

METHOD FOR SIMULATING THE DANGER POSED BY HAND GRENADES OR
MINES TO PARTICIPANTS IN A MILITARY EXERCISE

The invention relates to a method for simulating the danger posed by hand grenades or mines to participants in a military exercise, according to the preamble of Claim 1. It is used for the reality-approaching simulation of the danger posed by individual mines, mine blocks and hand grenades to participants in exercises, particularly soldiers and vehicles. As a result, the handling with all (harmless) consequences can be practiced during training, and the objective influence of mines and hand grenades can be determined in simulated combat. In this case, a mine or hand grenade is simulated by a weaponry simulator. The individual participants in the exercise (particularly personnel, vehicles) are equipped with a sensor system, in the following called "participant sensor system". The ranges of action of the mines and hand grenades are simulated by a data transmission between the brought-out weaponry simulators and the participant sensor systems.

It is an object of the invention to provide a method by means of which a precise range limitation of the mine or hand grenade can be carried out so that a reliable determination is achieved of the participants situated in the range of action of the triggered mine or hand grenade.

This object is achieved by means of the method according to Claim 1. Advantageous embodiments are the object of additional claims.

According to the invention, the data transmission from the weaponry simulator to the individual participant sensor systems is carried out in the form of a two-way radio transmission. The radio transmission from the individual participant sensor systems to the weaponry simulator is used for limiting the range of action of the mines or hand grenades to be simulated. For this purpose, the field pattern in the near field of the participating transmitting and receiving antennas is utilized. A hit is possible only when the near field of the transmitting antenna at the participant sensor system overlaps with the near field of the receiving antenna on the weaponry simulator.

As the transmission frequency, a frequency is selected whose near field range is larger than the maximally required range of action of the mine or hand grenade to be simulated. For the relationship between the near field r and the frequency f , the following applies according to general physical principles:

$$r \leq c/2\pi f \quad (c: \text{velocity of light}).$$

In order to simulate the ranges of action of typical mines and hand grenades (several m to several km), frequencies in the range of from several kHz to several 10 MHz can therefore be used for the transmission. This frequency range includes particularly the MW and LW range (LW long wave, approximately 30 - 300 kHz; MW medium wave, approximately 300 kHz - 3 MHz).

The radio transmission from the weaponry simulator to the individual participant sensor systems is used for confirming or verifying a mine or hand grenade hit. On principle, no limitation exists for this transmission with respect to the used frequencies. However, advantageously frequencies in the VHF or UHF range (VHF very high frequency, approximately 30 to 300 MHz; ultra high frequency, approximately 300 to 3,000 MHz) are used.

A participant's hit takes place when a confirmed communication is established between the participant sensor system and the weaponry simulator.

The range of action limitation according to the invention by a radio transmission in the near field range (for example, in the LW or MW range) from the participant sensor system to the weaponry simulator permits a precise and true-to-the original simulation of the action of various mine types and hand grenades. In particular, a covered as well as an open laying is possible.

As a result of the radio transmission from the weaponry simulator to the individual participant sensor systems (for example, in the UHF or VHF range), which is used for confirming a hit, a high reliability is obtained when detecting the weaponry simulator.

In order to achieve a precise range of action limitation with a level measurement in the case of a high-frequency transmission, a correspondingly high damping must be present in the transmission medium, including antennas. Therefore, magnetic antennas (such as a ferrite rod with an antenna coil) are

preferably used for the transmission from the participant sensor system to the weaponry, in which case the range of action limitation of the mines or hand grenades is achieved by the utilization of the field pattern in the near field of these antennas.

The high damping in the transmission path has the advantage that the damping influences occurring in nature and civilization as a result of different soil conditions, of cultivation, because of the weather or an open and covered laying only still play a minor role.

The method according to the invention can be used for the simulation of mines as well as for hand grenades (HGR). The different characteristics of these systems can therefore be simulated with the same technical preparations. The following mine types can, for example, be simulated:

Anti-tank laying mine (PzAbwVMi)

Anti-gunner mine (SchtzAbwMi)

Anti-gunner laying mine (SchtzAbwVMi).

The method according to the invention supports all

principles of the use of mine laying, such as, also the mixed laying of mine blocks (PzAbwVMi) and of individual mines (SchutzAbwVMi).

The method is designed for the mine combat simulation in combat exercise centers for the combat of connected weapons as well as as a stand-alone solution for pure mine combat training.

The participant sensor systems mounted on vehicles or personnel permit, in addition to the mine detection, also the radio-technical linking of additional equipment.

The invention will be explained in detail by means of concrete embodiments with reference to the drawings.

Figure 1 is a view of the starting situation during the implementation of the method according to the invention;

Figure 2 is a block diagram of the overall system consisting of the weaponry simulator and the participant sensor system;

Figures 3 is a view of the radio ranges of various weaponry

simulators and participant sensor systems.

In the case of all embodiments of the method according to the invention which will be described in the following, the transmission from the participant sensor system to the weaponry simulator takes place, for example, in the MW range; and the transmission from the weaponry simulator to the participant sensor system takes place, for example, in the UHF frequency range. As mentioned above, other frequency ranges are conceivable.

Figure 1 illustrates the starting position during the implementation of the method according to the invention. Two typical exercise participants are illustrated, specifically personnel and tanks, to which one participant sensor system HGRM-S respectively is assigned. Furthermore, three types of possible weaponry simulators KSIM (HGR-KSIM, PzAbwVMi-KSIM, SchtzAbwVMI-KSIM) are illustrated which simulate certain mine types or hand grenades. The SchtzAbwVMI-KSIM is triggered by the trip wire STR. The arrows between the individual KSIM and HGRM-S symbolize the possible transmission paths in the event of the triggering of a weaponry simulator.

Figure 2 illustrates a block diagram of the overall system consisting of the weaponry simulator KSIM and the participant sensor system HGRMS-S, as it is used when implementing the method according to the invention. The method according to the invention is based on a combination of two radio transmission links between the weaponry simulator KSIM and the participant sensor system HGRM-S. Correspondingly, the weaponry simulator KSIM illustrated in Figure 2 comprises a UHF transmitter as well as an MW receiver. Correspondingly, the participant sensor system HGRM-S comprises a UHF receiver as well as an MW transmitter. The MW radio link from the participant sensor system to the weaponry simulator (transmission in the near field range) is used for the effect range limitation and for the information transmission. The UHF radio link from the weaponry simulator to the participant sensor system is used for the information transmission (confirmation of the MW reception).

A hit by a mine or a hand grenade has taken place when a confirmed communication between the participant sensor system and the weaponry simulator was established. In this case, the communication takes place between the weaponry simulator and the participant sensor system, particularly according two similar

methods which will be described in detail in the following.

By way of the controller within the participant sensor system, an additional data transmission can be implemented between the participant sensor system and a central processing and control unit which is not illustrated here. For example, the fact that the respective participant was hit can be transmitted for further analysis.

The probability of radio collisions occurring outside the process is very low because of the locally limited transmission ranges as well as the low event frequency (mine / HGR triggering, data transmission), the short transmission times (high bit rate, few data) and the asynchronism of mine/HGR triggerings.

The method according to the invention is open for the linking of additional equipment for the purpose of data transmission by radio. The coding of various weaponry simulators as well as other equipment is transparent to the outside; that is, additional equipment can utilize the data transmission link with an unchanged participant sensor system. The data at the interface of the participant sensor system HGRM-S to the central

processing and control unit, on the one hand, and the data at the transfer interface (not shown in Figure 2) of the weaponry simulator KSIM to the additional pieces of equipment, on the other hand, are the same. The transmission power for the data transmission to personnel and vehicles can be reduced with respect to the mine simulation because here the parameters of the transmission link are more constant and only small ranges of from approximately 0.1 m to 3.0 must be bridged. In addition, in comparison to the mine simulation, the data transmission has a low priority which is automatically taken into account in the participant sensor system.

The time-related utilization of the used frequency is in a direct relationship with the mine triggering and with the data transmission. By means of the method according to the invention, the utilization is reduced to a minimum.

In the manner of examples, Figure 3 illustrates the radio transmission ranges of individual weaponry simulators and participant sensor systems, as used for the method according to the invention. Figure 3a) illustrates the transmission range of a PzAbwVMI weaponry simulator as well as of a vehicle participant

sensor system. Figure 3b) illustrates the transmission range of a SchtzAbwMi weaponry simulator as well as of a personnel participant sensor system. The UHF transmission ranges are illustrated by concentric closed lines. The significantly smaller MW transmission ranges are hatched. They correspond to the near field of the used magnetic antennas.

The double arrow on the transmission range of the vehicle participant sensor system indicates the driving direction of the vehicle.

Since the MW transmission is used for limiting the range of effect, the illustrated MW transmission ranges correspond exactly to the effect ranges of the PzAbwVMI or of the SchtzAbwMi. The simulation of the effect ranges is implemented by the directivity of magnetic antenna (for example, ferrite antenna). Depending on the arrangement, for example, a 360° effect range or an effect range in the form of a horizontal eight (vehicle participant sensor system) is generated. Furthermore, combinations of several magnetic antennas (for example, aligned in the direction of the x/y/z axis) are conceivable. The different ranges can be achieved by the different damping of the MW receiving antenna in

the weaponry simulator or by the controlling of the MW transmission power in the participant sensor system. In the case of the SchtzAbwMi weaponry simulator, the directivity in the UHF transmission range is achieved by a directed irradiation in the UHF range.

A complete two-way transmission in both illustrated situations in Figure 3a), 3b) takes place only in the case of an overlapping of the single-line hatched MW transmitting range of the respective participant sensor system HGRM-S and of the cross-hatched MW reception range of the weaponry simulator KSIM. In the case of the SchtzAbwMi, the participant must additionally be in the illustrated UHF "lobe".

In the following, two particularly advantageous embodiments of the method according to the invention are illustrated in detail with reference to tables.

Table 1 illustrates the implementation of a first embodiment of the method according to the invention;

Table 2 illustrates the implementation of another embodiment

of the method according to the invention;

Tables 3 to 7 are views of examples of the telegram construction during the radio transmission.

Method for Simulating the Danger Posed by PzAbwVMi

The participant sensor system mounted on a vehicle continuously emits MW prompt signals according to Table 4. If a PzAbwVMi weaponry simulator receives a transmission on MW, it emits its weaponry simulator identification and the sender identification of the participant sensor system on its UHF transmitter (telegram construction according to Table 5). The participant sensor system at the triggering vehicle recognizes this and registers and reports the reception as a hit. If other participant sensor systems also receive the UHF emissions, they know that the emission does not originate from them because it occurs asynchronously to their prompting event and simultaneously contains an external participant identification. The participant sensor system with the personnel (for saving energy) carries out no prompting emissions and can therefore not be "hit" by PzAbwVMi, which complies with the reality of the application. The described method replaces a high-expenditure original mine

sensor system in the weaponry simulator and permits a high relative speed between the vehicles and the weaponry simulator.

As an alternative to the described MW transmission, an LW transmission can, for example, be used. Analogously, instead of the above-mentioned UHF transmission, for example, a VHF transmission can be used.

The constant MW prompt emissions of the participant sensor system in the case of vehicle are spatially limited to a surface of approximately 8 m x 16 m, so that the vehicles do not hinder one another. This ensures the large-surface usability of the frequency.

The described embodiment of the method is again illustrated in detail in Table 1.

**Method for Simulating the Danger Posed by SchtzAbwVMi,
SchtzAbwMi, HGR**

In the case of this variant of the method according to the invention, the weaponry simulators are activated by certain effects, such as a trip wire triggering, an electric ignition, a

projection, at the weaponry simulator itself. Until the time of the triggering the electronic system as well as the receiver and transmitter of the weaponry simulator are in an inactive battery-saving condition ("sleep"). In the event of a triggering, the weaponry simulator emits by way of the UHF transmitter the identification of the Mine/HGR (telegram according to Table 3), and the participants in the UHF transmission range, which is significantly larger than the effect range of the mine/HGR, receive this message. Immediately after the reception, these participant sensor systems, controlled by way of the random sequence generator, attempt to establish a connection by way of the MW transmission link with the mine/HGR. The emissions of the participant sensor systems according to Table 4 are answered by the weaponry simulator directly in the UHF range (transponder method). Since each participant sensor system during the emission simultaneously listens at the UHF receiver, it can immediately be determined whether the own emission or that of another participant is answered. The participants which are outside the MW transmission range but within the UHF range will not be able to establish this connection (no hit). Each participant which has succeeded in establishing a connection has been hit by the mine/HGR. After the establishing of various

connections has been concluded, the triggered mine/HGR becomes inactive again when the selectable maximum number of participants (for example, 31) has been reached or after a time criterion has expired. The time duration of the process maximally, that is, in the case of 31 participants situated in the UHF transmission range of the triggering weaponry simulator, amounts to fractions of a second.

In an advantageous embodiment of the method, the participant sensor system recognizes whether a damage/injury to the participant is at all possible by the triggered mine type (an example in which damage/injury is not possible is the combination of an armored vehicle and a hand grenade). Only the damaged/injured participants will then carry out the described transponder method.

Table 2 again illustrates the described embodiment of the method in detail.

Also in the case of this embodiment of the method according to the invention, the MW transmission can be replaced, for example, by an LW transmission, and the UHF transmission can be

replaced, for example, by a VHF transmission.

The time-related utilization of the used frequencies is very low. Since the participant sensor systems with the personnel carry out no prompting emissions, they do not contribute to an additional radio load. When a mine is triggered, the UHF frequency is used in the framework of the transponder method several times for short periods (within a frame of maximally 1 second/mine) and in a periphery of approximately 50 m to 200 m.

As mentioned above, the participant sensor systems situated in the UHF reception range of the triggering weaponry simulator, after having received the identification of the triggering weaponry simulator, attempt to establish a connection by way of the MW transmission link to the mine/HGR by means of the transponder method. How the emissions of the individual participant sensor systems are coordinated and thus a collision resolution is reached, will be explained in detail in the following.

After the reception of the weaponry simulator identification, each participant sensor system calculates a

random number. After a certain time has expired, which is defined by the random number, the individual participant sensor system checks whether another participant sensor system is already emitting. If no other participant sensor system is emitting, it starts with the with the described transponder method by the MW emission of the telegram according to Table 4 with the participant No. 1. The triggered weaponry simulator answers the emissions of the participant sensor system such (telegram according to Table 4) that each participant sensor system can determine in the UHF band whether there is a transmission in the MW band. If another participant sensor system is already emitting, the checking participant sensor system will wait until the transponder process with the other participant sensor system is completed. In this case, all participant sensor systems receive the up-to-date identification of the participant sensor system which is just carrying out the transponder process. The next participant sensor system which starts with its transponder process emits with a participant number higher by one.

As the result of the described controlling of the sequence in which the individual participant sensor systems carry out the

transponder process with the triggered weaponry simulator, by the generating and assignment of random numbers, a large address space (the number of all participants which participate in the exercise may be large, for example, in the range of 1,000 participants) is achieved into a significantly smaller address space (the number of participants which, when the weaponry simulator is triggered, are situated in its UHF reception range, will normally be lower than 10). This significantly increases the speed of the process which is important particularly in the case of fast moving participants (such as vehicles).

If accidentally two participant sensor systems have calculated the same random number and emit together, the closer transmitter will succeed or an undefined UHF emission will occur. After a reception error in the transponder process, a new random number is determined in each participant sensor system and the process is repeated with the last valid participant number. Each participant sensor system which was able to establish a connection to the triggered weaponry simulator separately terminates the transponder process. If, because of a large distance or a radio interference, a participant sensor system receives no answer from the weaponry simulator, it will attempt

two more times to establish this connection. If this is also unsuccessful, it terminates the process. If, after the first-time emission of its identification, the weaponry simulator receives no reaction in the form of the transponder process, it will repeat its identification two times at time intervals of approximately one second. If an SchtzAbwVMi, SchtzAbwMi or HGR weaponry simulator recognizes that, when emitting the mine identification for the first time, another SchtzAbwVMi, SchtzAbwMi or HGR weaponry simulator is already carrying out the transponder process, the recognizing weaponry simulator will wait until the transponder process has been completed and will only then emit its mine identification for the first time.

The described approach permits a reliable selection of participants which are situated in the range of effect of a triggered mine/HGR.

Finding/Locating of the Mines/HGR

For finding/locating the mines/HGR, for example, after a concluded exercise, a direction finding system can advantageously be used.

By means of a prompting transmitter (identical to the participant sensor system), a circular area of a diameter of approximately 80 m can be searched. For this purpose, all brought-out mines (HGR only after "detonation") recognize by way of their MW receiver a special identification of the prompting transmitter for the direction finding operation. As long as the prompting transmitter is active, a special UHF signal for the direction finding operation is then generated in the mine/HGR. Commercially available radio direction finders are suitable for use as the direction finding system.

In the case of the described method for simulating the danger posed by SchtzAbwVMi, SchtzAbwMi, HGR, the MW receiver is only pulsed after the conclusion of the process and is therefore operated in a current-saving manner in order to be able to receive the prompting transmitter of the direction finding system for the locating. In the case of the SchtzAbwVMi and the SchtzAbwMi, the MW receiver is already operated in a pulsed manner after the arming in order to be able to also search for mines which were not triggered.

Data Transmission

An important advantage of the method according to the invention is the fact that the participant sensor systems mounted on vehicles or personnel, in addition to the mine detection, also permit the radio-technical linking of additional pieces of equipment. In this respect Table 6 shows a telegram as an example of the data transmission. Table 7 shows an example of a telegram for a confirmation.

TABLE 1

Step	Effect HGRM-S	Effect KSIM	Remarks
1.	Prompting (emitting the participant identification MW according to Table 4)	sleep mode (MW reception)	outside effect range
2.	Prompting (emitting the participant identification MW according to Table 4)	MW reception, work mode	triggering of KSIM
3.	Receive participant identification + mine identification by way of UHF	emit participant identification + mine identification by way of UHF according to Table 5	
4.	Report/register mine hits		
5.	Sleep mode (UHF reception)	Sleep Mode (MW reception)	

TABLE 2

Step	Effect HGRM-S	Effect KSIM	Remarks
1.	Sleep mode (UHF reception)	sleep mode	
2.	Sleep mode (UHF reception)	triggering of KSIM	in the case HGR time delay
3.	Receive mine identification	emit mine identification according to Table 3	
4.	Participant 1 emits on MW according to Table 4 and	MW reception and UHF emission according to Table 4	

simultaneously
receives its emission
on UHF

5. Participant 1 reports/
registers mine hits then sleep mode
for HGRM-S on
participant 1

TABLE 2

Step	Effect HGRM-S	Effect KSIM	Remarks
6.	Participant 2 emits on MW according to Table 4 and receives its emission simultaneously on UHF	MW reception and UHF emission according to Table 4	
7.	Participant 2 reports/ registers mine hits		subsequently sleep mode for HGRM-S on participant 2
8.	...	...	...
9.	Participant n emits on MW according to Table 4 and simultaneously receives its emission on UHF	MW reception and UHF emission according to Table 4	max. 31 participants can be differentiated
10.	Participant n reports/ registers mine hits		subsequently sleep mode for HGRM-S on participant n
11.	Sleep mode (UHF Reception)	time delay	
12.	Sleep mode (UHF Reception)	sleep mode (MW reception)	

TABLE 3

Bit No.	Meaning	Remarks
1	Identification bit	always "0"
2	bit mine type.15	max. 65535 different mines
3	bit mine type.14	displayable
4	bit mine type.13	
5	bit mine type.12	
6	bit mine type.11	
7	bit mine type.10	
8	bit mine type.9	
9	bit mine type.8	
10	bit mine type.7	
11	bit mine type.6	
12	bit mine type.5	
13	bit mine type.4	
14	bit mine type.3	
15	bit mine type.2	
16	bit mine type.1	
17	bit mine type.0	
18	Parity	"1" bits of No. 1-17 = odd, then "1"

TABLE 4

Bit No.	Meaning	Remarks
1	Identification bit	always "0"
2	HGRM sensor system on participant	"0"=soldier, "1"=vehicle
3	bit participant.4	max. 31 different "hit"
4	bit participant.3	particip.can be displayed
5	bit participant.2	
6	bit participant.1	
7	bit participant.0	
8	parity	"1" bit number of No. 1-7 =even, then "1"

If a telegram according to Table 3 was not received correctly (for example, parity error, transmission interference), by means of the participant No. "0", the mine identification can be requested again.

TABLE 5

Bit No.	Meaning	Remarks
1	Identification bit	always "0"
2	HGRM sensor system on participant	"1"=vehicle
3	bit participant.4	max. 31 different "hit"
4	bit participant.3	particip.can be displayed
5	bit participant.2	
6	bit participant.1	
7	bit participant.0	
8	bit mine type.15	max. 65535 different mines
9	bit mine type.14	displayable
10	bit mine type.13	
11	bit mine type.12	
12	bit mine type.11	
13	bit mine type.10	
14	bit mine type.9	
15	bit mine type.8	
16	bit mine type.7	
17	bit mine type.6	
18	bit mine type.5	
19	bit mine type.4	
20	bit mine type.3	

21	bit mine type.2	
22	bit mine type.1	
23	bit mine type.0	
24	Parity	"1" bit no. of No. 1-21 = even, then "1"

TABLE 6

Bit No.	Meaning	Remarks
1	1st identification bit	condition always "1"
2-16	target address 15 bits	highest-order bit first
17	confirmation	always "0"
18-32	sender address 15 bits	highest-order bit first
33-56	data 24 bits	3 bytes
57-64	check sum	bytes 1-7 added

TABLE 7

Bit No.	Meaning	Remarks
1	1st identification bit	condition always "1"
2-16	target address 15 bits	highest-order bit first
17	confirmation	"1" correct, "0" incorrect
18	parity	"1" bit number of No. 1-17 = even, then "1"

If a telegram according to Table 6 was not received correctly (for example, parity error, transmission interference), by means target address "0" (negative confirmation) the telegram can be requested again.

CLAIMS:

1. Method for simulating the danger posed by mines or hand grenades to one or several participants in a military exercise, wherein at least one weaponry simulator (KSIM) simulating mines or hand grenades and sensor systems (HGRM-S) assigned to the individual participants are used, and the effect of the mines or hand grenades is simulated by transmitting data between the weaponry simulator (KSIM) and the participant sensor systems (HGRM-S),

characterized in that data is transmitted by a two-way radio transmission between the weaponry simulator (KSIM) and the individual participant sensor systems (HGRM-S), the radio transmission taking place from the individual participant sensor systems (HGRM-S) to the weaponry simulator (KSIM) in the near field range of the participating transmitting and receiving antennas, and this transmission serving for the transmission of the effect range limitation of the mines or hand grenades, and the radio transmission from the weaponry simulator (KSIM) to the individual participant sensor systems (HGRM-S) being used for the confirmation or verification of a hit by the mines or hand



grenades.

2. Method according to Claim 1, characterized in that the radio transmission from the individual participant sensor systems (HGRM-S) to the weaponry simulator (KSIM) takes place in the MW or LW frequency range.

3. Method according to Claim 1 or 2, characterized in that the radio transmission from the weaponry simulator (KSIM) to the individual participant sensor systems (HGRM-S) takes place in the VHF or UHF frequency range.

4. Method according to one of the preceding claims, characterized in that magnetic antennas are used for transmitting and receiving in the near field range.

5. Method according to one of the preceding claims, characterized in that the two-way transmission between the weaponry simulator (KSIM) and a participant sensor system (HGRM-S) takes place by

- repeated transmitting of the participant identification by the participant sensor system (HGRM-S),



- receiving of the participant identification by the weaponry simulator (KSIM), the establishment of the transmission being considered as the triggering of the receiving weaponry simulator (KSIM) and as a hit of the transmitting participant sensor system (HGRM-S),

- transmitting of the weaponry simulator identification as well as of the participant identification by the weaponry simulator (KSIM) to the participant sensor system (HGRM-S),

- receiving of the weaponry simulator identification as well as of the participant identification by the participant sensor system (HGRM-S) and registering of the hit.

6. Method according to one of Claims 1 to 4, characterized in that the two-way transmission between the weaponry simulator (KSIM) and a participant sensor system (HGRM-S) takes place by

- transmitting of the weaponry simulator identification by the weaponry simulator (KSIM) when the weaponry simulator (KSIM) is triggered,

- receiving of the weaponry simulator identification by the participant sensor system (HGRM-S),

- transmitting of the participant identification by the



participant sensor system (HGRM-S),

- receiving of the participant identification by the weaponry simulator (KSIM), the establishment of the transmission being considered as a hit of the transmitting participant sensor system (HGRM-S) by the receiving weaponry simulator (KSIM),

- transmitting of the participant identification by the weaponry simulator (KSIM) to the participant sensor system (HGRM-S),

- receiving of the participant identification by the participant sensor system (HGRM-S) and registering of the hit.

7. Process according to Claim 6, characterized in that the transmitting of the participant identification by the participant sensor system (HGRM-S) as well as the receiving the participant identification by the participant sensor system (HGRM-S) take place essentially simultaneously.

8. Process according to Claim 6 or 7, characterized in that, when several participant sensor systems (HGRM-S) receive the weaponry simulator identification from the triggering weaponry simulator (KSIM), the sequence in which these



participant sensor systems (HGRM-S) transmit their participant identification to the weaponry simulator (KSIM) is determined by means of a random sequence generator.

9. Process according to one of Claims 6 to 8, characterized in that, after receiving the weaponry simulator identification, the participant sensor system (HGRM-S) carries out a check as to whether a hit of the assigned participant is permitted because of the type of the triggering weaponry simulator (KSIM), and if the result is negative, does not carry out the further process steps.

