

THE BRUNTON COMPANY

RIVERTON, WYO.
U.S.A.

Form 354-A

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HOW TO GET THE MOST
FROM YOUR . . .

BRUNTON®

Cadet

THE
BRUNTON COMPANY

Riverton, Wyo.
U.S.A.

PERFECTION IN INSTRUMENTATION SINCE 1880

A GUIDE TO QUICK, EASY,
AND ACCURATE USE OF THIS
UNIQUE VERSION OF THE
FAMOUS BRUNTON® POCKET
TRANSIT.

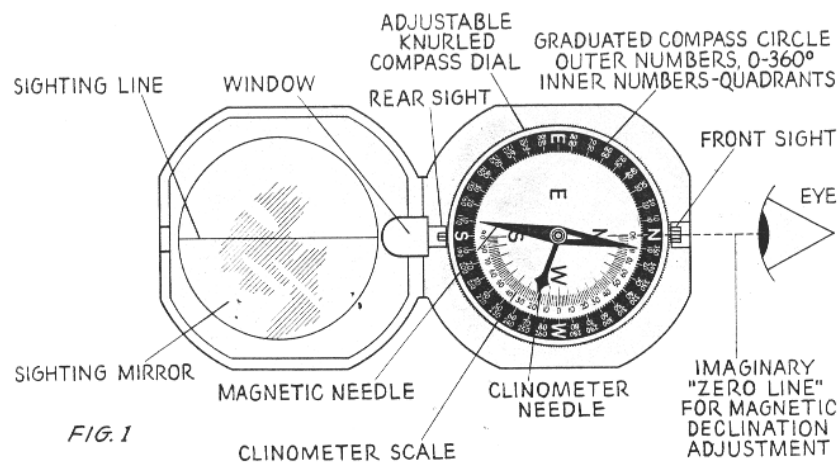


FIG. 1

Your **BRUNTON CADET** offers for the first time a true version, in inexpensive form, of the famous **BRUNTON POCKET TRANSIT**. Although it has the capabilities of a compass, this unique instrument is actually a complete pocket transit incorporating all the features and affording all the applications of this basic geologist's tool.

The **CADET** combines the principles of a surveyor's compass, a prismatic compass, a clinometer, a hand level, and plumb. The instrument is used to determine compass directions, (and thus to determine horizontal angles), to measure vertical angles, to run levels and to measure the inclination of objects.

1. TO SET THE COMPASS CIRCLE FOR TRUE OR MAGNETIC BEARINGS.

The North end of the needle is notched and seeks magnetic North. The earth's magnetic North pole and geographic (true) North pole are far apart. Therefore, there are few places where the needle of a transit points to true North.

The angle between magnetic North, indicated

by a compass, and true North is called "magnetic declination." (See Figure 2)

A map is oriented to true North so, when using a map, you should adjust your transit for each area of different magnetic declination. When this is done, the needle will point to a "true" reading on the graduated compass circle.

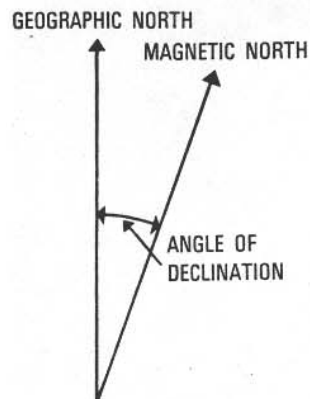


FIG. 2

Page 2

Refer to the marginal notes of U. S. topographic maps for the declination of your particular locality. Figure 3 shows lines of equal magnetic declination in the United States. Declination for locations between lines can be adequately estimated. Magnetic declination may be ignored where accuracy is not too important, in areas where declination is not great, or when maps are not used.

The compass circle may be adjusted for magnetic declination by manually rotating the knurled compass dial, offsetting the "N" on the compass circle

by the appropriate number of degrees (East or West) for the local declination. To obtain the greatest accuracy in this adjustment, use as a reference an imaginary "zero line" created by lining up the "V" of the front sight, the graduations on the compass circle, and the 90° mark at the North end of the clinometer dial in the bottom of the instrument. (See Figure 4.) Tension of rotation of the knurled compass dial may be increased or decreased by tightening or loosening the two small screws located on the outside bottom surface of the compass case.

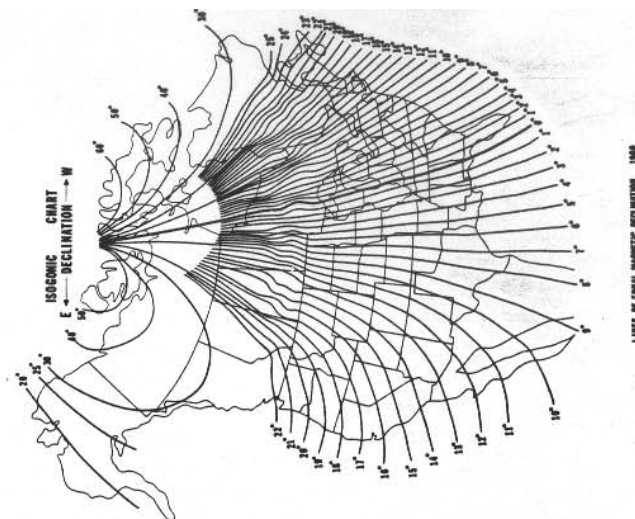


FIG. 3

Page 3

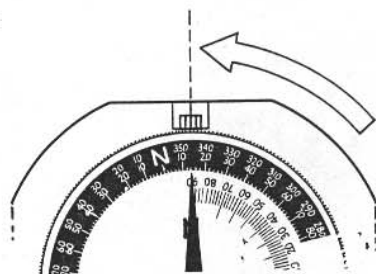


FIG. 4

Page 4

When magnetic declination is East of true North, rotate the knurled compass dial clockwise the number of degrees of declination.

When magnetic declination is West of true North, rotate the dial counter-clockwise the number of degrees of declination.

Example: If the declination is 14° West (such as that in Northern Connecticut), the needle will point 14° West of true North. Turn the circle so that the "N" on the circle moves to the left 14°. The reading of the compass circle at the "zero line" will now be 346° or North 14° West. This is the value of the declination. (See Figure 4.)

For magnetic bearings the compass circle should be set at "N".

Before your BRUNTON CADET is used, the compass circle should always be set at either "N" or at the declination of the locality. When taking bearings, always keep the transit level enough to permit the needle to swing freely.

2. TO PROPERLY READ THE COMPASS CIRCLE

The "E" and "W" on the graduated compass circle of your BRUNTON CADET are in reverse of their normal or map positions. This is because the circle is fixed to the instrument and revolves with it (the rosette on a ship's compass revolves with the compass needle). The "N" on the circle indicates "direction of the object sighted" rather than "North". The "E" means "when the North point of the needle is in this half of the circle, the object sighted is East of North (or of South)". The "W" means the opposite for its half. The compass circle is graduated in two different manners every two degrees. The outer graduations are numbered

0-360° counter-clockwise. With this graduation, North is 0° and increases counter-clockwise around the dial so East is 90°, South is 180°, West is 270° and North is 360°. Of course, 0° and 360° are both the same direction; that is, North. The inner graduations are numbered from 0° in both directions from "N" and from "S" to 90° at "E" and "W". This latter method of numbering is known as "Quadrants". With this graduation, North is zero and increases counter-clockwise so East is 90°, then it decreases so South is 0°, then increases so West is 90°, then decreases so North is 0°. Bearings or directions are therefore expressed in quadrants by terms such as North 30° East (N30°E), or North 20° West (N20°W), or South 15° East (S15°E), etc.

Page 5

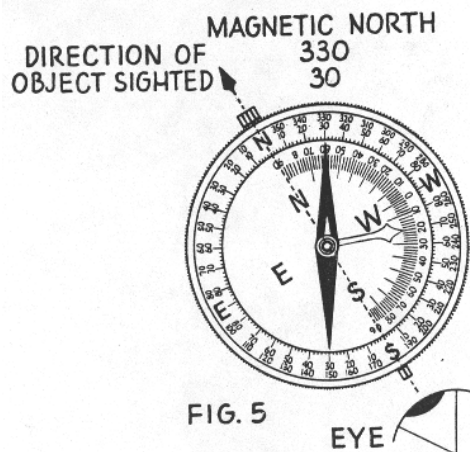


FIG. 5

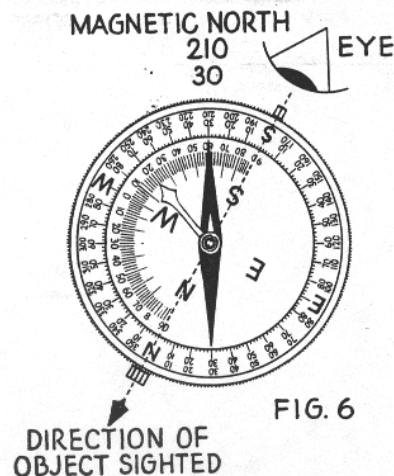


FIG. 6

In Figure 5, the needle is pointing to magnetic North and the instrument is set to sight an object 30° West of this point. Since the needle indicates 30° in the quadrant between "N" and "W", the bearing of this sight is N30°W when read from the inner scale (in quadrants) or 330° when read from the outer scale.

In Figure 6, the needle is pointing to magnetic North and the instrument is set to sight an object 30° West of South. Since the needle indicates 30° in the quadrant between "S" and "W", the bearing of this sight is S30°W (in quadrants) or 210° when measured on the outside of the compass circle.

REMEMBER — The compass needle always points to magnetic North. The graduation on the compass circle to which it points merely indicates the direction in which the instrument is being sighted.

3. TO TAKE A BEARING (See Figure 7)

"Bearing" means the direction or the degree reading from one object (usually you) to another. To take a bearing means to determine the direction from one object to another. In order to take a bearing, the instrument is held waist high and the lid opened toward the operator at about 45°. The instrument is held flat in the left hand with the sighting mirror to the rear. The left forearm is pressed against the waist and the instrument is steadied with the right hand. The instrument is correctly sighted on the object when the eye, looking into the mirror, sees the black center sighting line of the mirror bisecting both the "v" in the reflected front sight and the object sighted. At this point the North end of the needle indicates the bearing of the object sighted.

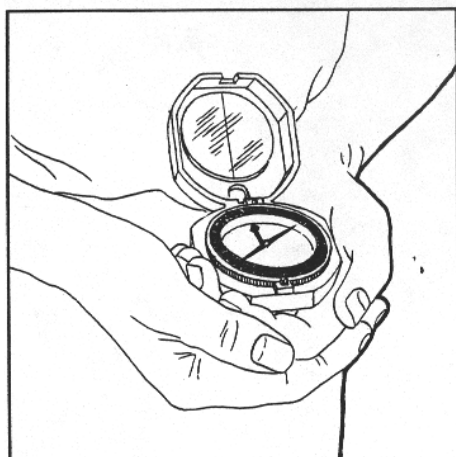


Fig. 7

To hold the instrument steady, it is suggested that the arms be held tightly against the body, and that the object be lined up by rotating the body while holding the hands rigid. Be sure to keep the transit level enough to permit the needle to swing freely.

Small swings of the needle can be averaged to get the calculated rest point without waiting for the needle to come to a complete rest. To avoid erratic results be sure there are no steel belt buckles, watchbands, pocket knives, electric cables, etc., near enough to deflect the magnetic needle.

4. TO MEASURE HORIZONTAL ANGLES.

The transit is used as described in paragraph 3. Take a bearing of each of two points between which the angle is to be measured. The horizontal angle is equal to the difference between the two bearings observed.

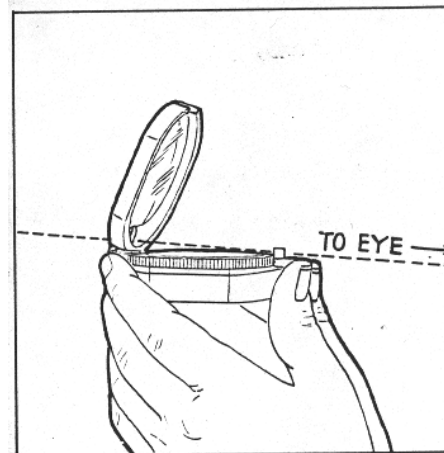


Fig. 8

5. TO USE THE INSTRUMENT AS A PRISMATIC COMPASS (See Figure 8)

Occasionally, there may be obstacles between the point of observation and the object being sighted or other circumstances may be encountered which require the observer to hold the instrument at eye height.

In cases such as this, hold the instrument in both hands at eye level (with the front sight toward you), sight through the "v" in the front sight lined up with the tip of the rear sight and through the window below the mirror at the object. The mirror in the cover should be angled toward the observer. Now observation of the position of the needle can be accurately observed in the mirror and the bearing determined.

Sighting is performed from the north end of the instrument in this case, so the degree reading pointed to by the south end of the needle should be read.

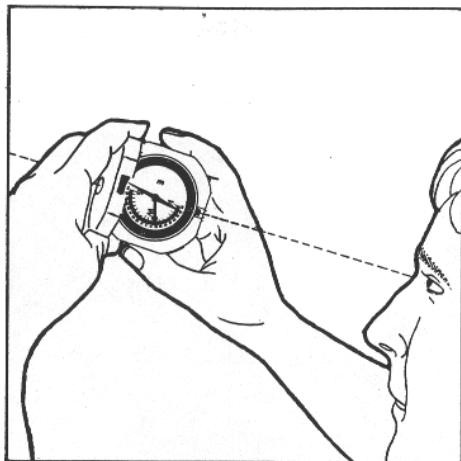


Fig. 9A

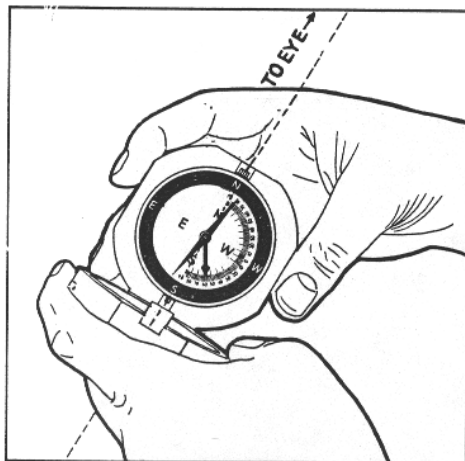


Fig. 9B

6. TO MEASURE VERTICAL ANGLES.

The mirror in the cover is opened to an angle of approximately 45° to the instrument case. With the front sight toward the observer and the mirror to the left, the body case is held absolutely vertical. The sighted object is then observed through the "V" in the front sight lined up with the tip of the rear sight and through the window below the mirror. The reflected image of the clinometer needle is then observed in the mirror and the graduation to which it points on the clinometer scale on the bottom plate of the transit is read to indicate the observed elevation or depression. (See Figures 9A and 9B.)

Another method of measuring angles of inclination is as follows:

- Open the lid of your **CADET** completely.
- Hold the instrument at eye level with arms out-stretched so that the clinometer needle is vertical and follows the scale in the bottom of the transit.
- Allow one long side of the transit to coincide

with the slope of the terrain, the inclination of which you are measuring.

d. The angle of inclination is indicated by observing the point of the clinometer needle, opposite the graduation on the clinometer scale. (See Figure 10A and 10B.)

Since the clinometer needle is a pendulum, it seeks the perpendicular and observations above or below a level line of sighting cause the pendulum to indicate a reading on the clinometer scale which is the angle in degrees between a level line of sight and the line of sight which is being observed.

7. ADDITIONAL USES OF THE TRANSIT.

7.1 As a Hand Level. Sight through the instrument as outlined in the first method of paragraph 6. The instrument is leveled by tilting it until the clinometer needle is observed in the mirror as pointing at "zero." The line of sight will now be level. In this manner the instrument can be used with a rod to run level lines or to determine points at an elevation similar to that of the observers eye.

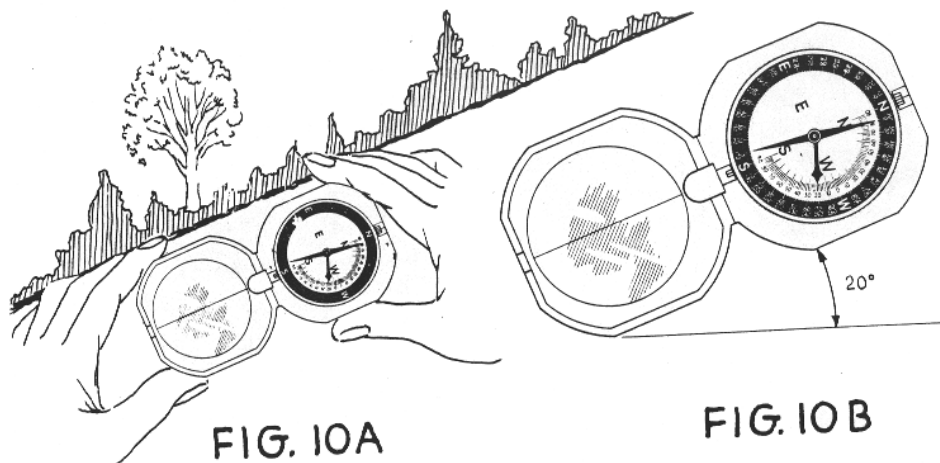


FIG. 10A

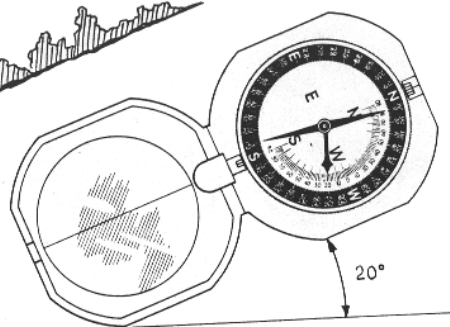


FIG. 10B

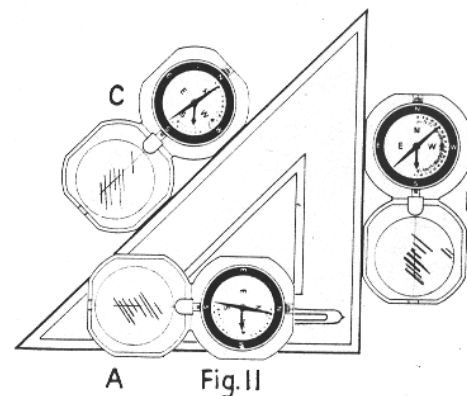


Fig. 11

Also, after tilting the instrument in the same manner until the clinometer needle reads "zero" and opening the cover out parallel with the face of the instrument, a long parallel edge is provided so that the instrument can be used as a level. (See Figure 11a)

7.2 To Use As A Plumb Bob. The instrument may be suspended in an open position, and with the clinometer needle pointing at 90° it may be used as a plumb. (See Figure 11b)

7.3 To Determine The Inclination Of An Object. The instrument is opened and placed on its side on the object in the direction of its slope. The inclination or slope can then be read in degrees by observing the graduation at which the clinometer needle points. (See Figure 11c)