GROUP OF GOVERNMENTAL EXPERTS OF THE STATES PARTIES TO THE CONVENTION ON PROHIBITIONS OR RESTRICTIONS ON THE USE OF CERTAIN CONVENTIONAL WEAPONS WHICH MAY BE DEEMED TO BE EXCESSIVELY INJURIOUS OR TO HAVE INDISCRIMINATE EFFECTS

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Working Group on Mines Other Than Anti-Personnel Mines

Sensitive Fuses and Sensors for Mines Other Than Anti-Personnel Mines (MOTAPM) Proposal for Best Practice

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Introduction

1. Fuses and sensors are a crucial factor, alongside others, to ensure the proper functioning of MOTAPM.

2. The use of MOTAPM can cause humanitarian suffering and can be a serious impediment to humanitarian assistance, peacekeeping, reconstruction, social and economic development. This appears to be concurrent with a general recognition that MOTAPM are a defensive weapon permissible according to international humanitarian law, as there is the need to warrant the operational capability of armed forces as well as their protection. Humanitarian aspects and military requirements need to be balanced.

Method of best practice

3. Best practice for fuse and sensor mechanisms employed in MOTAPM aims to reduce probable risks to human beings. The purpose of best practice is thus to determine suitable technical parameters for fuse mechanisms, which will increase the discriminatory capacity of MOTAPM and will prevent them from being actuated accidentally by the presence, proximity or contact of a person.

Types of fuses and sensors

4. Based on information and data provided by States Parties, the following broadly available fuses and sensors are considered as relevant: acoustic sensors; break wires; fiber-optic wires;

infra-red-sensors; magnetic sensors; pressure sensors; roller arms; scratch wire sensors; seismic/vibration sensors; tilt rods; trip wires.[1]

Grading sensitivity

5. Category One: *Fusing systems that cannot be designed not to be excessively sensitive, i.e. break wires, tilt rods, and trip wires.*[(i)]

(i) Break wires, tilt rods, and trip wires do not appear to be a recommended method of detonation, as it does not seem possible to design them in such a way that an individual cannot, within reason, initiate the mine.

6. Category Two: *Fusing systems that can be designed not to be excessively sensitive, but are best used in conjunction with other sensors, i.e. acoustic sensors,*[(i)] *infrared-sensors,*[(ii)] *and seismic/vibration sensors.*[(iii)]

(i) Acoustically activated fuses use electronic sensors to react to acoustic pressure and recognize the acoustic signature. Use in conjunction with other sensors is preferable.

(ii) Infrared activated fuses should be designed so as not to be activated in the presence of a person. The sensor should be able to match detected heat signatures to the intended target in conjunction with other sensors.

(iii) Seismic/Vibration sensors cannot currently locate their targets precisely; their use in conjunction with other sensors appears therefore to be indispensable. The sensor should be capable to match a seismic signature to the intended target.

7. Category Three: *Fusing systems that can be designed not to be excessively sensitive and can be designed to operate satisfactorily on their own, i.e. fiber-optic wires,*[(i)] *magnetic sensors,*[(ii)] *pressure sensors,*[(iii)] *roller arms,*[(iv)] *and scratch wire sensors.*[(v)]

(i) The pressure required to break the fiber-optic signal should be appropriate for the intended target.

(ii) To enhance military utility, magnetically activated mines should be capable of matching a magnetic signature to the intended target.

(iii) Pressure sensors should, where possible, be subject to a minimum pressure force appropriate for the intended target, e.g. 1500–1800 Newton. Pressure should preferably be exerted over a significant area (equal to that of a vehicle) rather than a single point.

(iv) The number of turns required to initiate the roller arm fuse should be matched to the intended target.

[1] The sequence of the fuses and sensors is strictly alphabetical and does not entail an assessment on their availability, distribution or use.

(v) The scratch wire sensor should be designed for specific targets by optimizing the scratch time, frequency and amplitude required to initiate the sensor by the intended target.

Qualifying sensitivity

8. Notwithstanding the recommendations pursuant to the preceding paragraphs 5 to 7, the observations in the subsequent paragraphs 9 to 11 merit due attention.

9. Future MOTAPM could incorporate multi-sensor fuses technology in order to reduce the possibility of inadvertent or accidental activation. If a single fuse or sensor fulfills safety requirements as recommended, the incorporation of multi-sensor fuses should be discretionary.

10. The influence of environmental factors - particularly *(i)* of weather and climate as well as *(ii)* of storage, handling and other external conditions - should be taken into account when selecting the types of fuses and determining the sensitivity of fuses.

11. Considerations and proposals of technical measures should take into account operational, procurement as well as life cycle factors; they should address clearly identified humanitarian issues as opposed to unquantifiable theoretical risks.

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