



CURTIS E. LEMAY CENTER

FOR DOCTRINE DEVELOPMENT AND EDUCATION



ANNEX 3-51 ELECTRONIC WARFARE

ELECTRONIC WARFARE DIVISIONS

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EW consist of three divisions: electronic attack (EA), electronic warfare support (ES), and electronic protection (EP). All three contribute to the success of air, space, and cyberspace operations. Capabilities inherent to the EW divisions can be used for both offensive and defensive purposes and are coordinated through electromagnetic battle management (EMBM).

Electronic Attack

EA is the division of EW involving the use of electromagnetic (EM), directed energy (DE), or antiradiation weapons to attack personnel, facilities, or equipment with the intent of degrading, neutralizing, or destroying enemy operational capability. EA prevents or reduces an enemy's use of the electromagnetic spectrum (EMS). It can be accomplished through detection, denial, disruption, deception, and destruction. EA includes lethal attack with assets like high-speed antiradiation missiles (HARMs); active applications such as decoys (flares or chaff), EM jamming, and expendable miniature jamming decoys; and employs EM or DE weapons (lasers, radio frequency weapons, particle beams, etc.).

EM jamming and the suppression of enemy air defenses (SEAD) are applications of EA:

- ★ **Electromagnetic Jamming.** EM jamming is the deliberate radiation, reradiation, or reflection of EM energy for the purpose of preventing or reducing an enemy's effective use of the EMS, with the intent of degrading or neutralizing the enemy's combat capability. Early Air Force EW efforts were primarily directed toward electronically jamming hostile radars to hide the number and location of friendly aircraft and to degrade the accuracy of radar-controlled weapons. Currently, jamming enemy sensor systems can limit enemy access to information on friendly force movements and composition and cause confusion. Jamming can degrade the enemy's decision making and implementation process when applied against command and control systems. An adversary heavily dependent on centralized control and execution for force employment presents an opportunity for EA.
- ★ **Suppression of Enemy Air Defenses.** SEAD is that activity which neutralizes, destroys, or temporarily degrades surface-based enemy air defenses by

destructive and/or disruptive means. The goal of SEAD operations is to provide a favorable situation in which friendly tactical forces can perform their missions effectively without interference from enemy air defenses. In Air Force doctrine, SEAD is not part of EW, but it is a broad term that may include the use of EW. In Air Force doctrine, SEAD is part of the counterair framework and directly contributes to offensive counterair and obtaining air superiority. This may involve using EM radiation to neutralize, degrade, disrupt, delay, or destroy elements of an enemy's [integrated air defense system](#) (IADS). During hostilities, enemy IADS will probably challenge friendly air operations. EW systems tasked to perform SEAD may be employed to locate and degrade, disrupt, neutralize, or destroy airborne and ground-based emitters. Typically, SEAD targets include radars for early warning/ground-controlled intercept (EW/GCI), acquisition (ACQ), surface-to-air missiles (SAMs), and antiaircraft artillery (AAA). Many Air Force functions can be enhanced with the employment of SEAD operations.

Electronic Warfare Support

ES responds to taskings to search for, intercept, identify, and locate sources of intentional and unintentional radiated electromagnetic energy for the purpose of threat recognition. Commanders, aircrews, and operators use ES to provide near-real-time information to supplement information from other intelligence sources. Additionally, ES information can be correlated with other [intelligence, surveillance, and reconnaissance](#) (ISR) information to provide a more accurate picture of the [electromagnetic operational environment](#) and therefore a better understanding of the battlespace. This information can be developed into an electronic order of battle for situational awareness and may be used to develop new countermeasures. The relationship between ES and [signals intelligence](#) (SIGINT), which includes [electronic intelligence](#) (ELINT) and [communications intelligence](#) (COMINT), is closely related because they share common functions of search, interception, identification, location, and exploitation of electromagnetic radiation. The distinction lies in the type and use of information, and who has tasking authority. ES resources are tasked by or under direct control of operational commanders. The operational commander may have authority to task national SIGINT assets to provide ES or may have direct operational control over tactical resources capable of providing ES. In either case, ES is distinguished by the fact that the operational commander determines aspects of resource configuration required to provide ES that meets immediate operational requirements. SIGINT is tasked by national authorities. The passive nature of ES allows it to be effectively employed during peacetime.¹

¹ See [Joint Publication 3-13.1, Electronic Warfare](#), and Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3210.03C, *Joint Electronic Warfare Policy*, for a more in-depth discussion of the relationship and distinctions between ES and SIGINT.

Electronic Protection

EP includes the actions taken to protect personnel, facilities, and equipment from any effects of friendly, neutral, or enemy use of the EMS, as well as naturally occurring phenomena that degrade, neutralize, or destroy friendly combat capability. Examples of EP include frequency agility, changing pulse repetition frequency, emission control (EMCON), and low observable technologies. Integration of EP and other security measures can prevent enemy detection, denial, disruption, deception, or destruction. Friendly force reliance on advanced technology demands comprehensive EP safeguards and considerations. Proper frequency management is a key element in preventing adverse effects (i.e., jamming friendly forces) by friendly forces. Much of the success of EP occurs during the design and acquisition of equipment. EMCON and low observable technologies are passive applications of EP.
