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COUNTER-ELECTRONICS HIGH-POWERED MICROWAVE ADVANCED MISSILE PROJECT

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The United States showcased more than 60 innovations and engineering feats of advanced weapon systems in the first ever Department of Defence Lab day exhibition at the Pentagon on May 14, 2015.¹ On the displays was the much awaited Counter-electronics High Powered Microwave Advanced Missile Project (CHAMP).² CHAMP is a non nuclear Electromagnetic Pulse Weapon (EMP) riding on a missile developed by the Boeing and the U.S. Air Force Research Laboratory (AFRL) Directed Energy Directorate, Kirtland Air Force Base, New Mexico. CHAMP is an advanced electronic warfare weapon system which would emit high power microwaves to disable electronic equipments and computer systems of an earmarked target with a pinpointed accuracy. The weapon has been designed to target the functionality of electronic systems not resulting in any physical damage to structures and people operating the equipment.

The US Air Force way back on October 16, 2008 had invited bids from contractors to develop, test, and demonstrate a multi-shot and multi-target aerial HPM demonstrator capable of degrading, damaging, or destroying electronic systems.³ For this effort, the Boeing Company was awarded the contract in the year 2009 and it along with AFRL developed the CHAMP missile. The test firing of missile was carried out successfully on October 16, 2012 using an AGM-86 Conventional Air-Launched Cruise Missile. During the live demonstration of flight over the Utah Test and Training Range test, the CHAMP missile navigated a pre-programmed flight plan and emitted bursts of high-powered energy,



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effectively knocking out the target's electronic systems.⁴ The missile in this demonstration phase carried out selective high-frequency radio wave strikes against numerous targets during a single mission. As per another report, "CHAMP fired high-power microwave bursts at a multi-story structure containing electronic systems and devices, the drone-like weapon irreparably disabled the computers, electronics and even the cameras recording the operation of seven targets in a one-hour period."⁵ Keith Coleman, the program manager for this project stated that, "This technology marks a new era in modern-day warfare," and "In the near future, this technology may be used to render an enemy's electronic and data systems useless even before the first troops or aircraft arrive."⁶

At the Pentagon exhibition, AFRL commander Major General Thomas Masiello conveyed that CHAMP was already a part of an operational system with the US Tactical Air Force and made the force operationally relevant.⁷ AFRL has now designated the Joint Air-to-Surface standoff missile – Extended range (JASSM-ER) manufactured by Lockheed Martin to carry CHAMP payload.⁸ A cruise missile with an estimated range in excess of 600 miles, JASSM-ER will itself be deployable from combat aircraft such as F-15 and F-16 fighter jets, B-1 and B-52 bombers, and the F-35 stealth fighter.⁹ The use of this long range cruise missile not only helps extend CHAMP's radius of action but also provides better standoff capability even when the weapon by itself is a short range system.

CHAMP can be used as a credible weapon system for paralysing the Command and Control Hub Centres with very little or almost no collateral damage. It provides an attractive solution to counter complete range of modern weapon equipment and their platforms. A HPM weapon can target multiple targets and simultaneously affect all the targets falling in the line of sight or cone of a beam. Such weapon would also be capable to attack dispersed targets by simultaneous locking as per the system capability and can be used to track and dispense energy on different targets concurrently. It can be effective in permanent damage to telecommunication networks, power grids, electronic gadgets,



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weapon components and computer systems leaving the infrastructural setup intact. The successful evaluation and induction of CHAMP indicates that the HPM weapon technology has matured considerably from the time when HPM research was restricted to generation of fixed frequency waveform having high power output. More important is the fact that the weapon system will produce an EMP effect without involvement of nuclear reactions; it is non-kinetic in nature and has negligible effect on humans.

The technology now would open up the use of HPM weapons on different weapon platforms and disable the capability of the adversary even before the hostilities commence. As the HPM technology proliferates, it is but natural that countermeasures like passive shielding of all electronic gadgets particularly used in weapon systems and supporting elements will become a norm. The countermeasures and defence against HPM weapons would call for better and sophisticated technology than the weapon system itself. With the wide-ranging research and development, the HPM weapon systems would soon mature to be fielded as war fighting machinery and provide for capabilities over comprehensive spectrum of warfare.

(Disclaimer: The views and opinions expressed in this article are those of the author and do not necessarily reflect the position of the Centre for Air Power Studies [CAPS])



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End Notes

¹ “DoD’s First ‘Lab Day’ to Showcase Innovation, Technology”, U.S. Department of Defense, at <http://www.defense.gov/news/newsarticle.aspx?id=128798> accessed on May 25, 2015

² “US Air Force Moves Forward with High-Power Microwave Weapon”, at http://defense-update.com/20150516_champ.html#.VWP5PdKqqko accessed on May 25, 2015

³ US Air Force, “Presolicitation release notice for counter-electronics high power microwave advanced missile project (CHAMP) joint capability technology demonstration (JCTD)”, at <https://www.fbo.gov/?s=opportunity&mode=form&id=e2daa9dccf59c9887810286dc9909d54&tab=core&cview=1> accessed on May 25, 2015

⁴ Randy Jackson, “CHAMPS- Light out”, *Boeing* press release at http://www.boeing.com/Features/2012/10/bds_champ_10_22_12.html accessed on February 23, 2015

⁵ Brandon Lewis, “Raytheon EMP weapon tested by Boeing, USAF Research Lab”, at <http://mil-embedded.com/news/raytheon-emp-missile-tested-by-boeing-usaf-research-lab/> accessed on February 24, 2015

⁶ *ibid*

⁷ James Drew, “USAF nominates JASSM missile to host new computer-killing weapon”, at <http://www.flightglobal.com/news/articles/usaf-nominates-jassm-missile-to-host-new-computer-killing-412348/> accessed on May 26, 2015

⁸ *ibid*

⁹ “Multi-use non-nuclear electromagnetic pulse drone is an operational system in US Air Force”, at <http://nextbigfuture.com/2015/05/multi-use-non-nuclear-electromagnetic.html#more> accessed on May 25, 2015
