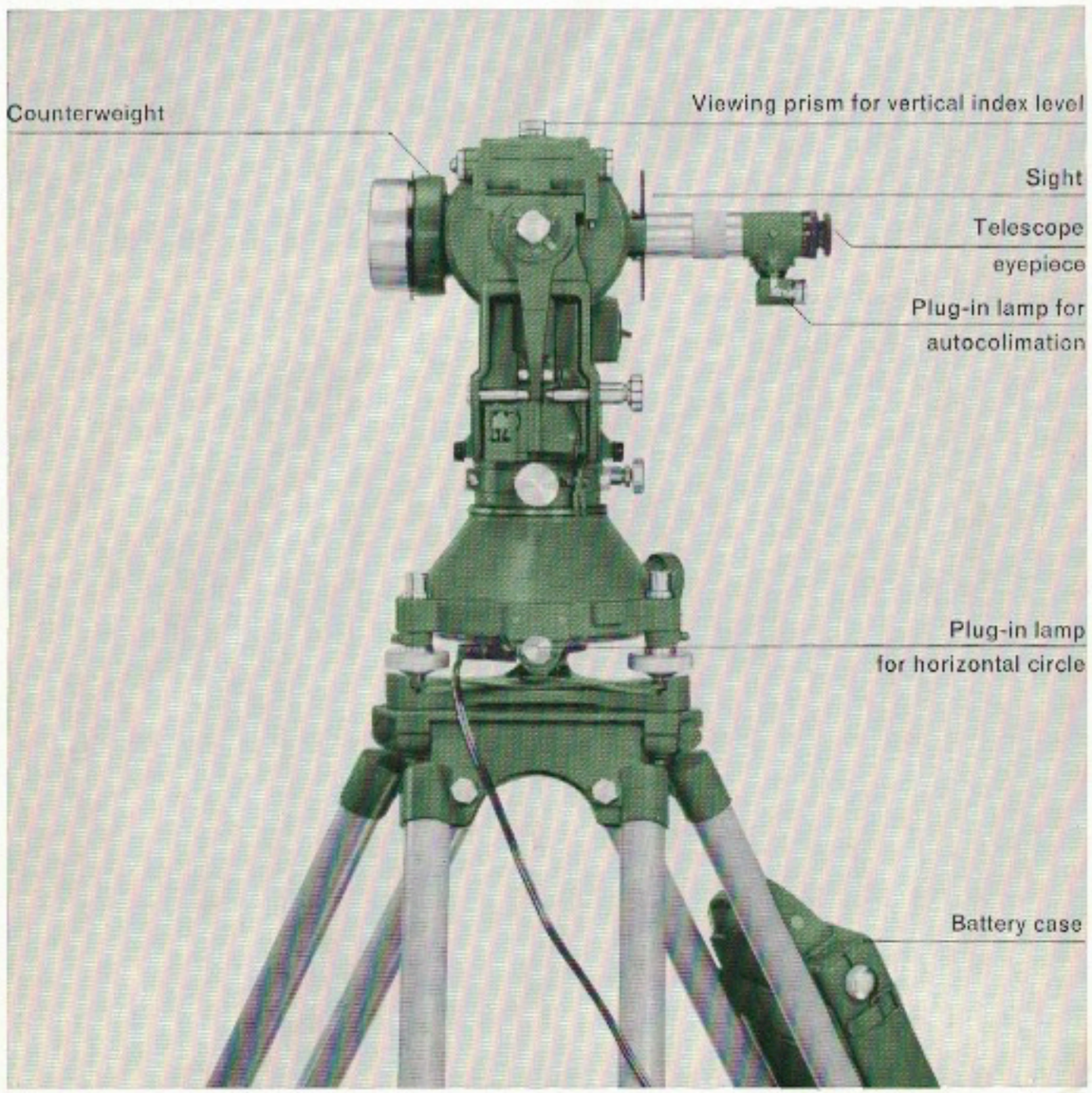
The T 3-A can also be used for angle measurement with the standard interchangeable eyepieces of the normal T 3, but the luminosity of the image is reduced inevitably by about 20%.

If required, the standard T3 theodolite can be fitted with a special Autocollimation eyepiece unit. This unit is interchangeable with the normal telescope eyepiece unit, and is fixed with two screws. The lamp to illuminate the translucent cross is connected in this case to a normal Wild tripod battery box. With this autocollimation eyepiece, only 24× magnification is possible. Normal angle measurement is still possible, however, but the image luminosity is reduced by about 30%. However, for extensive, normal angle measurement, the standard eyepiece unit can, of course, be replaced to give full luminosity and also to preserve the freedom of choice between the three magnifications. This change-over, however, should not be done in the field.



Autocollimation principle of the Wild T3-A Precision Theodolite. 1 Plane mirror, 2 Objective lens, 3 Negative cross, 4 Telescope reticule plate, 5 Eyepiece, 6 Beam splitter inclined at 45°, 7 Telescope image for autocolimation

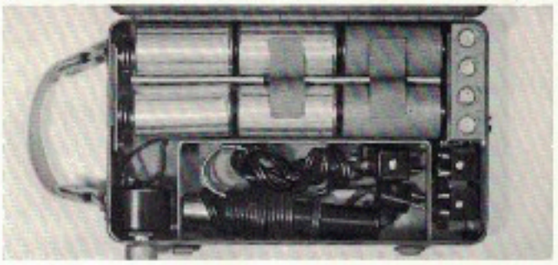
Wild T3-A Precision Theodolite with autocollimation device

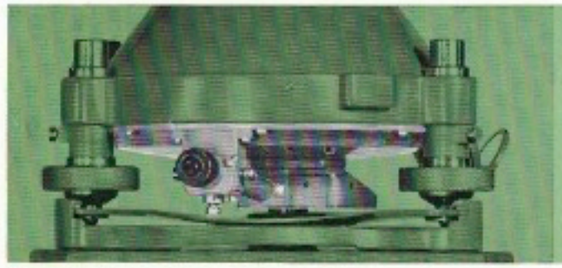


Optional Accessories

To mount the instrument on an ordinary pillar, it should be placed on a special heavy **pillar-plate** which has been centred previously by means of the circular bubble on the centring pin.

The electrical circuitry, connecting the lamp sockets to the main power socket, is built into the instrument. The **battery box,** which may be fastened to a bracket on the tripod, has a combined switch and rheostat and two series of sockets; one for the cable connecting battery box to instrument, the other for the hand-lamp cable.

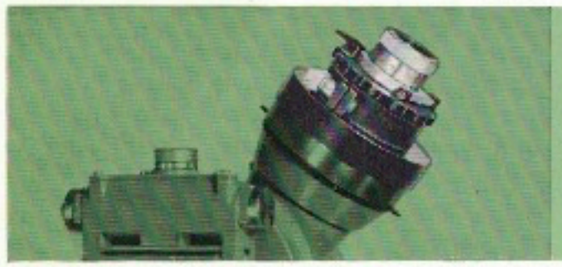




If required the T 3 can be provided with an **optical plummet.**

For steep pointings, up to 65° above the horizon, **eyepiece prisms** may be attached to the telescope and reading microscope eyepieces. For sun observations a dark sunglass may be placed over the telescope eyepiece.

The **collimator,** which is a T 3 telescope mounted on a stand, is a most valuable accessory for angle measurement in the laboratory and in industry. It provides a very exact reference pointing over extremely short distances.



Sun observations for astronomical determinations are simplified greatly by using the objective accessory, the **Wild-Roelofs Solar Prism** (details in Pamphlet Th 158e).

Technical Data

Telescope:	
Magnification	24, 30, 40×
Clear objective aperture	2.4 in (60 mm)
Diameter of field of view at 1000 ft. (m)	28.5 ft (m)
Shortest focussing distance	15 ft (4.6 m)
Sensitivity (per 2 mm run) of	
Plate level	7"
Index level (split bubble)	13"
Setting accuracy of index level	±0.4"

Glass circles	360° or 400ᵍ
Graduation interval, horizontal circle	4′ or 10ᶜ
Graduation interval, vertical circle	8′ or 20ᶜ
Micrometer scale interval	0.2" or 1ᶜᶜ
Reading by estimation to	0.1" or 0.5ᶜᶜ
Diameter of horizontal circle graduation	5.3 in (135 mm)
Diameter of vertical circle graduation	3.5 in (90 mm)

Standard Equipment

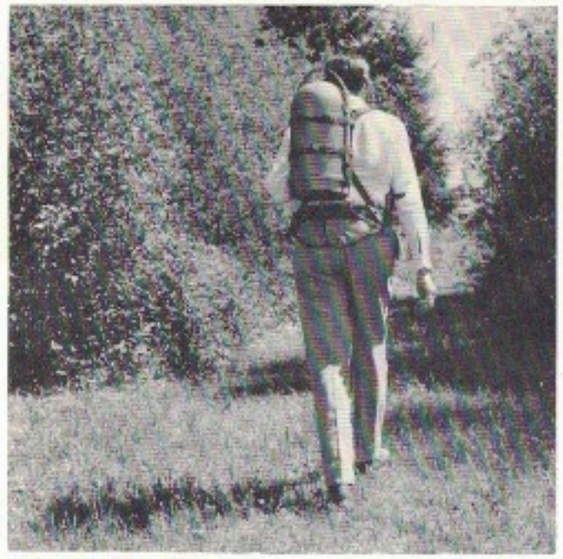
	lbs	kg
1 Wild T3 Precision Theodolite, 360° or 400ᵍ	24.6	11.2
in metal container, with accessories:	8.1	3.7
1 screwdriver, with 2 blades and 2 adjusting pins		
2 electric lighting connections		
1 Carrying frame	4.0	1.8
1 Wild 4a tripod with rigid legs	15.6	7.1
Accessories in tripod pouch		
1 plumb bob with bayonet plug		
1 hexagonal spanner		
or		
1 Wild T3A Precision Theodolite 360° or 400ᵍ, with built-in auto-collimation eyepiece		
in metal	33.0	15.0
container, with accessories:	8.1	3.7
1 screwdriver, with 2 blades and 2 adjusting pins		
3 electric lighting connections		
1 Battery box, normal	4.2	1.9
or		
1 Battery box, flame-proof, containing:		
6 single cell torch batteries (if ordered)		
1 connection cable		
1 handlamp		
1 Carrying frame	4.0	1.8
1 Wild 4a tripod, with rigid legs, accessories as above	15.6	7.1

Optonical Accessories

Leather cap for tripod head
Centring rod with circular bubble
T3/T2 combination bayonet base
Electric lighting for T3:
1 Battery box, normal
or
1 Battery box, flame-proof containing:
6 single cell torch batteries (if ordered)
1 connection cable
1 handlamp
Eyepiece prisms for telescope and reading eyepieces
Eyepiece filter for eyepiece prism: black blue and green
Eyepiece filter for telescope eyepiece: black, or blue or green
Wild-Roelofs solar prism, with T3 adapter ring, in case
T3 Pillar plate, with centring pin
Optical plumet (necessary modification can be made only in a Wild workshop)

Dam Deformation Accessories

1 Ball centring device, with modification parts (assembly to be made only in a Wild workshop)
3 Footscrew discs
Centring socket (pillar bolt) with protective cover for embedding in the pillar
Detachable pillar bolt target
Detachable circular bubble for setting the pillar bolt vertically in the concrete
Permanent target bolts, for embedding in the dam wall



Easy transport of instrument with practical light-weight carrying frame

Path of rays for circle reading in the Wild T3 Precision Theodolite

Modifications resulting from technical developments may be made in the interest of our customers. Therefore, illustrations and specifications are not binding and are subject to change without notice.

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