

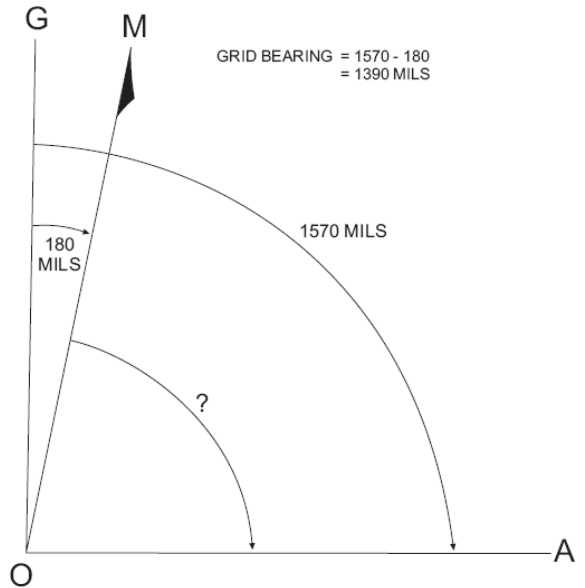


SOUTH QUEENSLAND AUSTRALIAN ARMY CADETS BRIGADE

NAVIGATION

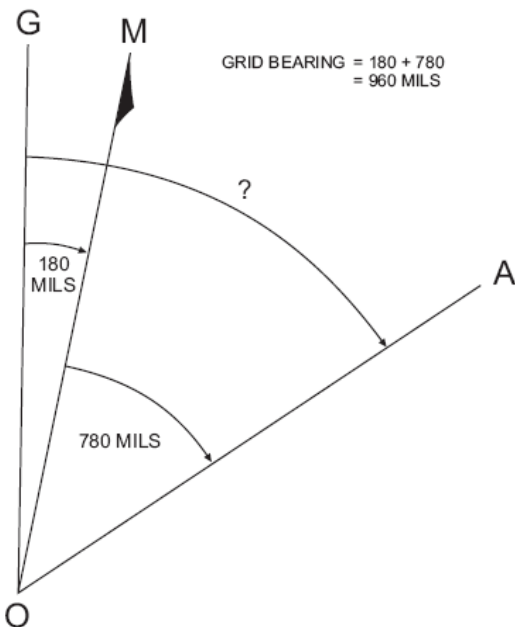
CONVERTING BEARINGS...CONT

Grid to Magnetic subtract (GMS - grand ma sleeps)



CONVERTING BEARINGS

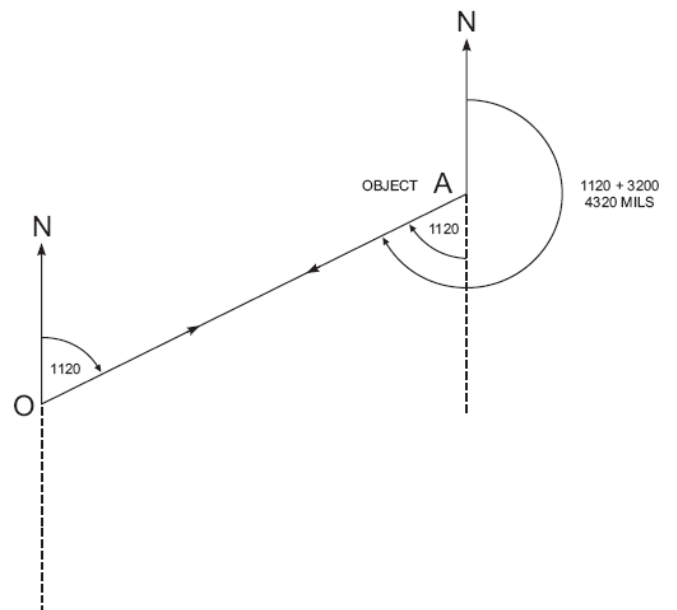
Magnetic to Grid add (MGA - my great aunt)



BACK BEARINGS

Back Bearings are used to determine the opposite direction of a forward bearing. This may be used to back track (go back along the bearing you have just moved along) or draw a bearing backwards from an object you have just found the forward bearing to.

If the forward bearing is less than 3200 mils, then you add 3200mils. If the forward bearing is more than 3200mils then you subtract 3200mils.

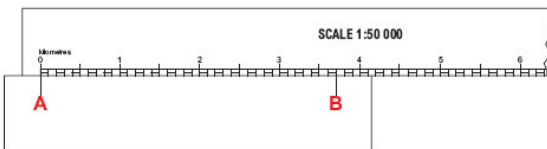
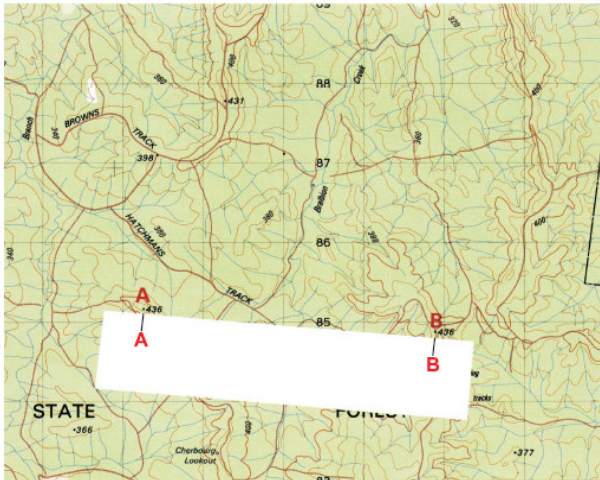


MEASURING DISTANCE

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Measuring Straight Distance

To measure the ground distance in a straight line between two points on a map, lay the straight edge of a piece of paper against the two points and, at each point, mark the paper with a tick. Then lay the paper along the graphic scale with the left-hand tick against the zero mark to determine the distance.

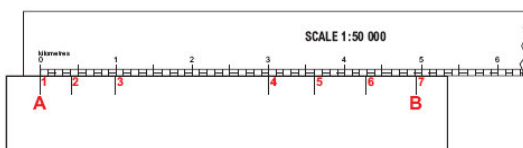
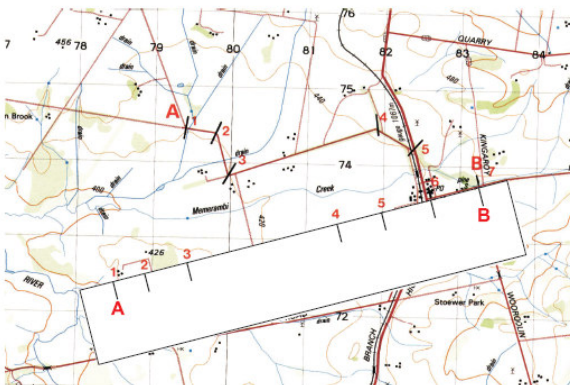


MEASURING DISTANCE

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Measuring Curved Line Distance

To measure the distance along a curved line such as a winding road, consider the road as a number of straight or nearly straight sections. Lay a piece of paper along the first section and mark it at A and at the end of the first straight section. Pivot the paper about the second mark until it lies along the second section. Mark the end of the second section and continue this method until B is reached. The total distance by road is then recorded as a straight line on the piece of paper and can be read off against the linear scale.



SERVICE PROTRACTOR

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Measuring Bearings

To measure the grid bearing from the point A to Point B:

- Using a straight edge and a fine pencil, join point A and point B. If the distance between the two points is less than 8cm, the line should be extended so that it overlaps the scale when the protractor is positioned on the map.
- Place the protractor on the map and position it so that the index mark is directly over point A, and the north line is pointing to grid north, that is, parallel to the eastings. If the north line does not overlap an easting, it will be pointing to grid north if an easting intersects the 10 mil scale at the top of the protractor the same number of divisions from the north line as at the bottom of the protractor.
- The grid bearing can now be read from the outside set of figures on the 10 mil scale, where the pencil line meets it.

When bearings of between 3200 mils and 6400 mils are to be measured, the protractor is rotated upside down or 3200 mils. The same principles apply, except that the inside set of figures is used on the 10 mil scale.

When time prevents the drawing of a fine pencil line on a map, a bearing can be measured using the black thread attached to the index mark. This method is not as accurate, although it has the advantage of not marking the map.

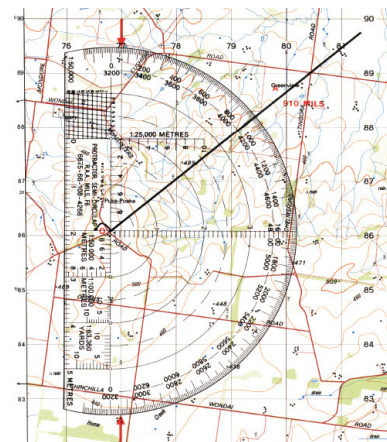
SERVICE PROTRACTOR...CONT

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Plotting Bearings

To plot a grid bearing on a map, proceed as follows:

- Place the protractor on the map and position the index mark directly over the point on the map from which the bearing is to be plotted (originating point) so that the north line is pointing to grid north.
- Read off the bearing required on the 10 mil scale and mark the map with a pencil.
- Draw a thin line through the originating point to the pencil mark. This line is the required grid bearing.



PRISMATIC COMPASS

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Taking a Bearing

Hold the compass in both hands, with a thumb through the ring. The compass must be held level and steady, so that the compass card swings freely. The lid must be vertical and the prism turned into the reading position. Look through the sighting slit and line up the hair-line in the lid with the object on which the bearing is to be taken. By looking through the eyehole when the card comes to rest, read off the bearing against the hair-line. Note that the figures increase from right to left. Accuracy to within 10 mils is not difficult.

Finding the Direction of a Given Bearing

Look through the eyehole and turn the compass until the hair-line cuts the required bearing. Note some distant object which is in line with the hair-line. This object will be on the required bearing.

Using the Compass without the Prism

Either of the operations outlined in sub-paragraphs a and b can be carried out without using the prism, but with much less accuracy. To take a bearing, open the compass out flat and line it up so that the tongue is directly in line with the object. The bearing is read from the inner circle of the compass card against the lubber line. To find the direction of a bearing, turn the compass until the inner circle below the lubber line reads the given bearing. The tongue is then pointing in the required direction.

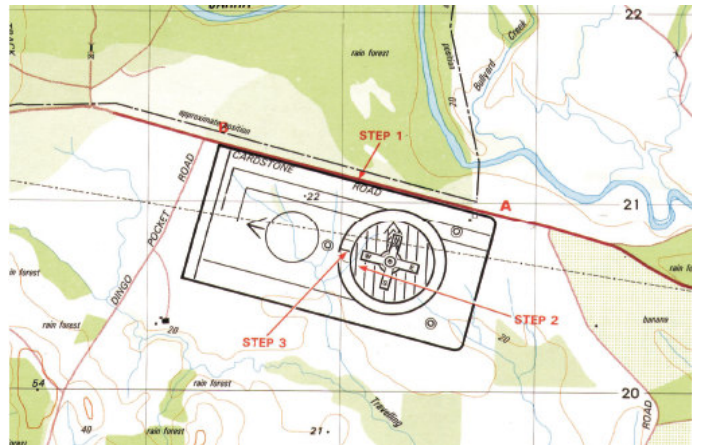
SILVA COMPASS

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Taking a Grid Bearing

- Step 1. Place the long edge of the base plate (or an aid line) along the desired bearing, making sure that the direction arrow points in the direction that you wish to travel.
- Step 2. Turn the compass housing so that the meridian lines are parallel with the easting on the map.
- Step 3. Read the grid bearing on the graduated dial against the lubber line.

Note: that before marching, the grid bearing must be converted to a magnetic bearing and the dial adjusted appropriately.



PRISMATIC COMPASS...CONT

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Setting the Compass for Night Marching

Having determined the bearing required, the locking screw should be loosened so that the upper glass cover can be turned freely. This should be positioned so that the graduation against the lubber line shows the required bearing. The glass cover should be kept in this position by tightening the locking screw. The tongue of the compass will then indicate the required bearing when the north point on the card coincides with the luminous strip on the glass cover.

The luminous strips on a compass fade with age. They will often regain their brightness if the luminous strip is exposed to sunlight before night activities commence.

Using the compass as a protractor

The compass can be used as a protractor in its absence. The compass can also be used to accurately orientate the map to the ground. In this case, the compass is placed on the map so that the wire is running up an easting. With the graduated dial being set to 0 mils, the direction from a point to any other point on the map can be determined, in the same way as a protractor is used.

When orientating the map to the ground, the navigator holds the compass and the map in the position as just described, and turns around on the spot until the magnetic card lines up with the lubber line.

SILVA COMPASS...CONT

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Taking a Magnetic Bearing

- Step 1. Hold the compass in the position with the direction arrow pointing to the object.
- Step 2. Rotate the compass housing until the orienting arrow is directly beneath the north (red) end of the compass needle.
- Step 3. Read the magnetic bearing on the graduated dial against the lubber line.

Setting the Compass on a Magnetic Bearing

- Step 1. Set the magnetic bearing on the compass by rotating the compass housing until the required bearing on the graduated dial is in line with the lubber line.
- Step 2. Hold the compass flat in the hand and turn around until the north end of the compass needle is directly above the orienting arrow.
- Step 3. The direction arrow now points along the required magnetic bearing.

SERIAL

This gives the sequence of the navigational bounds. Number the serials starting from 1.

FROM

This the grid reference from which you are going, i.e. the start point of each bound. Enter the grid references that you have been given.

TO

This is the grid reference that you are travelling to, i.e. the end point of each bound. Enter the grid references that you have been given.

GRID BEARING (GB)

Calculate the Grid Bearing along which you will travel using a service protractor.

MAGNETIC BEARING (MB)

Calculate the magnetic bearing along which you will travel.

DISTANCE (METRES)

Calculate the distance in metres from the start to the end of each bound

ESTIMATED TIME

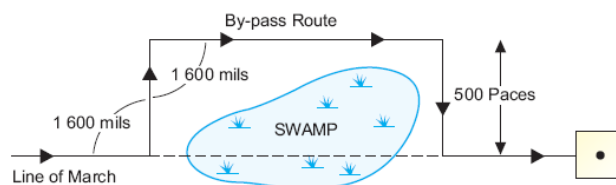
Calculate the estimated period of time that it will take to complete each bound. Remember, it takes one hour to cover 5000 metres during the day, over open undulating country;

BYPASSING

When unexpected 'bad going' is encountered (e.g. swamp or bamboo forest), a decision must be made as to whether it would be quicker to go around it or through it. If the decision is to bypass it, any tendency to cling to the edge of the area and 'feel' a route must be avoided, as a loss of direction will result.

The best methods of by bypassing, which eliminate the possibility of error, are as follows:

Method One. From the edge of the area, plot a fresh course at 1 600 mils from the line of march and move a paced distance, say 500 paces. When the 500 paces mark has been reached, swing back on parallel line of march for sufficient distance to ensure bypassing. Then swing back 1 600 mils in the direction of the original line of march for the desired distance (in this case 500 paces) to get back to a point from which the march can be continued.

**NAV DATA SHEET...CONT****GOING**

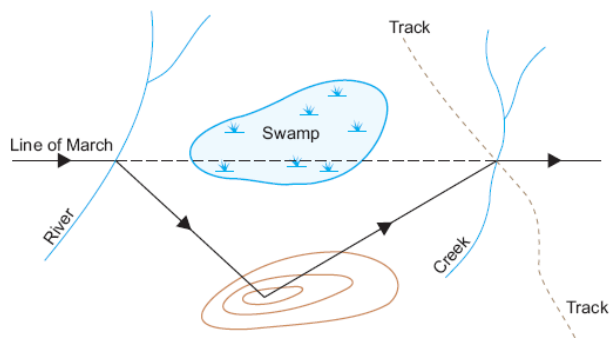
Record a brief description of the going (terrain) along the route, i.e. where the spurs, knolls and re-entrants are.

REMARKS

Enter any remarks that should be noted regarding each bound, i.e. the distances along the bound that creeks, roads etc are crossed.

BYPASSING...CONT

Method Two. Select an object to a flank. Plot a new course to this object and from it plot another course to another object on the line of march.



DEAD RECKONING

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Dead reckoning (or traversing) is a method of navigating by plotting direction and estimated distance travelled. The method enables the navigator to always know the direction and distance back to his/her start point. Dead reckoning is most commonly used:

- a. when maps are not available,
- b. in poorly-mapped or featureless areas, and
- c. when patrols are forced to travel beyond the edge of their map sheet.

The route is most accurately plotted when graph paper or the squared paper found in the field message and notebook is used. Directions can be left in magnetic bearings to save time, although the result must be converted to a grid bearing if applied to a map. Any scale can be used, although it is most convenient to use the same scale as the map, as the plot can then be superimposed upon it.

The plotting should be done with a sharp pencil and protractor. From a start point, the bearing and distance of the first leg is drawn. Each subsequent leg is then drawn in from the end of the previous one.

ACTION IF LOST

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If lost, the navigator should not act hastily. He/she should halt and consider:

- a. whether he/she has drifted left or right of his/her line;
- b. whether he/she could have already passed the objective, or whether the time and distance travelled was badly estimated;
- c. whether the ground covered conformed with his/her mental picture of the going he/she expected from the map;
- d. whether there are any features in the area which will help him to fix the position, or enable him to conduct a resection; and
- e. the possibility of local magnetic attraction, compass error or inaccuracy in the map, although extreme care should be taken before attributing one's 'being lost' to the map.