

The Feasibility and Effectiveness of a Common Consumer Device as an Electromagnetic Interference (EMI) Source

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Determined malefactors have demonstrated the use of common systems as effective weapons against civilian infrastructures, e.g. commercial jetliners used as kinetic weapons and garage door opener electronics used to trigger explosive devices. This undergraduate research project investigated the possibility of using ordinary systems for electro-magnetic interference or disruption. A major element of the present effort was to gauge the ability of undergraduate students, with minimal experience and guidance, to develop an effective electromagnetic interference source.

At present, the system effects of high power electromagnetic environments are well recognized by world scientific and military communities. Former CIA Director John Deutch has said that, "the electron is the ultimate precision-guided weapon." It has been known for some time that electronic equipment subjected to high electromagnetic field levels will often suffer degradation. In the course of the investigation of nuclear EMP effects on electronics during the Cold War period, it became evident that garden variety, unprotected electronics would malfunction, in some cases burn out, in the presence of electromagnetic fields in the 100s to 1000s of volts per meter. These electronic effects could have serious consequences in terms of interruption or termination of critical system operation. Although military systems were the primary concern for Cold War programs, it was clear that the civilian infrastructure was at least as vulnerable to disruption from intense electromagnetic field environments.

Because the operation and control of most critical infrastructures are highly dependent on electronics, it is important to understand the feasibility and effectiveness of devices that may be used to intentionally interfere with electronic system operation. This research project investigated (1) the feasibility of building a high power electromagnetic interference source from a common consumer item and (2) the effects of this source on the operation of personal computers. We were successful in fabricating a "shop-expedient" high power microwave (HPM) source by modifying a common microwave oven and testing its effects on personal computers.