

## Chapter 9

### Movement by Vehicle

#### 9001. Effect of Cold on Mobility

Marine forces are limited in cross-country movement over deep snow by their limited tactical over-snow vehicles.

#### 9002. Planning

All movement is slower in the cold. When planning vehicle movement, calculate movement speed not to exceed 48 kilometers per hour/30 miles per hour. Another consideration is weight capacity. Max weight capacity should be adhered to, to help maintain traction on ice and deep snow.

#### 9003. Maintenance

Motor transport personnel must ensure the operational readiness of assigned vehicles. Operator-level maintenance (before, during and after operation) is essential. The following tips should improve the readiness of motor Vehicles:

- a. Vehicle maintenance must be carried out in spite of cold. First echelon maintenance is the responsibility of the assigned driver. If, because of the cold, immediate maintenance is beyond the capability of the driver, motor transportation section heads must ensure the driver receives assistance.
- b. Maintenance must be performed while vehicle is warm, not hot. This is to ensure the driver doesn't burn his hands or other extremities while checking fluids. A minimum of 5 minutes after shutdown should be sufficient time to allow proper cooling and settling of fluids.
- c. Vehicle repairs and maintenance require light. Daylight is short in winter and the tactical situation may prevent the use of lights. The unit leader must take into account the need for light when planning the maintenance of vehicles.
- d. Most maintenance should be done indoors (if available) therefore mechanics should be allowed to repair various components in their tents.
- e. In extremely cold conditions, fuel lines and batteries freeze and crankcase oil thickens. When the tactical situation permits, vehicle engines should be run periodically and the vehicle should be moved frequently. Other precautions, such as removing vehicle batteries and holding them in warm areas, may have to be implemented. At least 10 percent of the unit's vehicles should be running at all times.
- f. Gasoline tanks and fuel cans must be continuously topped of to prevent condensation and ice crystals from forming inside these containers.
- g. Ensure that Marines handling fuel and carrying out maintenance wear contact gloves or rubber fuel handlers gloves as appropriate. Gasoline spills on clothing cause parkas and trousers to lose their insulation effectiveness. Petroleum spills on unprotected skin can cause frostbite.

#### 9004. Road Movement

Engineers normally keep main routes in operational areas open. The following are hints for Marine leaders conducting road moves:

- a. When a move is imminent, start vehicles at intervals of 30 minutes to warm the engines preventing them from becoming cold-soaked.
- b. Allow time for prestart checks and warming up, ensuring that all operators are aware of the correct starting procedures for a CWE.
- c. To ensure good visibility, snow and ice must be removed from all windows, headlights and taillights.
- d. An appropriate measure of dispersion between vehicles should reflect the increased difficulty in stopping on frozen surfaces. Also, avalanche awareness will impact distances between vehicles in order to protect against losing multiple vehicles in the event of a slide.
- e. Speed should never exceed 30 mph on ice or snow-covered roads.
- f. All drivers must have an assistant driver (A-driver.) While the A-driver is not responsible for the control of the vehicle, he should remain alert for hazardous road conditions, oncoming traffic and fatigue.
- g. Snow has a tendency to cause poor visibility, in which a ground guide should be used. The use of a ground guide is also essential when moving off the road.
- h. Chains or studded tires should always be used to improve traction and braking. Care and maintenance of chains are a first echelon responsibility.
- i. Vehicles must carry all SL-3 gear. Additionally, sandbags and a vehicle survival kit should be carried. The unit SOP will dictate the contents of the vehicle survival kit; at a minimum, vehicle recovery equipment and chock-blocks are mandatory.
- j. Drivers should have a route card, rations, and orders to follow in case of emergency or breakdown.

## **9005. Cross-Country Movement**

When cross-country movement is necessary, junior leaders may use these hints:

- Find a route and ensure it goes to your objective.
- Send an over-the snow vehicle or Marines on snowshoes to prepare a track.
- Avoid steep slopes of more than 10 degrees.
- Take exposed ground if you can. It holds the least amount of snow and therefore presents fewer concealed problems.
- Avoid draws and the lee sides of ridges. They may contain deep drifts necessitating an undue amount of labor.
- Do not cross ice until you have first checked its depth to see it will support the vehicle. (see figure 9-1)
- Dismount all passengers when crossing questionable ice areas.

Load (tons)	<i>Required ice thickness (inches)</i>	<i>Distance between loads (feet)</i>
0.1	2	17
1	4	34
2	6	48
3	7	58
4	8	67
5	9	75
10	13	106
20	18	149
30	22	183

MINIMUM ICE REQUIRED TO SUPPORT A LOAD