# ECLIPSE 8097
## INSTRUCTION MANUAL

## *1 -- Orientation: Brunton Eclipse 8097*

The Eclipse 8097 compass is a sighting instrument which uses the Earth's magnetic field to display a bearing (direction) in degrees, with respect to true or magnetic north.

The orientation section provides a description of the important Eclipse 8097 parts. A detailed description of 8097 operation is provided throughout the instruction manual.

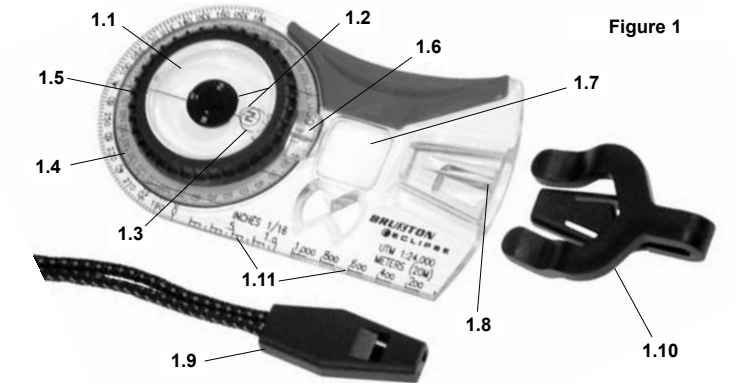



**Figure 1**

**1.1 Vial (Fig 1)**
The vial contains a needle disk with a red circled "N" (described in 1.2) and a blue orienting circle (described in 1.3). The fluid inside the vial stabilizes the needle disk.

**1.2 Needle Disk + RED circled "N" (Fig 1)**
The needle disk contains a permanently magnetized ferrous material which orients the red circled "N" to magnetic north. Also printed on the needle disk are "E", "S" and "W", for quick directional reference.

**1.3 Orienting Circle – BLUE (Fig 1)**
Use the adjustable blue orienting circle for bearing measurement and magnetic declination adjustment. Additionally, the blue line allows for accurate map alignment.

**1.4 Graduated Dial (Fig 1)**
The graduated dial is graduated 0° through 360°, incremented by 1°.

**1.5 Rotating Azimuth Ring (Fig 1)**
The rotating azimuth ring includes the graduated dial (described in 1.4). The blue orienting circle and graduated dial rotate with the azimuth ring.

**1.6 Index Lens (Fig 1)**
The bubble shaped index lens magnifies the graduated dial. Also, notice the **green** index line in the center of the index lens. Read bearing at this line.

**1.7 Viewing Lens (Fig 1)**
Use the viewing lens to magnify small writing on a map.

**1.8 Double Prism Alignment System (Fig 1)**
With a partner, use the double prism alignment system to sight an object or destination.

**1.9 Clip + Animal Alert / Rescue Whistle (Fig 1)**
The lanyard clip provides hands-free storage of the 8097 around your neck, wrist, etc. Also, use the whistle for a rescue signal or animal alert.

**1.10 Pocket / Map Clip (Fig 1)**
The detachable pocket/map clip fastens to the 8097, clips to maps, pockets, etc.

**1.11 Map Scales (Fig 1)**
The map scales on the clear base allow for quick position and distance calculations.

**1.12 Magnetic Declination Scale (Fig 2)**
Use the magnetic declination scale, on the bottom of the azimuth ring, with the adjustable **blue** orienting circle to adjust for magnetic declination at your position.

**1.13 Protractor (Fig 2)**
Use the protractor and the center ing template (1.14) to determine angles and map bearings.

**1.14 Centering Template (Fig 2)**
The centering template allows for accurate use of the protractor.

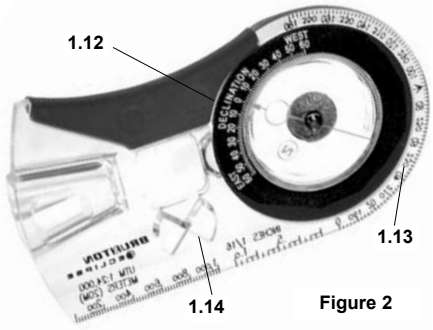



**Figure 2**

## *2 -- Magnetic Declination*

Magnetic declination (variation) is the difference between true geographic north (north pole) and magnetic north (in northern Canada), with respect to your position. It is important to note magnetic declination at your position, because magnetic declination varies and fluctuates slowly at different rates, around the world. (Fig 3) Contact Brunton for most recent information at (307) 856-6559, or e-mail us at support@brunton.com.



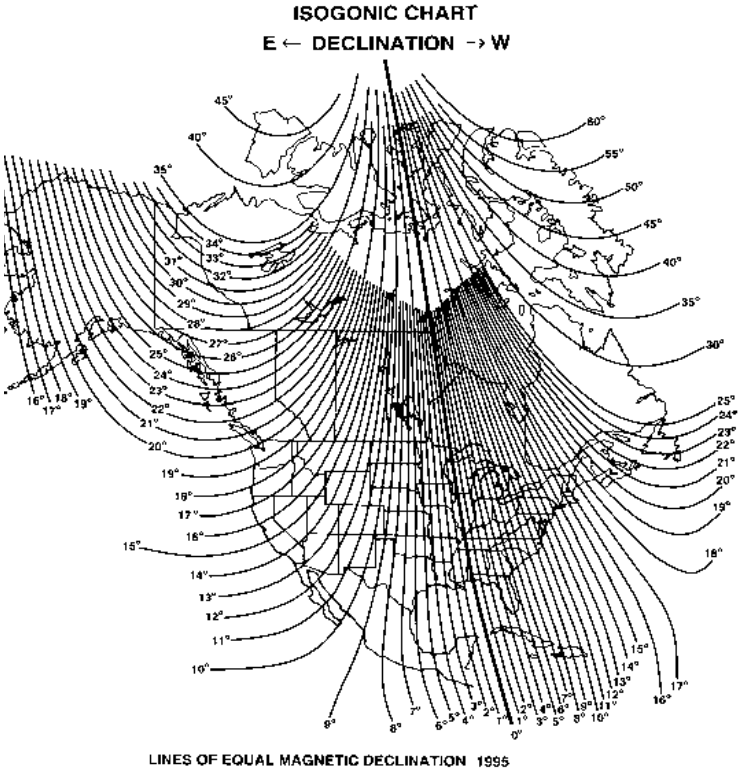



**Figure 3**

Use the isogonic chart (Fig 3), or current United States Geological Survey (USGS), Bureau of Land Management (BLM), or another map to determine magnetic declination at your position. Declination can be east, west or even 0°, from your current position. At 0° declination, true north and magnetic north are aligned.

Example: If magnetic declination at your position is 15° east, then magnetic north is 15° east of true geographic north. Figure 4 displays true geographic north and magnetic north, as indicated in the legends of USGS and BLM maps. Most maps use true north as a reference. When adjustment for magnetic declination is complete, a bearing measurement will be with respect to ***true*** north, same as the map.

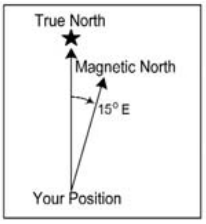



**Figure 4**

**2.1 Magnetic Declination Adjustment**

1. Find the magnetic declination at your current position from a map or chart.

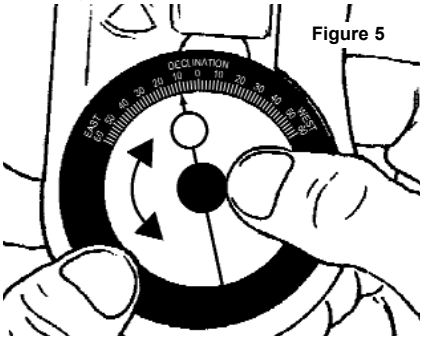



**Figure 5**

2. Locate declination scale on the bottom of the azimuth ring. (Fig 5)
3. Grasp azimuth ring in one hand, and the vial in the other. (Fig 5)
4. Hold azimuth ring stationary, and rotate vial until the arrow on the blue orienting circle points to the value of magnetic declination, at your position.
   - Make sure declination is correct (**east or west**).

## *3 – Field Bearing*

For the best accuracy, have a partner stand directly above the Eclipse 8097 and adjust the azimuth ring, while you sight an object through the double prism.

**3.1 Forward Sighting With Partner**

1. Adjust 8097 for magnetic declination at your position.
   - Refer to section 2.1, *Magnetic Declination Adjustment*, for help.
2. Sight object between the double prism alignment system. (Fig 6)
   - To align the sight with center of the vial, make sure all four triangles are the same size.
3. Have partner rotate azimuth ring until the blue orienting circle surrounds the red circled "N". (Fig 7)

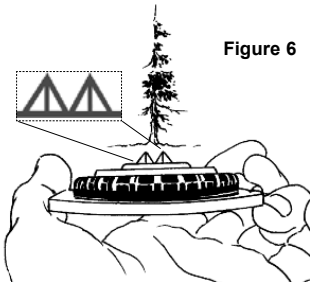


**Figure 6**

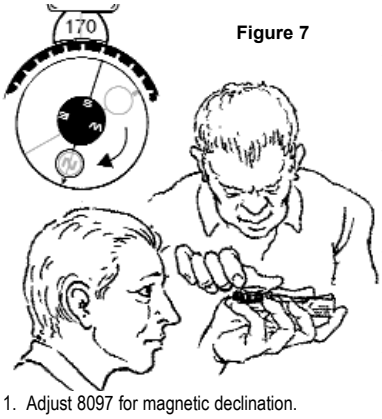



**Figure 7**

4. Read bearing -- 170°. (Fig 7)

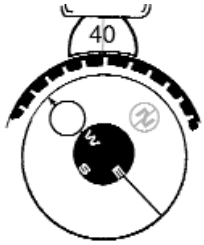
To guarantee accuracy, switch with your partner and have your partner re-sight the object. Both bearings should be within 1° of each other.

You can sight a field bearing without a partner, but the accuracy diminishes.

## *4 – Direction Of Travel*

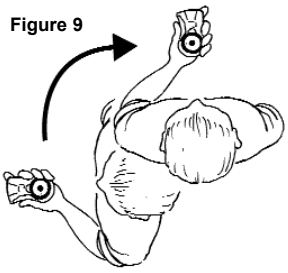
When field bearing to a destination is already known, set compass to known field bearing, sight bearing and travel to the destination. The bearing you travel is known as the direction of travel.

**Figure 8**




1. Adjust 8097 for magnetic declination.
2. Rotate azimuth ring until set at known field bearing. (Fig 8)
3. Pivot **your body** until vial displays "circle over circle". (Figs 9 & 10)

**Figure 9**



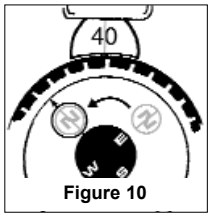



**Figure 10**

4. Sight distant object or destination at field bearing, and travel to it.

**Do not** travel compass bearing by watching the compass. If final destination is too far away to see, sight a tree, mountain or something else and walk to the object. At object, re-sight compass bearing to another object. Repeat until final destination is reached.

## *5 -- Topographic Map*

A topographic map (topo-map) is a 2-dimensional drawing of 3-dimensional terrain. Hills, valleys, ridges, cliffs and other terrain are represented through a series of contour lines. Each line represents constant elevation in meters or feet above sea level. Find the contour interval in the legend of the topographic map.

With practice, you'll begin to recognize many different contours on a topo-map, and identify the best possible route from one position to another. (Fig 11)

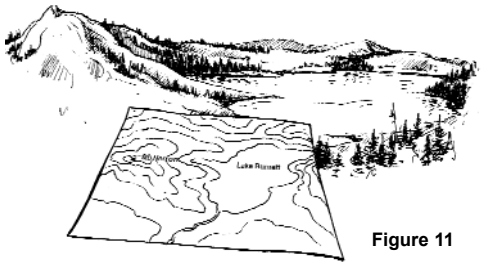


Figure 11

## *6 – Map Bearing*

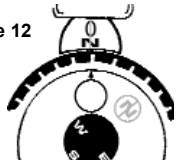
Whether in the field or at home, it is possible to determine a bearing from one position to another, directly from a map. The 8097 provides three methods of finding map bearings - map, compass and protractor alignment methods.

### 6.1 Map Alignment

Map alignment is the most accurate method. Align map to true north, then find a map bearing. Using this method, it is possible to compare the map to the actual terrain.

1. Adjust 8097 for magnetic declination.
2. Rotate azimuth ring until compass reads 0°. (Fig 12)
3. Place clear base along the map's true north-south margin (edge of printed map). (Fig 13)
   - On maps other than a USGS or BLM, true north-south may not be aligned with the map's margin, so it may be necessary to place the clear base next to the true north indicator.

Figure 12



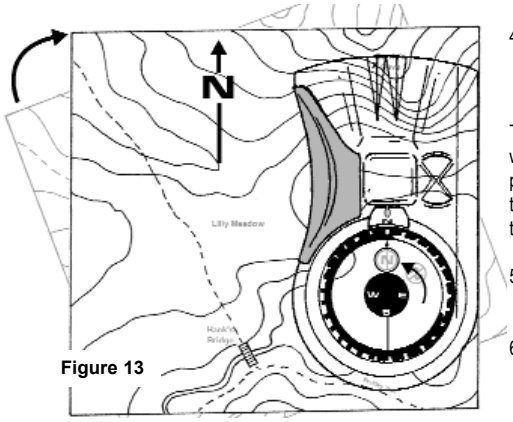


Figure 13

4. Rotate **map** until vial dis plays "circle over circle". (Fig 13)

The topo-map is now aligned with true north, and it is possible to compare the map to the actual terrain. Now, find the map bearing.

5. Place a "point" at a starting position and an "X" at a destination.
6. Draw a line connecting both marks.



7. Position clear base next to the line. (Fig 14)
   - **Do not** move the map.
8. Rotate azimuth ring until vial dis plays "circle over circle". (Fig 15)
9. Read bearing.

Figure 15

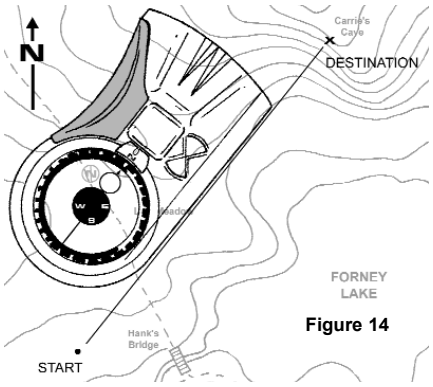


Figure 14

### 6.2 Compass Alignment

The compass alignment method allows for quick bearing determination, without aligning the map to true north. This is not as accurate as the map alignment method, but it can be used for pre-planning at home or in the office.

1. Adjust for **0°** magnetic declination.
2. Draw true north-south lines on a map, spaced approximately 1 inch apart. (Fig 16)
3. Mark a start position with a "point" and a destination with an "X".

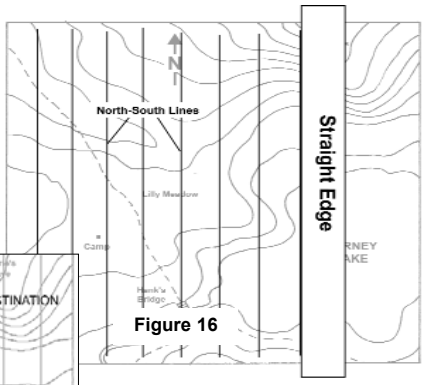


Figure 16

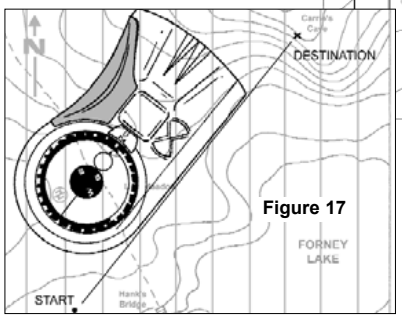


Figure 17

4. Draw a line connecting both marks.
5. Place clear base next to the bearing line. (Fig 17)

6. Rotate **azimuth ring** until blue orienting circle points to the map's true north. (Fig 18)
   · Align blue line in vial and red lines on graduated dial with drawn true north-south lines.
7. Read bearing.

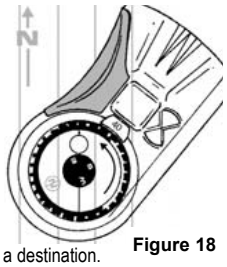


Figure 18

**6.3 Protractor And Centering Template**

Use the centering template and the protractor to determine a map bearing.

1. On the map, place a "point" at a starting position and an "X" at a destination.
2. Draw a bearing line connecting both marks.
3. Determine true north from the map's legend.
4. Draw a true north-south line through the "point".
5. Place the centering template directly over the point".
6. Draw an outline around the "point". (Fig 19)

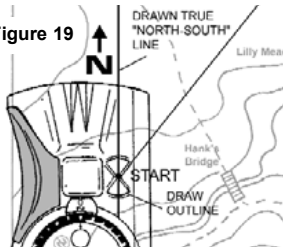


Figure 19

**6.3.a -- 0° to 180° Map Bearing**

1. With 0° on the protractor pointing **north**, position center of needle disk within the outline.
2. Using the 0° to 180° scale, read bearing where the bearing line intersects the protractor. (Fig 20)

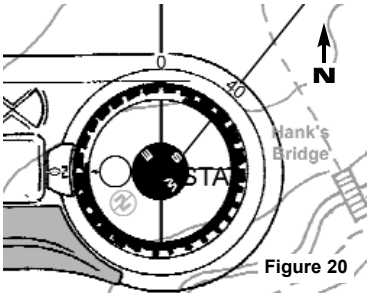


Figure 20

**6.3.b -- 181° to 360° Map Bearing**

1. With 0° on protractor pointing **south**, position center of needle disk within the outline.
2. Using the 181° to 360° scale, read bearing where the bearing line intersects the protractor. (Fig 21)

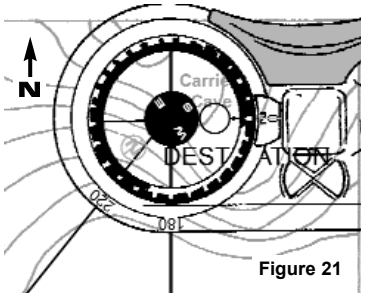


Figure 21

## *7 – Triangulation*

Determine field bearings to three visible landmarks and plot them as map bearings. The intersection of the bearing lines indicate your approximate position. A landmark can be a mountain peak, a cliff, or any visible object displayed on your map.

1. Adjust for magnetic declination.
2. Find three prominent landmarks in the field.
3. Orient map to true north. See section 6.1, *Map Alignment*, for help.
4. Find and mark all three landmarks with an 'X', and label them '1', '2' and '3'. (Fig 22)

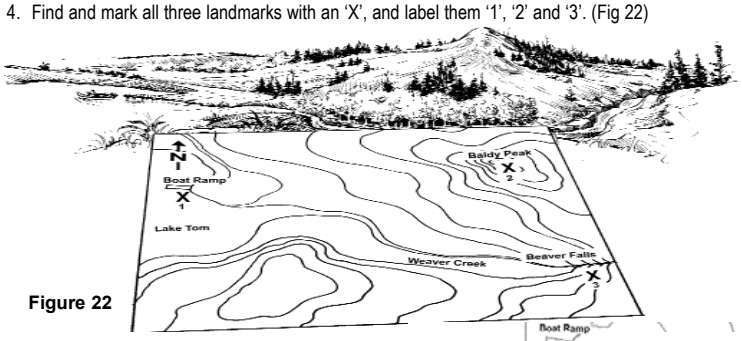



**Figure 22**

5. Sight a field bearing to landmark '1' (320°). See section 3.1, *Forward Sighting*, for help.
6. Place clear base next to landmark '1', on the map.
7. With bearing at 320°, pivot **compass** around landmark '1' until "circle over circle". (Fig 23)
8. Draw map bearing passing through landmark '1', using the clear base.
   - Your position is somewhere along this line.
9. Repeat process for landmarks '2' (50°) and '3' (90°).

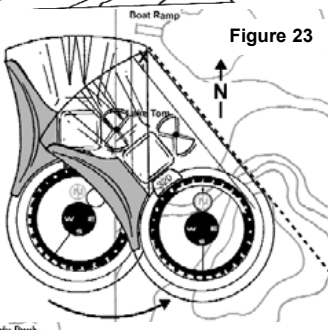



**Figure 23**

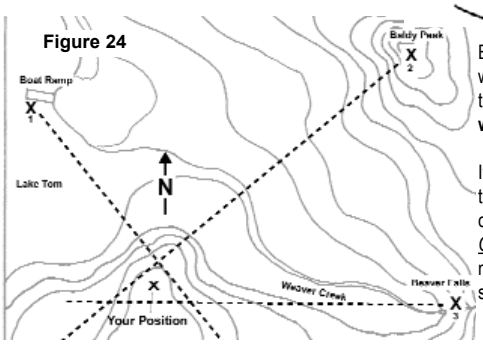



**Figure 24**

Either a point or a small triangle will form at the intersection of the three lines. **Your position is within the triangle**. (Fig 24)

It is also possible to determine three map bearings using the compass alignment method (6.2, *Compass Alignment*). This method uses the map's true north, so the map can be positioned any

direction while bearings on a map are determined. With magnetic declination set at 0°, and compass set at sighted bearing, rotate **compass** about position until the red lines on the graduated dial and the blue line in the vial are aligned with the map's true north-south lines. Then, draw bearing lines.

## *8 – Back Bearing*

A back bearing is 180° from another bearing. If you face true north (0° bearing) a back bearing is directly behind you, or 180°. Keep all bearings between 0° and 360°, and follow the steps below to determine back bearing.

Calculate back bearing:

1. If the bearing is from 0° to 180°, **add** 180° to calculate back bearing.
2. If the bearing is from 181° to 360°, **subtract** 180°.

## *9 – Coordinate Position*

Global Positioning System (GPS) receivers are becoming valuable navigation aids with map and compass. GPS receivers require an understanding of coordinate systems to locate a position. This section explains positioning on a 7.5 minute topographic map, using the 1:24,000 Universal Transverse Mercator (UTM) grid scale, on the clear base.

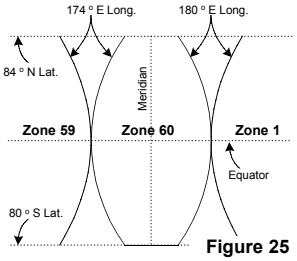


**Figure 25**

### 9.1 UTM Coordinate System

Universal Transverse Mercator (UTM) is a grid coordinate system measured from the Equator (0° latitude) and a zone meridian. UTM flattens and divides the Earth into 60 zones, each zone 6° wide and each with a zone meridian down the center. (Fig 25) UTM grid above 84° N. and below 80° S. latitude is considerably distorted, and is excluded from maps.

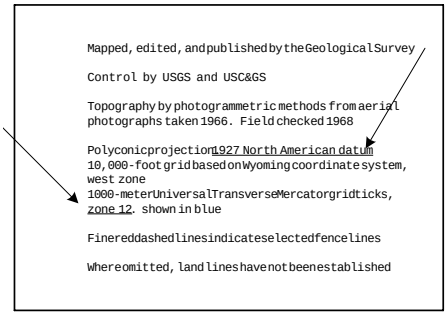


**Figure 26**

A UTM position is measured using an easting and a northing from a known reference point called a datum. If using a Global Positioning System (GPS) receiver, document the zone number and map datum (Fig 26), then enter into your GPS receiver.



The following example uses a 1:24,000 scale, topo-map, with 1,000 meter UTM grid tick marks, indicated by three small zeros in the easting label, $^{47}90^{000m}$E.

### 9.1.a -- 1:24,000 scale UTM Grid Coordinate Positioning

1. Identify and document the zone number, map datum and scale**.** (**zone 11**, **North American Datum 1927** & **1:24,000**, Figure 27).

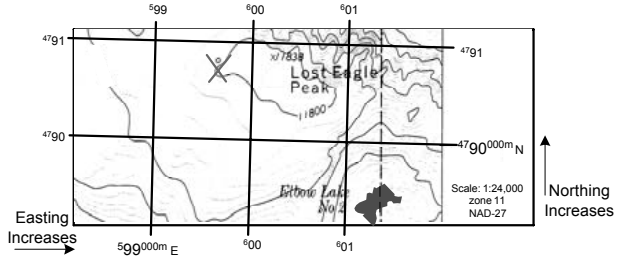


**Figure 27**

2. Identify UTM grid tick marks and labels around the map's margin.
3. Draw lines connecting equal value UTM tick marks. (Fig 27)
   · 1,000 meter by 1,000 meter grid will form.
4. Identify and mark a position on the map with an '**X**'.

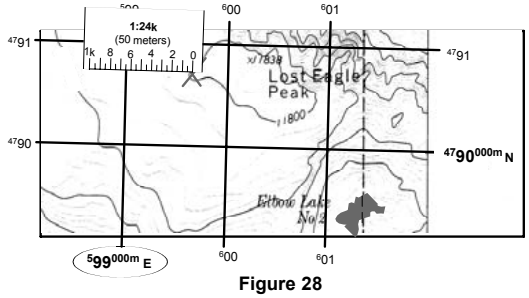


**Figure 28**

5. Place "0" of 1:24,000 UTM scale at the '**X**', with scale increasing left . (Fig 28)
   · Make sure UTM scale is parallel to the northing grid lines.
6. Count from the '**X**' to the nearest **left** easting line – 100, 200, … 500, 600 and **650 m**.
7. Add 650 meter to the nearest **left** easting line.
   · 650 m E + $^{5}99^{000m}$E = $^{5}\mathbf{99}^{\mathbf{650m}}$**E**

8. Rotate clear base until the "0" is at the 'X', and scale increases **down**. (Fig 29)
   · Make sure UTM scale is parallel to the easting grid lines.

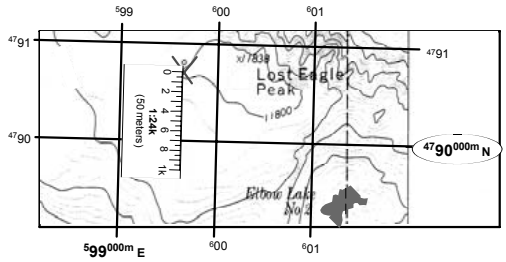



**Figure 29**

9. Count from the 'X' to the nearest northing line, **below** – 100, 200…600 and **700 m**.
10. Add 700 m to the nearest northing line **below** the 'X'.
    · 700 m N + $^{47}90^{000m}$N = **$^{47}90^{700m}$N**

**The final UTM coordinate is:**
**zone 11 $^{5}99^{650\ m}$E $^{47}90^{700m}$N** datum: **NAD-27**

The 1:24,000 UTM scale, in Figures 28 & 29 , have 50 meter resolution (50 meters between marks), where the 1:24,000 UTM scale on the 8097 base provides 20 meter resolution. Also, the grids change with respect to the scales. So, identify the grid values and grid resolution when using a UTM grid scale other than 1:24,000.

With UTM grid it is possible to identify a position within 100 meters of the actual position, without a scale. After identifying tick marks around the map's margin, and drawing grid lines, simply estimate the distance from the lower left-hand corner of the square grid that surrounds the 'X'. Remember, eastings always increase right and northings always increase up.

**9.1.b -- Metric UTM Grid Coordinate Positioning**
If using the metric version 8097, use the cm / mm scale for position determination.

| 1:25 000 scale | 1:50 000 scale | 1:250 000 scale |
|---|---|---|
| 4 cm = 1000 m | 2 cm = 1000 m | 4 cm = 10 000 m |
| 1 mm = 25 m | 1 mm = 50 m | 1 mm = 250 m |



## *10 – Clip + Animal Alert / Rescue Whistle*

An animal alert / rescue whistle is included with the Eclipse 8097. Remove whistle from 8097 by depressing and holding retaining latch on the bottom of the whistle, and pull.

To use whistle, position horizontally with retaining latch opening up. (Fig 30) Cover retaining latch opening with a finger. Be careful not to cover the airway exit hole, underneath. Completely cover the airway entry hole and blow. Vary frequency by changing finger pressure over retaining latch opening, while blowing.

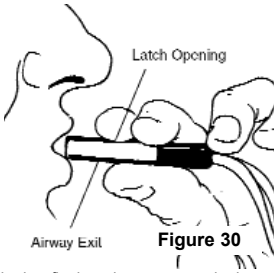



**Figure 30**

## *11 – Pocket / Map Clip*

An additional feature of the Eclipse 8097 is the pocket / map clip that fits into the same terminal as the lanyard clip. Clip compass to shirts, pant pockets, or maps for orienteering or route determination. (Fig 31) Remove the pocket / map clip by depressing and holding the retaining latch on the bottom of the clip, and pull.

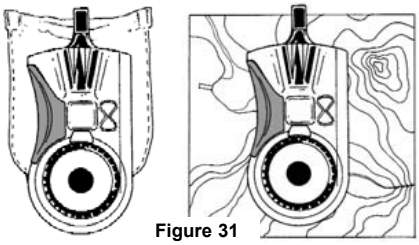


**Figure 31**

## *12 – Additional Information*

Before heading into the field, practice using the Eclipse 8097 and a map in a familiar area. Also, carefully re-read the instruction manual to gain a full understanding of 8097 applications. Become an expert with a map and compass, and educate yourself on survival techniques.

## *13 – Eclipse 8097 Compass Specifications*

| | |
|---|---|
| **Magnetism:** | NdFeB needle disk |
| **Accuracy:** | Bearing -- ± 1° accurate reading (0.5° readable) |
| **Size:** | Length – 4.6 in. (11.8 cm)*<br>Width – 2.6 in. (6.7 cm)*<br>Weight – 1.6 oz (45 g)* |

* -- Excluding lanyard, pocket / map clip and animal alert / rescue whistle