MAP READING AND LAND NAVIGATION

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MANEUVER CENTER OF EXCELLENCE

HOW TO NAVIGATE

STEP 1. ☑ **COMPASS CHECK/PACE COUNT**
Techniques, barriers, terrain changes, pace, and situations all play a factor in accuracy when navigating. Prepare yourself.

STEP 2. ☑ **CHECK GM ANGLE/DECLINATION**
The grid magnetic (GM) angle allows the individual to declinate the M2 compass based on the map.

STEP 3. ☑ **PLOT POINTS and PLAN ROUTE**
Plan your route so that the distance point to point is short: *The shorter the route, the less likely you are to make a mistake.*

STEP 4. ☑ **ORIENT MAP**
Using the compass and/or terrain association, orient the map NORTH. *Indirect fire (smoke) can be used to create a known point when available.*

STEP 5. ☑ **NAVIGATE USING BEST METHODS**
Using appropriate navigation methods, continue on plotted route; *usually point navigation (dead reckoning) or terrain association.*

COMPASS and PACE COUNT MUST BE CONDUCTED BEFORE ALL NAVIGATION EXERCISES

NORTH

TRUE	MAGNETIC	GRID
Points to North Pole	Points to magnetic field surrounding North Pole	North as depicted on map

? DISORIENTED
Move back to last known point and re-orient yourself.

PLOTTING A GRID POINT

EXAMPLE GRID POINT
1234 5678

EXAMPLE

4-DIGITS = 1000M
12__ 56__
1000M IDENTIFIERS

6-DIGITS = 100M
123_ 567_
100M IDENTIFIERS

8-DIGITS = 10M
1234 5678
10M IDENTIFIERS

18T	WL	1234	5678
GRID ZONE IDENTIFIER	100,000 SQUARE IDENTIFICATION	EASTING (To the Right)	NORTHING (Up)

REFERENCE

☒ TC 3-25.26, MAP READING AND LAND NAVIGATION, NOV 2013

MANEUVER CENTER OF EXCELLENCE

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[☑] COMPASS CHECK

USE MINIMUM of 2 KNOWN AZIMUTHS!

Each bezel click is 3 degrees (DEG)

Desired azimuth in DEG, divided by 3 equals number of bezel clicks required to preset the compass.

Align the luminous line with the north arrow to set your desired azimuth in night navigation.

> 3° IF MORE THAN 3 DEG error, DO NOT USE.

HOLD TECHNIQUES

COMPASS-TO-CHEEK
+ Used to sight objects

CENTER HOLD
+ Fast/easy, preferred method

METALS/ELECTRICAL SOURCES AFFECT COMPASSES.

SEPARATION DISTANCE ADJUSTMENTS:

55M	HIGH-TENSION POWER LINES
18M	FIELD GUN/TRUCK/TANK
10M	ACTIVE COMMUNICATION WIRE
<2M	SMALL ARMS

PACE COUNT

MAINTAIN STEADY PACE!

Changing pace will affect your ability to determine distance.

100M PACE COUNT

GET PACE COUNT FOR:

LOCAL TERRAIN (when possible)

DAY | NIGHT | NAVIGATION | RUNNING

PLOT POINT MAP LEGEND:

EP	END POINT
DEG	DEGREES
DIR	DIRECTION
DIST	DISTANCE
SP	START POINT

ROUTE PLAN PLOT POINTS

PACE COUNT

	/100M	DAY
	/100M	NIGHT
	/100M	RUN
	DEG	PANIC AZIMUTH

	EASTING	NORTHING
SP		
DIST/DIR	/M	DEG
Point 1 GRID		
DIST/DIR	/M	DEG
Point 2 GRID		
DIST/DIR	/M	DEG
Point 3 GRID		
DIST/DIR	/M	DEG
Point 4 GRID		
DIST/DIR	/M	DEG
Point 5 GRID		
DIST/DIR	/M	DEG
EP		
DIST/DIR	/M	DEG

TERRAIN FEATURES

MAJOR

HILL Contour lines in concentric circles

VALLEY High ground on three sides; river

RIDGE Sloping line of high ground

SADDLE Between two areas of high ground

DEPRESION Low point/sinkhole

MINOR

SPUR U/V-shaped contour lines away from high ground; streams to either side

DRAW U/V-shaped contour lines point toward high ground; stream in center

CLIFF Vertical or near-vertical drop; steep point with contour lines converging

SUPPLEMENTARY

CUT Formed by cutting into ground

FILL Formed by filling out of ground

☐ **LINEAR** Trails, streams, ridgelines, wood lines, power lines, streets, and contour lines

☐ **POINT** Hilltops, prominent buildings

☐ **HANDRAIL** Linear feature parallel to route; increases speed and orients movement

☐ **ATTACK POINT** Obvious landmark that can be found easily on the map

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BLACK	Cultural (man-made); buildings
RED-BROWN	Contour lines
BLUE	Hydrography/water features
GREEN	Significant vegetation (woods)
BROWN	Cultivated land
RED	Populated areas and main roads
OTHER	Special; see marginal information

Every 5th, heavy line with number
INDEX

The 4 finer lines between index
INTERMEDIATE

Lines resembling dashes; used if very little elevation change in area
SUPPLEMENTARY

You can use contour lines to navigate if you know your elevation.
ALTIMETER

300
200
100

NAVIGATION
METHODS

[ ] TERRAIN ASSOCIATION
Identify terrain features, elevation changes and man-made features on the ground as depicted on the map; these features orient movement and associate ground positions with map locations.

[ ] GENERAL AZIMUTH METHOD
Select a linear terrain feature, maintain map orientation and general azimuth, and handrail the terrain feature to destination.

[ ] POINT NAVIGATION (DEAD RECKONING)
Starting from known point and follow an azimuth and distance. Requires a compass and pace man (or odometer when mounted). Requires high degree of control as even slight deviation can cause navigation errors.

[ ] COMBINATION
Terrain association and general azimuth are speedy, but rough. Point navigation is precise, but exacting. Understanding when to use each technique increases effectiveness.

[ ] MOUNTED
Soldiers must consider increased speed and terrain restriction in vehicles.

[ ] HANDRAILS/CATCHING
Handrails are linear features (roads, ridgelines, or streams) that run roughly parallel to the direction of travel. Catching feature (roads/rivers) is a prominent location/feature near an objective, from which point navigation begins.

POLAR METHOD
LOCATING AN UNKNOWN POINT

Method of plotting an UNKNOWN position from a known point by giving a distance and direction. Polar method is a simple, fast way to find/report an unknown point, and is useful when calling for fire.

UNKNOWN POINT >>
Example: ENEMY COMMAND

>> DISTANCE and DIRECTION >>

[1] KNOWN POINT
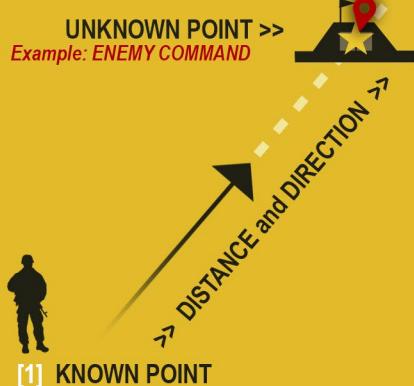
EXAMPLE:
You spot an ENEMY COMMAND post. Your Global Positioning System (GPS) gives your exact grid. Plot your [1] position on the map. Using a compass, you determine the enemy is 45 DEG from your position. Your laser range finder determines the enemy is 500m from your position. Draw a 500m line 45 DEG to plot enemy command post.

INTERSECTION
LOCATING AN UNKNOWN POINT

By shooting an azimuth to the unknown point from 2+ known points, the point of intersect identifies the unknown point.

UNKNOWN POINT >>
Example: ENEMY BUNKER

KNOWN POINT [1]

KNOWN POINT [2]
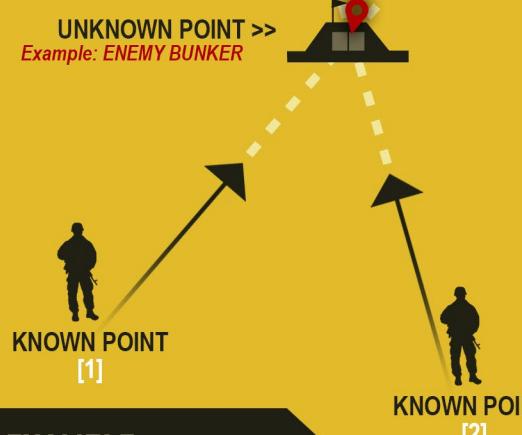
EXAMPLE:
From your [1] KNOWN POSITION, your squad (SQD) spots an enemy bunker. Another SQD spots the bunker from a different [2] KNOWN POSITION. Both SQDs shoot an azimuth to the bunker and draw a line from the position to the bunker on the map. The INTERSECTION of the two drawn lines identifies the bunker.

RE-SECTION
LOCATING YOUR POSITION

Shoot azimuths to 2+ known points, and then shoot back azimuths from those points; the point of intersect is your location.

KNOWN POINT [1]

KNOWN POINT [2]

UNKNOWN POINT
Example: YOUR POSITION
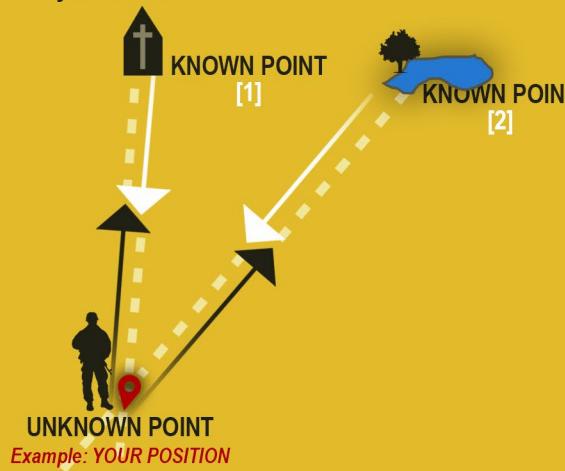
EXAMPLE:
You do not know where you are. From YOUR POSITION, you see a church and a lake, which are both on the map. Shoot an azimuth to each location, then get the back azimuth for both. On the map, draw a line using the back azimuth from both known points. Where the lines cross is where you are.

MODIFIED RE-SECTION
LOCATING YOUR POSITION

When you are on a linear feature (roads/rivers/etc.), shoot an azimuth to a known point, and then shoot a back azimuth from that point. Where the line crosses the linear feature is your location.

KNOWN POINT [1]

>> DISTANCE and DIRECTION >>

UNKNOWN POINT
Example: YOUR POSITION
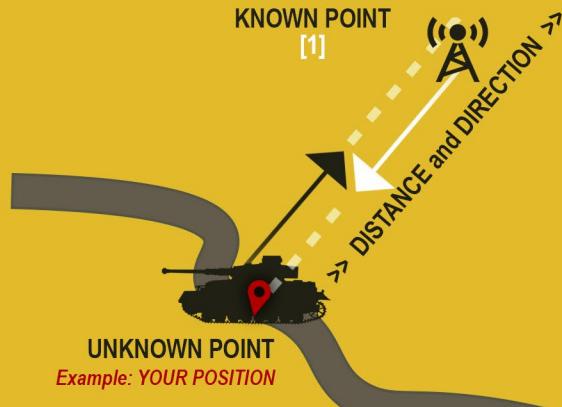
EXAMPLE:
Your convoy is on a road, but you're not sure where on the road you are. From the road, you see a radio tower that is on the map. Shoot an azimuth to it, then get the back azimuth. On the map, draw a line from the [1] radio tower using the back azimuth. Where the line crosses the road is YOUR POSITION.

OBSTACLE NAVIGATION
NAVIGATING OBSTACLES

BOX METHOD: Used for LARGE obstacles

IDENTIFIED POINT >>
Example: LARGE TREE
[3]

Identify a point on opposite side of obstacle.
* REMEMBER ORIGINAL PACE COUNT

RESUME AZIMUTH

ex: LAKE

[2]

[1]

ORIGINAL PACE COUNT

LEG [1]
Turn 90 degrees
Create obstacle pace count until clear of obstacle

LEG [2]
Turn 90 degrees
Resume ORIGINAL pace count until clear of obstacle

LEG [3]
Turn 90 degrees
Recount LEG [1] obstacle pace count
Turn 90 degrees

ALTERNATING METHOD: Used for SMALL obstacles
in your path, such as a big rock or tree. Go around obstacle, continue original azimuth. Alternate going around obstacles LEFT/RIGHT to mitigate favoring one side and causing a drift in your path.

LEFT

RIGHT

DAGR
DEFENSE ADVANCED GPS RECEIVER

PRESENT POSITION
MGRS-New   WGD
15T XG 11897e
       53935n

SPEED   ELEVATION   MSL
0kph   +00260m

TRACK   MAG   2344±11Z
359.7°   27-APR-02

GOTO WP   WP List   Back

F1 MARK   F2 MAIN   F3
PWR QUIT   ZEROIZE   PREV NEXT
BRT MENU   HELP SEL

⚠ **BLINKING POSITION DATA**
WHEN POSITION DATA IS BLINKING BLACK/GREY
DAGR IS NOT TRACKING SATELLITES
AND DATA MAY BE INACCURATE AND/OR UNAVAILABLE.

>> BASIC KEY FUNCTIONS

■ **POWER ON**
PWR/QUIT   PUSH and RELEASE

■ **POWER OFF**
PWR/QUIT   PUSH and HOLD (2 seconds)

■ **DUAL FUNCTION KEYS**
For **PRIMARY**   PUSH and RELEASE
For **SECONDARY**   PUSH and HOLD (2 seconds)

■ **PAGE CHANGE**
PWR/QUIT + POS/PG   PUSH and RELEASE

■ **10-DIGIT GRID POSITION**
POS/PG   PUSH and RELEASE

>> OPERATION MODES

CONTINUOUS
USES MOST POWER
Acquires/tracks satellite continuously

FIX
USES LESS POWER
Acquires satellite periodically

STAND BY
USES LEAST POWER
Does not acquire/track satellite

This is only basic DAGR information. Use actual manuals for operations.