Geologist's compass

Operating manual

Content

Eludications to fig. 1

1) Inclination measuring plate with backing edge
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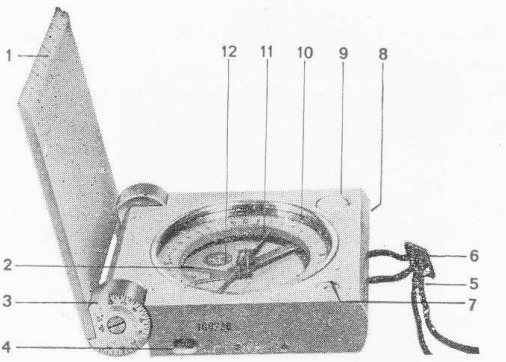
6) Slide for adjusting the arm strap
7) Box level
8) Casing
9) Locking key
10) Graduated circle of compass
11) Magnetic needle
12) Clinometer

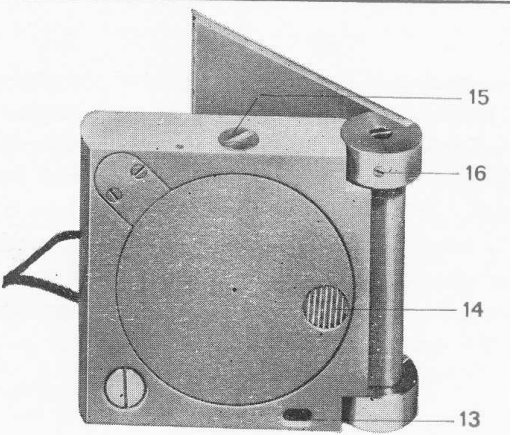
Fig. 1 Geologist's compass (total view)



Eludications to fig. 2

13) Insight for tubular spirit-level
14) Lock for clinometer
15) Drive for graduated circle of compass
16) Threaded stud bolt

Fig. 2 Geologist's compass (bottom side)



1. Application

The geologist's compass enables the measurement of strike directions, down dips and angles of pitch, or dipping angles of areal and linear geological elements (layer, schistosity, fault and interference areas, anticlinal axes and lineations) in one pass.
It is used aboveground and underground.
The graduated circle of the compass is orientable both for direct reading of the strike direction and of the down dip.

2. Equipment and technical data

2.1. Equipment

Geologist's compass	Order number
with 360°-division	108507:305.24
with 400gon –division	108507:405.26
Case	119725:100.24

2.2. Technical data

Graduated circles	
Diameter of compass circle	45 mm
Reading	2°/ 2 gon
Estimation	0,5°/ 0,5 gon
Diameter of vertical circle	22 mm
Reading	5°/ 5 gon
Estimation	1°/ 1 gon
Clinometer graduation, measuring range	± 90°/ 100 gon
Reading	2°/ 2 gon
Estimation	0,5°/ 0,5 gon

Spirit Levels

Indication of box level	40', approx.
Indication of tubular level	60', approx.
Building-up time of magnetic needle	50 s
Accuracy of directional indication	± 0,5°/ 0,5 gon
Adjustment of declination	at random
Graduated length of backing edge	70 mm
Reading	1 mm
Estimation	0,1 mm
Tilting range of inclination measuring plate	225°
Dimensions of compass (mm)	93 x 76 x 22
Dimensions of pouch (mm)	104 x 91 x 45
Weight, compass	280 g
Weight, case included	370 g

3. Description

3.1.
The compass was developed by the VEB Freiberger Präzisionsmechanik on the basis of experiences in decades in constructing geologist's compasses, following a suggestion rendered by the University of Halle, according to the pattern of the dual-circle compass (1) as proposed by Prof. Dr. E. Clar from Vienna.

Constructional details and the finished model have been planned in close cooperation with the Geologischen Institut der Bergakademie Freiberg and have finally been tried in the practice of geology.

The casing of the compass shows a modern, self-contained and contamination-proof outer appearance. In close condition, the inclination measuring plate serves as protective lid for the upper side of the casing. A manual how to apply the dual-circle geologist's compass was given in 1958 by Schwab (2).

3.2.
The magnetic needle is released on pushing the locking key (9). Alternating pushing in and releasing the locking key allows the magnetic needle swinging "North" to be easily fishtailed and the building-up time to become considerably shortened.

3.3.
Adjusting the declination and orienting the graduated circle of compass for various measuring methods is done by

making use of the drive (15) at the right-hand narrow side of the casing. Inserting a coin (about the size of a 5-penny piece or a quarter, resp.) in the slot of the drive disc (15) will serve the purpose.

3.4.
The pendulum of the clinometer (12) is released by turning the clinometer locking (14) on the bottom side by about ¼ turn to the left. For locking, the compass is to be positioned such as to allow the pendulum to occupy its limit position on top of the locking system. The clinometer locking (14) is to be moved over to the right by ¼ turn.

3.5.
The docked inclination measuring plate is closing up the casing against the ambient and, in the first place, is protecting the glass cover.

4. Handling

4.1. General

Varying form the hitherto known geologist's compasses, the graduated circle of compass is arbitrarily adjustable so that the azimuth of dip direction can be measured following Clar's (1) suggestion as also that of the direction of strike. Applicabilities and measuring process can be learned from figures 3 to 6.

Fig. 3 Possibilities of applying the inclination measuring plate to the hanging and the downthrow side of rock layers of differently steep bedding.

Fig. 3

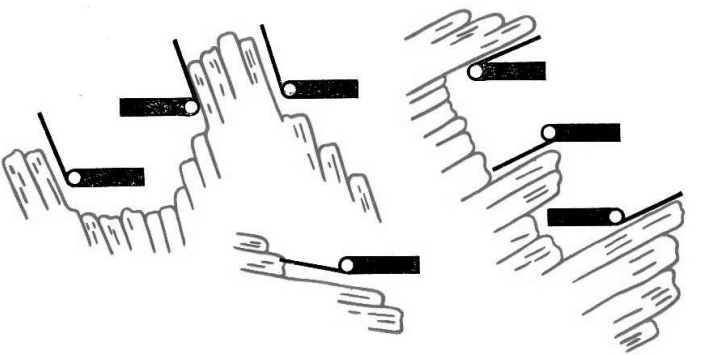


Fig. 4 Backing the inclination measuring plate against the downthrow side

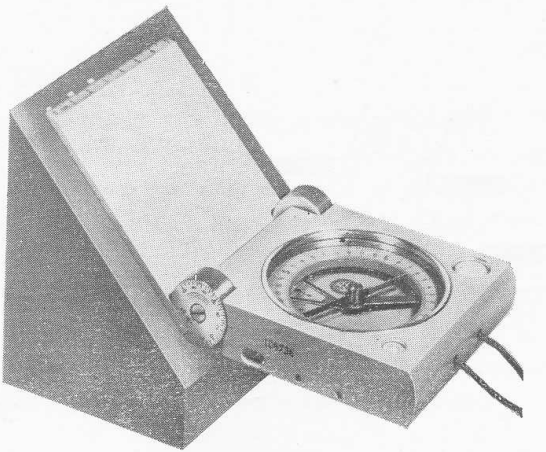


Fig. 5 Backing the inclination measuring plate against the hanging

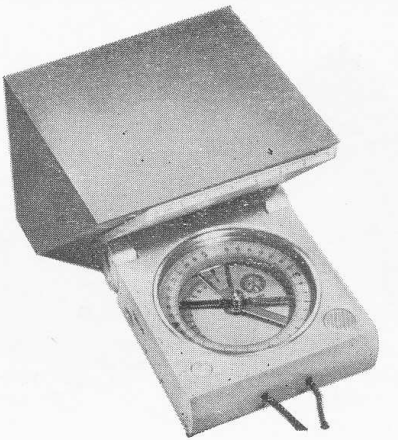
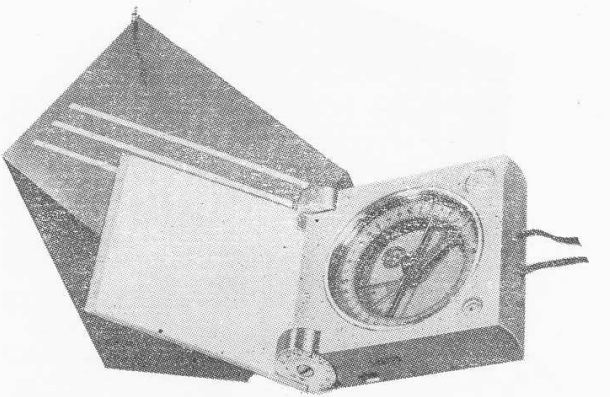


Fig. 6 Locating of linear tectonical data



4.2. Measuring the direction and inclination of the dip
The graduated circle of compass, rotary by means of drive (15), is to be oriented that way that graduation zero (N) coincides with the index linearranged between locking key and box level. For measuring direction and dip inclination the inclination measuring plate (1) is then to be docked with levelling box level (7) according to alternatives as given in figures 3 to 5. Releasing the magnetic needle (11) is brought into effect by pressing the locking key (9). Following up, the graduated circle of compass is to be read off after levelling into North-South direction. The inclination of dip is read off the vertical circle (3). In order to obtain unmistakable measured values for the direction of dip, in very backing position, the coloured markings on the magnetic needle and vertical circle shall be made use of in

such a manner that with vertical circle readings in the red marked quadrant the direction of dip is read off the red end of the magnetic needle, and with vertical circle readings in the black marked position of the vertical circle, the direction is read off the black end of the needle (1).

4.3. Measuring the strike and the dip+

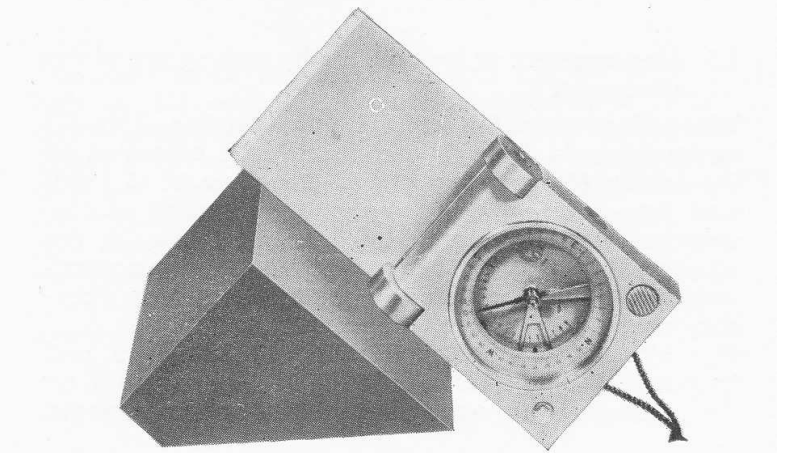
By using the drive (15) the graduated circle is to be adjusted that the graduation zero (N) coincide with the index line arranged opposite the vertical circle. For the measurement of strike and dip, the inclination measuring plate (1) is then to be docked with levelling box level (7) according to possibilities as demonstrated in the figures 3 to 5. The magnetic needle is to be released by pressing the locking key (9) and after levelling into North-South direction the graduated circle of compass is read of the black end of

the magnetic needle. The inclination of dip is to be measured on the vertical circle.

4.4. Locating linear tectional data

Tectional data are to be located in accordance with section 4.3. The methods according to 4.2. and 4.3. are differing only in the orientation of the graduated circle of compass varying by 90°/ 100 gon. With levelling box level (7) the edge of the inclination measuring plate is to be docked as shown in fig. 6, while the magnetic needle is released by pressing the locking key (9). After the needle's levelling into Norht-South direction according to section 4.3 strike and dip is to be read off from the graduated circle and the vertical circle.

Fig. 7 Inclination measurements by docking with the clinometer



4.5. Measurement of inclination by the use of the clinometer

When hinging up the inclination measuring plate (1) so much as to have it rest in straight extension of the casing (8) (reading of vertical circle 0° / 0 gon), and then placing the compass with its left narrow side upon the determining surface (fig. 7), the additionally attached clinometer enables a particularly quick and convenient measurement at an accuracy of approx ± 0,5° / 5gon.

This kind of clinometry enables a convenient and time-saving single-hand control of the compass by executing crevasse-statistical measurements. Extended by the hinged up lid the backing edge is increasing the measuring accuracy. Before measuring the clinometer is to be released according to section 3.4.

4.6. Inclination measurements using the tubular spirit level

The sighting over the edge of the correspondingly inclined inclination measuring plate enables the determination of slope of rocklayers, terrain slopes, etc. without docking the inclination measuring plate. While levelling the tubular spirit-level (4) and adjusting it parallel to the slope of terrain to be determined at simultaneous sighting over the edge of the inclination measuring plate. The inclination is read off at the vertical circle (3).

4.7. Considering the declination

By moving the drive disc (15) with a coin inserted in the slot enables the graduated circle of compass to be turned such as the correct any kind of declination. The data of the local declination my be taken either from an isogonic chart or ascertained by comparison of a known direction between

two fixed points with the compass bearing. Adjustment is made by making use of the continuous declination division on one of the index lines marked in the four quadrants.

4.8. Adjustment of the inclination

The manufacturer adjusts the horizontal position of the magnetic needle. In other places of employment, an oblique position of the magnetic needle may occur caused by a changed inclination. By sliding the copper strip arranged at the south-end, this oblique position is remedied. The casing is to be opened as explained under para. 5. Avoid pressure onto the center-pin when inserting the needle.

5. Treatment and maintenance

During disuse and transportation the geologist' compass should be stored in the provided case. The clinometer has to be secured whereas the lock of the magnetic needle takes place automatically. With regard to cleanliness and careful treatment the requirements are the same for the geologist's compass as well as for other measuring instruments. In case of ingress of moisture into the casing due to accident or inexpedient handling, please undo knurled ring on the glass cover by rotating it anticlockwise. After removing of the glass cover and the magnetic needle, the casing has to be dabbed dry carefully using a soft, non-teasing piece of cloth. The mobility of the inclination measuring plate can be regulate by means of the threaded stud bolt (16) in the positioning disc.

6. Literature

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A dual-circle geologist's and miner's compass for the measurement of areal and linear geological elements

Separate print from the negotiations of the Federal Institute of Geology Vienna, 1954, vol. 4

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Magazine for applied Geology, 1958, vol. 1, pages 37-38

(3) Möbius, G.

Geologist's compass- Schmidt's net
Instructions for the use of the geologist's compass and the azimuthal projection (Schmidt's net) for mapping areal and linear geological elements.

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