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MILITARY LASERS AND THE LAW

The challenges of conducting battle via air strikes and urban warfare often result in unnecessary casualties. Offensive laser weapons with pinpoint targeting accuracy may be a potential solution to this problem. Traditionally, laser weapons have been defensive in nature and focused on disabling enemy drones, missiles, and vehicles - with the sole exception of using low powered lasers to guide missiles and small arms to targets. However, interest is building among U.S. military brass in the potential use of laser weapons to target enemy combatants themselves.

The legal precedent for doing so is mixed. While the Geneva Conventions and the contemporary laws of war prohibit militaries from using lasers to blind combatants, weapons that temporarily impede eyesight are technically permitted, and there is no specific prohibition against the use of lasers to kill combatants. Technically, this suggests that - for the moment - there is enough legal flexibility for the employment of lasers against human targets, although doing so may be rejected by governments on policy grounds. (*Defense One*, March 30, 2017)

MAKING A BETTER SPECIAL OPERATOR

U.S. special operations forces are required to operate at incredibly high performance levels for long durations of time, so any small advantage can be critical to mission success. At a recent conference, the commander of the U.S. Navy's special operations units solicited defense contractors to think along these lines and design ways to enhance the physical and mental capabilities of America's elite soldiers. The appeal is part of a larger effort on the part of the U.S. military to give special forces units an added edge. And while pharmaceutical aids are a traditional type of human performance enhancement, the Pentagon is now turning to a more innovative method: the direct application of electrical stimulation to the brain.

Early testing of the neuro-priming transcranial electronic stimulus process shows that it helps to improve soldiers' ability to concentrate, which could potentially assist special operations units, particularly on longer missions. A number of elite athletes and Navy SEALs have already undergone some trials with a headphone-like apparatus that supplies such stimulus, with positive results. A major benefit to neuro-priming is that soldiers can train less frequently and achieve the same goal, or train at the same rate and enhance their performance levels. Long-term effects of this performance enhancement method are not yet available, however, so for the moment the military is proceeding with caution. (*Fox News*, April 2, 2017)

HIDING TANKERS IN PLAIN SIGHT

U.S. Air Force (USAF) fighter jets have advanced avionics and weaponry and can travel at extremely high speeds with significant maneuverability. Nevertheless, limitations on the range of fifth-generation planes have preserved the importance of large aerial refueling tankers. Unfortunately, while practical, aerial refueling aircraft are essentially huge, slow-moving floating targets - targets which enemies are trained to attack during wartime.

To correct this vulnerability, the USAF is now attempting to develop a "cloaking device" that would hide tanker planes from enemy radar. U.S. Defense contractor Raytheon has a radar jammer under development "that can interpret radar signals and adapt quickly to keep aircraft hidden." The potential jammer will require a significant amount of power to operate and, due to the high speed of incoming radar signals, will need to be operated by an artificial intelligence system. That, however, isn't necessarily a bar to development; the Air Force has already spent billions on a new tanker, scheduled for deployment in 2018. The program, however, currently has no stealth capability, so an electronic radar jamming system payload is likely to prove invaluable. (*Popular Mechanics*, April 6, 2017)

ABL 2.0?

Six years after the Pentagon's Airborne laser (ABL) weapons program was canceled, the U.S. military is once again interested in mounting laser weapons aboard planes. But unlike the ill-fated ABL initiative, which consisted of a megawatt-powered laser mounted atop a 747 and tasked with destroying incoming intercontinental ballistic missiles (ICBMs), the U.S. Air Force now hopes to mount a smaller, tactical laser weapon system atop a currently undefined platform. In a recent request for information (RFI), the USAF attempted to gain an understanding of the potential for laser weapons technology that will become available in the near-term. As noted on the RFI, the USAF is particularly interested in gaining information about "laser sources, electrical power, thermal management, beam control, battle management and other subsystems required for operation." Specifics regarding the new effort, however, are still scarce, and it is not yet clear how any new laser system could be operated or mounted to an aircraft. (*Military & Aerospace*, April 13, 2017)

THE FUTURE OF DRONE WARFARE: AUTONOMOUS ENGAGEMENT

Unmanned aerial vehicles, or drones, have shown steady progress toward full autonomy in military affairs. During a 2015 exercise named "Have Raider I," an F-16 drone (known as the NF-16 VISTA) demonstrated the ability to fly in formation with a lead aircraft with the same aptitude as a human pilot. This year, during the "Have Raider II" air exercise, the NF-16 VISTA went a step further by conducting autonomous evasive maneuvers while under attack from simulated surface-to-air missiles. The exercise was particularly impressive because the craft was able to operate in a hostile environment, detect new threats even when the testers cut the data links, and successfully conduct a planned ground assault mission with new targets appearing at random. The autonomous mission-planning software onboard the NF-16 VISTA, developed by Lockheed Martin's Skunk Works, is still years away from operational use, but following the latest successful outing may be prioritized for development by the U.S. military. (*Air and Space*, April 27, 2017)