

## Smart Soldier - Navigation

*'It was difficult to find the correct re-entrant into which we turned right to reach the objective. I must say "thank you" to Gus for his good navigation. Too deep or even too shallow could have been catastrophic.'*

Op FAUNA, Company Night raid, Korea 1952

### Navigation

By SGT Tony Robertson

Navigation is a skill soldiers need to be proficient at and all commanders require mastery of. It is an activity that should be second nature, as it needs to occur concurrently during patrols while thinking about enemy, formation control and tactics.

This article will provide information to compliment what can be read in doctrine, providing additional tips from my experience.

### Navigation equipment

A good commander and soldier always has a compass, protractor, map, pace counter, and a GPS for confirming location.

**Maps.** Try not to use very old maps as they will be incorrect when using GPS unless you update the GPS to the older datum, and even then the old maps may not show current roads and tracks. If maps are old, order new maps through your operations cell<sup>1</sup>. Maps should be located in your trouser map pocket, so that the next in command and other section members know its location.

*'Being conscious of the navigation problems. Every effort was made to obtain additional maps and compasses. The next problem was to sort out the compasses as some had been calibrated and others not. We discussed and rehearsed night movement. The Q Store was raided for service flannelette (strips of white cloth used to clean weapons and equipment) which we tied to our arms and to our packs.'*

Lieutenant Jim Hughes, The Battle of Maryang San, 1951

**Compass.** The compass should be tied off onto your shirt button or around your neck, and placed for easy access. Care needs to be taken of the compass and it should be protected<sup>2</sup>.

Always trust the compass over your own sense of direction, the compass is likely to be right. Do not estimate your position and proceed on an assumption. If you do think the compass is wrong, move to another location, as it could be affected by local magnetic interference such as transmission lines, iron stone, iron ore, or metal objects such as glasses, watches or weapons. Even small quantities of iron can significantly affect a compass.

**GPS.** Whilst these are good for navigation and checking your location, there are a number of issues with GPS units. In conflict, civilian GPS satellites may be jammed or even spoofed<sup>3</sup>, batteries may go

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<sup>1</sup> You check if you have the latest Australian map by using the map request tool

<https://www.dgd.defence.mil.au/geoviewer2/>

You can order new Australian maps here or download a Geospatial PDF that you could use on a device with a Geospatial PDF reader app such as <https://www.avenzamaps.com/>

<sup>2</sup> Take care not to stack anything on it, drop it, or smash it.

<sup>3</sup> Spoofing gives you false coordinates and you may not realise it. Use the defence provided GPS (PLGR or DAGR) if in doubt, as these have anti-jamming.

## Smart Soldier - Navigation

flat, and GPS is not reliable in close country and jungle as they won't pick up the signal due the tree canopy blocking it. Therefore, old style navigation skills should still be taught and continually practiced.

*'Completely satisfactory navigation is only possible with existing maps by means of briefing from air photographs. Previous patrol reports are valuable.'*

Bougainville lessons learned, April to May 1945

### Converting bearings

A navigation topic that some soldiers may struggle with is with the conversion of bearings between magnetic and grid.

Compass bearings are magnetic. These must be converted to grid bearings before being plotted on a map and grid bearings from a map must be converted to magnetic bearings before being used on a compass.

**North points.** It's important to know that there are three north points used in navigation. True North (TN) is the direction along the earth's surface to the geographic North Pole. Grid North (GN) is the direction northwards along the grid lines of a map. Magnetic North (MN) is the direction a compass points towards in relation to the magnetic North Pole.

**Grid-magnetic angle.** The grid-magnetic angle is the figure that is used when changing between compass and map bearings. It is provided in the marginal information of your map. Look for the north point diagram. Please note that this figure is not fixed as the position of the magnetic pole changes<sup>4</sup>. Luckily this change can be estimated and is included in the north point diagram. You will have to apply these changes to the grid-magnetic angle before then adding or subtracting from your bearing<sup>5</sup>.

Knowing whether to add or subtract the grid-magnetic angle to our bearing can be confusing<sup>6</sup>. The best way to remember is to use the following 'word plays' as an aid:

- When MN is to the east (right) of GN in the north point diagram use 'magnetic to grid add' (MGA - 'my great aunt') and 'grid to magnetic subtract' (GMS - 'grand ma sleeps').
- When MN is to the west (left) of GN in the north point diagram use 'magnetic to grid subtract' (MGS - 'my gran snores') and 'grid to magnetic add' (GMA - 'good morning Australia').

*'A study of the general slope of the land and the local drainage pattern is useful. Natural sounds such as the rush of water in a mountain stream or waterfall can be good guiding aids.'*

*Another method of navigation which is slower than direct movement, but effective, is to select on the map or air photograph a number of points which can be identified on the ground, and which*

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<sup>4</sup> The earth's magnetic fields are constantly changing, a process known as secular variation. Our planet's outer core contains complex fluid currents of iron, nickel and cobalt. These elements generate a magnetic field whose poles do not coincide with true north or true south—the earth's axis of rotation.

<sup>5</sup> Tip for young players. If you get the grid-magnetic angle from the internet, do not mistakenly use magnetic variation or magnetic declination. Use the grid-magnetic angle.

<sup>6</sup> In Australia, MN is to the east of GN for nearly all of the country except for a fairly large part of the south-west corner.

## Smart Soldier - Navigation

*generally correspond with the route to be taken. By moving from one identified point to the next, the objective must eventually be reached, though the course taken may be circuitous.'*

AMF Tropical Warfare Pam No 2, 1945

### Navigation exercises

Navigation exercises (navexs) are a good way to practice our skills, and a good amount of thought needs to go into these exercises to ensure they are interesting and that soldiers learn. Several years ago I ran a navex for my unit, which was essentially a competition. The soldiers were put into teams of three and were given the grid references for around 25 control points in a non-military training area which was mainly close country with plenty of tracks and creeks. Each control point was given a point's allocation depending on its location from the start point and whether it was difficult to find or get through to. The teams then put together their own patrol route to work out the best way to get to the most points in one day. They submitted their Navigation Data Sheets prior to step off, and radioed through when they reached their selected points. The numbering system at the points were random XYZ, XXY, etc, designations. The troops enjoyed the event and a prize was given to the team with the most points.

*'Navigation at night is very tedious if the compass must be used at frequent intervals to check the course. To avoid this a star with a bearing about two degrees less than the compass course should be selected, and it will serve as a guide for half an hour. After this period its bearing may have changed appreciably due to the Earth's rotation.'*

Middle East Training Memorandum No 3, 1941

### Conclusion

Navigation is a skill that commanders need to be highly proficient at, so they can get their troops to the right place at the right time, and be able to use ground to their tactical advantage in training and operations. Failure in navigation can be embarrassing in training and can lead to a loss of confidence in commanders by their subordinates. In war time, navigational errors may cost lives.

*'To learn more about navigation, read LWP-G-7-7-2 Navigation. It is also recommended that you find a book on navigation that works for you, and to practice, practice and practice.'*

*To learn more about the changing magnetic fields, go to <http://www.ga.gov.au/ausgeonews/ausgeonews201006/geomagnetic.jsp> for more information. Also, if you don't have access to a north point diagram for the grid-magnetic angle, seek support from a Geospatial Technician in AustInt.*