

# COMPACT HPM AND UWB SOURCES USING EXPLOSIVES - THE POTENTIAL OF FUTURE NON-LETHAL WARHEAD SYSTEMS

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## INTRODUCTION

Modern electronic systems are susceptible to intense electromagnetic fields. After penetration into the internal system the electromagnetic waves are converted to current and voltage waves on cable systems connected to the electronic components. Dependent on the level either distortion due to demodulation effects occur or the component is destroyed. In either case the system loses the capability it was designed for. So delivering an intense electromagnetic field to an target provides a non lethal defense technique to interrupt missions.

In the far field each electromagnetic field decreases inversely proportional to the distance from its source. To overcome this 1/r problem for a large distance between source and sink it is possible to transport the source to the vicinity of the sink. Due to the fact that now less field strength at the source is necessary, either the source power may be reduced with a directional radiation pattern or the antenna gain may be reduced at the same source power to obtain a quasi omnidirectional radiation pattern.

For a small non stationary source system the primary energy has to be stored in a small volume. The conversion of the huge stored chemical energy in explosives to electrical energy even with low conversion efficiency is applicable.

Either UWB and HPM Subsystems can be realized with the use of explosives. Mainly this concerns the primary energy section. The switching systems in the pulse forming section may be realized by explosives if the switching velocity and the absolute switching time slot need not be too precise. Even the directivity of the antenna might be manipulated by ionized regions in air produced by the detonation front.

Explosive devices operate in the microsecond region. So if not using a long time energy storage unit (which is bulky and heavy) the radiation time is also in the microsecond and nanosecond regime. Therefore explosive devices operate primarily as one-shot or short burst devices. This implies that the electronics of the target is either destroyed or upset with a long recovery time by this single field pulse.

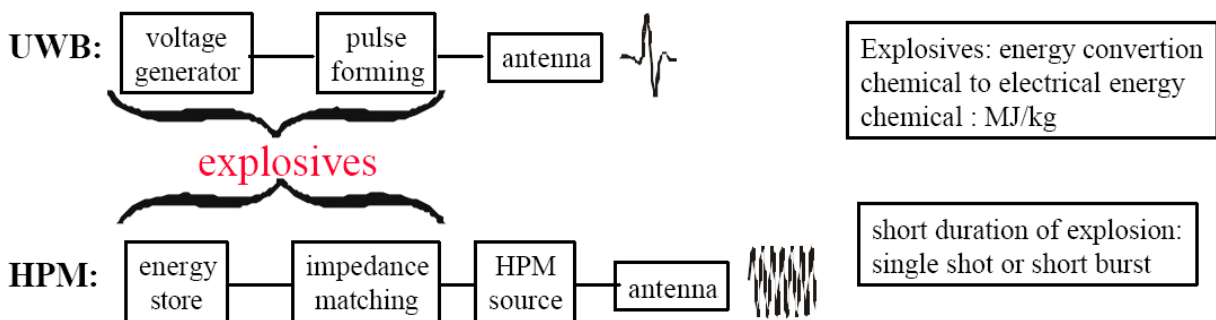


Figure 1: UWB and HPM Subsystems.