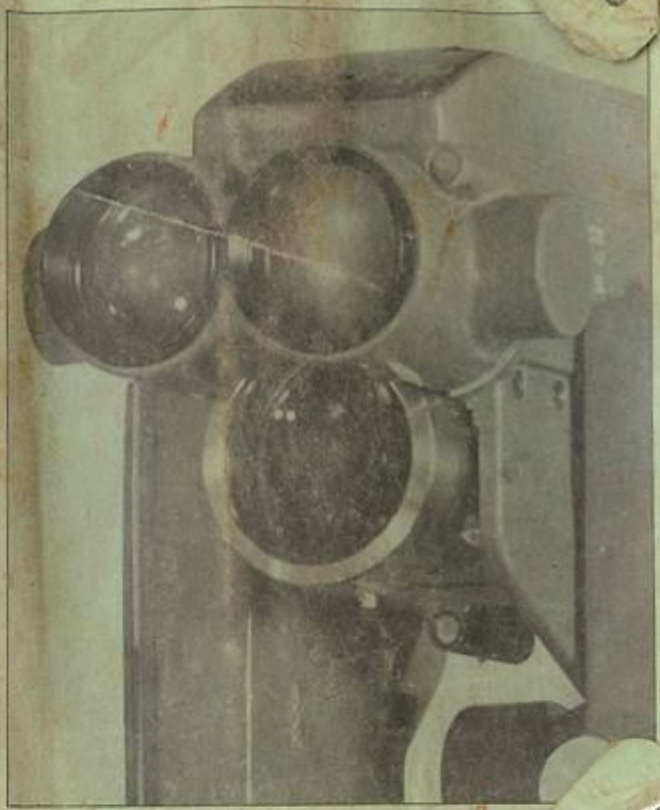
WILD DISTOMAT DI4/DI

Instructions for use



WILD
HEERBRUGG

...vature and Refraction when working with the optional keyboard

The DI4/DI4L Distomats described in this manual have a microprocessor that automatically corrects the height difference (and horizontal distance) for earth curvature and mean refraction. See 4.6.1.

The microprocessor used in earlier DI4/DI4L Distomats does not apply a correction for curvature and refraction.

To distinguish Distomats:

- Cover the objectives with the hand and touch [TEST]. Read the signal. See 4.3.3.
- If the received signal display shows 02 or 03, the Distomat is as described in this manual. A correction for curvature and refraction is applied.
- If the received signal shows 00, the Distomat is an earlier model. A correction for curvature and refraction is not applied. Please ask for the earlier edition of the Instructions for Use.

1. Equipment

Stock No.	
395192	DI4 [illegible]
239001	DI4
365181	Co[illegible]
409846	D[illegible]
403701	[illegible]
365181	
395193	
239001	
365131	
4098	
[illegible]37	

410360 DI4L Equipment LCD-Display, [illegible] Distomat, LCD, with auxilia-

LCD DISTOMAT DI4/DI4L

Instructions for use

Contents

1. Equipment

Stock No.	
	DI4 Distomat
395 192	DI4 Equipment LED-Display, for T1/T16
239 001	DI4 Distomat, LED, with accessories, in container
365 181	Counterweight GGD 4
409 846	DI4 Equipment LCD-Display, for T1/T16
403 701	DI4 Distomat, LCD, with accessories, in container
365 181	Counterweight GGD 4
395 193	DI4 Equipment LED-Display, for T2
239 001	DI4 Distomat, LED, with accessories, in container
365 136	Counterweight GGD 5
409 847	DI4 Equipment LCD-Display, for T2
403 701	DI4 Distomat, LCD, with accessories, in container
365 136	Counterweight GGD 5
	DI4L Distomat
402 188	DI4L Equipment LED-Display, for T1/T16
403 750	DI4L Distomat, LED, with auxiliary filter and accessories, in container
365 181	Counterweight GGD 4
410 359	DI4L Equipment LCD-Display, for T1/T16
403 702	DI4L Distomat, LCD, with auxiliary filter and accessories, in container
365 181	Counterweight GGD 4
402 189	DI4L Equipment LED-Display, for T2
403 750	DI4L Distomat, LED, with auxiliary filter and accessories, in container
365 136	Counterweight GGD 5
410 360	DI4L Equipment LCD-Display,
403 702	DI4L Distomat, LCD, with auxilia accessories, in container
365 136	Counterweight GGD 5

Accessories delivered with DI4 an
1 Allen key, 10 fuses
1 rain and dust cover

Counterweights

365 181	Counterweight GGD 4 for DI4/DI4L on T1/T16
365 136	Counterweight GGD 5 for DI4/DI4L on T2
376 580	Counterweight GGD 6 for DI4/DI4L on former T1A (up to No. 187 352) and former T16 (up to No. 183 742) and former T2 (up to No. 184 042)

Power-supply equipment
Select as required

Batteries, rechargeable, NiCd, 12 V

401 846	Mini-battery GEB 66, 0.5 Ah, with cable attached
402 210	Small battery GEB 70, 2 Ah, 5 pole socket
409 667	Large battery GEB 71, 7 Ah, 5 pole socket

Cables for connecting batteries t DI4 and DI4L

409 672	Battery cable with 5 pole plug battery GEB 70 2 Ah and 4(GEB 71 7 Ah
237 715	Battery cable with 3 pole p with 3 pole socket, small large battery GEB 44 7

...les for connecting battery cables to 12 V ... battery

nte

37 716 Cable 4 m long with 5 pole socket, connects battery cable 409 672 to car battery
Cable 4 m long with 3 pole socket, connects battery cable 237 715 to car battery

Chargers 115 V/220–230 V, 50/60 Hz, for 12 V NiCd batteries

401 847 Charger GKL12 for 401 846 mini-battery GEB 66 0.5 Ah and 402 210 small battery GEB 70 2 Ah. Charges two batteries simultaneously

409 669 Charger GKL13 with 5 pole plug, for 409 667 large battery GEB 71 7 Ah

Keyboard

Adapter to be fitted to theodolite standard for keyboard/mini-battery/GRE 2

237 733 Keyboard
395 182 Adapter for T1
395 183 Adapter for T16
395 181 Adapter for T2
399 787 Adapter for former T1A (up to No. 187 352)
399 788 Adapter for former T16 (up to No. 183 742)
399 786 Adapter for former T2 (up to No. 184 042)
395 194 Quote this number, if keyboard/mini-battery/GRE 2 adapter is to be fitted to theodolite at factory
Note that the mini-battery cannot be used together with the keyboard

Recording device

Wild GRE 2 Recording Unit. See brochure G1 341e

4

Theodolites for DI 4/DI 4L

With Distomat/telescope adapter GVS already fitted

Wild T1 Micrometer Theodolite, with adapter GVS 20 and focussing sleeve extension already fitted, in container

374 903 T1, 400^g, with tribrach GDF 21
380 881 T1, 400^g, without tribrach, for centring tripod GST 70
374 902 T1, 360°, with tribrach GDF 21
380 880 T1, 360°, without tribrach, for centring tripod GST 70

Wild T16 Scale Reading Theodolite, with adapter GVS 20 and focussing sleeve extension already fitted, in container

373 728 T16, 400^g, with tribrach GDF 21
380 883 T16, 400^g, without tribrach, for centring tripod GST 70
373 729 T16, 360°, with tribrach GDF 21
380 882 T16, 360°, without tribrach, for centring tripod GST 70
397 298 T16, 360°, with 20" scale, with tribrach GDF 21
397 299 T16, 360°, with 20" scale, without tribrach, for centring tripod GST 70
308 855 T16D, 360°, with tribrach GDF 21
318 556 T16D, 360°, without tribrach, for centring tripod GST 70
397 300 T16D, 360°, with 20" scale, with tribrach GDF 21
398 401 T16D, 360°, with 20" scale, without tribrach, for centring tripod GST 70

Wild T2 Universal Theodolite, with adapter GVS 19 already fitted, in container

366 695 T2, 400^g, with tribrach GDF 22
380 885 T2, 400^g, without tribrach, for centring tripod GST 70
366 694 T2, 360°, with tribrach GDF 22
380 884 T2, 360°, without tribrach, for centring tripod GST 70

Distomat/telescope adapter GVS

To be fitted to customers theodolite. (Note: DI 4/DI 4L adapters = DI 3S/DI 3 adapters.)

368 847 Adapter GVS 20 for T1 and T16, with focussing sleeve extension
346 530 Adapter GVS 19 for T2
353 166 Adapter GVS 17 for former T1A (up to No. 187 352) and former T16 (up to No. 183 742)
353 167 Adapter GVS 18 for former T2 (up to No. 184 042)

Reflector equipment

Circular prism system

362 830 Circular prism GPR1, in container
125 189 Case for 12 circular prisms
237 718 Single-prism holder GPH 1A
353 163 Draw-string bag for GPH 1A
391 305 Container for 2 GPH 1A, 2 carriers, 2 tribrachs

362 819 Three-prism holder GPH 3, in container:
400 080 Three-prism holder GPH 3
201 965 Container for GPH 3

376 233 Eleven-prism holder GPH 11, in container:
364 618 Eleven-prism holder GPH 11
124 898 Container for GPH 11

Carriers for GPH 1A and GPH 3

325 722 Carrier GRT 10, without plate level, without optical plummet
360 530 Carrier GZR 1, with plate level and optical plummet
360 532 Carrier GZR 2, with plate level, without optical plummet

Plumbing poles and reflector stand for GPH 1A and GPH 3

385 500 Plumbing pole, telescopic, with circular bubble, cm and 0.05 ft graduation, extends to 2.15 m
353 196 Plumbing pole tripod GST 5, with telescopic legs
403 427 Mini plumbing pole (prism/target 20 cm over point)
376 300 Reflector stand GST 8, cm graduation
237 930 Extension 0.5 m long, for GST 8, plumbing pole and carriers
403 428 Extension 1 m long, for plumbing pole, carriers and GST 8

Target lamp GEB 72

411 625 Wild GEB 72 target lamp
353 163 Draw-string bag for GEB 72
393 911 Spare bulb with reflector, halogen, 12 V/20 W
409 679 Battery cable with 5-pole plug, connects GEB 72 lamp to GEB 71 and GEB 70 batteries
409 700 Cable 4 m long with crocodile clips, connects GEB 72 lamp to 12 V car battery
415 766 Battery cable with 3-pole plug, connects GEB 72 lamp to former batteries GEB 49 and GEB 44 with 3-pole socket
For batteries, see power-supply equipment

Tribrachs
For all carriers and GPH 11
Note that for centring tripod GST 70 a tribrach is not required.

399 776 Tribrach GDF 22, with optical plummet (T2 tribrach)
399 778 Tribrach GDF 21, without optical plummet (T1/T16 tribrach)

Tripods

296 632 Tripod GST 20, with telescopic legs, protective cover for head, pouch with plumb bob and hexagonal key
394 752 Tripod GST 20-9, with telescopic legs, protective cover for head, hexagonal key
316 170 Tripod GST 20-2, extra-long (2.5 m), with telescopic legs, protective cover for head, pouch with plumb bob and hexagonal key
373 725 Centring tripod GST 70 for T1/T16, with telescopic legs, rod with cm-graduation only, protective cover for head, pouch with plumb bob and hexagonal key
356 117 Centring tripod GST 70 for T2, with telescopic legs, rod with cm-graduation only, protective cover for head, pouch with plumb bob and hexagonal key

For tripod

373 726 Centring rod for T1/T16, cm graduation
373 727 Centring rod for T1/T16, 0.05 ft graduation
212 956 Centring rod for T2, cm graduation
212 957 Centring rod for T2, 0.05 ft graduation
373 731 Centring rod for T1/T16, extra-long (2.5 m), for use with GST 20-2, cm graduation
266 862 Centring rod for T2, extra-long (2.5 m), for use with GST 20-2, cm graduation
315 010 Shoulder carrying strap, for GST 20 and GST 70
332 200 Tripod base GST 4

2. Technical data

Distance measurement		
Standard deviation σ	5 mm + 5 mm/km	
σ Tracking	1–2 cm	
Distance measurement	fully automatic	
Signal attenuation DI 4	by automatic filters	
Signal attenuation DI 4L	by automatic filters	
	for distances below 100 m the auxiliary filter must be fitted	
Breaks in beam	result not affected	
Measuring programs	DIST	DIST TEST
Type	Normal	Tracking
Time including filters	6–7.5 s	2.5–4 s
Display LED, digital	six-figure, to mm or 0.01 ft	
Display LCD, digital	seven-figure, to mm or 0.01 ft	
Unambiguous up to	1999.999 m or 6561.67 ft (= 2000 m × 3.280833)	

Keyboard (optional accessory)	
Angle input	selectable, 360° or 400ᵍ six-figure input, degrees, mins, tens of secs.
Display	slope distance, horizontal distance, height difference, coordinate differences
Time for reductions	1.5 s

Scale correction	variable, 16-step switch
Correction change per switch step	2 mm/100 m = 0.02 ft/1000 ft = 20 ppm

Range with Wild circular prisms

Disto-mat	No. of prisms	Atmospheric conditions: Poor [1]	Average [2]	Excellent [3]
DI 4	1	0.6 km	1.0 km	1.3 km
	3	0.8 km	1.5 km	2.0 km
	7	1.0 km	1.8 km	2.5 km
	11	1.2 km	2.0 km	3.0 km
DI 4L	1	1.2 km	2.5 km	3.5 km
	3	1.5 km	3.5 km	5.0 km
	7	1.7 km	4.5 km	6.0 km
	11	1.8 km	5.0 km	7.0 km

[1] Strong haze with visibility about 3 km.
Or, very bright sunlight with severe heat shimmer.
[2] Light haze with visibility about 15 km.
Or, moderate sunlight with light heat shimmer.
[3] Overcast, no haze, visibility about 30 km, no heat shimmer.

Optics	
Transmitting objective	35 mm free aperture
Receiving objective	32 mm free aperture
Focal length	38 mm
Beam width at half power	4' (12 cm at 100 m, 1.2 ft at 1000 ft)

Measuring frequencies/scale units	
Carrier-wave length DI 4	0.885 µm infra-red
Carrier-wave length DI 4L	0.835 µm infra-red
Fine measurement	4 870 255 Hz = 30.7692 m
Coarse measurement	74 927 Hz = 2000 m

Power consumption	
After switching ON and while measuring	about 5 W (0.4 A/12 V)
While calculating and displaying	about 2 W (0.2 A/12 V)
Temperature range for DI4 operation	−20° C to +50° C (−4° F to +122° F)
Mini-battery, GEB66, 0.5 Ah	NiCd, 12 V (10 gas-tight cells)
No. of measurements at 20° C (68° F) when fully charged	about 100
Fuse	Micro-fuse, 0.8 A, with 2 pins
To be charged with	Charger GKL12
Small battery, GEB70, 2 Ah	NiCd, 12 V (10 gas-tight cells)
No. of measurements at 20° C (68° F) when fully charged	about 400
Fuse	FST 5020/T 2.5 A/5 × 20
To be charged with	Charger GKL12
Large battery, GEB71, 7 Ah	NiCd, 12 V (10 gas-tight cells)
No. of measurements at 20° C (68° F) when fully charged	about 1500
Fuse	FST 5020/T 2.5 A/5 × 20
To be charged with	Charger GKL13

Charger GKL12	For mini-battery GEB66 and small battery GEB70, charges 2 batteries simultaneously
Mains/line supply for charger	115 V/220 V +10% −15%, 50/60 Hz
Consumption	about 5 W
Charging current	2 × 0.2 A ±10%
Time for charging flat battery	about 14 hours (charging current 0.05 A for mini-battery)
Ambient temperature for charging battery	+10° C to +30° C (50° F to 86° F)
Charger GKL13	for large battery GEB71, 7 Ah
Mains/line supply for charger	115 V/220 V ±20%, 50–60 Hz
Consumption	about 25 W
Charging current	0.7 A ±10%
Time for charging flat 7 Ah battery	about 14 hours
Ambient temperature for charging 7 Ah battery	+10° C to +30° C (50° F to 86° F)
Weights	
DI4/DI4L	1.1 kg (2.4 lb)
Counterweight	
GGD4 for T1/T16	0.8 kg (2.0 lb)
GGD5 for T2	1.1 kg (2.4 lb)
Keyboard	0.2 kg (0.4 lb)
Mini-battery, 0.5 Ah	0.4 kg (0.9 lb)
Small battery, 2 Ah	0.9 kg (2.0 lb)
Large battery, 7 Ah	3.0 kg (6.6 lb)
Container	3.8 kg (8.4 lb)

Dimensions of container	35 × 27 × 22 cm (1.15 × 0.89 × 0.72 ft)
Tilting range	
DI4 on theodolite	−65° (−70g) to zenith
Height of tilting axis above tribrach dish	
Theodolites T1 and T16	180 mm (0.59 ft)
Theodolite T2	196 mm (0.64 ft)
Reflector GPH11	196 mm (0.64 ft)
Reflectors GPH1A, GPH3	Set to required height by GRT10 carrier. See fig. 15
	180 mm (0.59 ft) when on carrier GZR1
	196 mm (0.64 ft) when on carrier GZR2

3. Description

See fig. 1 at end of booklet.

3.1 DI4/DI4L DISTOMAT

There are four models of the Distomat:
- DI4, 2 km range, with LED display
- DI4, 2 km range, with LCD display
- DI4L, 5 km range, with LED display
- DI4L, 5 km range, with LCD display

Fig. 2 Adapter mounted on telescope of T16 theodolite
10 Adapter, with two bolts and 3 V-shaped notches
11 Focusing sleeve extension for T1 and T16 (not available for T2)

The DI4 and DI4L are identical in size, appearance and operation. The only difference is that an auxiliary filter has to be fitted to the DI4L when measuring distances less than about 100 m (fig. 3b).

The DI4 can be fitted on T1, T16 and T2 theodolites. An adapter (10, fig. 2) must be mounted on the telescope in face right position. For details of adapters see section 1, Equipment. With the T1 and T16, telescope and DI4 will transit.

Two spring levers (13, fig. 3a) lock the DI4 to the two bolts of the adapter. The three centring balls (12, fig. 3a) on the underside of the DI4 rest in the three V-shaped notches of the adapter, thus maintaining collimation between DI4 and telescope. Parallelism (i.e. collimation) between the telescope line of sight and the optical axis of the DI4 can be adjusted; see 5.2.

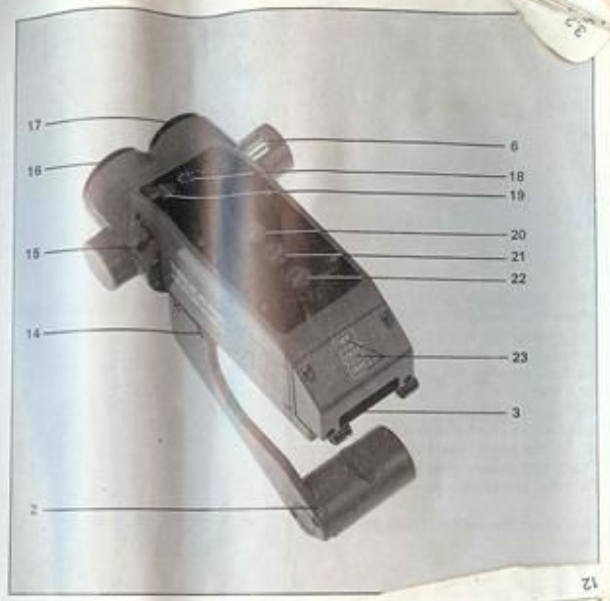
Due to the counterweight (2, fig. 4), the telescope with DI4 fitted remains perfectly balanced.

Because of the adapter, it is not possible to fit a telescope level or telescope roof plummet on the theodolite.

Fig. 3a Underside of DI4
12 Base plate. The three centring balls rest in the V-shaped notches of the adapter. The spring clamps grip the two bolts of the adapter
13 Two spring levers

Fig. 3b DI4L with auxiliary filter
16a Auxiliary filter. Must be fitted to the transmitting objective of DI4L when measuring distances less than 100 m.
17 Receiving objective

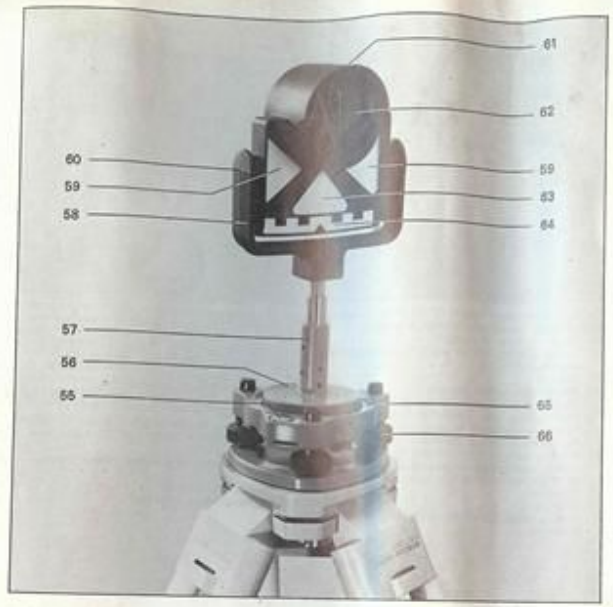
Fig. 4 Wild DI4 Distomat
2 Counterweight
3 Display
6 Socket for battery cable or keyboard cable. Red dot to red dot. Push/pull. Don't turn.
14 Screws for attaching counterweight (2)
15 Optical sight
16 Transmitting objective
17 Receiving objective
18 Scale correction switches
19 Switches for units and additive constant
20 [OFF] Key
21 [MEAS] Key
22 [DIST] Key
23 Key arrangement



◄◄ Fig. 7b Large battery, GEB 71, 12 V/7 Ah. Fully charged sufficient for about 1500 measurements. Charge with GKL13 (Fig. 8).
38 Carrying strap
39 Hook for hanging battery on tripod
40 Socket for battery and charging cable
41 Fuse (FST 5020/T 2.5 A/5×20). Screw out black cover to change fuse.

◄ Fig. 8 Charger GKL13 (left). Charges one large battery 7 Ah. Charger GKL12 (right) for mini-battery GEB66, 0.5 Ah and for small battery GEB 70, 2 Ah. Charges two batteries simultaneously.
42 Plug. Fits into battery socket
43 Voltage selector switch 115 V and 220 V/230 V (on underside of GKL12)
44 Mains/line cable
45 Plug for mains/line socket
46 Charging control lamp, red (two lamps, one for each battery, on GKL12)
47 Mains/line power control lamp, green. GKL13 only.
48 Charging cable

◄ Fig. 9 Cable 4 m long, for connecting to 12 V car battery. **Note: connect to 12 V supply only.** Protected by a fuse against false-poling. To change fuse: Remove two screws on top of housing. Fuse and spare fuse are inside.
50 Hook for hanging on tripod leg
51 Socket for battery cable
52 Cable 4 m long
53 Crocodile clips on banana plugs (54)
54 Banana plugs



3.4 REFLECTORS
(figs. 10 to 14)

Circular prisms can be fitted as required into single (GPH1A), three (GPH3) and eleven (GPH11) prism holders. Catches (70, fig. 11) hold the prisms in place. The tilting range of the prism holders is −45° to zenith.
The single-prism holder GPH1 of the Tachymat equipment is not recommended for the DI4. The GPH1 has no target marks and the prism lies in the tilting axis, thus separate pointing for angle and DI4 distance measurement would be needed.

Fig. 10 Single-prism holder GPH1A, with circular prism, on reflector carrier, in tribrach
55 Circular bubble of tribrach
56 Centring flange of carrier (57)
57 Carrier GRT10, can be set to theodolite tilting axis height (fig. 15)
58 Standards
59 Target for horizontal cross hair (vertical angle measurement)
60 Tilting axis
61 Aiming notch, for directing prism towards Distomat
62 Circular prism GPR1, 60 mm free aperture
63 Target for vertical cross hair (horizontal angle measurement)
64 Centimetre scale, useful when setting out
65 Tribrach
66 Swivel knob locking device. Arrow down = locked. Arrow up = unlocked

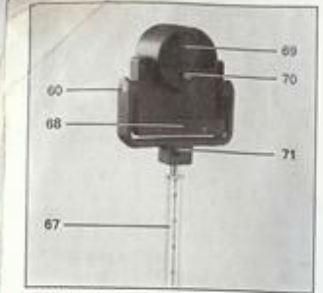


Fig. 11 Single-prism holder GPH1A, with circular prism, on plumbing pole
60 Tilting axis
67 Plumbing pole, with cm and 0.05 ft graduation to read height of tilting axis (60) above ground point
68 Counterbalance
69 Rear of prism housing
70 Prism catch. Turn horizontal to lock prism in holder. Turn vertical to remove prism. Horizontal = locked. Vertical = unlocked
71 Release button. Prism holder fits on reflector carrier, plumbing pole and reflector stand (fig. 16). Press button to fit and remove prism holder

Fig. 12 Three-prism holder GPH3, with 3 circular prisms fitted, on reflector carrier, in tribrach
55 Circular bubble of tribrach
57 Carrier GRT10, can be set to theodolite tilting axis height (fig. 15)
65 Tribrach
66 Swivel knob locking device. Arrow down = locked. Arrow up = unlocked
70 Prism catch. Turn horizontal to lock prism in holder. Turn vertical to remove prism. Horizontal = locked. Vertical = unlocked
71 Release button. Prism holder fits on reflector carrier, plumbing pole and reflector stand (fig. 16). Press button to fit and remove prism holder
72 Standards
73 Tilting axis
73 Aiming notch, for directing prisms towards Distomat

Fig. 13 Eleven-prism holder GPH11. Up to 11 prisms can be fitted. Prisms should be arranged symmetrically about the centre. Photo shows 6 prisms arranged symmetrically around the GEB 72 target lamp. Photo shows GPH11 in tribrach.
55 Circular bubble of tribrach
66 Swivel knob locking device. Arrow down = locked. Arrow up = unlocked
75 Standards
76 Tilting axis. Height of GPH11 tilting axis above tribrach dish = height of T2 tilting axis = 196 mm
77 Aiming notch, for directing prisms towards Distomat
78 Target lamp GEB 72
79 Centring flange of GPH11

Fig. 14 Target lamp GEB 72. The GEB 72 fits into Wild prism holders. It is powered by a 12 V battery. It can be seen over distances which are measured with Wild Distomats. It facilitates locating and pointing to the reflector. See brochure G1 349e. Photo shows GEB 72 in a GPH3 holder. The lamp is in the centre with a prism on each side. There is an on/off switch and a socket for the cable at the rear of the lamp.

3.5 CARRIER REFLECTOR STAND PLUMBING POLE (figs. 15 to 19)

Fig. 15 Setting the reflector carrier GRT10 to the height of the theodolite tilting axis.
Slacken screw with screwdriver. Set carrier to required height and then turn until screw is seen in one of the holes. Tighten screw again.
Line T2/TC1 = 196 mm T2 and Tachymat TC1
Line T1/T16 = 180 mm new T1/new T16
Dot T1A = 176 mm former T1A
Dot T16 = 167 mm former T16
Carrier fits in Wild tribrachs and takes single (GPH1A) and three (GPH3) prism holders.

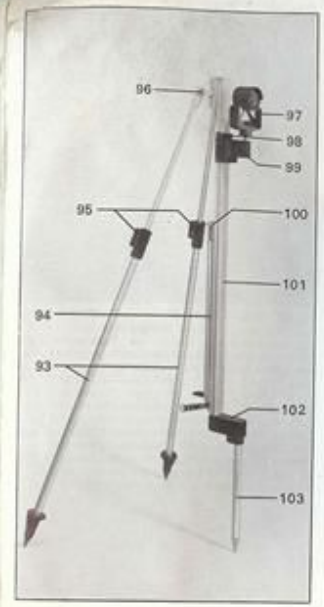


Fig. 16 Reflector Stand GST8, with single-prism holder GPH1A. Also takes three-prism holder GPH3.
93 Telescopic legs
94 Extension piece, 50 cm long, optional accessory. Can be used on reflector carriage (99) or to lengthen point (103)
95 Clamps for telescopic legs
96 Hinge. Adjust using hexagonal key from tripod
97 Single-prism holder GPH1A
98 Black button. Press to move reflector carriage (99) up and down vertical column (101)
99 Reflector carriage. Can be slid up and down vertical column (101) on pressing black button (98)
cm-reading against top of carriage = height of reflector tilting axis above point (103)
100 Circular bubble
101 Vertical column with cm-graduation
102 Holder for removable point (103). To shorten reflector stand for transport, remove point and push into holder (102)
103 Removable point

Fig. 17 Reflector Stand GST8. Using the 0.5 m extension piece (94, fig. 16) to increase length of point (103, fig. 16).
To increase height of reflector above ground, fit extension piece on reflector carriage (99, fig. 16).

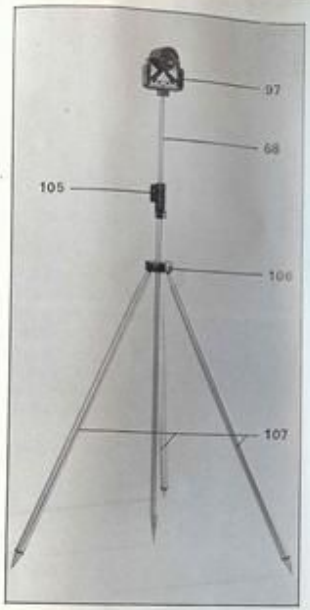


Fig. 18 Single-prism holder GPH1A, on plumbing pole GLS11, in plumbing pole tripod GST5. Note that, for most applications, the plumbing pole can be hand-held.
68 Plumbing pole GLS11, with cm and 0.05 ft graduation
97 Single-prism holder GPH1A
105 Clamp for plumbing pole. To extend or retract pole, press the clamp
106 Plumbing pole tripod GST6. Fit the pole into the ring of the tripod from above
107 Tripod leg, telescopic. Turn lower part of leg through about 90° with respect to upper part. Extend or retract leg. Turn to clamp again.

Fig. 19 Mini plumbing pole with GPH1A

4. Instructions for use

Setting up the tripod and theodolite and the use of the theodolite are presumed to be known, otherwise consult the theodolite instruction booklet.

4.1 FITTING THE DI4 ON THE THEODOLITE

Theodolite in face right. Telescope roughly horizontal. Tighten vertical clamp. Remove carrying handle.

Take DI4 out of container (fig. 20). Lead it over and parallel to telescope with counterweight between standards (fig. 21) until it rests on the two bolts of the adapter.

Press the two spring levers together (fig. 22). The DI4 now drops on to the adapter. Press down gently on the DI4 to make sure it is correctly in place. Release the two spring levers.

Important! The DI4 must sit flush on the adapter. If it is clamped in an inclined position, the measurement will be affected.

Fig. 20 Container for DI4, battery, keyboard, and accessories ▶

Fig. 21 Lead DI4 over and parallel to telescope ▼ with counterweight between standards

Fig. 22 Press the two spring levers together. Press ▶▼ down gently on DI4. Release the two spring levers.

Important! The DI4 must sit flush on the adapter

Hook battery on tripod leg. Plug battery cable into socket in base of battery (fig. 23) and into socket (fig. 24) of DI4. The red dots on socket and plug show the correct position.

When using optional keyboard: Fit keyboard into adapter on side of theodolite and turn locking lever down (fig. 27). Plug battery cable into socket under keyboard (fig. 28). Plug keyboard cable into socket of DI4 (fig. 29).

Note: When using the DI4/DI4L with keyboard either the small battery (fig. 7a) or the large battery (fig. 7b) must be used. The mini-battery (fig. 6a) cannot be used with the keyboard. The mini-battery clips into the adapter on the side of the theodolite in place of the keyboard.

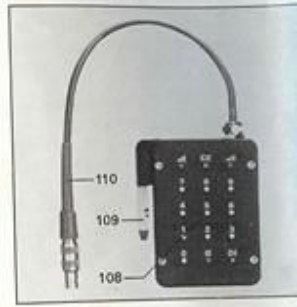
Level up theodolite with plate level.

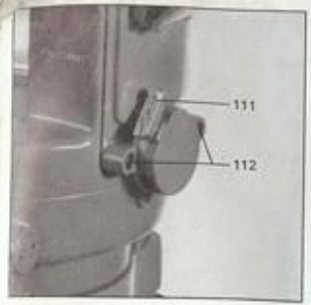
Important! If the DI4 is put on another theodolite, or if it has been for service or repair, adjust parallelism (collimation) between DI4 and telescope. Section 5.2.

Fig. 23 Plug battery cable into socket in base of ▶ battery. To remove, just pull out; don't turn

Fig. 24 Plug cable into socket of DI4. Red dots on ▼ socket and plug show correct position. To remove, just pull out, don't turn

Fig. 25 Keyboard GTS1, optional accessory ▶▼
108 Keyboard
109 Clip, fits into keyboard adapter (fig. 27)
110 Keyboard cable



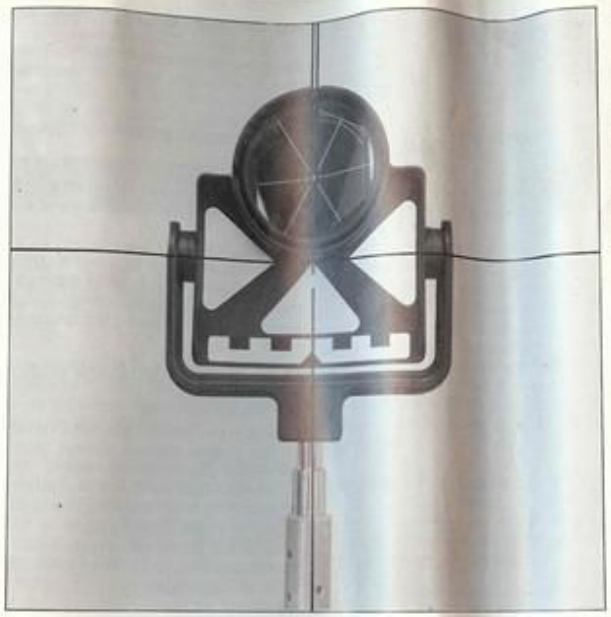


◀◀Fig. 26 Keyboard adapter fitted on theodolite
111 Locking lever. Up = unlocked. Down = locked
112 Screws attaching keyboard adapter to theodolite

◀Fig. 27 Fitting the keyboard
– Clip keyboard into adapter.
– Then turn locking lever (111, fig. 26) down to lock keyboard in position.
Note: The keyboard can be positioned at either 30° or 45° from the vertical. See fig. 40.

◀◀Fig. 28 Plug battery cable into socket under keyboard. To remove, just pull out; don't turn.

◀Fig. 29 Plug keyboard cable into socket of DI4. Red dots on socket and plug show correct position. To remove, just pull out; don't turn.



4.2 POINTING TO THE REFLECTOR

Important – collimation check
The DI4 infra-beam should be parallel to the telescope line of sight. Check regularly as described in 5.2.

Pointing to the reflector
With collimation adjusted so that the infra-red beam of the DI4 is parallel to the telescope line of sight, **only a single pointing is needed for both distance and angle measurement.**

Point to the yellow target marks of the GPH1A (fig. 30). Point to the centre of the GPH3 (fig. 31) and GPH11 (fig. 32). Note that pointing is always to the tilting axis of the reflector.

Important: If GPH3, GPH11 reflectors are used at less than the 200 m recommended minimum distance, point as shown in the figures for angle measurement and then turn the V drive of the theodolite to obtain a maximum signal for distance measurement.

Fig. 30 Single-prism holder GPH1A. Minimum distance about 20 cm.

Fig. 31 Three-prism holder GPH3. Preferably not to be used below 200 m.

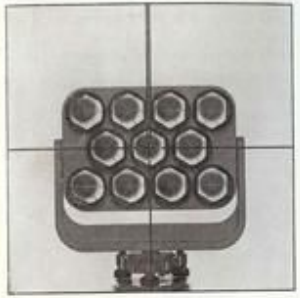


Fig. 32 Eleven-prism holder GPH11. Preferably not to be used below 200 m.

4.3 DISTANCE MEASUREMENT

Set the units/additive constant switch (4.4.1) and scale correction switches (4.4.2).

4.3.1 NORMAL PROGRAM [DIST]

Measuring: Touching [DIST] (or [DI] on the keyboard) switches on the DI4 and starts the normal distance measurement.

In the LED display, a red point appears at the left during the distance measurement. In the LCD display, the minus sign appears at the left during the measurement.

After 6–7.5 seconds the slope distance is displayed.

A point in the bottom right-hand corner of the display appears several times during the distance measurement. This is normal. This point remains in the display if the beam is interrupted by an object or if the received signal is too weak or too strong for a measurement. If a measurement cannot be completed it must be terminated by [OFF] (switching off.

The LED display has six figures. For distances between 1000 m and 2000 m the 1 km is indicated by a red point after the first figure. Only the excess over 1000 m is displayed digitally. See fig. 34 for explanation of points seen in display.

Example
3.86.591 = 1386.591 m.

The LCD display has 7 figures. The distance is displayed digitally up to 1999.999 m (6561.67 ft). See fig. 34 for an explanation of points seen in display.

The display is unambiguous up to 1999.999 m (6561.67 ft). This is because the coarse measuring scale of the instrument is 2000 m.

For longer distances, the distance must be known to the nearest 2 km (6561.67 ft). Examples: A distance of 2563.270 m will be shown as 563.270. A distance of 5007.802 m will be shown as 1007.802.

Examples in feet: A distance of 7914.59 ft is shown as 1352.92 (7914.59 – 6561.67). A distance of 13303.38 ft is shown as 180.04 (13303.38 – (2 x 6561.67)).

The scale correction switches (see 4.4.2) can only be used for distances < 2000 m (6561.67 ft). For 2000 m (6561.67 ft) and over, set the switches to 08 (correction = 0) and proceed as explained in 4.6.2.

Standard deviation: If [DIST] is held down, two figures appear on the right of the display. They show the standard deviation s in mm that can be expected of a distance measurement. If the received signal is insufficient for a distance measurement the display shows 99. On releasing [DIST] the distance is measured provided the received signal is sufficient.

Note that 99 always appears for a fraction of a second before the standard deviation. Note that at very short distances 99 will appear several times until the correct filter is selected.

Note that it is pointless to check standard deviation at very short distances. The standard deviation display is intended for showing the accuracy of measurement over longer distances and in case of weak received signal.

[OFF] switches the DI4 off.

Automatic battery check: If, on touching [DIST], the battery voltage is below the minimum necessary for a correct measurement, the DI4 will refuse to measure. The DI4 switches automatically to test mode (see 4.3.3). Change the battery.

When measuring distances less than 100 m, the auxiliary filter must be fitted to the transmitting objective of the DI4L (fig. 3b). When measuring distances over 200 m to one prism, the auxiliary filter must be removed. Distances between 100 m and 200 m can be measured either with or without the auxiliary filter.

Note: A point lights permanently at the bottom right-hand corner of the display if the return signal is either too weak (remove auxiliary filter) or too strong (fit auxiliary filter). See fig. 34.

4.3.2 TRACKING DIST TEST

Touching first DIST and then TEST within 1 to 2 seconds starts the tracking program. The measurement repeats automatically. Slope distance is displayed for 1.5 seconds at intervals of 2.5 seconds.

Tracking can be terminated as follows:

With DI4
- Touch OFF to switch off.
- Touch DIST to start a normal distance measurement.

With optional keyboard:
- Touch DI whilst a distance is in the display to start a normal distance measurement.
- Touch CE whilst a distance is in the display. Slope distance remains in display. V-circle reading can now be entered for reductions to ◿ and ◿. See 4.6.1.
- Touch 0...9 number keys whilst a distance is in display to enter V-circle reading for reductions to ◿ and ◿. See 4.6.1.

4.3.3 TEST MODE TEST

Touching TEST for a moment puts the DI4 in test mode.

Fig. 33 shows an example of te mode.

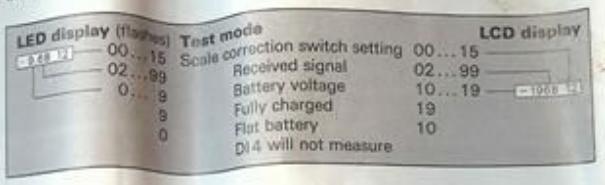


Fig. 33 Example of display after touching TEST

Display check: While TEST is held down, all elements of the display should come on simultaneously (fig. 34).

Points seen in display: Fig. 34 explains the meaning of the various points in both the LED and LCD displays.

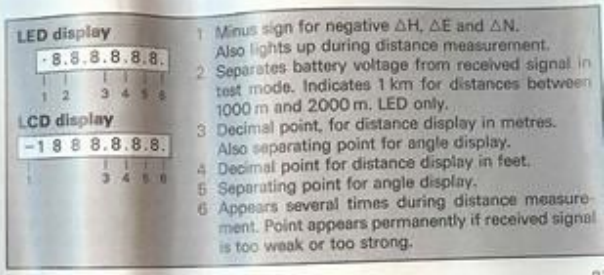
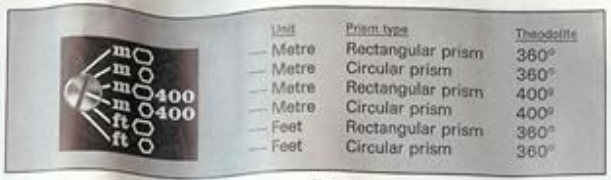


Fig. 34 Display check while TEST is held down. Note the meaning of the various points



Unit	Prism type	Theodolite
— Metre	Rectangular prism	360°
— Metre	Circular prism	360°
— Metre	Rectangular prism	400g
— Metre	Circular prism	400g
— Feet	Rectangular prism	360°
— Feet	Circular prism	360°

Fig. 35 Switch for units and additive constant. The switch is in the position: metre, circular prism, 400g.
The index for the switch is the white line at 90° to the slot.

4.4.1 SWITCH FOR UNITS AND ADDITIVE CONSTANT (fig. 35)

Two types of Wild prisms can be used with the DI 4:

- the circular prisms illustrated in this booklet
- the rectangular prisms which were manufactured formerly for the DI 10, DI 3 and DI 3S Distomats.

With the same switch setting, a distance measured to a rectangular prism would be shown 35 mm longer than to a circular prism.

For this reason it is **important** to set the switch for the type of prism being used. The distance will then be displayed correctly.

The index of the switch is the white line at right angles to the slot of the screw. Using a screwdriver, set the switch for:

- Type of prism, circular or rectangular,
- Measuring units, m or ft.
- Theodolite being used, 360° or 400g (in case of reduction using keyboard, see 4.6).

4.4.2 SCALE CORRECTION SWITCHES (fig. 36)

According to the setting of the switches, the measured slope distance up to 1999.999 m (6561.66 ft) is multiplied by a factor before being displayed. Thus a scale correction can be applied.

Note that the scale correction switches can only be used for distances < 2000 m (6561.67 ft). For 2000 m (6561.67 ft) and over, set the switches to 08 (correction = 0) and proceed as explained in 4.6.2.

Fig. 36 Scale correction switches.
Setting 12 (left 8 + right 4 = 12).
Correction = +8 mm/100 m = +0.08 ft/1000 ft
The index is the white line at 90° to the slot.

Within the range of the switches, corrections proportional to the distance (e.g. atmospheric correction, reduction to sea level, projection scale factor) can be taken into account automatically. Factors and corrections corresponding to the switch settings are given in the table.

Set the switches with a screwdriver. The index is the white line at right angles to the slot of the screw.

Example: To set switches to 12. Set left switch to 8 and right switch to 4. 8 + 4 = 12 (fig. 36).

The step between the switch positions is 2 mm per 100 m = 0.02 ft per 1000 ft = 20 ppm.

If it is preferred to calculate and apply corrections "by hand" or computer, set the switches to 08 (correction = 0).

If the required correction is outside the range of the switch – e.g. due to a large height above sea level and/or a large projection scale factor – set the switches to 08 (correction = 0) and apply the correction "by hand".

Switches left + right	Scale switch setting	Multiplication factor	Scale correction mm per 100 m or ft/1000 ft per 1000 ft
0 + 0	00	0.99984	−16
0 + 1	01	86	−14
0 + 2	02	88	−12
0 + 3	03	90	−10
0 + 4	04	92	− 8
0 + 5	05	94	− 6
0 + 6	06	96	− 4
0 + 7	07	98	− 2
8 + 0	08	1.00000	0
8 + 1	09	02	+ 2
8 + 2	10	04	+ 4
8 + 3	11	06	+ 6
8 + 4	12	08	+ 8
8 + 5	13	10	+10
8 + 6	14	12	+12
8 + 7	15	14	+14

4.5 REDUCTIONS

4.5.1 ATMOSPHERIC CORRECTION ΔD_1

Using temperature and height above sea level (or pressure), enter graph 1 and read off either:

Atmospheric correction in mm per 100 m or 1/100ths ft per 1000 ft (thin lines and unringed numbers)

or

Corresponding scale correction switch settings (thick lines and ringed numbers).

A temperature change of about 10° C or a change in elevation of about 350 m (about 35 mb change in pressure) changes the correction by only 1 mm/100 m = 0.01 ft/1000 ft.

For most work it is sufficient to take the average temperature for the day and the mean height of the area above sea level.

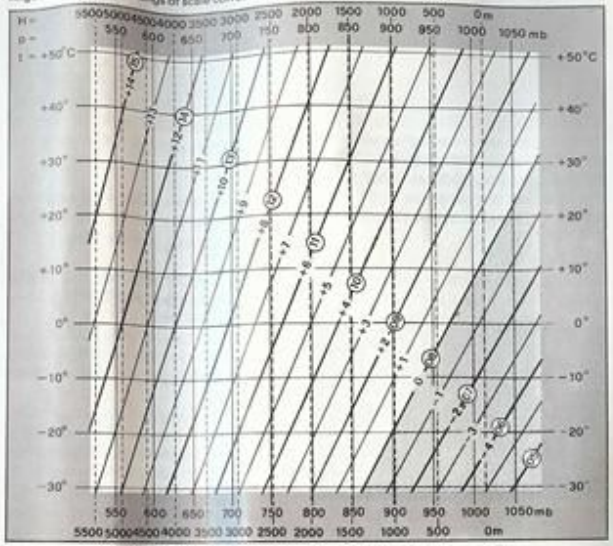
Graph 1 is based on the following formula (after Barrel and Sears) which is valid for the 0.885 µm carrier wave of the DI4 and the 0.835 µm carrier wave of the DI4L.

$$\Delta D_1 = 28.2 - \frac{0.0290\ p}{1+0.0037\ t}$$

(p in mb, t in °C)

ΔD_1 = atmospheric correction in mm per 100 m or 1/100ths ft per 1000 ft.

Graph 1 Atmospheric correction graph. °C and metres above sea level (pressure in mb). Thin lines and unringed numbers give atmospheric correction in mm per 100 m or 1/100ths ft per 1000 ft. Thick lines and ringed numbers give settings of scale correction switches.



See page 44 for atmospheric correction graph in °F and feet above sea level (pressure in inches).

4.5.2 CORRECTION TO SEA LEVEL ΔD_2

The correction in mm per 100 m or 1/100ths ft per 1000 ft can be taken from graph 2. This is based on the formula:

$$\Delta D_2 = -\frac{H}{R} \cdot 10^3$$

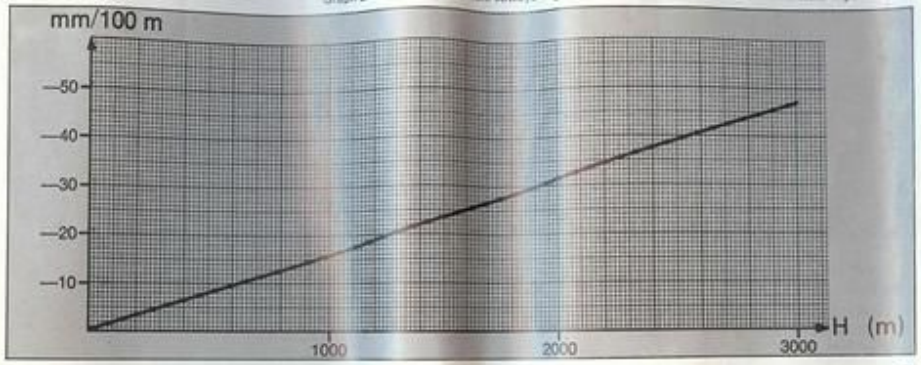
ΔD_2 = correction to sea level in mm per 100 m or 1/100ths ft per 1000 ft

H = Height of DI4 above sea level in metres

R = $6.378 \cdot 10^6$ metres

See page 45 for sea level correction graph with height above sea level in feet.

Graph 2 Sea level correction. Always negative. Correction in mm per 100 m or 1/100ths ft per 1000 ft.



4.5.3 CORRECTION FOR PROJECTION SCALE FACTOR ΔD_3

This depends on the projection used locally. Information should be obtained from the local Survey Department. A table is usually available. Correction for projection scale factor = ΔD_3.

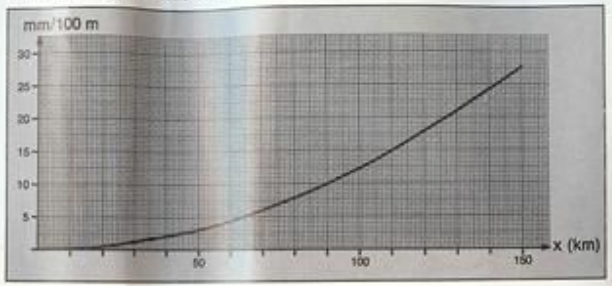
For a Transverse-Mercator (Gauss-Krüger) projection with scale factor 1 on the central meridian, the correction ΔD_3 can be taken from graph 3.

Graph 3 is based on the formula:

$$\Delta D_3 = + \frac{X^2}{2R^2} \cdot 10^5$$

ΔD_3 = correction for projection scale factor in mm per 100 m or 1/100ths ft per 1000 ft
X = easting (distance) in km from central meridian with scale factor 1
R = 6378 km

Graph 3 Correction ΔD_3 for projection scale factor for Transverse Mercator projection with scale factor 1 on central meridian. Correction in mm per 100 m or 1/100ths ft per 1000 ft. X = easting (distance) in km from central meridian with scale factor 1.



Note that in many countries the projection scale factor is not 1 on the central meridian. In this case graph 3 cannot be used directly.

4.5.4 EXAMPLES

a) Atmospheric Correction ΔD_1 only

t = +15°C
H = 560 m above sea level (p = 953 mb)
ΔD_1 = +2 mm/100 m (Graph 1)

Set scale correction switches to 09 (8 + 1). See page 29.

The displayed distances will have the atmospheric correction ΔD_1 applied automatically.

When working with the keyboard (4.6) the displayed horizontal distance refers to the height of the DI 4.

b) Atmospheric Correction ΔD_1 and Correction to Sea level ΔD_2

t = +15°C
H = 560 m above sea level (p = 953 mb)
ΔD_1 = +2 mm/100 m (Graph 1)
ΔD_2 = −9 mm/100 m (Graph 2)
Sum = −7 mm/100 m

Set scale correction switches to 05 (0 + 5). See page 29.

The displayed distances will refer to sea level.

c) Atmospheric Correction ΔD_1, Correction to Sea Level ΔD_2, Correction for Projection Scale Factor ΔD_3

t = +15°C
H = 560 m above sea level (p = 953 mb)
X = 125 km (projection with scale factor 1 on central meridian)
ΔD_1 = + 2 mm/100 m (Graph 1)
ΔD_2 = − 9 mm/100 m (Graph 2)
ΔD_3 = +19 mm/100 m (Graph 3)
Sum = +12 mm/100 m

Set scale correction switches to 14 (8 + 6). See page 29.

The displayed distances will refer to the coordinate system.

See pages 44 and 45 for examples in feet.

4.5.5 GRAPH FOR COMBINED CORRECTION

The setting of the scale correction switches for a combined atmospheric/sea level/scale factor correction can be read from graph 4.

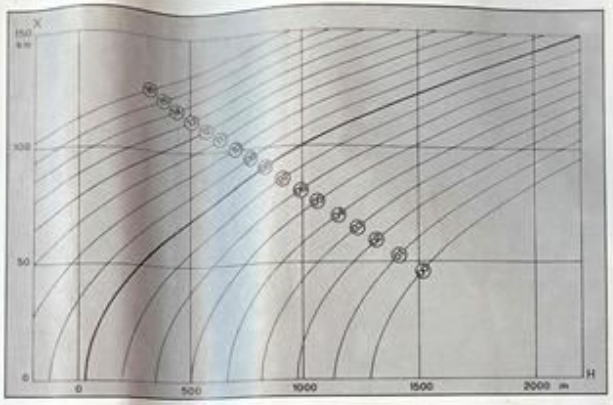
Graph 4 can only be used when working on a projection with scale factor 1 on the central meridian. It is based on:

1. Correction for projection scale factor $= +\frac{X^2}{2R^2}$
   Where X is distance in km from central meridian with scale factor 1.
   R = 6378 km
2. A mean temperature of 15°C (+59°F).

Using X (km from central meridian) and H (height above sea level in metres) read the required setting for the scale correction switches.

Graph 4 can be used directly from +5°C (41°F) to +25°C (77°F). If the temperature is below +5°C (41°F) subtract 1 from the switch setting read from the graph. If the temperature is above +25°C (77°F), add 1.

Graph 4 Setting of scale correction switches for combined atmospheric/sea level/scale factor correction. Graph can only be used for projection with scale factor 1 on central meridian. Can be used directly from +5°C to +25°C. For temperatures below +5°C subtract 1 from switch setting read from graph. Above 25°C, add 1.



Examples			
t	0°C	+10°C	+35°C
H	800 m	800 m	800 m
X	100 km	100 km	100 km
Switch setting	08 (8+0)	09 (8+1)	10 (8+2)

4.6 USE OF KEYBOARD

The keyboard is optional. With it horizontal distance, height difference and coordinate differences can be displayed. See 3.2 and figs. 1, 5, 25, 26, 27, 28 and 29.

The keyboard can only be used for reductions for distances < 2000 m (6561.67 ft). For 2000 m (6561.67 ft) and over, proceed as outlined in 4.6.2.

Touching [H] on the keyboard switches on the DI4 and starts the normal distance measurement. See 4.3.1.

For tracking, see 4.3.2.

4.6.1 HORIZONTAL DISTANCE AND HEIGHT DIFFERENCE

Measure slope distance by touching [DIST] or [DI]. Read V-circle of theodolite. After slope distance is displayed, input V-reading via keyboard. Six figures must always be entered, i.e. degrees, minutes, tens of seconds. If only degrees and minutes are read (e.g. 270°49') enter last figure as zero (e.g. 270.49.0). Examples:

V-read face right	Input	Display
360° 277°15'20"	277152	277.15.2
400g 302.542g	302542	302.54.2

Input appears in DI4 display. Check displayed value.

- [CE] Clears incorrect input and recalls slope distance to display. Input correct V-reading.
- [d] DI4 displays horizontal distance
- [d] DI4 displays height difference, sign correct
- [CE] Recalls slope distance to display, even though reductions have been completed.

Negative height differences are indicated as follows: By a red point at the left of the LED display. By a minus sign in the LCD display. See fig. 34.

The vertical angle should be measured to the yellow target marks of the GPH1A reflector, or to the centre of the GPH3 and GPH11 reflectors. Point as shown in figs. 30, 31 and 32, section 4.2. Note that pointing is always to the tilting axis of the reflector.

Note: If the error in the horizontal distance is not to be larger than ±5 mm (±0.015 ft), the vertical angle must be measured with the following accuracy:

Slope of the line	For D = 1000 m (3000 ft)	For D = 100 m (300 ft)
5° (or 5g)	±12" (or 40cc)	±120" (or 400cc)
10° (or 10g)	± 6" (or 20cc)	± 60" (or 200cc)
20° (or 20g)	± 3" (or 10cc)	± 30" (or 100cc)
40° (or 40g)	± 1.5" (or 5cc)	± 15" (or 50cc)

In most cases, it suffices to measure the vertical angle in one face (Face Right).

The displayed horizontal distance and height difference are automatically corrected for earth curvature and mean refraction.

Horizontal distance and height difference are calculated in the DI4/DI4L according to the following formulae:

Slope distance $\measuredangle = D_0 \cdot (1+m)$

Horizontal distance $\measuredangle = Y - A \cdot X \cdot Y$

Difference in height $\measuredangle = X + B \cdot Y^2$

where:

D_0 = uncorrected slope distance in metres

m = scale correction set (see 4.4.2 and 4.5)

ζ = zenith angle
= FL (V-circle reading)
= 360° – FR or 400^g – FR

$Y = \measuredangle \cdot \sin \zeta$

$X = \measuredangle \cdot \cos \zeta$

$$A = \frac{1 - \frac{k}{2}}{R} = 1.4700 \cdot 10^{-7}$$

$$B = \frac{1 - k}{2R} = 6.8288 \cdot 10^{-8}$$

$k = 0.13$

$R = 6.37 \cdot 10^6$ m (earth radius)

Note: In feet

$$A = \frac{1.4700 \cdot 10^{-7}}{3.2808333}$$

$$B = \frac{6.8288 \cdot 10^{-8}}{3.2808333}$$

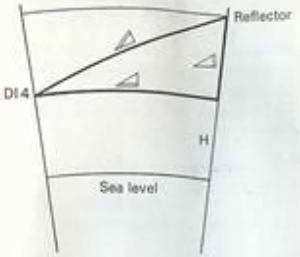


Fig. 37 Reductions in the DI4/DI4L

These formulae take into account earth curvature and refraction (mean value k = 0.13) for both $\measuredangle$ and $\measuredangle$.

Note that the formulae give $\measuredangle$ at the height of the DI4 and not at the height of the reflector (fig. 37).

4.6.2 REDUCTIONS FOR DISTANCES > 2000 m (6561.67 ft)

Use of the scale correction switches and reductions with the keyboard are only possible for distances < 2000 m (6561.67 ft).

For 2000 m (6561.67 ft) and over, proceed as follows:

Horizontal distance $\measuredangle$ and difference in height $\measuredangle$

$\measuredangle$ and $\measuredangle$ may be calculated using the formulae given in 4.6.1.
Correction to sea level (4.5.2) and correction for projection scale factor (4.5.3) can now be applied to $\measuredangle$.

Measuring in metres

Slope distance $\measuredangle$
Set scale correction switches to 08 (correction = 0).
D_0 = displayed slope distance (uncorrected).
Take atmospheric correction ΔD_1 in mm per 100 m from Graph 1.

$\measuredangle = D_0 + Q$,

$$Q\,[\text{mm}] = \frac{D_0\,[\text{m}]}{100\,[\text{m}]} \cdot \Delta D_1\,[\text{mm}]$$

Example:
t = +15°C
H = 560 m
ΔD_1 = +2 mm/100 m (Graph 1)

D_0 = 3275.261 m

$Q\,[\text{mm}] = +\left(\frac{3275}{100} \times 2\right) = +66$ mm

$\measuredangle = 3275.261 + 0.066 = \underline{3275.327\text{ m}}$

Measuring in feet

Slope distance $\measuredangle$
Set scale correction switches to 08 (correction = 0).
D_0 = displayed slope distance (uncorrected).
Take atmospheric correction ΔD_1 in Viooths ft per 1000 ft from Graph 1a.

$\measuredangle = D_0 + Q$,

$$Q\,[\text{ft}] = \frac{D_0\,[\text{ft}]}{1000\,[\text{ft}]} \cdot \Delta D_1\,[\text{ft}]$$

Example:
t = 59°F
H = 1840 ft
ΔD_1 = +0.02 ft/1000 ft (Graph 1a)

D_0 = 10745.58 ft

$Q\,[\text{ft}] = +\left(\frac{10745}{1000} \times 0.02\right) = +0.21$ ft

$\measuredangle = 10745.58 + 0.21 = \underline{10745.79\text{ ft}}$

4.6.3 COORDINATE DIFFERENCES

If the horizontal angle (azimuth/bearing) is entered after the horizontal distance is displayed, the DI4 will calculate **rectangular coordinates on a local system.**

The zero, or origin, of the system is the instrument, i.e. the station point. The north direction (N-axis) of the system is the direction of zero (0°, 0ᵍ) on the horizontal circle. See fig. 38.

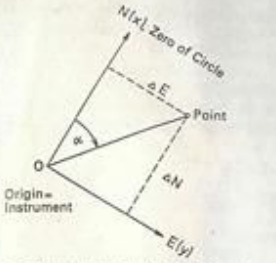


Fig. 38 Local rectangular coordinate system

After measuring slope distance [DIST] or [DI], read V-circle. Input V-reading via keyboard (6 figures). [CE] Clears incorrect input and recalls ◿ to display.
◿ DI4 displays horizontal distance. [CE] Recalls ◿ to display.
↕ DI4 displays height difference ΔH, sign correct. [CE] Recalls ◿ to display.
[Hz] Recalls ◿ to display. Input Hz-angle/azimuth/bearing (6 figures).
[CE] Clears incorrect input and recalls ◿ to display.
◿ DI4 displays ΔE (diff. E/ing), sign correct. [CE] Recalls ◿ to display.
◿ DI4 displays ΔN (diff. N/ing), sign correct. [CE] Recalls ◿ to display.
Negative ΔH, ΔE, ΔN, indicated by red point at left of LED display. Minus sign in LCD display. See fig. 34.

Examples:	LED and LCD displays D < 1000 m		LED display D > 1000 m		LCD display D > 1000 m	
Units	400ᵍ/m	360°/ft	400ᵍ/m	360°/ft	400ᵍ/m	360°/ft
	Display shows	Display shows	Display shows	Display shows	Display shows	Display shows
[DIST] or [DI] Slope distance	114.004 m	374.03 ft	9.53.417 m	6408.84 ft	1953.417 m	6408.84 ft
Input V-Circle reading	305.95.0	275.21.2	305.95.0	275.21.2	305.95.0	275.21.2
◿ Horizontal distance	113.506 m	372.40 ft	9.44.839 m	6380.69 ft	1944.839 m	6380.69 ft
[Hz]						
Input Hz angle	075.54.3	067.59.2	289.03.1	260.07.4	289.03.1	260.07.4
◿ ΔE Easting	105.233 m	345.26 ft	-9.16.042 m	-6286.21 ft	-1916.042 m	-6286.21 ft
◿ ΔN Northing	42.541 m	139.57 ft	- 333.441 m	-1093.97 ft	- 333.441 m	-1093.97 ft

4.7 IMPORTANT HINTS

1. Point to reflector. Touch [DIST]. If the received signal is too weak for a distance measurement, a point will be seen at bottom right of display (see 4.3.1 and fig. 34). The reason may be:
   a) DI4 not properly seated on adapter.
   b) Battery voltage too low.
   c) Reflector not properly directed.
   d) DI4 objectives or prism of reflector may be covered with moisture or dust (see 6).
   e) Distance too long. Or fog, haze, bad heat shimmer weakening signal.
   f) Beam interrupted by an object.
   g) In spite of pointing correctly with telescope, DI4 not directed at prism. Check parallelism (collimation) DI4/telescope (see 5.2).
   h) Auxiliary filter for DI4L. Fit for < 100 m. Remove for > 200 m. See 4.3.1.
2. If, after switching on by touching [TEST] or [DIST], there is no point in the display, the reason may be one of the following:
   a) Keyboard not connected or not properly connected to DI4.
   b) Battery not connected or not properly connected.
   c) Battery flat, or battery fuse blown, or battery defect.
   d) Battery cable or keyboard cable broken.
   e) DI4 defect.
   f) Cable 4 m long for connecting to 12 V car battery (fig. 9): – Battery flat or cable connected to wrong terminals or cable not properly connected or cable broken or fuse blown.
3. In very hot sunny weather it is recommended to shade the DI4 with an umbrella, as severe heating can reduce the efficiency of the diodes and therefore range. Never point the aiming head directly into the sun as this may damage the diodes.
4. For maximum efficiency at long range, it is recommended to shade the reflector prisms from intense sunlight.
5. Only **one** reflector must be visible in the telescope field of view. If more than one reflector is within the infra-red beam, signal mixing will cause an erroneous distance measurement. Reflecting surfaces, such as traffic signs and cat's-eye reflectors, can also cause errors if they are within the beam.
6. Certain types of walkie-talkie radios may affect a DI4 measurement if they are used very close to the instrument and if the speak-button is pressed during a measurement. When using walkie-talkie radios, it is advisable to check whether they can influence the measurement; if so, avoid pressing the speak-button during a measurement.
   Using a walkie-talkie radio at the reflector station during a measurement has no effect.
7. Easiest method with very steep sights: Point, measure, read circles (diagonal eyepieces can be used if necessary). Put telescope roughly horizontal and read distance. Enter angles into keyboard for reduction.