Annex D – MINE AWARENESS FOR VEHICLE OCCUPANTS

Human Behaviour – An Important Part of the Protection System

Mine awareness could be described as the knowledge of how to minimize the risk to be injured by a landmine. Mine awareness is often defined in terms of anti personal mines and unprotected personnel. It is based on how to recognise mines and signs of mines and rules of how to handle dangerous situations. In that case, a detonation of a mine is not possible and still remains unharmed.

When it comes to personnel riding a vehicle it is a somewhat different situation. Even an unprotected vehicle often offer some kind of protection and a protected vehicle hopefully gives the crew and the passengers the means to protect themselves in the best possible way. A vehicle, protected and qualified according to the criteria described in this documentation even gives a good chance of no injury at all.

Mine protection of vehicles is often a combination of different measures ranging from reinforced bottom structure to seat belts and holders for weapons and equipment.

However, the risk for injury of the crew and passengers is not only a function of constructive measures of the vehicle. As described in this document and STANAG 4569 the mine protection level of a vehicle is based on the effects on the human body and qualified according to strict rules. Test equipment is used to evaluate a certain place and even a certain position of the vehicle occupants. Any other place or position could decrease the protection level.

Therefore it is important that the vehicle occupants know how to behave in case of a mine strike to minimize the risk for injury. In fact, the behaviour of the vehicle occupants is a part of the vehicle protective system and thus, education about mine awareness is of great importance. A protected vehicle **and** a well trained crew are the key to maximize the protection.

Below are few examples of recommendations/rules related to mine awareness for vehicle occupants:

- Wear hearing protection;
- Use only seats that are prescribed and place your feet on the shock absorbing foot rest (if applicable);
- Wear seat restraint system (or seat belt);
- Avoid any loose objects inside the vehicle (see examples below);
- Before mission: Perform inspection of protective measures;
- Do not drive to fast, because of the risk for secondary accidents;
- Keep distance to the vehicle in front in case it strikes a mine; and
- Do not leave the vehicle in case of a mine strike; if there is one mine there could be more (AP or AT mines).

Figure D.1 illustrates what could happen with loose objects when a mine detonates below the bottom of a vehicle (in this case; 0,5 kg TNT placed on the ground at a distance of 0,5 m from a 10 mm steel bottom plate). The equipment (water bottle, gun and ammunition box) gets a velocity of approximately 25 m/s. These loose objects became very dangerous projectiles. A 1 mm soft aluminium plate (placed above the objects) was perforated by the objects.

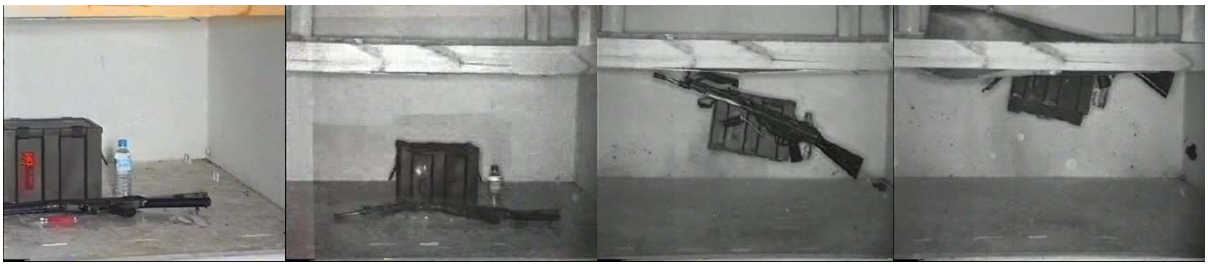

Figure D.1: Illustration of Danger of Loose Objects (Picture courtesy of FMV).

Another example of flying object effects is given in Figure D.2. A fire extinguisher (identified by the red circle) was placed inside a light-armoured vehicle subjected to the detonation of a blast mine. For this specific test, all the measurements did not exceed the injury tolerance levels (as described in Chapter 3), but the neck lateral bending moment (shown on the right side of the figure) was very high (Mx peak value of 420 Nm). This severe impact was caused by the fire extinguisher that hit the side of the driver's head after hitting the wall beside the driver. This example shows that even if a vehicle is well protected against mines, failure in the other protective procedures might be fatal for occupants. In this case, it is believed that the impact on the driver's head would probably result in life-threatening neck injuries.

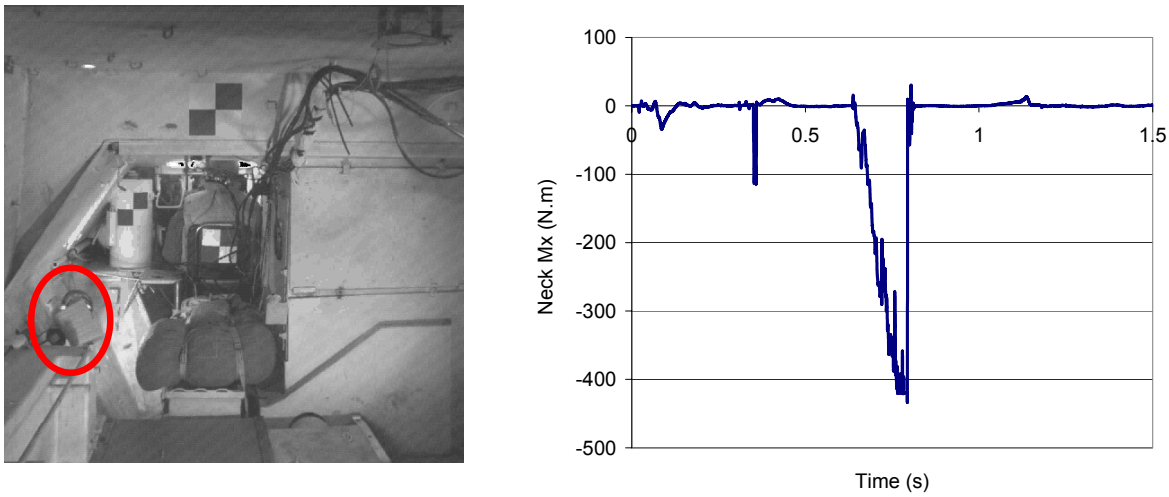

Figure D.2: Fire Extinguisher Impact on Occupant's Head during a Mine Test (Picture courtesy of DRDC).

These two examples show the importance of securing all objects inside the vehicle to prevent loose objects in case of a mine strike.