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OF THE AIR FORCE**

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ELECTRONIC WARFARE (EW)

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This Air Force instruction (AFI) provides guidance for electronic warfare (EW) capability development and sustainment and implements Air Force Policy Directive (AFPD) 10-7, *Information Operations*, 6 September 2006, (Incorporating Change 1, 18 September 2009). This instruction reflects updated information based on Air Force Doctrine Document (AFDD) 3-13.1, *EW Operations*, 5 November 2002, Incorporating Change 1, 28 July 2011 and joint doctrine found in Joint Publication (JP) 3-13.1, *Electronic Warfare*, 8 February 2012. This publication applies to the US Air Force, the Air National Guard (ANG) and to Air Force Reserve Command (AFRC) units. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with AFMAN 33-363, Management of Records, and disposed of IAW the Air Force Records Information Management System (AFRIMS) Disposition Schedule (RDS) located at <https://www.my.af.mil/gcss-af61a/afirms/afirms/>. Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using the USAF IMT 847, Recommendation for Change of Publication; route USAF IMT 847s from the field through the appropriate functional chain of command to Electronic Warfare Division (AF/A5RE), 1480 Air Force Pentagon, Washington, DC 20330-1480; email to the AF/A5RE Workflow (usaf.pentagon.af-a3-5.mbx.a5re-workflow@mail.mil). This publication may be supplemented at any level; supplements are not required to be routed to the OPR of this publication for coordination prior to certification and approval. Requests for waivers must be submitted through the chain of command to the appropriate Tier waiver approval authority IAW AFI 33-360, Publications and Forms Management.

SUMMARY OF CHANGES

This document has been substantially revised and must be reviewed in its entirety. Primary areas of change include the complete reformatting to reflect capability development and sustainment through the doctrine, organization, training, materiel, leadership & education, personnel and facilities (DOTMLPF) construct and the addition of Tier waiver authority numbers for each unit (wing or equivalent, and below) compliance item, as directed by AFI 33-360. The name was changed to Electronic Warfare from the previous Electronic Warfare Operations since this publication is not intended to address EW operations, but capability development and sustainment via DOTMLPF. Also, this document updates EW terminology, doctrinal and operational EW procedures, current requirements guidance via the Joint Capabilities Integration and Development System (JCIDS) process, and organizational names and designations.

Chapter 1—DOCTRINE	4
1.1. Doctrine:	4
1.2. The three major components of EW:	4
1.3. EW employs the following doctrinal tenets:	5
1.4. EW’s primary functions in air operations are to:	5
1.5. EW:	5
Chapter 2—ORGANIZATIONS, ROLES & RESPONSIBILITIES	7
2.1. This chapter defines the roles and responsibilities of:	7
2.2. The Director of Operational Capability Requirement (AF/A5R) will:	7
2.3. The Headquarters Air Force Electronic Warfare Division (AF/A5RE) will:	7
2.4. The Deputy Chief of Staff for Logistics, Installations and Mission Support (A4/7) will:	9
2.5. The Director of Air Force Test and Evaluation (T&E) (AF/TE) will:	9
2.6. The Deputy Chief of Staff, Manpower and Personnel (AF/A1):	10
2.7. The Assistant Secretary of the Air Force for Acquisition (SAF/AQ) will:	10
2.8. The office of the Undersecretary of the Air Force, Director for International Affairs (SAF/IA) will:	10
2.9. The office of the Secretary of the Air Force, Information Dominance and Chief Information Officer (SAF/CIO A6) will:	10
2.10. All MAJCOMs, as applicable, will:	10
2.11. Lead Commands for specific weapon systems:	11
2.12. Using Commands, as specified in AFRD 10-9, will:	12
2.13. Implementing Commands (AFMC / AFSPC) will:	12
2.14. Air Combat Command (ACC) will:	13

2.15.	Air Education and Training Command (AETC) will:	13
2.16.	Air Force Materiel Command (AFMC):	14
2.17.	Air Force Special Operations Command (AFSOC) will:	15
2.18.	AMC will:	15
2.19.	The Air Force ISR Agency will:	15
2.20.	Air Force Operational Test and Evaluation Center (AFOTEC):	15
Chapter 3—TRAINING		16
3.1.	This chapter provides :	16
3.2.	Basic, senior, continuation, and advanced, levels of EW training:	16
3.3.	Coalition operations:	17
3.4.	The culmination of EW effectiveness and integration:	17
3.5.	Organizations employing EW resources:	17
Chapter 4—MATERIEL DEVELOPMENT, SUSTAINMENT & READINESS		18
4.1.	Developing, sustaining and improving materiel solutions:	18
4.2.	Sustainment.	19
4.3.	Readiness.	19
Chapter 5—LEADERSHIP & EDUCATION		20
5.1.	The Chief of Staff of the Air Force (CSAF):	20
5.2.	Air Force EV2030 Report Card:	20
5.3.	EW Advisory Group (EWAG).	20
5.4.	Electronic Warfare (EW) Test and Evaluation (T&E) Consortium.	20
Chapter 6—PERSONNEL		21
6.1.	This chapter provides guidance concerning specialized manning, readiness, proficiency and expertise:	21
6.2.	MAJCOMs will:	21
Chapter 7—FACILITIES		22
7.1.	EW operators, maintainers, engineers and analysts require:	22
7.2.	The Air Force test and training range infrastructure:	23
7.3.	MAJCOMs will:	24
Attachment 1—GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION		25
Attachment 2—USAF EW SUPPORT TO JOINT TASK FORCES		33

Chapter 1

DOCTRINE

1.1. Doctrine: Provides fundamental principles by which military forces guide their action in support of national objectives. Air Force Doctrine Document (AFDD) 3-13.1, *Electronic Warfare*, defines electronic warfare (EW) as any military action involving the use of the electromagnetic spectrum (EMS) to include directed energy (DE) to control the EMS or to attack an enemy.

1.1.1. The EMS is divided into three portions:

1.1.1.1. Radio Frequency (RF) used by communications systems such as radios, cellphones, WIFI wireless networking technology and data links, radars such as airborne intercept, air defense or navigation and millimeter-wave systems.

1.1.2. Electro-Optic (EO) which includes infrared (IR), visible light, and ultraviolet (UV) sub-divisions, used by flares or infrared countermeasures systems or lasers.

1.1.3. Ray which includes gamma rays, X-Rays, etc.

1.2. The three major components of EW: Are electronic attack (EA), electronic protection (EP), and electronic warfare support (ES).

1.2.1. EA involves the use of electromagnetic energy, DE, or anti-radiation weapons to attack personnel, facilities, or equipment. The primary effects achieved by EA are deception, disruption, denial, degradation and destruction. Creating precise EA effects will also require use of a battle management function. This includes spectrum management to ensure electromagnetic spectrum deconfliction in multiple dimensions (e.g. time, altitude and distance).

1.2.1.1. EA includes any actions taken to prevent or reduce an enemy's effective use of the EM spectrum. Techniques include jamming, electromagnetic deception, or direct attack of an enemy's electronic capabilities through the employment of weapons that use either electromagnetic energy or DE (e.g. lasers, radio frequency, high power microwave [HPM] weapons, and particle beams) as their primary disruptive or destructive mechanism.

1.2.1.2. Examples of EA systems include: Jammers onboard the EC-130H, COMPASS CALL, F-16CJ with High-Speed Anti-Radiation Missiles (HARMs), chaff, flares, self-protection jamming systems, Large Aircraft Infrared Countermeasures (LAIRCM), active towed decoys, and counter remote/radio controlled improvised explosive device (RCIED) systems.

1.2.2. EP involves means taken to protect personnel, facilities, and equipment from the effects of friendly or enemy employment of EA or other EM spectrum capabilities (such as an electromagnetic pulse [EMP]) that have the potential to degrade, neutralize, or destroy friendly combat capability. Examples of EP include: frequency/pulse repetition frequency (RF/PRF) agility, or laser eye protection (LEP).

1.2.3. ES involves actions tasked by, or under direct control of, an operational commander to search for, intercept, identify, and locate sources of intentional and unintentional radiated electromagnetic energy for the purpose of immediate threat recognition, targeting, planning, and conduct of future operations. Examples of ES systems include: radar and laser warning receivers (RWR/LWR), the HARM targeting system, sensors forward capabilities, Rapid Attack Identification, Detection and Reporting System (RAIDRS), GPS jammer geo-location systems or the Battlefield Laser Detection System (BLADES).

1.3. EW employs the following doctrinal tenets:

1.3.1. Control. Achieved by means of effective management and coordination of friendly EW systems that protect friendly use of and deny adversary access to key areas of the electromagnetic spectrum. Electronic Warfare Battle Management (EWBM) is an example of an EW function that could be used to improve control of EW resources.

1.3.2. Exploit. To exploit is to use the EM spectrum to the advantage of friendly forces. Friendly forces can use deception, disruption, denial, degradation and destruction in varying degrees to impede the adversary's decision loop. For instance, one may use electromagnetic deception to convey misleading information to an enemy or use an enemy's electromagnetic emissions to locate and identify the enemy.

1.3.3. Enhance. Enhancers are those intangibles that allow EW to function as a force multiplier, from self-protection to operational attack, thus greatly improving the likelihood of mission success on multiple levels of conflict. The primary example of an EW enhancer is the training function.

1.3.4. The tenets are used by EA, EP and ES to produce the effects of detection, denial, disruption, deception and destruction in varying degrees to enhance overall mission objectives.

1.4. EW's primary functions in air operations are to: a) support air campaigns through counter-IADS; b) support Suppression of Enemy Air Defenses (SEAD); c) disrupt military C2 nodes; and d) disrupt non-IADS systems. EW supports operations such as offensive counterair and defensive counterair as described in AFDD 3-01, *Counterair Operations*, as well as SEAD. In fact, EW assets are frequently the most vital to any effective operation to suppress enemy command and control (C2), integrated air defense systems (IADS), and other significant military capabilities utilizing the EMS. Not only are friendly EW capabilities critical, enemy EW operations, if left unhindered, could have devastating effects on friendly C2 systems. Early and persistent efforts should be aimed at defeating enemy EW capabilities.

1.5. EW: Is evolving due to technological advances and an increasing reliance on the EMS within military and civilian sectors.

1.5.1. While EW retains its traditional role in counterair, it intersects or supports other military capabilities such as spectrum management, irregular warfare (IW), navigation warfare (NAVWAR) and information, cyberspace, and space operations.

1.5.1.1. Joint Electromagnetic Spectrum Operations (JEMSO) are the coordinated efforts of EW and joint electromagnetic spectrum management operations to exploit, attack, protect, and manage the electromagnetic environment (EME).

1.5.1.2. During IW, EW can influence adversary and/or friendly population in an effort to win popular support.

1.5.1.3. Information Operations (IO) is, “the integrated employment, during military operations, of information-related capabilities in concert with other lines of operation to influence, disrupt, corrupt, or usurp the decision-making of adversaries and potential adversaries while protecting our own” (JP 3-13). EW contributes to IO by using offensive and defensive tactics to shape, disrupt and exploit adversarial used of the EMS while protecting friendly freedom of action. As an information-related capability (IRC), EW can stand alone in a traditional function, or can enable, support, and enhance its sister IRCS. Proper execution of EW activities is critical when supporting other IRCS such as Offensive Cyberspace Operations (OCO), Military Information Support Operations (MISO) or military deception (Ref to *Information Operations*, AFDD 3-13). The operational level continues to be the optimal place for the synchronization of IRC activities (Ref to Attachment 2, USAF EW Support to Joint Task Forces). Due to the complementary nature of and potential synergistic effects of EW and computer network operations, each must be coordinated. EW capabilities may permit use of the electromagnetic spectrum as a maneuver space for cyberspace operations. EW capabilities may serve as a means of accessing otherwise inaccessible networks to conduct cyberspace operations; presenting new opportunities for offensive action as well as the need for defensive preparations.

1.5.2. As our recognition of EW capability intersections with other areas (i.e. cyberspace, information and space operations) grows, our need to address the growing list of networks using commercial technologies grows also. Emerging non-IADS targets include non-military leadership networks, commercial/media networks, communications networks, positioning, navigation, timing networks, and others as directed by a combatant commander (CCDR). EW targeting must comply with applicable rules of engagement and the law of armed conflict.

Chapter 2

ORGANIZATIONS, ROLES & RESPONSIBILITIES

2.1. This chapter defines the roles and responsibilities of: Air Force organizations charged with developing, fielding, operating or sustaining EW capabilities.

2.1.1. The Deputy Chief of Staff for Operations, Plans and Requirements (AF/A3/5) will:

2.1.1.1. Be accountable for the United States Air Force (USAF) EW policy, doctrine, strategy as well as prioritization of operational capabilities. Serve as the office of responsibility (OPR) for all Air Force EW DOTMLPF actions.

2.1.2. Employ an Electronic Warfare Advisory Group (EWAG) to address cross-major command (MAJCOM) EW issues. The EWAG is chartered to identify and prioritize EW issues to ensure the Air Force is organized, trained, and equipped to conduct combat operations. The EWAG may report its findings/recommendations to the Air Force Requirements Oversight Council (AFROC), which, in turn, may request a lead MAJCOM to develop the appropriate Joint Capabilities Integration and Development System (JCIDS) documentation. (Refer to AFI 10-601, *Operational Capability Requirements Development*).

2.1.3. Ensure EW capabilities are properly planned and programmed across associated AF Core Function Master Plans (CFMP) during the integration cycle of CFMP development. Advise Core Function Lead Integrator (CFLI) staffs where appropriate on EW capabilities during MAJCOM CFMP development.

2.2. The Director of Operational Capability Requirement (AF/A5R) will:

2.2.1. Facilitate the staffing and coordination of EW requirements documentation. In addition, A5R ensures that validated EW requirements compete within the JCIDS process.

2.2.2. Work with SAF/AQ, SAF/AA and AF/A8 directorates to resolve requirements and/or programmatic issues associated with EW programs (includes related Special Access Programs (SAP)).

2.2.3. Assume operational sponsorship for validated Force Application (FA)/Force Protection (FP) concepts and associated requirements using organic Air Force EW systems.

2.2.4. Act as the A3/5 co-chairperson for the Electronic Warfare Advisory Group Senior Advisory Group (EWAG SAG) to include: charter maintenance, membership, agenda content, minute distribution, and follow-on actions.

2.2.5. Provide the operational perspective (delegated by A3/5) on Foreign Military Sales (FMS) issues involving U.S. EW systems or support elements (includes software products).

2.3. The Headquarters Air Force Electronic Warfare Division (AF/A5RE) will:

2.3.1. Act as HAF OPR for Air Force EW requirements, capability development and sustainment through DOTMLPF. Facilitate the staffing and coordination of EW requirements documentation to ensure that validated EW requirements compete within the JCIDS process.

2.3.2. Communicate the USAF operational vision for EW to Air Force agencies; disseminate operational guidance concerning EW capabilities, gaps or shortfalls across the various missions, organizations, and functions of the Air Force. Also, A5RE will document,

articulate, and advocate current and future EW requirements within the Air Force corporate process.

2.3.3. Act as the A3/5 co-chairperson for the Electronic Warfare Advisory Group Technical Advisory Group (EWAG TAG) to include: charter maintenance, membership, agenda content, minute distribution, and follow-on actions.

2.3.4. In coordination with SAF/CIO A6, A3, A2 and other electromagnetic spectrum stakeholders, communicate the Air Force's EW policy, doctrine, and future force structure to external organizations, establish and advocate AF EW positions on issues and ensure these positions are correctly articulated within appropriate Joint Chiefs of Staff (JCS) or Office of Secretary of Defense (OSD) organizations.

2.3.5. Support AF/A3O, as needed, to develop current policy and guidance for operational deployments, rated EW career field management, training/range instrumentation, or other supporting elements to satisfy Air Force and joint operational requirements.

2.3.6. In coordination with SAF/CIO A6, advocate for Joint Capability Technology Demonstrations (JCTD), Applied Technology Demonstrations (ATD), or other technology demonstrations that address EW capability.

2.3.7. Provide guidance to acquisition, research & development, intelligence, testing and operations & sustainment communities to ensure they have adequate A3/5 guidance concerning the future direction of the Air Force's EW requirements.

2.3.8. Act as the A3/5 focal point to leverage and integrate new EW technologies; evaluate innovative EW concepts, plans, and operational demonstrations of these concepts, recommend policy, programming, budgeting, organizational training (including tactics, techniques and procedures (TTP)), and equipping actions.

2.3.9. Provide subject matter expertise (SME) to other U.S. Government agencies (e.g. Department of Homeland Security [DHS], Department of Justice [DOJ]) concerning Air Force EW programs.

2.3.10. Support AF/A5X, as needed, to review all EW related deployment planning policy, Unit Type Code (UTC) development, and associated OPLANS, CONPLANS and CONOPS.

2.3.11. Monitor future threat assessments and recommend corrective actions, as required. Implement anticipatory actions in capability-based planning efforts.

2.3.12. In coordination with AF/A2R, track preparation of those portions of the National Intelligence Program (NIP)/ General Defense Intelligence Program (GDIP) and Military Intelligence Program (MIP) for which there is Air Force EW equity.

2.3.13. In coordination with AF/A2D, ensure intelligence support for EW programs.

2.3.14. In coordination with SAF/AQ and AF/A8P, ensure EW resources associated with traditional EA or ES systems are planned, programmed, and budgeted. Ensure programs map to current requirements and address anticipated needs of the warfighter.

2.3.15. Develop and coordinate the A3/5 operational perspective on all FMS requests concerning U.S. EW systems or associated equipment. In addition, monitor and make recommendations on DE technology transfer requests.

2.3.16. Develop and coordinate the A3/5 operational perspective concerning the request and prioritization of EW related acquisitions made under the Air Force Foreign Materiel Program (FMP).

2.3.17. Provide the A3/5 perspective for the assessment of coalition EW interoperability issues. Recommend courses of action to accommodate effective and timely participation in coalition operations.

2.3.18. In coordination with SAF/LLW, SAF/AQ, or AF/A8P, respond to Congressional, OSD and JCS inquiries on EW programmatic/operational issues on behalf of A3/5.

2.3.19. Synchronize all aspects of the Electronic Warfare Integrated Reprogramming (EWIR) process IAW AFI 10-703, *Electronic Warfare Integrated Reprogramming*.

2.3.20. Coordinate with AF/A3CX/A6CX to identify/explore opportunities for the development of common and interoperable synergistic capabilities or concepts associated with current and new EW technologies.

2.3.21. Support the Air Force Spectrum Management Office (AFSMO) with regard to its spectrum management responsibilities IAW DoDI 8320.05, *Electromagnetic Spectrum Data Sharing* and other applicable guidance.

2.3.22. In coordination with SAF/AQXR, support preparation of the Congressional Budget Justification Books by drafting Procurement Documents (P-Docs) and Research & Development Documents (R-Docs)

2.4. The Deputy Chief of Staff for Logistics, Installations and Mission Support (A4/7) will:

2.4.1. Review weapon system support equipment requirements to ensure acquisition and sustainment programs consider common support equipment to ensure justification of peculiar support equipment, including Automatic Test Systems and Automatic Test Equipment.

2.4.2. Establish a focal point within A4/7 to facilitate the review of EW capabilities-based requirements documentation.

2.4.3. Act as lead agent for funding and fielding for replacement of existing unsustainable common aircraft support equipment.

2.4.4. Monitor the "State of Health" and common sustainment issues associated with organic EW systems and associated equipment.

2.4.5. Support the EWAG as defined within the IPT's charter.

2.5. The Director of Air Force Test and Evaluation (T&E) (AF/TE) will:

2.5.1. Oversee the Air Force T&E infrastructure and ensure adequate T&E resources and facilities are available to support EW systems development and acquisition activities.

2.5.2. Maintain a focal point within AF/TE to monitor and support EW-related programs by:

2.5.2.1. Reviewing requirements documents.

2.5.2.2. Assessing Key Performance Parameters (KPPs) and Key System Attributes (KSAs) for testability and measurability.

2.5.2.3. Assisting in the development of strategies for T&E.

2.5.2.4. Reviewing and coordinating Test and Evaluation Master Plans (TEMP).

2.5.3. As the Executive Agent for the Air Force FMP, coordinate with AF/A3/5 to ensure EW requirements and equities are considered and supported by Air Force FMP activities.

2.6. The Deputy Chief of Staff, Manpower and Personnel (AF/A1): Through the Air Force Personnel Center (AFPC), and in coordination with A3O and career field managers, track EW expertise along with having responsibility for electronic warfare officer (EWO) AFSCs and “E” prefix maintenance.

2.7. The Assistant Secretary of the Air Force for Acquisition (SAF/AQ) will:

2.7.1. Provide direction and oversight of acquisitions involving EW-related operational programs IAW AFI 63-101/20-101, *Integrated Life Cycle Management*.

2.7.2. Support the EWAG as defined within its charter.

2.7.3. Provide direction and oversight of space acquisition to include program direction, system management, and upgrades in space control capabilities.

2.7.4. Assist Air Staff or MAJCOMs in documenting, articulating, and advocating for space-related EW requirements to the Joint Staff, OSD, other Services, or Congress.

2.8. The office of the Undersecretary of the Air Force, Director for International Affairs (SAF/IA) will:

2.8.1. Oversee the FMS of U.S. EW systems to foreign governments.

2.8.2. Coordinate with A3/5 for the Air Force’s operational perspective regarding FMS issues involving U.S. EW systems and associated hardware/software.

2.8.3. Direct the development of the FMS EWIR database (EWIRDB) for system Mission Data File (MDF) reprogramming to ensure a degree of coalition interoperability until such time as theater forces can provide EW system mission data file updates.

2.9. The office of the Secretary of the Air Force, Information Dominance and Chief Information Officer (SAF/CIO A6) will:

2.9.1. Coordinate with appropriate HAF and MAJCOM organizations to incorporate Air Force EW initiatives into Joint/Air Force experimentation and acquisition activities.

2.9.2. Through the Air Force Spectrum Management Office (AFSMO), plan, obtain, and preserve access to the electromagnetic spectrum for Air Force EW related activities.

2.9.3. Support the EWAG as defined within its charter.

2.10. All MAJCOMs, as applicable, will:

2.10.1. Identify EW skills and billets required for specific needs.

2.10.2. Assign qualified EW personnel to specified command billets.

2.10.3. Conduct a periodic review of EW authorizations.

2.10.4. Resolve training shortfalls where possible and submit annual reports on the status of resolution to the A3/5.

- 2.10.5. Develop formal EW training to cover individual, unit, and senior officer training tailored to the command's specific mission(s).
- 2.10.6. To the greatest extent possible, perform EW training assessments during large force exercises.
- 2.10.7. Develop EW training assessments for evaluations and inspections.
- 2.10.8. Support the EWIR process IAW AFI 10-703.
- 2.10.9. Ensure assigned MAJCOM, numbered air force (NAF), or warfighting headquarters (WFHQ) have a core number of EW experienced personnel prepared to support or act as liaisons to the Electronic Warfare Coordination Cell (EWCC).
- 2.10.10. Coordinate and comment on relevant EW doctrine, policy, operational sustainment, requirements derivation or programmatic issues with the appropriate HAF agencies (e.g. AF/A2, A3O, A4M, A5R, A5X and SAF/AQ).

2.11. Lead Commands for specific weapon systems: As specified in AFPD 10-9, *Lead Operational Command Weapons System Management*, will:

- 2.11.1. Coordinate with A3/5 during development of CONOPS employing EW capabilities.
- 2.11.2. Be responsible for requirements documentation, resources identification, and prioritizing (EW upgrades or new systems) to better control, exploit or enhance our EM spectrum capabilities.
- 2.11.3. Execute mission data upgrades on a timeline appropriate to the urgency of the change and provide upgrades to gained Air Reserve Components (ARC) before any real-world deployments.
- 2.11.4. Conduct Force Development Evaluations in order to determine EW system gaps or shortfalls in operations and training.
- 2.11.5. Document and staff EW effectiveness shortfalls identified in contingency operations.
- 2.11.6. Provide readiness standards and effectiveness data for unique systems.
- 2.11.7. Plan, program and support EW-specific ground test sets, test procedures, and technician training.
- 2.11.8. Plan, program and support appropriate equipment for conducting EW sustainment along with gained ARC.
- 2.11.9. Identify opportunities for the development of common and interoperable support equipment.
- 2.11.10. Plan, program and support EW system upgrades and their operational sustainment.
- 2.11.11. Ensure derived system requirements for a new EW system, or System of Systems (SoS) capabilities are accompanied with command-sponsored analysis. This analysis must be supported with combat simulations with sufficient rigor to provide decision makers with operationally relevant data upon which to base their decisions.
- 2.11.12. Identify and prioritize EW capability shortfalls or gaps in their respective CFMPs.

2.11.13. Lead High Performance Team (HPT) actions associated with requirements development.

2.11.14. Support the EWIR process IAW AFI 10-703.

2.11.15. For cross-MAJCOM EW systems (e.g., ALQ-131, AAQ-24 LAIRCM pods, ALE-47, ALR-56M), lead command has responsibility for CONOP development of employment; and overall allocation authority to meet Combatant Commander needs.

2.12. Using Commands, as specified in AFPD 10-9, will:

2.12.1. Ensure assigned MAJCOM, numbered air force (NAF), or warfighting headquarters (WFHQ) have a core number of EW experienced personnel prepared to support or act as liaisons to the EWCC.

2.12.2. As available, participate in HPT actions associated with EW requirements development.

2.12.3. Support Modeling and Simulation (M&S) analyses as required for the lead command's EW requirements.

2.12.4. Support the EWIR process IAW AFI 10-703.

2.12.5. Operate EW equipment within the US & Territories, and Canada for testing, training, and/or exercises, in accordance with CJCSM 3212.02C, *Performing Electronic Attack in the US and Canada for Tests, Training, and Exercises*.

2.13. Implementing Commands (AFMC / AFSPC) will:

2.13.1. Field operationally effective and suitable EW programs to control, exploit and enhance Air Force spectrum capabilities IAW the CFMPs: AS, GPA, PR, C2, GIISR, ND, SS, CS, SO, GPM, ET, ACS and BP.

2.13.2. Provide core/support HPT members, as appropriate, for EW requirements development.

2.13.3. Assist the lead MAJCOM in developing and preparing Analysis of Alternatives (AoA) studies.

2.13.4. Employ modeling, simulation and analysis (MS&A) tools and processes to effectively measure EW requirements in the capabilities-based planning (CBP) process. This analysis will be supported by combat simulations realistic enough to provide the decision maker with quality, operationally relevant measures of effectiveness and cost information.

2.13.5. Assist the lead command concerning EW acquisition and sustainment phases.

2.13.6. To the maximum extent possible, ensure commonality for similar EW systems, support equipment, and training and range equipment.

2.13.7. Air Force Space Command (AFSPC) organizations charged with performing acquisition related activities for space systems will coordinate with A3/5 through the Deputy Director for Space Operations (A3OS) on EW-specific space control policy, guidance, requirements, and programmatic issues. AFSPC organizations charged with performing acquisition related activities for cyber systems, will coordinate with A3/5 through

AF/A3CX/A6CX on EW-specific cyber policy, guidance, requirements, and programmatic issues.

2.14. Air Combat Command (ACC) will:

2.14.1. Assume operational lead for the Combat Air Forces (CAF) on innovative EW concepts or sustainment (current & future) actions. ACC will ensure that EW gaps/shortfalls with common Force Application or Force Protection (FA or FP) functions are properly coordinated across the MAJCOMs.

2.14.2. As appropriate, coordinate and comment on relevant EW doctrine, policy, operational sustainment, requirements derivation or programmatic issues with the appropriate HAF agencies (e.g. AF/A2, A3O, A4M, A5R, A5X and SAF/AQ).

2.14.3. Allocate electronic attack pods and emitters for the Electronic Combat Ranges (ECR).

2.14.4. Be the operational proponent for the Electronic Warfare Assessment Program known as COMBAT SHIELD and be prepared to advise other MAJCOMs on the establishment of similar activities.

2.14.5. Be the designated lead for Air Force EWCC integration and associated training.

2.14.6. Build operational-level EW training objectives for Flag and USAF Weapons School exercises; including advanced and campaign-level training.

2.14.7. To the greatest extent possible, develop requirements for and fund scalable, modular, and interoperable EW systems and equipment.

2.14.8. Maintain the Centralized Aircraft Survivability Assessment System (CASAS) as a key support tool to EW operations. This mission planning tool requires continuous assessments in order to reflect platform survivability in an ever-changing threat environment.

2.14.9. Host annual CAF and Senior Leader Conferences (CAFSEWC and SLEWC) as well as supporting the EWAG as defined within its charter.

2.14.10. Properly man and fund EW assessment programs.

2.15. Air Education and Training Command (AETC) will:

2.15.1. Provide appropriate undergraduate courses for awarding EWO AFSCs.

2.15.2. Be the focal point for developing, conducting, and evaluating initial EW skills training, advanced technical training, and graduate academic education programs to include flight training.

2.15.3. Coordinate with ACC (includes PACAF and USAFE), AMC (for MAF), AFGSC, AFSOC, or AFSPC (as required) regarding development of advanced level EW academic programs or senior leadership EW training courseware.

2.15.4. Coordinate on Air Force EW requirement documentation or other Service requirements that may have direct training implications.

2.15.5. Coordinate with CAF (ACC is designated lead) regarding common EW equipment and support of annual assessment requirements.

2.15.6. As appropriate, provide HPT membership, for undergraduate EW training issues that arise during the requirements process.

2.15.7. Support the EWAG as defined within its charter.

2.16. Air Force Materiel Command (AFMC): Will perform the following activities for EW systems (except for space- related systems):

2.16.1. Assist sponsoring MAJCOM in providing an integrated MS&A assessment of AF warfighter urgent operational needs and Air Force capability documents to ensure the identified capability requirements are technologically sound, testable, sustainable, and affordable, and address SoS considerations.

2.16.2. Oversee the execution of Operational Flight Program (OFP) software upgrades to fielded Air Force EW systems (e.g., ALQ-131, ALR-56M).

2.16.3. Accomplish hardware upgrades to fielded Air Force EW systems in response to identified requirements that cannot be satisfied through software upgrades. **Note:** Any hardware changes that impact RF characteristics must meet supportability and compliance requirements found in AFI 33-580, *Spectrum Management*.

2.16.4. Develop, procure, and sustain EW systems, support equipment, and training and range equipment in support of using command-funded programs.

2.16.5. Identify EW-related sustainability shortfalls to the appropriate MAJCOM.

2.16.6. Serve as the OPR for EW developmental test and evaluation (DT&E) training to maintain an adequate supply of properly trained EW developmental testers.

2.16.7. Maintain dedicated R&D facilities (i.e., Air Force Research centers such as AFRL) to facilitate the rapid development of Quick Reaction Capabilities (QRC) that go beyond traditional EW functions. QRC or “Clip-in” capabilities will continue to be a challenge since their success is measured by the Air Force’s ability to rapidly adapt its EW capabilities to emerging IADS and non-IADS emitters.

2.16.8. Ensure Reliability, Availability, and Maintainability for Pods and Integrated Systems (RAMPOD) data is available for analysis of support and sustainment shortfalls. RAMPOD is a reliability, availability, and maintainability logistics engineering support system for electronic attack pods and integrated systems.

2.16.9. Ensure that a request for a legal review of DE weapons are forwarded through the AFMC staff judge advocate to AF/JAO (except for special access program legal reviews, which are forwarded to SAF/GCI) on a timely basis in accordance with AFI 51-402, *Legal Reviews of Weapons and Cyber Capabilities*.

2.16.10. Provide combined Air Force and FMS EW support IAW AFI 10-703.

2.16.11. Support the EWAG as defined within its charter.

2.16.12. AFMC A2/5 will act as the co-chairperson for the Electronic Warfare Advisor Group Senior Advisory Group (EWAG SAG). The Air Force Life Cycle Management Center (AFLCMC) Program Development and Integration Directorate (AFLCMC/XZ) is responsible for charter maintenance, membership, agenda content, minute distribution, and follow-on actions.

2.16.13. AFLCMC/XZI will act as the co-chairperson for the Electronic Warfare Advisory Group Technical Advisory Group (EWAG TAG).

2.17. Air Force Special Operations Command (AFSOC) will:

2.17.1. Assume operational lead for the Air Force Special Operations Forces (AFSOF) on innovative EW concepts or sustainment (current & future) actions IAW AFPD 10-9. Ensure that identified EW gaps/shortfalls with common FA or FP functions are properly coordinated across the MAJCOMs.

2.17.2. Be the operational proponent for the Electronic Warfare Assessment Program (EWAP). Establish a capability to conduct EWAP testing IAW AFI 10-703.

2.17.3. Be the focal point for developing and conducting graduate AFSOF EW academic education programs through the Air Force Special Operations Warfare Center.

2.17.4. Coordinate with ACC and AMC (Air Mobility Command) (for Mobility Air Forces (MAF)) concerning common EW systems and training range emitter requirements.

2.17.5. Support the EWAG as defined within the IPT's charter.

2.18. AMC will: Coordinate with ACC and AFSOC agencies concerning common EW systems and training range emitter requirements. AMC will support the EWAG as defined within the IPT's charter.

2.19. The Air Force ISR Agency will:

2.19.1. Coordinate with the Deputy Chief of Staff for Intelligence (AF/A2), A3O, A5R or MAJCOM counterparts concerning the programming of NIP resources used in support of EW operations.

2.19.2. Support the EWIR process IAW AFI 10-703.

2.19.3. Ensure the National Air and Space Intelligence Center (NASIC) accomplishes the following:

2.19.3.1. Validates Aircrew Training Devices (ATDs) threat databases to ensure proper function and fidelity of the simulators' EW functions IAW 5600-series DOD and MAJCOM guidance.

2.19.3.2. In coordination with the ISR Agency and A2, collect and maintain data on all laser incidents involving Air Force aircraft. This data collection is necessary to fully understanding the nature of the threat and to develop countermeasures.

2.20. Air Force Operational Test and Evaluation Center (AFOTEC): Will manage and conduct Air Force EW-related operational test & evaluation (OT&E) in accordance with AFI 99-103.

Chapter 3

TRAINING

3.1. This chapter provides : a broad overview of basic to advanced levels of EW training accomplished in the classroom, in-flight as a single ship and during large force exercises.

3.1.1. Proficiency in Air Force EW operations begins with having quality training programs. Training programs must have attainable objectives that are specific, relevant, and necessary. They must address full-spectrum operations and use the full range of training devices, local training operations, and exercises to hone individual skill sets.

3.2. Basic, senior, continuation, and advanced, levels of EW training: Will correspond to requirements at the tactical, operational, and strategic levels of warfare. This training will integrate both space and cyber capabilities as they relate to EW.

3.2.1. Basic Level Training: Air Education and Training Command (AETC) has oversight for conducting basic EW training. The primary method for qualification will be the completion of the appropriate formal training course listed in the Education and Training Course Announcement (ETCA).

3.2.2. Senior Level Training: AETC will continue to provide an upper-level program that focuses on the integration of full-spectrum IO and Cyber capabilities into the campaign plan.

3.2.3. Continuation Training: MAJCOMs will define both individual and crew EW training requirements across all skill levels.

3.2.3.1. For rated individuals (EWO AFSC) continuation training will be daily, weekly, or quarterly for all personnel assigned to wing/squadron levels. Training will be outlined in each aircraft platform's respective 11-series Air Force instructions.

3.2.3.2. Individuals holding an "E" prefix and used to fill a EW-related Request for Forces (RFF) from the acquisition, engineering, test and evaluation, communications or intelligence communities will be mission ready IAW HAF, MAJCOM or Numbered Air Force (NAF) guidance prior to deployment.

3.2.4. Advanced Level Training: The CAF, in coordination with AETC, has oversight for advanced EW training above the unit level to provide an in-depth knowledge of national assets, EA targeting, and joint/combined operations necessary to equip the commander with integrated EW capabilities in an effort to meet operational objectives. NOTE: Hands-on, in depth graduate level engineering courses are available to EW acquisition and engineering professionals through the EW T&E University, operated and maintained by the 771TS/412 EWG, Edwards AFB, CA. EW testing requires an extensive understanding of threat systems, threat modes, range assets, and various EW systems under test. Engineers need to understand the importance of emerging threats, proliferation, threat laydowns, and threat functionality to better develop effective test methodology. EW T&E U provides classified course offerings that are not available to the general public. The courses are intended to provide an array of EW knowledge to beginner engineers as well as build, develop, and maintain EW engineering expertise for those more experienced professionals.

3.3. Coalition operations: Create unique challenges on the battlefield. Therefore the entire Air Force EW community will maintain awareness of foreign system capabilities to determine their interoperability within a coalition environment.

3.4. The culmination of EW effectiveness and integration: Is best evaluated during exercises and will address Force Application (FA) and Force Protection (FP) Tactics, Techniques, and Procedures (TTP) to measure how well specific EW capabilities support Air Expeditionary Force (AEF) requirements.

3.4.1. Exercises can take on many levels of sophistication ranging from unit-level exercises to AEF preparation. Whenever possible, the 57th Adversary Tactics Group and similar opposing force (OPFOR) organizations will be incorporated to emulate adversary EW from ground, air, space, or cyberspace. Exercise scenario developers must take into account EW targets and effects in the battlespace since non-kinetic attacks are challenging to integrate into scripts.

3.4.2. Large force exercises (e.g., Red, Blue, Green and Cyber Flags) will incorporate both offensive and defensive EA activities. SERENE BYTE reprogramming activities should be considered for inclusion during all large force exercises. Where possible, activities should include other services and allied partners to fully exploit joint/combined operational training opportunities.

3.5. Organizations employing EW resources: Should regularly analyze their EW training and their associated enablers to modify or establish new training requirements as needed. MAJCOMs will assess the quality of EW training and identify any gaps or shortfalls.

Chapter 4

MATERIEL DEVELOPMENT, SUSTAINMENT & READINESS

4.1. Developing, sustaining and improving materiel solutions: Derives from Title 10 United States Code (USC) statutory responsibilities which outlines Air Force functions of “organize, train and equip.” The equip function includes activities such as acquisition, maintenance, and repair of military equipment.

4.1.1. Development. The Joint Capabilities Integration and Development System (JCIDS) is used to determine the requirement for and support of the acquisition of a materiel EW solution to a validated capability gap. JCIDS is a key component of the Capabilities-Based Planning (CBP) process and operates hand-in-hand with the Planning, Programming, Budgeting and Execution (PPBE) process. The guidance contained in this document does NOT take precedence over that found in AFI 10-601 when validating EW requirements. In addition, information from this document will be used in concert with the guidance found in AFI 10-604, *Capabilities-Based Planning* and AFI 63-101/20-101.

4.1.1.1. The Air Force defines its core duties and responsibilities into thirteen core functions to be used across the DOTMLPF spectrum. The core functions are: Air Superiority (AS), Global Persistent Attack (GPA), Education and Training (ET), Personnel Recovery (PR), Command and Control (C2), Global Integrated ISR (GIISR), Nuclear Deterrence (ND), Space Superiority (SS), Cyber Superiority (CS), Special Operations (SO), Rapid Global Mobility (GPM), Agile Combat Support (ACS), and Building Partnerships (BP). MAJCOMs will develop requirements for, acquire, field, operate and sustain EW-related systems that achieve desired effects in order to control the electromagnetic spectrum in support of the core functions.

4.1.2. Developers, operators, planners, or Subject Matter Experts (SMEs) involved with developing new EW systems must understand the EME to ensure fielded systems can achieve desired effects and to prevent undesired effects from occurring. These fielded capabilities must be deconflicted with other capabilities being employed in or across the entire battlespace to prevent fratricide within the EMS.

4.1.3. Test and evaluation relies on support from the acquisition and exploitation activities of the Air Force FMP to provide data on the technical and operational vulnerabilities of foreign systems.

4.1.3.1. EW-related testing must occur in the most operationally representative and relevant environment practical. Therefore, the Air Force FMP will provide representative systems to the maximum extent possible. AFMC test and evaluation organizations provide threat representative EW systems when FMP assets are not available.

4.1.3.2. A systematic understanding of the concept of threat employment, capability, and proliferation is necessary to determine the priority for acquisition of new adversary systems or upgrades to older systems. Conclusions obtained from the FMP/Foreign Materiel Exploitation (FME) will be incorporated into the appropriate target and threat analysis documents. During resource prioritization, consideration will be given to the exploitation of non-IADS emitters, when appropriate, in addition to traditional IADS emitters.

4.2. Sustainment. This section provides guidance to agencies charged with EW sustainment efforts related to EWIR and test & evaluation associated with EW systems.

4.2.1. EWIR is a systematic process designed to increase aircrew survivability and mission success while operating in an environment characterized by friendly, neutral, and hostile systems that use the EMS. EWIR provides the Commander, Air Force Forces (COMAFFOR), Joint Force Air Component Commander (JFACC) or Combined Force Air Component Commander (CFACC) as well as units a timely and accurate means to detect, identify and respond to electromagnetic emissions. EWIR functions within the scope of electronic warfare (EW) are governed by AFI 10-703, *Electronic Warfare Integrated Reprogramming*.

4.2.2. Testing of EW related mission data software changes, minor system software changes, and minor hardware changes must be conducted in accordance with the processes outlined in AFI 99-103 and AFI 33-580. When performing EA in the US and Canada for testing, training, and/or exercises, users will comply with CJCSM 3212.02C. Spectrum-related data shall be collected and administered in accordance with DoDI 8320.05.

4.3. Readiness. Lead MAJCOMs are charged with the responsibility of conducting readiness assessments of EW systems associated with their weapons platforms on at least an annual basis. Assessments will also be conducted on support equipment and training devices.

4.3.1. AFLCMC and the Air Force Sustainment Center having EW self-protection (Defensive EA) systems within their portfolio will coordinate with the respective MAJCOM requirements communities on state of health reports identifying key system shortfalls, gaps or future trends. These reports will be forwarded onto AF/A2C, A2D, A2R, A3O, A4L, A5R, or A5X for follow-on Air Staff actions.

4.3.2. MAJCOMs will establish readiness standards for EW systems based on their operational requirements to ensure sufficient numbers of fully mission capable systems are available to meet operational commitments. Commanders will assess their EW systems by evaluating them against MAJCOM guidance and input the results into the Defense Readiness Reporting System (DRRS).

4.3.3. MAJCOM A3 divisions will establish equipment readiness levels for specific self-protection (Defensive EA) systems (e.g., ALQ-131, ALQ-172, or AAR-47) or Offensive EA targeting systems (i.e., AN/ASQ-213 / HARM Targeting System [HTS]).

4.3.3.1. EW system effectiveness assessments for fighter aircraft will be accomplished via the COMBAT SHIELD program. Other aircraft types should model their effectiveness assessments after the COMBAT SHIELD example whenever possible.

4.3.3.2. Visiting assessment teams, similar to those used by COMBAT SHIELD, should be used to the maximum extent possible for annual certification or pre-deployment system ring outs.

4.3.4. Units will take advantage of all opportunities to exercise their respective systems and support equipment to determine operational status.

4.3.5. IG programs will evaluate and report the readiness of unit EW systems, associated maintenance equipment, and associated training devices.

Chapter 5

LEADERSHIP & EDUCATION

5.1. The Chief of Staff of the Air Force (CSAF): Provides the strategic vision for EW. This is articulated in the USAF EW Roadmap/EW Vision 2030 (EV2030) as a robust suite of capabilities to enable control of the EMS to assure freedom of operation and primary effects in and through all domains which include air, space, cyberspace, land and maritime. EV2030 covers the period from 2010 to 2030, delineated into three phases: Near-term (present to FY17), Mid-term (FY18 – FY23) and Far-term (FY24 – FY30). For each phase, the roadmap specifies actionable steps organized by DOTMLPF. These actionable steps deliberately map to desired end states in four distinct EW capability areas: Airborne Electronic Attack (AEA), Self-Protection (survivability), DE and EW Battle Management/Support, all of which are derived from the Joint Capability Areas (JCs) and Air Force Core Functions.

5.2. Air Force EV2030 Report Card: AF/A5R, via the EW SAG, will provide an annual “Report Card” to AF/A3/5 assessing progress against each EV2030 milestone. HAF is responsible for updating this document and coordinating those changes with the MAJCOMs.

5.3. EW Advisory Group (EWAG). This the Air Force corporate body for facilitating effective integrated management of AF EW across DOTMLPF. It is responsible with ensuring the most effective and efficient utilization of materiel capabilities, including requirements refinement and endorsement, technology and system development, procurement and fielding, sustainment/upgrading, and eventual retirement (AF EWAG Charter, Oct 2010).

5.3.1. EW Senior Advisory Group (EW SAG). Membership in this organization, which is co-chaired by HQ AFMC/A2/5 and AF/A5R, is comprised of General Officer/SES stakeholders from the HAF, ARC and MAJCOMs. The EW SAG shall meet at least annually in order to support the PPBE process. It sets the objectives and provides recommendations to the SECAF and CSAF.

5.3.2. EW Technical Advisory Group (EW TAG). Co-chaired by AFLCMC/XZI and AF/A5RE, the EW TAG shall meet at least semi-annually and serves as the focal point for coordination and collaboration for achieving EWAG objectives, provides direction and oversight to any EW integrated product teams (IPT), and makes recommendations to the SAG. Membership consists of senior representatives at the O-6 level or civilian equivalents from the HAF, ARC, MAJCOMs, and other vested organizations (i.e., NSA, Sister Services, J-39, etc.). Leadership from the AF Reprogramming Centers (AFI 10-703) are key members of this group.

5.4. Electronic Warfare (EW) Test and Evaluation (T&E) Consortium. The AF EW T&E Consortium works Test and Evaluation efforts through the AF EWAG and AF/TE. Chaired by AF/TE, the AF EW T&E Consortium membership consists of senior representatives at the O-6 level or civilian equivalents from the MAJCOMs and test organizations with an interest in the test and evaluation of EW systems. The EW T&E Consortium is the AF agent for coordinating EW T&E activities including 1) recommending lead test organizations, 2) prioritizing test facility use and modernization, 3) standardizing test practices, and 4) reducing duplication and increasing efficiencies and effectiveness.

Chapter 6

PERSONNEL

6.1. This chapter provides guidance concerning specialized manning, readiness, proficiency and expertise: To increase the Air Force's ability to maximize each component of EW operations.

6.1.1. Air Force EW personnel must be ready to operate at the strategic, operational, and tactical levels of warfare. Maintaining a professional fighting force requires personnel with in-depth knowledge of their EW specialty and an awareness of other IRCs. Career progression should facilitate development of this expertise and familiarization of these disciplines within individual career paths. This knowledge and experience will be tracked so personnel are readily identifiable for additional training opportunities or assignments.

6.1.2. The primary method for identifying and tracking rated EW expertise (Air Force wide) is the Air Force Specialty Code (AFSC). Individuals not in possession of an Electronic Warfare Officer (EWO) AFSC but having critical EW expertise will be distinguished via an "E" prefix to their primary AFSC. To ensure adequate expertise is available the following tasks will be accomplished:

6.1.2.1. Air Force MAJCOM A3 (operations) divisions will identify which non-EWO AFSC officer positions require specialized EW knowledge and experience to their A1 (manpower) counterparts. These positions include but are not limited to pilots, navigators, and operators (cyberwarfare and space control expertise), along with EW-related platform maintenance, intelligence, engineering, and acquisitions personnel.

6.1.2.2. The HAF Director of Operations (AF/A3O) has oversight for "E prefix" management including recruiting, training, assignments, and career development studies or reports. Contact your local manpower office to obtain details on the current Unit Manning Document (UMD) with "E" prefixes attached to MAJCOM authorized AFSCs.

6.1.3. Commands will manage their respective EW force structure to ensure their organizations have available resources for all documented UMD positions.

6.1.4. Personnel readiness demands that properly trained and qualified individuals are placed where they are most needed. Commands utilizing Special Experience Identifiers to fill IO/IRC career force billets will also ensure their EW experts are easily identifiable and distinct from those with Offensive Cyber Operations, Space Operations or Military Information Support Operations proficiency in order to meet Air Force A3/5 operational tasks IAW AFD 10-4, *Operations Planning: Air & Space Expeditionary Force*.

6.2. MAJCOMs will: Assess their EW manpower requirements (operations, maintenance/logistics, intelligence, and associated support staffs) and forward this information to AF/A3O for follow-on action. In turn, HAF directorates will do the following:

6.2.1. AF/A3O will assess authorized billets against MAJCOM requirements and fill positions requiring EW expertise.

6.2.2. AF/A1M will determine the number of authorizations earned, correct grades and skill levels based on man-hour and work load factors.

Chapter 7

FACILITIES

7.1. EW operators, maintainers, engineers and analysts require: Different types of facilities to provide operational EW capability to the warfighter. Facilities including laboratories for development and sustainment, installed systems test facilities, test & training ranges and associated instrumentation are needed to test, train and prepare for combat operations.

7.1.1. EW laboratories, ranges, and associated instrumentation support the EW development, demonstration, T&E and sustainment efforts needed to successfully operate in a congested and contested EMOE. These EW facilities maintain the ability to generate up-to-date red/gray/blue/white signals in order to accurately simulate the congested and contested EME of anti-access/area denial (A2/AD) environments. They include:

7.1.1.1. Anechoic RF Test Facilities: The Air Force Test Center (AFTC) operates anechoic RF facilities with a broad range of capabilities. They support the research, developmental and operational test communities, industry and U.S allied foreign militaries (partner nations) in the execution of EW and other RF test requirements. Anechoic facilities are used to absorb RF energy to reduce the electromagnetic reflections. This, in turn, simulates free-space (airborne) environments within acceptable limitations based on frequency and the size of the facility and the test article (system-under-test). The quiet RF environment allows for MIL-STD electromagnetic interference and compatibility (EMI/C) testing on various EW systems and other avionics. Additionally, anechoic facilities allow testing in a highly secure and controlled environment.

7.1.2. The Benefield Anechoic Facility (BAF) at Edwards AFB supports installed systems testing for avionics test programs requiring a large, shielded chamber with RF absorption capability that simulates free space. The BAF provides the capability to:

7.1.2.1. Investigate and evaluate anomalies associated with EW systems, avionics, tactical missiles and their host platforms.

7.1.2.2. Accommodate tactical-sized, (single or multiple), or large vehicles that can be operated in a controlled EME with emitters on and sensors stimulated while RF signals are recorded and analyzed.

7.1.2.3. Generate RF signals with a wide variety of characteristics, simulating red/gray/blue/white surface-based, sea-based, and airborne systems.

7.1.2.4. Produce combination of signals and control functions emulating a wide variety of test conditions.

7.1.2.5. Generate conditions that are not available on outdoor ranges from the aspect of signal density, pulse density and number of simultaneous types.

7.1.2.6. Have the capabilities for real-time and post-test RF signal parameter measurement, instrument display recording, data analysis and test coordination, as well as providing the data for signal verification

7.1.3. The Joint Preflight Integration of Munitions and Electronic Systems (J-PRIMES) facility at Eglin AFB provides an environment to facilitate testing air-to-air and air-to-surface munitions and electronics systems on fighter-sized aircraft and land vehicles prior to open air testing. Jointly the J-PRIMES and the BAF facilities will provide complementary anechoic chamber capabilities to effectively test and field RF-centric systems and other avionics that must operate in a dense or high power electromagnetic environment. AFTC will work with program offices to determine which combination of anechoic chamber test capabilities can best support test requirements based on technical requirements, location, and schedule availability.

7.1.4. The Electronic Warfare Aviation Integration Support Facility (EWAISF) at Robins AFB, Georgia and mission data (MD) development labs at Eglin AFB, Florida and Robins AFB are equipped and maintained to support the reprogramming process IAW AFI 10-703.

7.1.5. The Digital Integrated Air Defense System (DIADS) Mission Simulation Laboratory (MSL) will provide a verified and validated mission-level simulation of integrated air defense systems. It provides the ability to model/test the effects of a variety of EW systems on the IADS, from end to end, within an operationally representative scenario not available elsewhere in size and density. Its strength lies in the ability to accurately model the air picture development to make it a relevant tool for providing answers for both the tester and the trainer for system and tactics effectiveness.

7.1.6. The Multi-Spectral Test & Training Environment (MSTTE) will provide a multi-use threat EW capability supporting open-air and component-in-the-loop (CITL) testing and training on the Eglin Test and Training Complex (ETTC). MSTTE consists of a suite of fully instrumented threat air defense systems operated across the Eglin ranges. There are 13 primary threats that support multiple programs. A few additional systems are dedicated for and funded by specific customers. The primary purpose of the MSTTE systems is to support open-air testing. The systems are also available to provide EW training for aircrews. MSTTE also provided the capability to support open-air CITL testing using a tower complex, the Electronic Systems Test Facility (ESTF). This enables testing/developing EW algorithms and techniques. The location of the MSTTE assets provides a unique synergism with other test capabilities on Eglin, creating an integrated precision measurement capability.

7.1.7. Hardware-in-the-loop (HITL) facilities include the Guided Weapons Evaluation Facility (GWEF) at Eglin AFB. The GWEF will support testing of domestic munitions systems and in its EW role, will provide infrared countermeasure (IRCM) HITL testing to evaluate the effectiveness of countermeasure systems to defeat electro-optical and infrared threat missiles. In order to provide effectiveness evaluations, the GWEF will maintain and operate validated HITL simulations employing actual threats against simulated targets emitting in the optical band of the threat missile. These simulations allow thousands of simulated engagements under varying aircraft operating conditions to determine if flares, directed energy, or laser countermeasures are effective in defeating threat missile guidance systems.

7.2. The Air Force test and training range infrastructure:

7.2.1. Provides open-air operation in support of air-to-air and air-to-ground weapons DT/OT&E for DoD, non-DoD and commercial customers.

7.2.2. Includes mission scheduling, test & training resources, test operations, and test analysis in support of weapons and command, control, communications, computers, and intelligence, surveillance and reconnaissance (C4ISR) test programs.

7.2.3. Supports MAJCOM EW investment and modernization efforts.

7.3. MAJCOMs will:

7.3.1. Acquire, maintain and sufficiently fund T&E facilities such as Integrated System Test Facilities (ISTF), like those at Arnold, Edwards and Eglin Air Force Bases and mission simulation laboratories at Arnold, Edwards, Eglin, Holloman and Kirtland Air Force Bases which provide key T&E capabilities to ensure EW programs meet validated operational requirements. Conducting EW testing in these facilities enables the identification of issues prior to open air testing, and reduces the expensive and time-consuming “fly-fix-fly” process. These facilities support:

7.3.1.1. EW range test and training operations.

7.3.1.2. Anechoic radio frequency test facilities for antenna tests, installed systems tests, and RF interoperability/compatibility tests.

7.3.1.3. Building and maintaining live-virtual-constructive (L-V-C) EW operations.

7.3.1.4. Operation of HITL capabilities to support evaluation of aircraft self-protection systems against ground and airborne threat missile systems, ISR systems, and radar systems. An example of this capability exists at Edwards AFB in the Integrated Facility for Avionics Systems Test (IFAST).

7.3.1.5. Operation of HITL capabilities to support evaluation of guidance, navigation and geo-location systems in threat-representative NAVWAR environments such as the 746th Test Squadron’s Navigation Test and Evaluation Laboratory (NavTEL).

7.3.2. Ensure a T&E process is incorporated into each acquisition program’s Test and Evaluation Master Plan (TEMP), which documents the overall structure and objectives of the T&E program. The objective is to identify overall T&E activities to be performed by the government and system contractors. This will guide the development of specific test events and direct the integration and utilization of AF ground test facilities into these events. MAJCOMs will ensure the TEMP documents the T&E schedule and test resource requirements. All Air Force EW test activities will utilize AF test facilities for applicable tests if possible. If an EW ground test requirement cannot be met with the use of an existing AF ground test facility, it will be documented in the TEMP T&E schedule and will require a waiver from AF/TE.

BURTON M. FIELD, Lt Gen, USAF
DCS, Operations, Plans & Requirements

Attachment 1**GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION*****References***

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Abbreviations and Acronyms

ACC—Air Combat Command

ACTD—Advanced Concept Technology Demonstrations

AEA—Airborne Electronic Attack

AEF—Air Expeditionary Force

AETC—Air Education and Training Command

AFGSC—Air Force Global Strike Command

AFI—Air Force Instruction

AFMC—Air Force Materiel Command

AFOTEC—Air Force Operational Test and Evaluation Center

AFPD—Air Force Policy Directive

AFROC—Air Force Requirements Oversight Council

AFSC—Air Force Specialty Code

AFSMO—Air Force Spectrum Management Office

AFSOC—Air Force Special Operations Command

AFSOF—Air Force Special Operations Forces

AFSPC—Air Force Space Command

ALCOA—Autonomous Low-Cost Optical Augmentation

AMC—Air Mobility Command

ANG—Air National Guard

AoA—Analysis of Alternatives

ATD—Aircrew Training Devices / Applied Technology Demonstration

BCD—Battlefield Coordination Detachment

C2W—Command and Control Warfare

CAF—Combat Air Forces

CBP—Capabilities Based Planning

CFLI—Core Function Lead Integrator

CFMP—Core Function Master Plan

CIS—Communications Interface Shelter

CCDR—Combatant Commander

DAG—Defense Acquisition Guide book

DE—Directed Energy

DIRCM—Directed Infrared Countermeasures

DOD—Department of Defense

DOTMLPF—Doctrine, Organization, Training, Materiel, Leadership & Education, Personnel, Facilities

DRRS—Defense Readiness Reporting System

EA—Electronic Attack

EME—Electromagnetic Environment

EMP—Electromagnetic Pulse

EMS—Electromagnetic Spectrum

EP—Electronic Protection

ES—Electronic Warfare Support

ETCA—Education and Training Course Announcement

EW—Electronic Warfare

EWBM—Electronic Warfare Battle Management

EWCA—Electronic Warfare Coordination Authority

EWCC—Electronic Warfare Coordination Cell

EWAG—Electronic Warfare Advisory Group

EWIR—Electronic Warfare Integrated Reprogramming

EWO—Electronic Warfare Officer

F2T2EA—Find, Fix, Track, Target, Engage & Assess

FA—Force Application

FMA—Foreign Materiel Acquisition

FME—Foreign Materiel Exploitation

FMS—Foreign Military Sales

FP—Force Protection

GPA—Global Persistent Attack

GS—Global Strike

HAF—Headquarters Air Force

HARM—High-Speed Anti-radiation Missile

HPM—High Powered Microwave

HPT(s)—High Performance Team(s)

IA—International Affairs

IED—Improvised Explosive Devices
IO—Information Operations
IR—Infrared
IRCM—Infrared Countermeasures
ISR—Intelligence, Surveillance and Reconnaissance
IW—Irregular Warfare
JAEA—Joint Airborne Electronic Attack
JCEWS—Joint Force Commander’s Electronic Warfare Staff
JCS—Joint Chiefs of Staff
JFACC—Joint Force Air Component Commander
JFC—Joint Force Commander
JRFL—Joint Restricted Frequency List
JROC—Joint Requirements Oversight Council
LAIRCM—Large Aircraft Infrared Countermeasures
LEP—Laser Eye Protection
LWR—Laser Warning Receivers
MAF—Mobility Air Forces
MAJCOM—Major Command
MASINT—Measures and Signatures Intelligence
MD—Mission Data
M&S—Modeling and Simulation
NAF—Numbered Air Forces
NASIC—National Air and Space Intelligence Center
NTISR—Non-Traditional Intelligence, Surveillance and Reconnaissance
OCO— Offensive Cyber Operations
OFP—Operational Flight Program
OPFOR—Opposition Force
OT&E—Operational Test and Evaluation
PRF—Pulse Repetition Frequency
QRC—Quick Reaction Capability
RAMPOD—Reliability, Availability, and Maintainability for Pods and Integrated Systems
R&D—Research and Development

RCIED—Remote/Radio Controlled Improvised Explosive Devices

RCS—Radar Cross Section

RDT&E—Research, Development, Test, and Evaluation

RF—Radio Frequency

RWR—Radar Warning Receivers

SAF—Secretary of the Air Force

SAP—Special Access Programs

SEAD—Suppression of Enemy Air Defenses

SEI—Specific Emitter Identification

SIGINT—Signals Intelligence

SME—Subject Matter Expert

STO—Special Technical Operations

T&E—Test and Evaluation

TTP—Tactics Techniques and Procedures

USAF—United States Air Force

UTC—Unit Type Code

UV—Ultraviolet

Terms

Note: The purpose of this glossary is to help the reader understand the terms used in this publication. It is not intended to encompass all pertinent terms. Joint Publication 1—02, *Department of Defense Dictionary of Military and Associated Terms*, and the *Air Force Glossary* (<https://www.doctrine.AirForce.mil/Library/AirForceGlossary.asp>) contain standardized terms and definitions for Department of Defense and United States Air Force use.

Capabilities—Based Planning (CBP) — CBP is planning under uncertainty to provide capabilities suitable for a wide range of challenges and circumstances, all designed to achieve certain battlespace effects. The Air Force uses a capabilities-based planning process based on analysis to identify required capabilities and capability objectives. Joint Capabilities Integration and Development System (JCIDS) analysis and A5X capabilities-based planning are primary contributors to the Air Force planning process, but top-down direction, urgent warfighter needs, technological opportunities, and experiments and demonstrations provide other means for identifying the need for a new capability.

Capability— The ability to achieve an effect to a standard under specified conditions through multiple combinations of means and ways to perform a set of tasks.

Capability Gap— Those synergistic resources as measured by employing DOTMLPF analysis currently unavailable but potentially attainable for future operational tasks.

Capability Shortfall— A lack of full military utility needed by an operational user to effectively execute a task.

COMBAT SHIELD— System level assessments of the CAF fighter fleet with the dual goals of reporting to Air Force leadership on the overall state of EW health of the fighter fleet and providing unit commanders with on-site analysis and feedback on the readiness of their EW defensive and targeting systems. Not applicable to AFSPC.

Core Function— Core duties and responsibilities the Air Force performs as a Service to be used across doctrine, organization, training, materiel, leadership and education, personnel, and facilities.

Core Function Lead Integrator (CFLI)— Office/individual charged with providing guidance for the development of the CFMP.

Core Function Master Plan (CFMP)— Document that translates the vision of one of the twelve core functions into a risk-informed, resource-constrained planning force proposal that informs follow-on Program Objective Memorandum (POM) and Science and Technology (S&T) activities.

Cyberspace— A global domain within the information environment consisting of the interdependent network of information technology infrastructures, including the Internet, telecommunications networks, computer systems, and embedded processors and controllers.

Electromagnetic pulse (EMP)— Is the generation and radiation in a transmission medium of a very narrow and very high-amplitude pulse of electromagnetic noise. The term is associated with the high-level pulse because of a nuclear detonation and with an intentionally generated narrow, high-amplitude pulse for EA applications. In nuclear detonations, the EMP signal consists of a continuous spectrum with most of its energy distributed throughout the low frequency band of 3 to 30 kHz.

Electronic Warfare (EW)— Any military action involving the use of electromagnetic (EM) and directed energy (DE) to control the EM spectrum or to attack the enemy. The three major subdivisions within EW are: electronic attack (EA), electronic protection (EP), and electronic warfare support (ES).

Electronic Warfare Coordination Authority (EWCA)— The Joint Force Commander (JFC) designee for the coordination of all Electronic Warfare activities within the theater of operations.

Electronic Warfare Coordination Cell (EWCC)— A specialized portion of the Air Operations Center (AOC) dedicated to achieving a commander's EW related objectives for the electromagnetic spectrum.

Electronic Warfare Integrated Reprogramming (EWIR)— A systematic process for operational commanders to respond to a dynamic threat environment. It gives all Air Force units a timely and accurate means to respond to expected and unexpected electronic emissions, changes in air defense tactics, and unique mission requirements. These EWIR responsibilities include procedures for changes in tactics, employment guidance, electronic warfare (EW) equipment (software/hardware), aircrew training and training devices (i.e. threat simulators, threat emitters) and other support systems.

Information Operations— “The integrated employment, during military operations, of information-related capabilities in concert with other lines of operation to influence, disrupt,

corrupt or usurp the decision-making of potential adversaries while protecting our own.” (JP 1-02)

Information operations (IO)- are the integrated employment of the capabilities of influence operations, electronic warfare operations, and network warfare operations, in concert with specified integrated control enablers, to influence, disrupt, corrupt, or usurp adversarial human and automated decision making while protecting our own. (**AFDD 3-13**) (Italicized definition applies only to the Air Force)

Interoperability— The ability of systems, units or forces to provide data, information, materiel, and Services to and accept the same from other systems, units or forces and to use the data, information, materiel and Services so exchanged to enable them to operate effectively together. NSS and ITS interoperability include both the technical exchange of information and the end-to-end operational effectiveness of that exchanged information as required for mission accomplishment.

Joint Capabilities Integration and Development System (JCIDS)— A Joint concepts-centric process that supports the Joint Chiefs of Staff and the JROC in identifying, assessing, and prioritizing joint military capability needs and identifying integrated DOTMLPF solutions (materiel and non-materiel) to fill those needs within the DoD CBP process. Additionally, JCIDS is a key element in the Chairman's effort to realize the initiatives directed in the Transformation Planning Guidance.

Materiel Solution— A defense acquisition program (non-developmental, modification of existing systems, or new program) that satisfies identified operator capabilities.

Network Operations (NetOps)— The integrated planning and employment of military capabilities to provide the friendly net environment needed to plan, control and execute military operations and conduct Service functions. NetOps provides operational planning and control. It involves time-critical, operational-level decisions that direct configuration changes and information routing. NetOps risk management and command and control decisions are based on a fused assessment of intelligence, ongoing operations, commander's intent, blue and gray situation, net health, and net security. NetOps provides the three operational elements of information assurance, network/system management, and information dissemination management. Also called NetOps.

Offensive Cyberspace Operations— Cyberspace operations intended to project power by the application of force in or through cyberspace. Also called OCO.

Operational Test and Evaluation (OT&E)— Testing and evaluation conducted in as realistic an operational environment as possible to estimate the prospective system's operational effectiveness and operational suitability. In addition, OT&E provides information on organization, personnel requirements, doctrine, and tactics. Within the Air Force, the Air Force Operational Test and Evaluation Center (AFOTEC), conducts OT&E.

Proficiency— Estimate used during capability analysis that answers the question “How well do we perform a given task (miles, minutes, percent, etc.)?” Together, proficiency and sufficiency ratings will be used to determine overall health and risk of a capability to achieve an effect.

RAMPOD— Operational R&M Assessment System supports all facets of maintaining, testing, integrating, and evaluating changes to field data collection software programs (RCS). These programs currently support the ALQ-131/184/188 EA Pods, ALE-40/45/47 chaff/flare systems.

Spectrum Management— Involves planning, coordinating, and managing use of the EM spectrum through operational, engineering, and administrative procedures. Its objective is to enable electronic systems to perform their functions in the intended environment without causing or suffering unacceptable interference.

Sponsor— Domain owner responsible for all common documentation, periodic reporting, and funding actions required for supporting the capabilities, development, and acquisition process for a specific capability proposal.

Sufficiency— Estimate used during capability analysis that answers the question “Do we have enough (troops, aircraft, supplies, etc.)?” Together, sufficiency and proficiency ratings will be used to determine overall health and risk of a capability to achieve an effect.

User— An operational command or agency that receives or will receive benefit from the acquired system. Combatant Commanders and their Service component commands are the users. There may be more than one user for a system. Because the Service component commands are required to organize, equip, and train forces for the Combatant Commanders, they are seen as users of systems. The Chiefs of the Services and heads of other DOD components are validation and approval authorities and are not viewed as users.

Attachment 2

USAF EW SUPPORT TO JOINT TASK FORCES

A2.1. This attachment provides: Service guidelines to commanders concerning Air Force EW during contingency operations. As always, JCS guidance takes precedence over the information provided in this attachment.

A2.2. Operations IRAQI FREEDOM (OIF) and ENDURING FREEDOM (OEF): Demonstrated why the Air Force needs a fully trained core of EWCC experts to coordinate and execute operational EW activities to meet Joint Force Commander (JFC) objectives.

A2.2.1. The EWCC will work closely with the Joint Force Commander's Electronic Warfare Staff (JCEWS) or component equivalents (as designated by the lead service) to provide SMEs on USAF EW capabilities.

A2.2.2. It will coordinate as appropriate with the CAOC plans/operations divisions, IO, Space, Intel, Battlefield Coordination Detachment (BCD), J-6, or other cells as required by its assigned JFC function(s).

A2.3. Air Force EWCC manning will be fully integrated.

A2.3.1. The Chief of the EWCC will be a senior Air Force EWO and designated by the appropriate component commander. This designated individual will be the CAOC EW focal point to ensure proper coordination within the IO Cell and other Specialty Teams. As a minimum, the Chief will be cleared and briefed into Special Technical Operations (STO); and strong consideration should be given to COAL WARFIGHTER (CW) in-brief. All other EWCC personnel will be cleared to TS/SCI.

A2.3.2. Manning levels must be commensurate with the scale of EW operations being conducted. In order to function correctly, liaison links must be established with supporting commands as well as EW specialists from correlating capabilities and other employed EW elements.

A2.3.3. The EWCC will be the Air Force's primary agency for the deconfliction of intentional EM emissions across Services and other Coalition partners participating in the Joint Operational Construct.

A2.3.4. Inside the War Fighting HQ (WFHQ), the EWCC will provide critical Air Force SMEs on the following items.

Figure A2.1. EWCC will Provide Critical Air Force SMEs on the following items

Deliberate/Crisis Action Planning CONPLAN/OPLAN TET/Strategy - Air Operations Directive (AOD) Master Air Attack Plan (MAAP) - Air Tasking Order (ATO) EW Spins - Rules of Engagement (ROE) Joint Restricted Frequency List (JRFL) Jamming Control Authority (JCA) EWBM Activities as directed by the JFC Electronic Warfare Integrated Reprogramming (EWIR) in respective AORs
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A2.4. The Air Force EWCC: can be called upon to act as the joint force commander's mechanism for coordinating and executing EW operations within a theatre of operations including those involving a Combined Joint Task Force (CJTF). Responsibilities include EW planning, coordination/monitoring, source of advice, line-of-fire deconfliction, as well as the traditional EA activities normally reserved for offensive air operations and defensive activities associated with the FP mission.

A2.5. In order to synchronize combat operations: Constant liaison with the ground maneuver, intelligence, and communications staffs/elements is essential for the EM spectrum environment.

A2.5.1. The EWCC must be located in a secure area for the handling and storage of sensitive intelligence material, within close proximity to component IO Staff, Operations, Space, Intelligence (MASINT/SIGINT) and Communications Interface Shelter (CIS) staff cells.

A2.5.2. Elements of the EWCC must be an integral part of a NAF headquarters/Component Staff during peacetime to enable OPLAN development, exercise planning and conducting effective EW training.

A2.6. All operational analyses revealing EW gaps, shortfalls, and benchmark best practices will be: Documented as lessons learned and will be incorporated into the Air Force Advanced Lessons Management System (ALMS) Observation format, located at <http://www.a9.hq.smil.mil/a9l/>, no later than 48 hours after observation occurrence.