ARMY, MARINE CORPS, NAVY, AIR FORCE

JSTARS

MULTI-SERVICE TACTICS, TECHNIQUES, AND PROCEDURES FOR THE JOINT SURVEILLANCE TARGET ATTACK RADAR SYSTEM

AIR LAND SEA APPLICATION CENTER

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MCRP 2-24A (formerly MCRP 2-1E)
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MULTI-SERVICE TACTICS, TECHNIQUES, AND PROCEDURES

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E R R A T U M

to

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MULTI-SERVICE TTP FOR JOINT SURVEILLANCE TARGET ATTACK RADAR SYSTEM (JSTARS)

1. Change the publication short title to read “MCRP 2-24A” (vice MCRP 2-1E).

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FOREWORD

This publication has been prepared under our direction for use by our respective commands and other commands as appropriate.

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PREFACE

1. Scope

This document provides detailed multi-Service tactics, techniques and procedures (MTTPs) for consideration and use during planning and employment of the Joint Surveillance Target Attack Radar System (JSTARS). This publication—

a. Describes the JSTARS elements, including the E-8C aircraft, airborne subsystems, ground-based segments, and their capabilities and limitations.

b. Describes the missions of JSTARS, including intelligence support, attack support, battle management, and special missions support.

c. Outlines employment planning and mission tasking considerations for JSTARS.

d. Describes JSTARS communications and data systems interfaces.

2. Purpose

This publication provides theater and component level planners detailed procedures for planning, implementing, and executing JSTARS operations in support of the joint force. It consolidates references for JSTARS and provides planners in-depth information for mission planning and employment during exercises, contingencies, and combat operations. This publication does not restrict the authority of the joint force commander (JFC) from organizing the force and executing the mission in a manner in which the JFC deems appropriate.

3. Applicability

This publication provides JFCs, component commanders, and their operational staffs off-the-shelf guidance for JSTARS mission planning and execution. Planners can use this publication to integrate JSTARS into theater-specific plans in support of the warfighting commander's objectives. The publication provides the tactical level warfighters an understanding on how JSTARS can support their operations.

4. Implementation Plan

Participating Service command offices of primary responsibility (OPR) will review this publication, validate the information and, where appropriate, reference and incorporate it in Service manuals, regulations, and curricula as follows:

Army. The Army will incorporate the procedures in this publication in U.S. Army training and doctrinal publications as directed by the Commander, U.S. Army Training and Doctrine Command (TRADOC). Distribution is in accordance with initial distribution number (IDN) XXXXX.

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Air Force. Air Force units will validate and incorporate appropriate procedures in accordance with applicable governing directives. Distribution is in accordance with AFI 33-360.

5. User Information

a. TRADOC, MCCDC, NWDC, Headquarters Air Force Doctrine Center (HQ AFDC) and the Air Land Sea Application (ALSA) Center developed this publication with the joint participation of the approving Service commands. ALSA will review and update this publication as necessary.

b. This publication reflects current joint and Service doctrine, command and control organizations, facilities, personnel, responsibilities, and procedures. Changes in Service protocol, appropriately reflected in joint and Service publications, will likewise be incorporated in revisions to this document.

c. We encourage recommended changes for improving this publication. Key your comments to the specific page and paragraph and provide a rationale for each recommendation. Send comments and recommendations directly to—

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JSTARS

Multi-Service Tactics, Techniques, and Procedures for Joint Surveillance Target Attack Radar System

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*** This publication supersedes FM 90-37, MCRP 2-2B, NWP 3-55.13, and AFJPAM 10-224, 28 July 1997.**

EXECUTIVE SUMMARY

JSTARS

Multi-Service Tactics, Techniques and Procedures For Joint Surveillance Target Attack Radar System

JSTARS is a "system of systems" consisting of both airborne and ground-based segments. It features the E-8C, a militarized Boeing 707-300 aircraft with airborne radar, operations and control, and communication subsystems designed to support and be interoperable with existing and planned joint command, control, communications, computers, and intelligence (C4I) systems. The ground-based segment consists of the Army and Marine Corps common ground station (CGS) and the Army, Air Force, and Marine Corps joint Services workstation (JSWS). These systems receive E-8C complete radar data in near real time (NRT) and process, store, and display that data, allowing the operators to build and maintain situational awareness of the battlespace. The operator can then manipulate and analyze that information and forward it to command and control (C2) and fire support nodes to aid in decision making and targeting.

JSTARS provides the supported commander(s) a means for battle management and support to offensive air operations by providing C2; intelligence, surveillance, and reconnaissance (ISR) support; and intelligence preparation of the battlespace (IPB) that contribute to an understanding of the enemy situation and help commanders delay, disrupt, and destroy enemy forces, in accordance with the JFC's overall objectives.

The JFC determines the most effective use of JSTARS, based on the situation and the concept of the operations, and establishes mission priorities using overall campaign objectives. The JFC's campaign plan may require the E-8C to simultaneously support land, naval, and air operations.

Planning for E-8C missions begins when the JFC's collections management board approves mission support requests based on the JFC's priorities. Commanders pass collection requirements to their respective component collections manager. Component collection managers pass this information to the Joint Collection Management Board (JCMB)/Joint Intelligence Support Element (JISE), unless authority is specifically delegated to a component command. This information is assimilated into the air tasking order (ATO) for mission planning and tasking.

JSTARS Overview

Chapter I introduces the JSTARS and briefly describes the system components, their capabilities and limitations. An overview of JSTARS missions is included to enable planners to integrate JSTARS into the campaign plan.

System Description and Capabilities

Chapter II details the specific capabilities of each component of JSTARS. Operating parameters for the E-8C and its subsystems are provided to operational planners to enable informed planning and employment considerations. Discussion of the CGS and JSWS includes a description of each of these variants, their interface with other systems, and their capabilities and limitations.

Operational Considerations

Chapter III outlines employment planning and mission tasking considerations for JSTARS. The integration of JSTARS operations with the JFC's intelligence collection and targeting processes is of specific concern. This chapter also details the information and products required from supported units for successful JSTARS mission support training.

Tactical Considerations

Chapter IV details the coordination required between the airborne and ground-based segments of the JSTARS. Specific items of discussion include the coordination between the intelligence staff, the ground station operators, and the aircraft mission crew needed to optimize JSTARS employment and operations.

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Chapter I

JSTARS Overview

1. Mission

JSTARS performs theater-wide battle management and ISR support missions. JSTARS provides radar surveillance and targeting information to component commanders to develop an understanding of the enemy situation and to support attack operations/targeting. JSTARS mission capabilities contribute to an understanding of the enemy situation and assist ground, air, and naval commanders in delaying, disrupting, and destroying enemy forces, in accordance with the JFC's overall objectives. JSTARS supports these component commander's operations although the E-8C usually remains under the direction of the joint force air component commander (JFACC). JSTARS provides continuous wide-area surveillance (WAS) and targeting support to surface commanders equipped with CGS and JSWS. JSTARS can also support air operations to include air interdiction (AI), close air support (CAS), offensive counter air (OCA), and other special missions spanning the spectrum of warfare. Although the original primary mission of JSTARS was the dedicated support of the ground commander, JSTARS operations have evolved as the nature of joint operations has matured. In recent years, the Marine Corps, Navy, and Special Operations Forces (SOF) have obtained support from JSTARS through acquisition of ground stations or through indirect means. Regardless of which component commander JSTARS supports, mission priorities are established by the JFC based on the overall campaign objectives.

2. JSTARS Components

JSTARS includes both airborne and ground-based segments. The airborne segment consists of the E-8C aircraft; the ground-based segment consists of the CGS, the JSWS and their corresponding equipment. Although the term "JSTARS" refers to both the airborne and ground-based components of the system, conventional usage refers to the aircraft as "JSTARS." To prevent confusion, this MTTP will specify the airborne components as "JSTARS aircraft" or "E-8C" and the ground-based components by including the terms "ground-component", "CGS" and/or "JSWS."

a. E-8C Aircraft. The E-8C is a Boeing 707 aircraft containing a radar subsystem, an operations and control subsystem, and a communications subsystem. The E-8C provides WAS and small-area ground surveillance (sector search); target and situational development; target acquisition, analysis, and attack planning; and limited post-attack battle damage assessment (BDA). The radar system detects moving targets in the moving target indicator (MTI) mode and receives fixed-target indications in the fixed target indicator(FTI)/synthetic aperture radar (SAR) mode.

b. CGS. The CGS is the ground station for JSTARS and other radar and imagery systems. Mounted on a mobile M1113 (Army) or M1097A2 (USMC) high mobility multi-purpose wheeled vehicle (HMMWV), CGS is employed in combat units from echelons above corps (EAC) to the brigade and armored Cavalry regiment levels. The Marine Corps has one CGS per Marine Expeditionary Force (MEF) maintained in the Intelligence Battalion for MEF support. The CGS links with the E-8C and other ISR systems and operates by receiving MTI and SAR/FTI data from the E-8C via the surveillance and control data link (SCDL). It processes, stores, and displays data and

enables the operator to manipulate sensor data and communicate with the E-8C. The system includes remote workstations (RWS) for the battlestaff to correlate NRT combat information, then analyze and react accordingly.

c. JSWS. The JSWS is a beyond line-of-sight (BLOS), modular, portable, workstation with the same software, hardware, capability, and functionality as a CGS, when equipped with comparable communications equipment. The JSWS provides C2 connectivity to component commanders in support of offensive air operations, ground operations, and support missions. The Marine Corps has a JSWS assigned for each MEF, resident in the Intelligence Battalion.

3. Command Relationships

This section articulates the command relationships of JSTARS operations, and clarifies individual component responsibilities for planning, directing, controlling, and mission accomplishment. This applies to U.S. forces in any theater of operations; however, specific factors, such as the size and type of U.S. forces involved and unique command arrangements, could require modifications. Coordinated mission planning, tasking, and execution is essential to the effective employment of JSTARS.

a. JSTARS mission priorities are established by the JFC. This is accomplished by the joint force staff (J2/J3) integrating all component commander's requests for support and recommending surveillance and mission priorities to the JFC for final approval. The JFC, as the responsible commander for all theater assets, may exercise operational control and/or tactical control of the E-8C through the JFACC. The JFACC determines the number of aircraft and orbits needed to execute the JFC directed mission. The JFACC is responsible for satisfying the requirements for continuous WAS and attack support missions of corps commanders and other ground commanders equipped with CGS/JSWS.

b. The JFC's guidance provides unity of effort between the joint force land component commander’s (JFLCC's) ground campaign and the JFACC's air campaign. JSTARS' collection requirements are the responsibility of Joint Force J2. Within the confines of the JFC's objectives and priorities, the JFACC integrates all component commander's requirements and recommends surveillance and target priorities to the JFC for final approval. Also in support of the JFC's theater objectives and priorities, the JFLCC designates the corps commander(s) or unit(s) to be supported and the duration of support. The corps commander(s) or unit(s) determine their required coverage area and times of coverage, and pass requirements to the joint air operations center (JAOC). The JFACC's collection manager takes these requirements to produce the JSTARS' collection deck, a prioritized list of predetermined sites for surveillance/reconnaissance.

c. The JFACC is normally the supported commander for theater airborne reconnaissance and surveillance. As such, he has the authority to designate priorities and times for airborne ISR assets. Through his staff, the JFACC deconflicts requirements and missions, protects the aircraft, and integrates and synchronizes JSTARS with other ISR operations. While the JFACC is the “supported commander” for airborne ISR, he is not the only recipient of JSTARS ISR and C2 support. The E-8C can simultaneously support multiple component commanders, in relative priority as specified by the JFC.

4. Employment

JSTARS E-8C may be employed as part of a rapid U.S. force projection package. In most instances, the E-8C can perform ISR and attack operations missions concurrently. However, operational/campaign requirements may dictate an emphasis on certain mission types. The JFACC will determine mission emphasis based on the JFC's intent.

a. Ground-based Functions. JSTARS ground-based segment (CGS and/or JSWS) supports surface commanders by providing an improved ability to anticipate events in the battlespace and more effectively employ assets. Surface commanders can make key decisions in maneuver, targeting, and offensive and defensive operations because of JSTARS unique ability to view the evolving battlespace. JSTARS augments organic cavalry and reconnaissance assets and provides integrated updates to support the IPB process. This ability allows all echelons to focus on their entire area of interest (AOI) and monitor an entire corps sector by providing a common picture of the battlefield. For more information on how JSTARS is employed by surface commanders, see Chapter III and Appendix D.

b. ISR Functions. The E-8C detects and tracks moving and stationary ground targets, day or night, in almost any weather, providing timely information to C2 and ISR units and other theater users. E-8C radar WAS data processing provides an approximate number of targets, target location, direction, speed, elevation, time of arrival, and point of arrival. The SAR/FTI modes can be used to detect and monitor radar significant ground structures (such as pontoon bridges and airfields), battlefield fortifications/obstacles (such as concertina wire, trenches, and beach fortifications), and halted vehicles. JSTARS provides NRT information simultaneously to airborne-, ground-, maritime-based C2 and ISR units, intelligence systems, and other agencies. Surveillance provides broad, relatively continuous monitoring to detect changes in enemy force status, activity, or threats. Reconnaissance complements surveillance by targeting specific objectives at specific periodic intervals, rather than in a continuous monitoring mode. Reconnaissance generally has a time constraint associated with the tasking. ISR support functions include the following:

(1) Provide/relay cross cueing of intelligence collectors to assist in indications & warning (I&W), threat warning, identification of E-8C radar data, and assistance in battle management decisions.

(2) Nominate potential targets.

(3) Provide sensor data for IPB.

(4) Exploit imagery based on historical display and on-board analysis of E-8C data.

(5) Provide limited post-attack assessment.

(6) Provide ground situation and limited littoral surveillance.

(7) Monitor transition of amphibious forces ashore.

(8) Provide limited detection of rotating antennas and slow moving fixed- or rotary-wing aircraft.

c. Command and Control Functions. The E-8C performs battle management by jointly coordinating directed fires against enemy targets. When directed, the E-8C

quickly assigns strike assets to identify, delay, destroy, or neutralize enemy forces. Missions supported include AI, CAS, personnel recovery (PR) (such as combat search and rescue [CSAR]), OCA, and theater missile defense (TMD). The E-8C battle management and attack support functions include, but are not limited to, the following:

(1) Support JFACC execution of the ATO by coordinating between command elements and tactical resources.

(2) Provide information and coordinate tasking for air/ground weapon systems.

(3) Coordinate and relay information relevant to airspace coordination measures and fire support coordination measures.

(4) When required by the rules of engagement (ROE), coordinate clearance for fire through the JAOC for air-to-ground (A/G) targeting.

(5) Receive and relay in-flight reports.

(6) Assume the role of airborne mission commander (AMC) for PR operations, when directed.

(7) Assist strike aircraft in visual or sensor acquisition of targets.

(8) Support SOF.

Chapter II

System Description and Capabilities

1. System Description

The JSTARS includes both the airborne E-8C and ground-based CGS and JSWS segments. The mission crew aboard the E-8C is joint—Army and Air Force; the crew of the CGS is Army or Marine Corps. Both segments can receive, store, display, and manipulate radar data.

2. E-8C Description

The E-8C is a modified Boeing 707-300 equipped with an AN/APY-3 radar, operation and control operator workstations (OWS), and communications subsystems. E-8C performance characteristics and runway requirements are listed in Tables II-1 and II-2. Special attention should be taken to be aware of runway barriers since the E-8C radome has one foot seven inches of ground clearance.

Table II-1. E-8C General Information

Maximum gross weight (on ground) (1 E-8C-1)	336,000 pounds
Maximum flight time with air refueling	24 hours
Optimum air refueling altitude	20,000 to 26,000 feet
Air refueling on-load (Based on refueling 5 to 7 hours after takeoff)	65,000 to 85,000 pounds
Flight time without air refueling (standard load)	8 hours
Standard mission fuel load	120,000 pounds
Optimum cruise speed (31,000 feet)	0.77 Mach/460 knots true air speed
Fuel requirements Primary fuel ----------JP-8, commercial Jet B Alternate fuel ----------JP-4, JP-5, Jet A-1, Jet A Emergency fuel --------Aviation gasoline (AVGAS), AVGAS +3% grade 1065, and 1100 oil	

Table II-2. E-8C Runway Requirements

Requirements	***Measurements***
Minimum runway length	9,000 feet (7,000 feet with waiver)
Minimum runway width	135 feet
Minimum taxiway width	75 feet
Runway load bearing capacity	336,000 pounds (TT)
Note: Short runways greatly reduce takeoff fuel loads	

a. Radar Subsystem. The JSTARS aircraft is capable of providing NRT MTI and SAR, which provide wide and small area surveillance and SAR capability to support target situation development, target acquisition, target analysis, and attack support to ground-, naval-, and air-attack systems. The E-8C radar detects and tracks moving and stationary targets in excess of 150 kilometers from the platform. The system has a limited capability to detect and locate rotating antennas and littoral targets and, through radar history playback, determine the flight path of helicopters and slow moving fixed-wing aircraft. During air refueling, the radar subsystem is disabled (radar standby).

(1) Radar Description. The radar is a phased-array, multi-mode, side-looking radar system. The field of view (FOV) covered by the radar is the radar reference coverage area (RRCA). The RRCA moves constantly with the aircraft as it proceeds along its flight path. The radar revisit rate refers to how quickly the radar scans an area (typically averages 60 to 90 seconds). The quality of the radar data decreases when revisit times exceed 90 seconds. The ground reference coverage area (GRCA) is smaller than the RRCA and is under constant surveillance, regardless of the E-8C position in its orbit. The GRCA remains geographically fixed, enabling continuous surveillance. The GRCA generally corresponds to a corps area of operations (AO) (see Figure II-1).

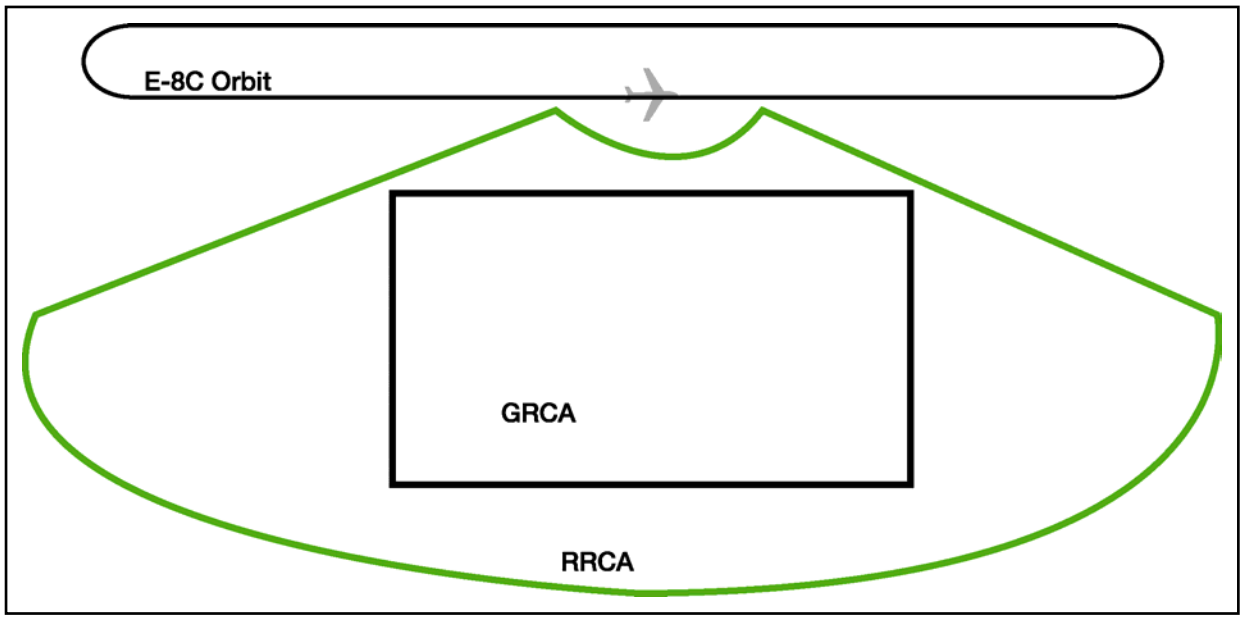

Figure II-1. Radar Reference Coverage Area and Ground Reference Coverage Area

(2) MTI mode. MTI is the primary operating mode and is used to locate moving vehicles, rotating antennas, and slow-moving aircraft. E-8C MTI modes include GRCA, RRCA, sector search, attack planning, and attack control. The WAS mode refers to the GRCA and RRCA. Only one GRCA or one RRCA may be operated at a time; they cannot be run simultaneously.

(a) The primary difference between each of these jobs is the size of the area covered, the interrupt priority, the available radar resolution, and the specified radar revisit rate. The revisit rates for all MTI modes are adjustable and the radar is capable of servicing multiple MTI modes simultaneously, with the exception of the WAS mode. See Table II-3 for MTI basic information.

Table II-3. JSTARS MTI Basics

JSTARS MTI **Can** Detect— • Vehicles the size of a HMMWV, moving at least 10 kph. • Slow-moving aircraft (fixed and rotary wing). • Convoy movement (speed, direction, location, and time). • Choke points based on traffic analysis. • Operational bridges and causeways (based on traffic pattern analysis). • Possible locations of logistics sites, command posts, and rest stops.
JSTARS MTI **Cannot**— • See through hills and mountains (because of terrain masking). • Identify the difference between types of vehicles (e.g., T-55 or T-72). • Determine static defended areas; if they are manned and/or, with what type of weapon system. • Locate, track, and identify people moving on the ground. • Detect or track rockets or tactical ballistic missiles in flight.

(b) The mission crew will coordinate revisit rates with the supported commanders. Multiple requests for increased coverage or quicker revisit rates may impact other components. Additional internal radar-service requests (RSRs) may impact available timeline to the GRCA. The E-8C mission crew commander (MCC) will inform the supported commanders if dynamic requests and revisit rates are supportable, based on JFC's guidance and priorities.

(3) SAR/FTI Performance. SAR is a high resolution radar image of a specified area on the ground. FTI is a sub-function of the SAR mode, and is used to provide a display of stationary targets. The E-8C has the ability to shoot SAR/FTI imagery at the expense of MTI processing. Current SAR imagery resolution is limited; its quality is dependent on system and natural variables. For example, SAR imagery quality decreases as its distance from the aircraft increases. SAR/FTI has a national imagery interpretation rating system (NIIRS) rating of 3 to 4. Downlinking SAR/FTI imagery to JSWS or CGS is constrained by communication limitations. See Table II-4 for SAR basic information.

Table II-4. JSTARS SAR Basics

JSTARS SAR **Can**— • Confirm (through pattern analysis) the presence of occupied artillery, surface-to-air missile (SAM), and air defense artillery (ADA) sites. • Locate small individual vehicles. • Refine target accuracy/description. • Support limited BDA.
JSTARS SAR **Cannot**— • Tell what types of vehicles are in a particular location, only if vehicles are there or not. • Detect (by itself) mobile surface-to-surface missile (SSM) units (JSTARS must cue or be cued by other sensors). • Build a theater-level mosaic (the SAR frame is relatively small compared to the view given by the MTI radar).

(4) SAR Imagery Exploitation. SAR images can be stored and subsequently retrieved for exploitation (see Figure II-2). Multiple SAR images can be displayed adjacent to, or overlapping each other to create a mosaic covering a large area (see Figure II-3).

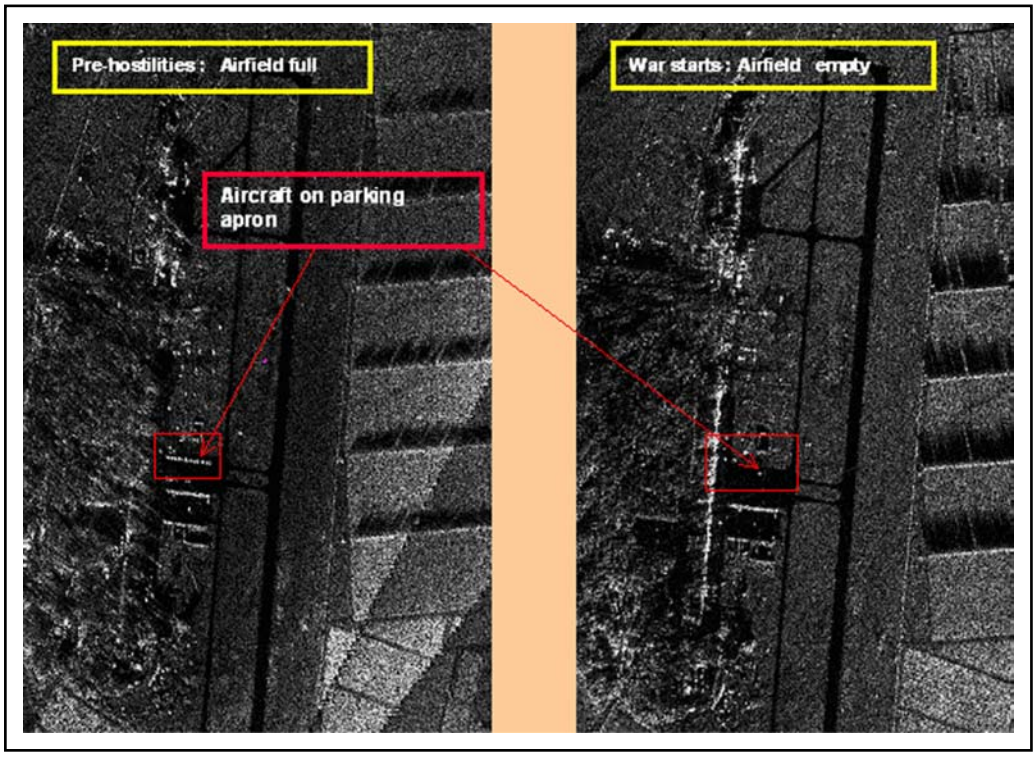

Figure II-2. SAR Imagery Exploitation

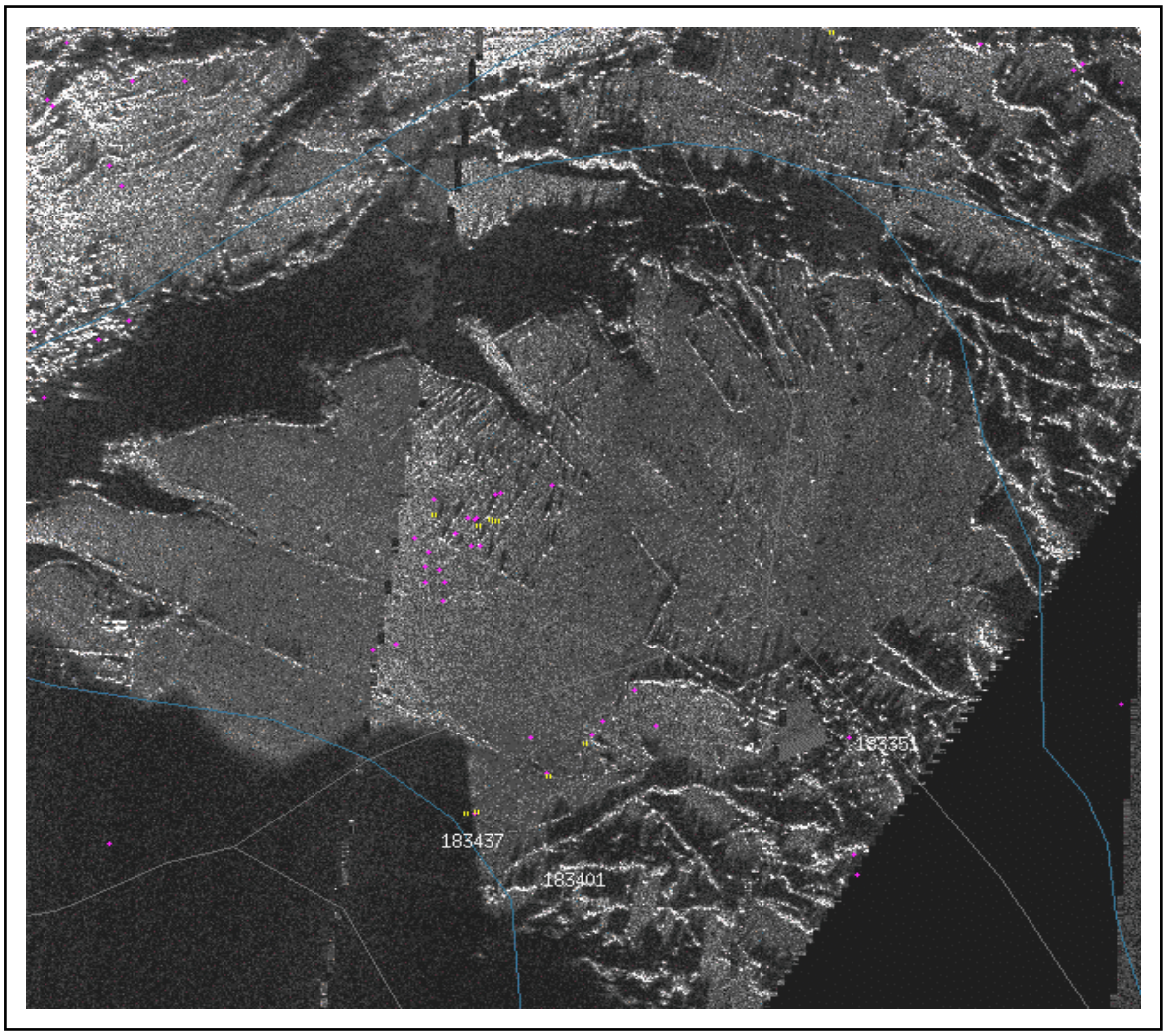

Figure II-3. SAR Mosaic

(5) E-8C Radar Electronic Protection (EP). The E-8C is designed with a highly robust EP capability. See AFTTP 3-1.30 for more details.

(6) Operator Workstations (OWS). The JSTARS aircraft mission crew members can access databases to provide amplifying information on friendly and enemy order of battle (OB), receive and send free-text messages, and conduct crew coordination. Mission crews perform radar data manipulation to include: construct SAR mosaics, track targets, perform target position predictions, and perform history playback of MTI activity.

Note. The CGS shares this same functionality.

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(7) History Playback. History playback is the capability to replay MTI data, overlay successive MTI frames, and fast forward data (similar to video cassette recorder) (see Figure II-4). This exploitation manipulation tool is key in detecting target

start points, determining patterns of movement, routes, and/or end points. History playback can also cue potential locations for SAR/FTI imagery. History playback provides analytic flexibility for reviewing and assessing stored MTI and SAR data.

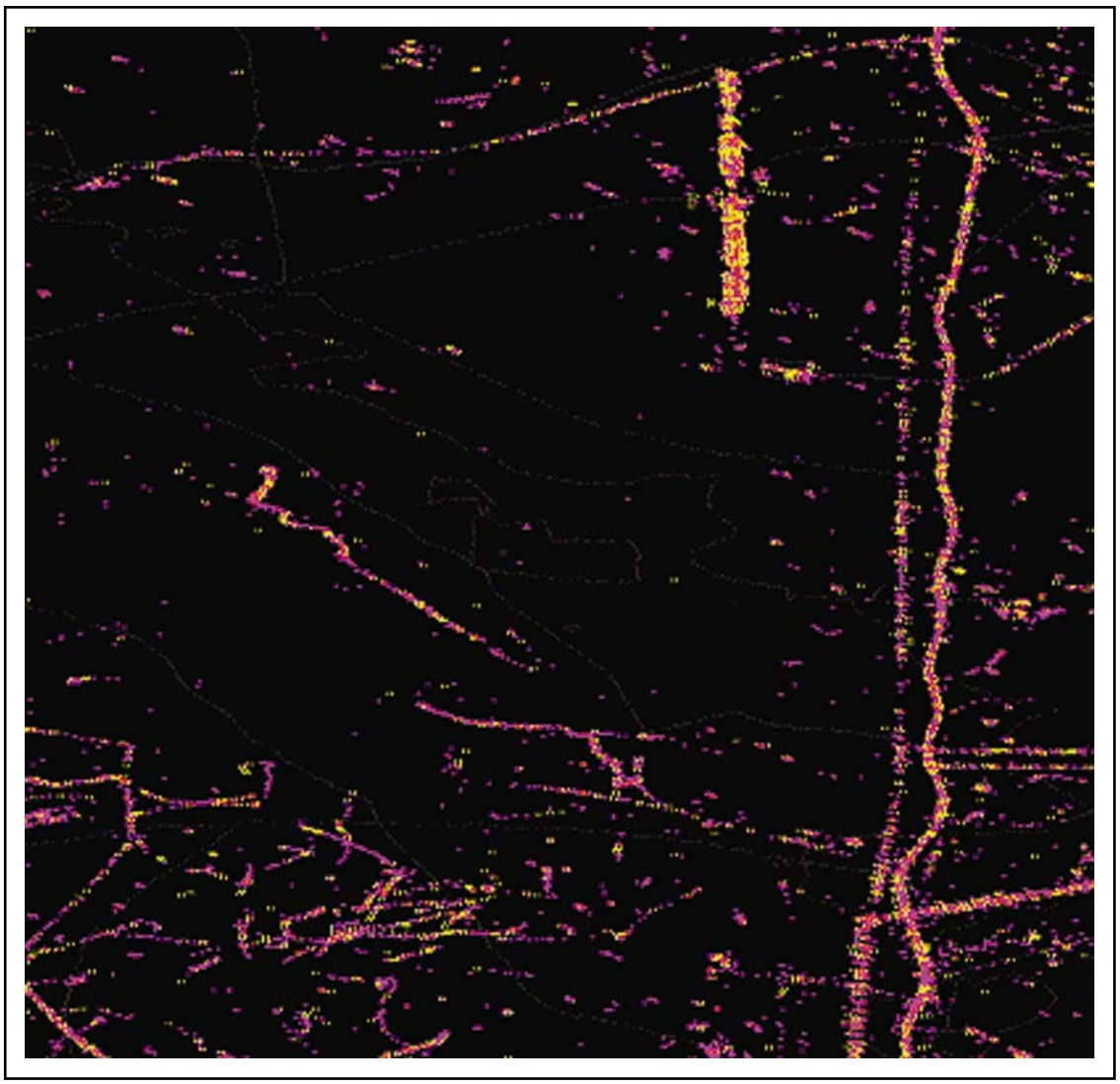

Figure II-4. History Playback Time Compression

(8) Computerized Map Database. The E-8C, CGS, and JSWS systems have a computerized map database of major cartographic (geographic and man-made features) and hypsographic (elevation related) features. Figure II-5 illustrates cartographic and hypsographic data overlaid on a joint operations graphic (JOG). This database also provides the capability to display a variety of graphic underlays on which to display MTI data/SAR imagery. Examples are global navigation chart (GNC), jet navigation chart (JNC), operational navigation chart (ONC), tactical pilotage chart (TPC), JOG, tactical land map (TLM), and digitized terrain data. These underlays add contextual information to enhance radar scope interpretation. Target locations can be passed in many datum formats (UTM or latitude/longitude). E-8C Block 20 aircraft can display imagery data.

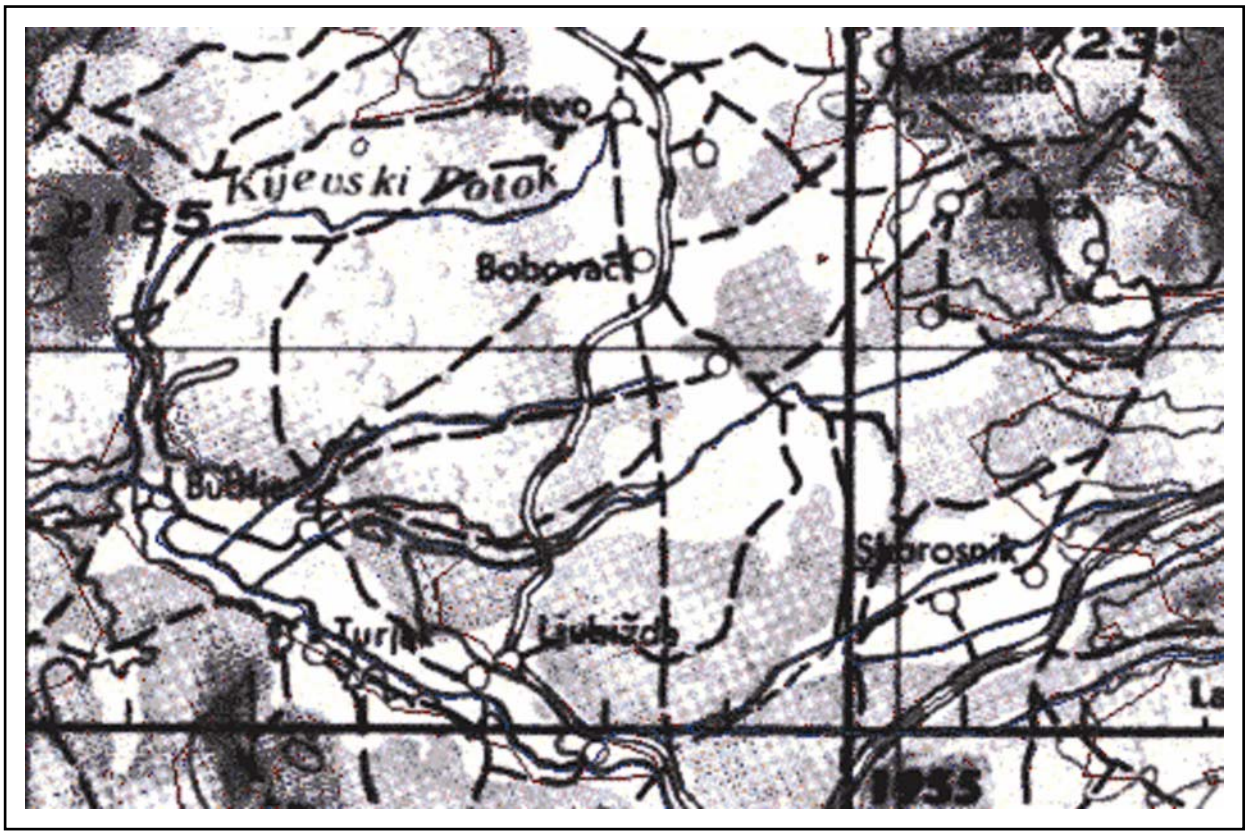

Figure II-5. Computerized Map Database

b. Communications Subsystem. The E-8C communications system provides the mission and flight crew with both internal and external communications to support the mission. It includes 12 AN/ARC-225 UHF, three AN/ARC-186 VHF, two AN/ARC-190 HF radios, and two multi-mission UHF satellite transceiver (MUST) radios, joint tactical information distribution system (JTIDS) and SCDL systems. All radios and data links have secure capability. Crew members can access up to five external radios while monitoring five internal nets for crew coordination. See Table II-5 for a communications summary.

Table II-5. E-8C Communications Subsystem

Communication Equipment	*Crypto*	*Quantity*	*Frequency*
Have Quick II AN/ARC 225	KY-58	12[1]	225.000 to 399.975 MHz
VHF (AM/FM) AN/ARC 186	KY-58	3	AM 108.000 to 151.975 MHz FM 30.000 to 87.975 MHz
HF AN/ARC 190	ANDVT	2	2.000 to 29.999 MHz
Multi-mission UHF satellite transceiver (MUST)	KY-58/KG-84[2]	2	Line of sight (LOS)
VHF/FM AN/ARC-201D single channel ground-air radio system (SINCGARS)	Embedded	1[3]	FM 30.000 to 87.975 MHz
Personal Computer Interim Data Modem (PC-IDM)		1[3,4]	
Joint Tactical Information Distribution System JTIDS (Class II)	Secure data unit KGV-8A	2[5]	
SCDL (air data terminal)	Secure data unit KGV-8A	1[6]	
Commander's tactical terminal (CTT3)/Hybrid-receive (HR)	Embedded	2[7]	
Future Growth: Demand Assigned Multiple Access (DAMA) compliant satellite communications (SATCOM) radios			

Notes:

[1] Only 11 UHF radios are available for use by the mission crew at any given time. UHF #7 is configured for stand-alone operation and reserved for flight deck use during emergencies.

[2] KY-58 is used for SATCOM voice; KG-84 is used for SATCOM data.

[3] Currently only a minimal number of aircraft are configured with SINCGARS and PC-IDM but the entire fleet will eventually have this capability.

[4] The current E-8C IDM protocol implementation allows JSTARS to exchange data only with Apache Longbows.

[5] Two Class 2 bilingual JTIDS terminals are available. Only one is operational at any time and it is secured using KGV-8. JTIDS provides tactical digital information link—joint (TADIL-J) message generation and processing, and TADIL-J to interim JTIDS message specification (IJMS) message translation. TADIL-J allows the E-8C to communicate digitally with JTIDS-equipped aircraft, ground and surface participants, and ISR platforms.

[6] SCDL is a JSTARS unique Ku-band data link that provides secure, jam-resistant air-to-ground and ground-to-air digital data transmission capabilities. Its primary function is to provide near real-time surveillance data to the CGS.

[7] These can receive the tactical information broadcast system (TIBS), tactical related applications (TRAP) data dissemination system (TDDS), and tactical digital information exchange system—broadcast (TADIX-B). Tactical reconnaissance information exchange system (TRIXS) data is not currently processed. Although the JSTARS CTT is capable of receiving TRIXS information, currently the computer architecture does not interpret TRIXS data.

3. CGS Capabilities/Limitations

a. CGS Description. The CGS provides brigade, division, corps, MEF/MAGTF and Joint Task Force (JTF) commanders a means to receive, manipulate, and display MTI, signals intelligence (SIGINT), and imagery intelligence (IMINT) sensor products. Analyzed and sanitized SIGINT (via the CGS commander's tactical terminal three channel [CTT3]) and imagery products (via Secondary Imagery Dissemination System [SIDS]) are provided while E-8C MTI and SAR images are displayed as NRT information. The capability to correlate pre-processed and analyzed SIGINT and IMINT with NRT JSTARS aircraft information makes the CGS a powerful tool to support and focus the battle. The CGS system consists of a crew of six, one mission vehicle with shelter, one support vehicle, and two high mobility trailers (HMT), each with a 10-kilowatt tactical quiet generator. The Army CGS mission shelter is mounted on a M1113 heavy HMMWV and the support vehicle is a M1097 HMMWV without a shelter. TheUSMC uses M1097A2 HMMWVs. The mission vehicle contains a lightweight multipurpose shelter (LMS) housing all essential equipment except the SCDL. This vehicle tows one generator and transports a crew of two (see Figure II-6). The CGS mission support vehicle consists of a SCDL ground data terminal (GDT), a communications system, and an operations system with two operator workstations. It tows one generator and transports a crew of four (see Table II-6). CGSs will normally be placed at brigade, division, corps, EAC, and MEF levels. During mission planning, each component's highest supported echelon's G2 coordinates with each of its subordinate units and designates which CGS will have direct uplink authority to the E-8C. For example, the CGS supporting the G2 at the division or corps main will become the primary CGS at that echelon. Based on the tactical situation or information needs of the command, this primary CGS can then delegate which CGS within the command has the authority to request radar products directly from the E-8C.

Figure II-6. Common Ground Station

Table II-6. CGS Capabilities

Prime Mover	***Communications***	***Capabilities***
1 HMMWV with LMS 1 Mission Support HMMWV 2 Trailer-Mounted 10-kw Generators	2 x AN/VRC-92A SINCGARS (VHF) (1 voice /1 digital) 1 x AN/VRC 83 (UHF) 1 x KY-68 mobile subscriber equipment (MSE) 1 x joint tactical terminal (JTT) 1 x SATCOM radio (AN/PCS-5) 2 x STU-IIIs and fax Interface with All-Source Analysis System (ASAS), Trojan, UAV, SIDS, Interim Data Modem (IDM) FATDS and Advanced Field Artillery Tactical Data System (AFATDS) Communicate with Apache Longbow and Blackhawk via IDM Communicate using Secret Internet Protocol Router Network (SIPRNET)	MSE & SINCGARS can use digital AFATDS messages. Receives MTI and SAR imagery from E-8C Aircraft Receives UAV electro-optical and infrared imagery Operates while moving RWS can receive secondary imagery dissemination Pulls imagery product library data (historical imagery) Sends and receives target data from Apache Longbow ASAS and Marine intelligence analysis system (IAS)/ intelligence operations server (IOS) messages

b. Connectivity. CGS has connectivity to a host of ISR platforms, C4I nodes, and targeting systems. ISR platforms include the E-8C, U-2R, GUARDRAIL Common Sensor, Airborne Reconnaissance Low, and Apache Longbow. CGS can receive unmanned aerial vehicle (UAV) information from Hunter Ground Control Station (GCS), tactical unmanned aerial vehicle (TUAV) GCS, and Predator ground systems.

C4I system connectivity includes All-Source Analysis System/Analysis and Control Element (ASAS/ACE) and Army Battle Command System (ABCS) on ABCS LAN and intelligence analysis system(IAS)/intelligence operations server (IOS). GCS has direct connectivity to Advanced Field Artillery Tactical Data System (AFATDS)/TACFIRE system, either by LAN direct connection or digital single channel ground-air radio system (SINCGARS). CGS can also access any imagery database with Imagery Product Library (IPL) software via LAN, wide-area network (WAN), SIPRNET, Trojan SPIRIT (Special Purpose Intelligence Remote Integrated Terminal) or mobile subscriber equipment (MSE).

c. Voice Communications.

(1) Secure, jam-resistant, communications are provided by the AN/VRC-83 UHF and AN/VRC-92F Advanced Lightweight SINCGARS Improvement Program (ASIP) VHF/FM SINCGARS radios. The AN/VRC-83 is the primary communications means between ground components and the JSTARS aircraft. The AN/VRC-92F (SINCGARS) radio or the AN/PSC-5 (EMUT/SPITFIRE) can be used as alternate means to communicate with the JSTARS aircraft line of sight (LOS).

(2) The CGS includes one MSE secure tactical telephone (KY-68) and two secure telephone units/equipment (STU-III/STE).

d. Datalinks. The CGS can engage in multiple data links with the E-8C, airborne reconnaissance low (ARL), Apache Longbow, U-2, AFATDS, and via satellite communications (SATCOM). To receive E-8C imagery, the CGS uses either SCDL or SATCOM relay. Both methods have advantages and disadvantages.

(1) SCDL. The primary means to receive JSTARS imagery from the E-8C is through SCDL. To receive direct E-8C SCDL data, the CGS and E-8C must be able to maintain line of sight (LOS). An unlimited number of CGSs with LOS to the E-8C can receive data broadcast from the aircraft.

(a) SCDL characteristics:

- SCDL is comprised of an air data terminal (ADT) on board the E-8C and a GDT in ground stations.
- A maximum of 15 CGSs can be in a two-way LOS SCDL link with the E-8C.
- An unlimited number of CGSs can be in receive-only mode.

(b) SCDL Advantages:

- Highest data transmission rate of both MTI and SAR.
- Two-way secure, digital communications between CGS and E-8C.
- Facilitates retransmission of E-8C data from a LOS CGS to other CGS not in LOS when both ground stations are in SATCOM relay mode.
- Jam resistant, secure data link.
- Minimum radar data latency.

(c) SCDL Disadvantages:

- Requires LOS to the E-8C.

- Limited use while the CGS is moving.

(2) UHF SATCOM Relay (SCDL Echo). A CGS within SCDL LOS of the E-8C and designated as primary/main CGS, retransmits E-8C data, via narrow band satellite, to other CGSs designated as secondary stations. This mode of operation is used when a CGS does not have LOS with the aircraft. A CGS in the SATCOM relay configuration can communicate with a (primary) CGS re-transmitting the E-8C data. This enables the moving (secondary) CGS to submit RSRs to the primary CGS. The primary CGS can also filter SARs on the re-transmission to prevent data latency of the receiving CGS operating in the SATCOM relay modes. In nearly every case, it is desirable to filter out SAR imagery to maintain NRT reception of MTI data. The tactical situation will determine if the data should be filtered.

(a) SATCOM Advantages:

- Does not require LOS to the aircraft.
- Can receive data while on the move. The non-driver operator in the mission vehicle can maintain situational awareness and pass significant information to the supported commander via voice links.

(b) SATCOM disadvantages:

- Lower data rate.
- Does not allow digital communication between the CGS in SATCOM relay mode and the aircraft.
- Increased data latency.
- Transmitting SAR imagery significantly increases latency of all E-8C data.
- Increased planning and coordination between echelons is required.

(c) BLOS data link (SATCOM). Upgraded CGS V2 has the capability to receive data BLOS from the E-8C via CTT3/JTT SATCOM radio. Upgraded CGS are being fielded.

e. CGS to CGS Connectivity. This ability assists in command and control of CGSs within a division or corps and allows CGS crews to hand off targets. There are three ways a CGS can transmit a free text message to another CGS:

(1) Configured in multi-CGS mode.

(2) TCP-IP via LAN.

(3) Through the E-8C aircraft via SCDL.

f. LAN Datalink. CGS can transmit data to other CGSs through Trojan SPIRIT and SIPRNET.

g. Operation without E-8C. When E-8C radar data is not available, the CGSs will continue to provide support by correlating and reporting on other available sensor data received and by exploiting previously recorded E-8C data.

h. Sensor Feeds and Cross Cueing Capabilities. Select CGSs can cross cue data received from a variety of other theater platforms and sensors.

(1) U-2 and ARL. Korean- and Okinawan-based CGSs receive enhanced moving target indicator (EMTI) from the U-2S. All CGS receive ARL MTI. The ARL is an Army airborne COMINT/IMINT collection and processing system.

(2) Secondary Imagery Dissemination System (SIDS). CGS can exchange secondary imagery in national imagery transmission format (NITF) with any joint interoperability test command (JITC) certified imagery system. This includes, but is not limited to, the Army tactical exploitation system (TES), Army mobile integrated tactical terminal (MITT), Army modern imagery exploitation system (MIES), forward area support terminal (FAST), Air Force contingency airborne reconnaissance system (CARS), Marine tactical exploitation group (TEG), and TES-Navy (TES-N). CGS can externally access the imagery database connected to a secret collateral LAN that runs IPL server software.

(3) SIGINT. The CGS's CTT3 allows the receipt of three of the four intelligence broadcasts: TRIXS, TIBS, TDDS, and TADIXS-B (Table II-5). The CGS can also receive U-2R EMTI via the TRIXS link. JTT is a follow-on system to the CTT3 that will allow the CGS to receive eight intelligence broadcasts simultaneously and provide two additional UHF broadcast frequencies.

(4) AFATDS. This interface provides for direct digital connectivity between the CGSs assigned to fire support nodes and AFATDS nets through digital FM or landline communications. The AFATDS can connect to the CGS by direct-wire connection, the tactical operations center (TOC) LAN, or SINCGARS radio. The AFATDS workstation can also be placed in close proximity to the CGS RWS where operators can pass information verbally or visually.

(a) The AFATDS can transmit the following message types to the CGS:

- Artillery target intelligence: target criteria (ATI:TCRIT).
- SYS:PTM.

(b) If electronically connected, the CGS can digitally transmit the following message types to AFATDS:

- Artillery target intelligence: coordination report (ATI:CDR).
- Fire mission: call for fire (FM:CFF).
- Support datum.
- System plain text message (SYS:PTM).

(5) All-Source Analysis System (ASAS). The ASAS is the intelligence and electronic processing system for the Army; the Marine Corps has a similar capability with the IAS. The CGS and/or JSWS are major information providers for these systems at all intelligence centers throughout both Services. CGS provides the current picture of the battlefield, derived from E-8C, UAV, and SIGINT. The CGS also provides imagery and U.S. message text format (USMTF) messages that help satisfy the commander's priority intelligence requirements (PIR) and critical information requirements (CCIR). Connectivity to these systems is provided through MSE, LAN, or direct connection.

i. Interim Data Modem (IDM). The CGS is equipped with an IDM to transmit freeze frame MTI data to Apache Longbow aircraft via SINCGARS radio and receive Apache Longbow fire control radar data.

4. JSWS Capabilities/Limitations

a. JSWS System Description. The JSWS is a modular, portable system with the same software, hardware, capability, and functionality as a CGS equipped with comparable communications equipment. JSWS supports all CGS sensor interfaces and communications links; however, it does not typically have a LOS SCDL antenna, but can be configured for one. The JSWS is transported in four self-contained ruggedized transit cases along with its corresponding communications equipment. It shares the same hardware and software as the CGS and is suitable for field environments, meeting high and low temperature requirements (see Figure II-7). JSWS can provide BLOS, NRT intelligence, and situational awareness to respond to dynamic targeting.

b. Missions. Currently, JSWS provides ground situational awareness that can be cross cued with other sensor feeds to support target detection/tracking in support of the JFACC via display of enemy scheme of maneuver, friendly force disposition, increased situational awareness, and attack support. Inputs are used in the JAOC to plan and adjust the theater air plan or in NRT to directly support strike operations and additional collection requests.

c. Communication/Data Capabilities. The JSWS is capable of receiving ground moving target indicator (GMTI), SAR, and free text messages (FTM) from the E-8C and other data from other sensors. JSWS operators communicate with the E-8C crew via FTM, which is similar to e-mail. Electronic maps (EMAPs) are loaded via CD-ROM or by 4-mm tape. The operator can use graphic overlays to draw boxes for named areas of interest (NAI) or target areas of interest (TAI). MTI, FTI SAR, and target tracking with the JSWS connected to a classified network can provide distributed mission training (DMT), simulated evaluator inputs, and fusion capability. JSWS could be connected to SIPRNET allowing external analysis of the MTI and SAR data. Data files from multiple missions may be saved and reviewed at a later date.

Figure II-7. Joint Services Workstation

d. Data Coordination. JSWS MTI and SARs may be passed via classified network to be analyzed and exploited. The results of the analyzed data can be sent back over the JSWS network, providing the crew with valuable information. This type of coordination allows for distributed exploitation both in and out of theater.

e. Historical Analysis. The JSWS gives the JAOC a comprehensive picture in NRT and allows post mission historical analysis of JSTARS data. The JSWS—

(1) Allows a JAOC to monitor and communicate with the JSTARS aircraft for potential re-tasking and changes in reporting.

(2) Can receive MTI and SAR imagery from the E-8C or imagery from U-2, ARL, UAV and other sensors, if additional equipment is available. For example, to receive UAV data, the system must be collocated within 100 feet of the UAV ground system.

(3) Can correlate multiple sensors data to assist in target identification.

(4) Allows multiple workstations to be added for real time or post mission analysis.

f. Configurations.

(1) Normal connection to the E-8C platform is through SATCOM, but the JSWS can be hardware configured to receive SCDL. JSWS is not fielded with a GDT. Both the JSWS and CGS can operate simultaneously for operators to request radar jobs.

(2) AFATDS can also use the SINCGARS radio enabling JSWS to receive data from artillery firing units. GUARDRAIL common sensor uses the CTT3 TRIXS. Rivet Joint can link data to the JSWS, either by SATCOM or CTT3. To get imagery from the Predator UAV, JSWS must be connected via wireline to the UAV shelter. CTT3 can pull broadcast from all sources.

(3) JSWS receives U-2 data from a LOS radio on board the aircraft to the CTT3, if the CTT3 is equipped with an omni-directional antenna, or through TRIXS. ARL MTI data can be passed to the JSWS if the JSWS has the LOS LST-5 radio. The Apache Longbow could use the IDM or the SINCGARS radio to get data and messages to and from the JSWS. Targeting information is passed via FTM to task the Apache Longbow for launch and to pass essential data.

(4) The JSWS must be connected to a secure LAN or have direct LAN connectivity to pass information to ASAS. Once connected to the SIPRNET, the JSWS can be used as a joint tool between operations and intelligence sections. A SIPRNET connection provides the following:

(a) Access to Broadsword database (a single database that connects all IPL imagery servers, the MTIX/MTES server, intelligence data warehouse, etc).

(b) Access to SENSOR WEB (on line NRT broadcast intelligence feed) in the event the CTT3 goes down.

(c) Streaming MTI (long term goal) over the network.

(d) FSR online technical support. This is a Unix provided capability for remote logins whereby technical representatives could log into the JSWS and perform software maintenance.

(e) Access to all source intelligence and operations information via theater and unit classified home pages/web sites.

g. System Support. Support for JSWS will depend on the ownership of the system. Theater organizations are responsible for manning, maintenance, and administration of their own systems. Air Force JSWS deployed into a theater will be maintained and administrated by contract. Army systems will be operated and maintained by Service personnel. Field service representatives may maintain Army systems as an exception.

h. Connectivity. JSWS deployed into a theater will typically be set up in a stand-alone configuration (two-way communication with the E-8C). Each stand-alone JSWS can be networked to support an additional six local workstations.

(1) Voice. The JSWS has no organic voice capability. If voice communications are required with the E-8C, operators must use an available radio.

(2) BLOS Datalink (SATCOM). The RT-1273AG (MUST), CTT3 or JTT radios are the Air Force primary means of SATCOM connectivity with the E-8C. The Army/Marine Corps primary SATCOM system for the JSWS is the AN/USC-55 CTT3 and will be replaced with the JTT radio.

(3) JSWS—JSWS/CGS Connectivity. JSWS in the SATCOM net can communicate directly via FTM with any other JSWS. JSWS can only communicate via FTM with a CGS by having the E-8C mission crew act as a relay.

i. LOS Datalink. The JSWS can also maintain connectivity with the E-8C using a SCDL GDT. The GDT is not included in the basic JSWS equipment set.

j. LAN Datalink. The JSWS can be deployed as a stand-alone system, or multiple workstations can connect via LAN or WAN. When deployed in a networked configuration, the network may contain redundant sensor and communications interfaces. In a LAN or WAN configuration, JSTARS sensor data, UAV sensor data, and EMAPs are all stored within the JSWS server, where they can be accessed by all connected workstations. SIPRNET allows the JSWS to receive demand-driven direct digital dissemination (5D) and IPL imagery and perform limited secondary imagery dissemination (SID). It also provides access to INTEL-LINK and General Dynamics on-line troubleshooting service. Because the system meets compliance standards, CD-ROM based EMAPs (such as ARC digitized raster graphics [ADRG] and digital terrain elevation data [DTED]) from local in-theater source can be loaded on the system to improve map coverage (see Table II-7).

Table II-7. Nominal JSWS Interfaces

Supported Sensors	*Supported Interfaces*	*Supported Data Sources*
JSTARS E-8	JSTARS GDT	MTI
GUARDRAIL	CTT3	FTI
Army Aviation	IDM	SAR
Rivet Joint	MSE	EO/IR video imagery
Predator UAV	RT-1273AG (MUST)	SIGINT
ARL	SIPRNET	ELINT
U-2R	Trojan SPIRIT	5D imagery
FA-18 SHARP		IPL
P-3 AIP		SID

Chapter III

Operational Considerations

1. Overview

JSTARS supports JFC objectives under the direction of the JFACC. The JFC's campaign plan may require JSTARS to support multiple component commanders simultaneously. JSTARS operates within the context of the intelligence and joint targeting process throughout the spectrum of conflict. The JFC determines the concept of the operation and establishes mission priorities based on overall campaign objectives. Component commanders may further delegate mission-tasking authority to subordinate commanders and forward requirements through the intelligence and targeting process.

2. Intelligence Process

JSTARS operates as a fully integrated ISR asset in support of the collection management processes, in accordance with JP 2-01, *Joint intelligence Support to Military Operations*. The phases of the intelligence process are planning and direction, collection, processing and exploitation, production, dissemination and integration, and evaluation.

a. Planning and Direction. Intelligence requirements provide direction for current and future intelligence operations. This is the phase in which requirements are prioritized by the collection requirements manager, typically via a collection management board. The JFC PIRs and the component commanders' requirements are consolidated and a prioritized list of collection requirements is established for the theater/AO.

b. Collection. This phase involves tasking appropriate collection assets and/or resources; it consists of two processes: the collection requirements management (CRM) and the collection operations management (COM) processes.

(1) The CRM process defines what intelligence systems must collect. During this process, the ISR collection manager determines collection requirements for the E-8C. This planning normally occurs 48 to 72 hours before ATO execution. These collection requirements along with offensive air operations support requirements help determine E-8C orbit location and station times. This process results in a prioritized collection task list for the JSTARS platform. The task list includes NAI (such as location, time, and duration). The NAI locations are the primary drivers for the E-8C search areas (i.e. GRCA or sector search) (see Figure III-1).

#	NAI	BE#	LAT	LONG	RAD	TIME	CRITERIA	PIR	REPT FREQ	EXPLTR	RQSTR	AMPN	REM	XCUE	SCRN
1	JFC-1	0123KA	1234N	05678W	2KM	1900-0100	1+ MTI	CINC 1.1			CCJ2	Report any sgnfcnt trp/veh mvmt	Poss enemy ldrshp mtg loc		
2	JFSOCC-1						5+ MTI	JFLCC 2.3			TF SMITH				
3	JFLCC-1						5+ MTI				JFLCC				

Figure III-1. Sample JSTARS Collection List

(2) The COM process develops details to specify how the collection occurs. Units should not specifically request an JSTARS aircraft. Instead, they should submit their intelligence requirements and allow the collection managers to determine the best assets to meet those requirements. At this point, the collection manager, JSTARS liaison officers (LNOs), and crew begin to plan the details of the mission and predict NAI they can observe to meet the collection list requirements. Additionally, ISR assets are identified for cross cueing. This is an iterative process and further encompasses execution of the JSTARS mission (including dynamic taskings), exploitation, and evaluation of the mission. During execution, E-8C surveillance primarily focuses on detection of ground movement that can indicate enemy ground activity, threats, and initiatives meeting established requirements. It is important to note the ground station operators at the components are normally the primary monitors of the NAI on the collection list.

c. Processing and Exploitation. During this phase, collected data is exploited and transformed into a product that can be used to analyze and produce intelligence. Ground station operators monitor NAI in support of their respective component operations. Intelligence analysts at the component or theater intelligence centers use JSTARS aircraft data during mission execution and post-mission to develop intelligence products in response to requirements (see Appendix A).

d. Production. This phase involves integrating, evaluating, analyzing, and interpreting information from single or multiple sources; it is sometimes indistinguishable with the processing phase. The E-8C mission crews do not produce intelligence products. The 93rd Air Control Wing intelligence analysts produce post-mission initial photointerpretation reports (IPIR) and mission reports (MISREPs). Ground station operators may produce intelligence products for their component commanders in response to their respective PIR.

e. Dissemination and Integration. This phase consists of disseminating intelligence products to the requestor. Example of JSTARS products can be found on component intelligence webpages, in IPLs, and within daily intelligence summaries (DISUMs).

f. Evaluate. Intelligence personnel at all levels evaluate how well the intelligence phases worked. This evaluation helps focus the next iteration of the intelligence process.

3. Joint Targeting Cycle

JSTARS operates within the context of the six-phase joint targeting cycle in accordance with JP 3-60, *Joint Doctrine for Targeting* (the corresponding phase of the Army/Marine targeting cycle is shown in parentheses).

a. Phase 1: Commander's Objectives, Guidance, and Intent (Decide).

(1) JSTARS planners use the JFACC's guidance and intent to prioritize support requirements. JSTARS planners must understand the relative priority of support for each component commander. In order for the E-8C crew to operate within the context of the JFC and supported commander's intent, it is essential that they have clearly articulated priorities and weights of effort. The JFACC coordinates with the JFC and component commanders' staffs when establishing the E-8C's mission priorities, and integrates all component commanders' request for JSTARS support. As the supported commander for airborne C2 and ISR, the JFACC controls the E-8C and determines the number of aircraft and orbits needed to support the JFC's and components' requirements.

(2) Components should base all requests for E-8C support on achieving specific desired effects in accordance with JFC objectives. Requests based on desired effecs streamline the JSTARS planning process and enable the E-8C crew to execute pre-planned and dynamic requests for JSTARS support based on published priorities.

(3) CGS and JSWS, at each component, operate within the context of their respective component commander's guidance and intent.

(4) The E-8C is tasked through the ATO, and control is exercised through the JAOC. The ATO is the “OPORD” that the JAOC uses to direct the E-8C where and when to fly.

b. Phase 2: Target Development, Validation, Nomination, Prioritization (Detect). Target development translates commanders' objectives and guidance into a target list. The E-8C supports target development by executing its collection deck and providing ad hoc collection for fleeting targets. Specifically, JSTARS assists in validating targets and answering collection and exploitation requirements. As the situation or conflict progresses, JSTARS helps the targeting analyst ensure that targets being considered are still consistent with the JFC's intent. The system helps detect a change in the enemy's course of action, which may require a change in the targeting effort. Target development occurs at the ground stations of each supported commander. Secondary means to support target development for supported commanders is voice reporting with the E-8C mission crew. See Chapter IV, paragraph 2c(2) for more information on voice reporting.

c. Phase 3: Capabilities and Analysis (Deliver).

(1) This phase of the joint targeting cycle involves the estimative analysis of the most likely outcome resulting from the use of lethal or non-lethal capabilities to achieve effects against specific targets. It is facilitated by ISR and target acquisition (TA). This analysis aids the JFC's decision regarding which course of action (COA) or COA elements to employ in operations.

(2) JSTARS is a non-lethal capability that can stagnate and/or deter a mass force from forming and surprising friendly forces. Recent conflicts have proven that when

enemy forces mass and move, they can be detected, tracked, and engaged using the JSTARS aircraft.

d. Phase 4: Commander's Decision and Force Assignment (Deliver).

(1) COAs derived from joint intelligence preparation of the battlespace (JIPB) and ISR & TA are complete and ready for the JFC's review and decision making when they contain the objective-driven results of target development with all of the associated recommendations of forces to be applied. This occurs after the target nomination lists and associated forces are vetted through the appropriate coordinating bodies representing the joint force components. This coordination ensures synergistic application of effort to minimize the likelihood of operational conflicts. Four fundamental aspects for successful planning and employment of the E-8C weapon system apply:

(a) The E-8C is a theater-wide battle management platform and normally an integral part of the theater air control system (TACS) under JFACC control.

(b) The E-8C is capable of performing C2 in conjunction with ISR tasks.

(c) The E-8C and the ground stations receiving JSTARS information form a complementary system and must be employed as such.

(d) All components should base requests for E-8C support/coverage on desired effects.

(2) In general, C2 elements facilitate coordination, deconfliction, and synchronization to ensure timely employment of assets against targets, increase mutual support, preclude duplication of effort and over-targeting, reduce potential for fratricide, and ensure continuing operations during periods of degraded communications. JSTARS C2 functions are generally executed with offensive air operations such as counterair (offensive counter air [OCA] missions—such as OCA attack operations and suppression of enemy air defenses [SEAD]), counterland (AI and CAS), special operations, combat search and recovery, and associated special missions.

(3) The JAOC's Combat Plans Division and JSTARS liaison personnel determine E-8C on-station requirements and orbit locations. Additional instructions for the E-8C are published in the special instructions (SPINS) portion of the ATO. The guidance provides E-8C crews the flexibility to maximize aircraft employment real time and provide the best support/coverage to mission priorities. Dynamic real time requests from supported air, ground, and maritime commanders/units are communicated directly to the E-8C via the RSR and the E-8C crew responds to requests in accordance with tactics, techniques, and procedures (TTP) and ATO/SPINS guidelines. During mission execution, changes in tasking will be coordinated through the JAOC Combat Operations Division and approved in accordance with JFACC guidance.

e. Phase 5: Mission Planning and Force Execution (Deliver).

(1) Support to JFACC. The JFACC normally functions as the supported commander for counterair operations, strategic attack operations, theater airborne reconnaissance and surveillance, and the overall AI effort. The mission crew uses the ATO to assist in conducting offensive air operations under direction of the JAOC. The following are missions the E-8C is expected to support, which include support of pre-planned strikes or time sensitive targets.

(a) AI. In an AI scenario, the E-8C mission crew will be provided with a list of specific preplanned targets and AI assets scheduled against them. Inbound aircraft will receive the air picture from airborne early warning (AEW)/ground controlled intercept (GCI). Interdiction aircraft will monitor AEW/GCI/E-8C frequencies for threat warnings and targeting information. Threat warning may be simulcast on multiple frequencies. Aircraft may transmit in-flight reports to the E-8C after attack.

(b) Airborne Alert Interdiction (XINT). JSTARS can also develop dynamic targets for interdiction aircraft on airborne alert. Planners must develop detailed procedures that include redundant connectivity (voice/data), an XINT communications plan with standard communication formats, and mission priorities for threat warning, mission support, and battle management. Refer to AFTTP 3-1.30 for more details on communication plans.

(c) Personnel Recovery (PR). JSTARS can assist CSAR task force (CSARTF) elements. The E-8C may perform AMC duties during joint combat search and rescue (JCSAR), but typically acts as a supporting aircraft. When tasked as a support asset to a JCSAR, the JSTARS aircraft will monitor the CSARTF package on the AMC/C2 frequency and any other briefed frequency (such as voice product network [VPN], air operations net, threat warning). Time critical information will be passed on the AMC frequency and non- time critical information will be passed on the C2 frequency. For further information on JCSAR, see JP 3-50.21, *Joint TTP for CSAR*.

(d) TMD and OCA Attack Operations. JSTARS can support missions to attack enemy theater missile infrastructure and mobile surface-to-air threats prior to launch. The E-8C also has a limited ability to detect rotating antennas. Through the use of history playback and cross-cued data from other sensor systems (such as Cobra Ball, Rivet Joint), the E-8C mission crew can track movement that is suspected to be a transporter/erector/launcher (TEL) and pass its location to a shooter. If the threat moves, the E-8C may be able to track the threat to a reload or hide site for follow-on targeting.

(2) Support to JFLCC. The JFLCC is the supported commander within the land AO. When directed by the JFC, the JFACC is the supporting commander for operations such as CAS and AI within the land AO.

(a) CAS. The air support operations center (ASOC) is the focal point for CAS. The E-8C may be tasked in a limited role as an airborne extension of the ASOC, to increase ASOC radio coverage, or to perform a specific CAS related function in an area. The JSTAR aircraft role in CAS is further limited to locating possible targets for various agencies (such as tactical air control [TACP], and forward air controller (airborne) [FAC [A]) due to a lack of on-board identification capability, lack of communications to the fire support element (FSE) and no direct access to the supported ground commander's priorities of CAS support. When supporting CAS operations, the E-8C will provide MTI and SAR data to the Army air ground system and/or the Marine air ground task force (MAGTF) via the CGS/JSWS. When supporting CAS, the E-8C may not be able to support other component commander requirements.

(b) Army Support. JSTARS support to Army targeting operations is primarily through E-8C data via the CGS or the JSWS. E-8C radar data simultaneously supports multiple echelons of Army commanders with MTI and SAR data. CGSs are organic to each corps and division, and are located down to brigade TOC

to provide direct intelligence information and fire control support to these echelons. Light divisions will receive five CGSs; all other divisions will receive six CGSs. Each corps is different and their active duty components may receive from two to eight CGSs. Interface is with the ASAS/IAS through secure digital land line and with AFATDS. This interface supports intelligence collection, battlefield visualization, and intelligence support to targeting (see Table III-1).

Table III-1. Army Communications/Information Interface for JSTARS

From	*To/Between*	*Via*
E-8C	CGS	SCDL Secure UHF/VHF voice
CGS	National and theater sensors/processors	CTT3 SATCOM Trojan SPIRIT
CGS	UAV GCS	Digital data link (fiber optic cable)
CGS	ASAS and AFATDS/TACFIRE	Digital data link Secure area communications Army common user system
CGS	ASOC, EAC, CTOC, DTOC	LAN/digital data link Secure area communications Army common user system Combat net radio
CGS	Maneuver brigade Aviation brigade Artillery brigade	LAN/digital data link Secure area communications system Combat net radio
CGS	CGS	Army common user system SATCOM Trojan SPIRIT Combat net radio LAN
CGS	Apache Longbow	VHF/IDM

(c) Marine Corps Support. CGS operators at the senior MAGTF combat operations center (COC) use processed radar data to assist the commander with battlefield management, targeting information, and other intelligence functions. The senior fire support coordination center (FSCC) within the MAGTF COC uses SAR and MTI data to assist coordination of fire assets against potential targets. During amphibious operations, the U.S. Navy provides support to embarked forces via the JSWS. JSWS provides the commander amphibious task force (CATF) and commander landing force (CLF) with NRT MTI for CAS and Naval surface gunnery. It provides situational awareness to the CLF during beachhead expansion or inland combat operations. When the MEF is phased ashore, their organic CGS provides support to the MEF commander.

- MEF CGS Targets. MEF targets include platoon-plus size mounted enemy formations that could interdict landing or combat operations, artillery batteries, and battalion-size battle positions.

- MEF JSTARS Employment. During amphibious operations, the U.S. Navy JSWS provides E-8C MTI/SAR and SIGINT directly to the ATF supporting

arms coordination center (SACC). In addition, a CGS may be loaded onto a landing craft or air transported by helicopter. This CGS will be used once the beachhead or port is secure. During inland combat operations, the CGS is located with MEF command elements intelligence operations center (IOC). The RWS is placed in the operations center. The CGS provides its own power.

- Interfaces. The CGS may directly interface with a Marine IAS, TEG for secondary imagery, or a UAV ground station (see Table III-2).

- CGS Products. The CGS can provide a hard or soft-copy image of all correlated sensor information available for mission planning, targeting, or battle management.

- MEF CGS Cues. The MEF staff may use the CGS information to cue the following point sensors: UAV, EP-3, Hawkeye, Marine, and Navy fixed and rotary wing air assets, the ground armored reconnaissance units, and FAC (air and ground).

Table III-2. Marine Corps Communication/Information Interfaces for JSTARS

From	*To/Between*	*Via*
E-8C	CGS	SCDL Secure UHF/VHF voice
E-8C	MAGTF C4I system	JTIDS (TADIL-J)
CGS	Theater sensor	CTT3
CGS	National sensor	CTT3
CGS	MAGTF C4I system	Digital data link
CGS	CGS	USMC common user system SATCOM Trojan SPIRIT Combat net radio LAN

(3) Support to JFMCC. JSTARS can provide NRT surveillance of littoral areas to the carrier battle groups (CVBGs), amphibious ready groups (ARGs), and amphibious forces when they enter assigned operating areas. Once naval assets are established in their assigned operating area, JSTARS can provide information for naval surface fire support, strike aviation, Tomahawk land attack missile (TLAM), and TMD operations. JSTARS enhances the CVBG commander's situational awareness, especially in the littoral regions, and allows the commander to maneuver the battle group in a more confident manner with respect to possible enemy land-based threats. Having additional knowledge gained from JSTARS regarding enemy troop and equipment activity allows for more accurate and timely planning and more precise reaction if force is required. JSTARS can provide significant information to the CATF and the CLF during the planning stage of an operation, as well as during mission execution. JSTARS can identify critical lines of communication, replenishment points, NRT maneuver, and enemy force size. Additionally, JSTARS information can assist the CATF in positioning forces relative to the coastline. The CLF can use JSTARS data to identify the least defended area of the beach for landing and plan the attack accordingly. The E-8C supports JSWS operators afloat in targeting in the same manner as JSWS in the other Services. Some large deck aircraft carriers configured with a full Naval Fires Network

(TES-N, Global Command and Control System-Maritime [GCCS-M] and Joint Service Imagery Processing System [JSIPS]) and a MUST radio and antenna have the capability to receive direct downlink of E-8C MTI and SAR images for processing and exploitation. If not configured with TES-N, deployed ships can receive E-8C SAR and MTI imagery through SIPRNET/Global Broadcast System (GBS) from a remote JSWS unit after it has been processed.

(4) Support to Joint Special Operations Task Force (JSOTF). SOF are organized, trained, and equipped specifically to accomplish nine principal missions: direct action, combatting terrorism, foreign internal defense, unconventional warfare, special reconnaissance, psychological operations, civil affairs, information operations, and counter proliferation of weapons of mass destruction.

(a) SOF JSWS Mission. During direct action, unconventional warfare, special reconnaissance, and counterproliferation of weapons of mass destruction, infiltration/exfiltration, hostage rescue, and CSAR, the JSWS provides the Joint Special Operations Task Force Commander (COMJSOTF) with NRT updates of the target area including disposition of enemy forces/facilities, location, strength, composition of forces, and nature of activity. The JSWS also supports development of new targets and rapid retargeting efforts.

(b) SOF JSWS employment. During SOF operations, if the JSWS is available and requested by U.S. Special Operations Command (USSOCOM), it will be employed with Special Operations Forces-Intelligence Vehicle-Migration (SOF-IV-M) at the JSOTF echelon.

(c) Interfaces. The JSWS may directly interface with Special Operations Command Research, Analysis and Threat Evaluation System (SOCRATES). The JSWS can provide hard copy or soft copy imagery of all correlated sensor information available for mission planning.

(5) Airborne Command Post Forced Entry (ACP-FE). The ACP-FE, made up of an airborne battle staff (ABS) (integrated ground and air battle staffs aboard the JSTARS aircraft), is designated primarily to provide dedicated, forward and redundant C2 for forced entry operations The ACP-FE serves primarily as an integrated, on-site C2 node capable of coordinating, controlling, and supporting force commanders during the most critical stages of forcible and early entry operations (en route, insertion, and initial phases of ground operations). Required ACP-FE support for the ABS includes intelligence feeds, fire support, joint airlift, CAS, and combat air patrol (CAP). The ACP-FE provides situational awareness to the corps commander prior to the assault (Phase II of FE operations) and provides the information needed for Go/No-Go decisions.

(a) ACP-FE Planning Considerations. The nature of the ACP-FE mission necessitates drastic changes to the standard E-8C manning composition to provide working space for approximately seven ABS positions. This mission is communications intensive for the JSTARS aircraft due to the unique dedicated and redundant communications requirements including a command net, operations/intelligence net, secure en route communications package, tactical air deception net, fire support net, and airlift coordination net. This mission also requires an orbit location to allow for MTI and SAR of the AO while accounting for surface-to-air threats and LOS communications requirements. The special requirements for manning, communications, and orbit location may prevent the JSTARS aircraft from executing

normal C2 and ISR taskings. In this instance a separate jet may be required to meet both C2 and ISR taskings.

f. Phase 6: Combat Assessment (Assess). The E-8C can perform limited Phase 1 BDA. For example, the E-8C can utilize both MTI and SAR modes of the radar to monitor a bridge for activity pre-strike, then compare activity post-strike for a limited BDA.

4. JSTARS and the TACS

JSTARS operations are an integral part of the USAF TACS. The TACS may provide tactical C2 of combat air force (CAF), coordinate air operations with other component commanders, and execute the JFC's plan. The E-8C may affect the employment of a significant number of other weapons systems in theater including Army, Navy, and Marine Corps aviation, artillery, and maneuver elements (see Figure III-2). For more information on the TACS, see AFTTP 3-1.26.

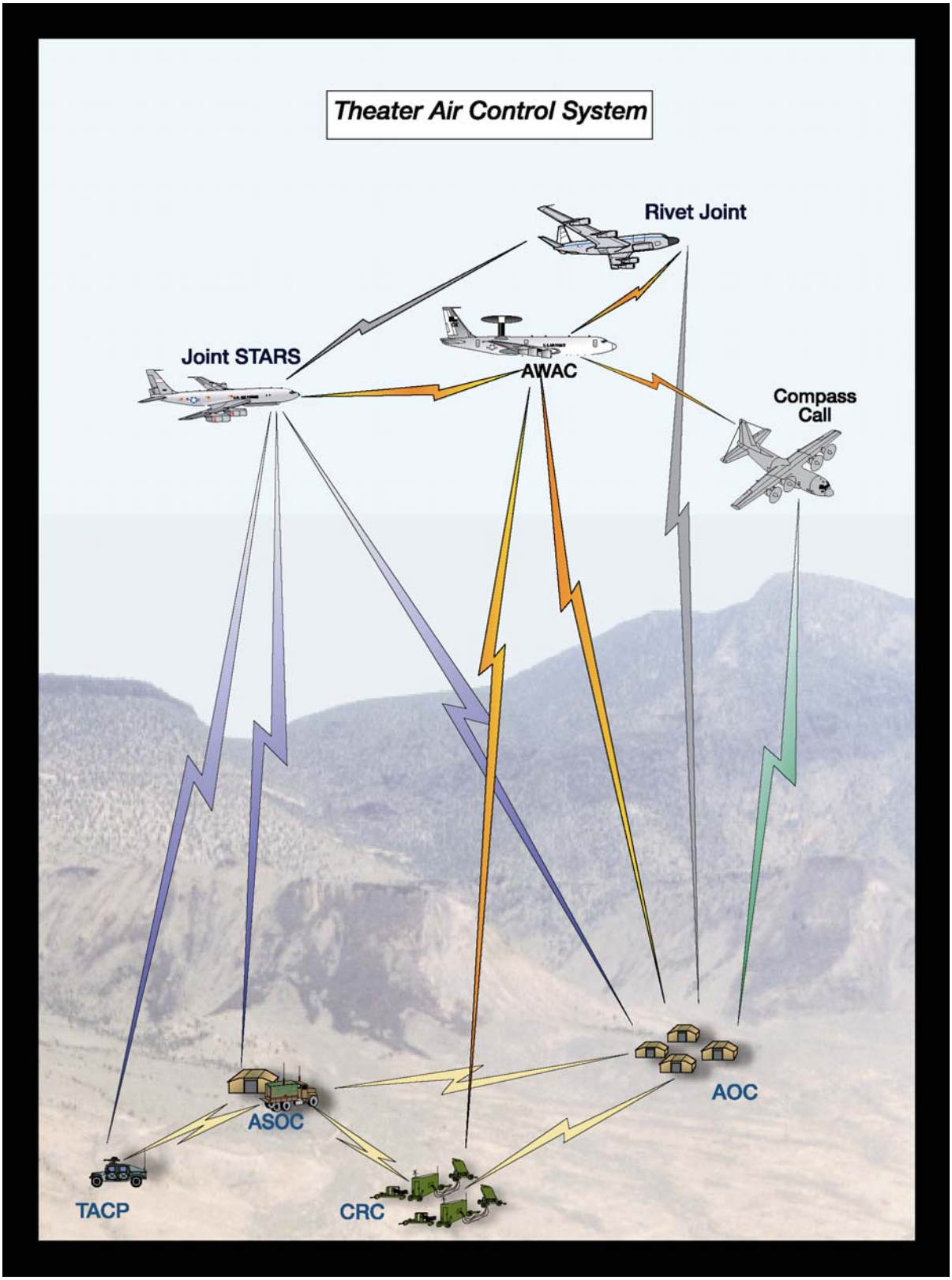

Figure III-2. Theater Air Control System

Chapter IV

Tactical Considerations

This chapter discusses the tactical employment of JSTARS in the context of mission planning, execution, and post-mission actions.

1. Mission Planning Considerations

a. Air/Ground Coordination. Coordination and communication between supported commanders and the JSTARS LNO team and E-8C mission planning team (MPT) is crucial for operations. LNOs and MPTs must know the ground commander's priorities/situation if it has changed since the pre-mission briefing (For more information on LNO duties and responsibilities, see ALSA *MTTP for JTF-LNO Integration*). The E-8C MPT and/or E-8C mission crew will breakout the ATO for offensive air operations and coordinate directly with appropriate command centers (such as JAOC, ASOC, and DASC) and aviation units prior to take-off. Additionally, supported battlestaffs need to know specifics regarding E-8C flight times or radar coverage. When possible, coordination between the air and ground staffs should occur within flight planning timelines and before the E-8C takes off. Continuous coordination should occur throughout the mission to maximize the effectiveness of JSTARS support to the commander.

b. Pre-mission Coordination. Minimum coordination between E-8C crews and supported units include:

(1) The JAOC/LNO team provides the crew—

(a) Collection task list.

(b) Master air attack plan.

(c) ATO and airspace control order (ACO).

(d) Priorities of support for mission (see Table IV-2).

(2) The supported unit staffs provide the crew—

(a) Current OPORD/FRAGORD including friendly IPB.

(b) Current battlespace geometry.

(c) Ground station locations.

(d) High payoff target (HPT) list.

(e) Current NAI/PIR and intelligence effects matrix as appropriate.

(f) Deep attack routes.

(g) Fire support coordination measures.

(h) Current operational tasking (OPTASK) link.

(i) TAI/engagement areas.

(j) Current callsigns and operations codes.

(3) The MPT/E-8C crew provides supported commander with—

(a) E-8C on and off-station times.

(b) GRCA coordinates.

(c) Orbit location(s).

(d) Current call signs and frequencies.

(e) Tasked priority of support.

(f) E-8C special missions that may impact support to the supported unit.

c. Specific Pre-Mission Roles.

(1) E-8C MissionCrew. MPT determines the orbit, ingress and egress routes, refueling requirements, and communications plan; obtains ROE; establishes on/off-board contracts for C2 and ISR; determines route and area threats; and establishes the tracking/surveillance plan for NAI that the mission crew is primarily responsible to monitor. During this period the MPT and LNOs refine the collection task list for the mission crew. The MPT conducts visibility analysis of assigned NAI to determine visibility and to optimize the orbit. The E-8C/CGS/JSWS can determine which areas of interest are screened from specific locations in the current orbit/altitude. This can be done for an area, for a specific route and for potential orbits/altitudes.

(2) Supported Commanders. Each supported commander provides their mission, commander's intent, desired end state, and timelines for planning and execution. During staff planning, the intelligence staff provides the E-8C mission crew the intelligence effects matrix, as appropriate (see Figure IV-1). At lower echelons, collection managers forward their intelligence effects matrix to the level responsible for coordination with the E-8C. At this level, the collection manager will prioritize areas to cover, based on the senior commander's guidance, consolidate all requests into one intelligence effects matrix and forward it to the E-8C crew. The intelligence effects matrix includes—

(a) Specific areas requiring collection (such as NAI, TAI, engagement areas, etc.).

(b) Commander's PIR.

(c) Activity to detect in the target area.

(d) Radar effects desired.

(e) Designated cross-cue sensor.

(f) Supported unit requiring the information.

(g) Time period to cover the area.

Coverage Area	PIR	Activity to Detect	Effects Desired	Point Sensor	Supported Unit	0001	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700
NAI 1	1	MRD Crossing PL Brown	MTI/SS	UAV LRS-D	532 MI BN																		
NAI 34	6	River Crossing	MTI/WAS	UAV GRCS	USFK CACC																		
TAI 6	2	MRL Bn	SAR MTI/WAS	GRCS Q-37 TRQ-32	6-37 FA																		
Engagemnt Area Smash	3	33rd MRD AA	MTI/AP	GRCS UAV	12TH AVN																		
NAI 7	1	MRB Moving South	MTI/WAS	UAV	2 ID																		
TAI 4	5	SA-8 Btry	MTI/AC	GRCS	12TH AVN																		
NAI 21	4	River Crossing	MTI/AC	UAV	USFK CACC																		
NAI 15	2	Attack Helo departing airfield	SAR	National IMINT	USFK CACC																		

Figure IV-1. Example JFLCC Intelligence Effects Matrix

(3) Unit Graphics. The CGS/JSWS crew is provided the unit graphics to include NAI, TAI, engagement area, target reference points (TRP), OPORD, PIR, HPT list, intelligence collection plan, and targeting matrix.

(4) Active and Passive CGS. Up to 15 CGSs in the SCDL mode have the ability for "active" two-way digital communication with the JSTARS aircraft. An unlimited number of CGSs within LOS of the E-8C can operate in a receive-only "passive" mode. If more than 15 CGSs are supporting the military operation, the number of "active" stations must be controlled and allocated based on priorities established by the senior commander. The component collection manager will use these priorities to designate which CGSs are authorized to operate in the "active" mode. The collection manager provides a prioritized list of "active" CGSs to the JAOC through its LNOs. Additionally, the collection manager will determine which active CGSs are allowed to request RSRs.

2. Execution

a. En Route and On-Station Mission Considerations.

(1) JAOC/LNO team provides the crew—

(a) Updates to the master air attack plan (MAAP) that affect the mission.

(b) Changes in JFC priority of support.

(c) ATO/ACO changes.

(d) ROE changes.

(e) Tanker updates.

(2) The supported ground unit staff provides—

(a) Voice and SCDL/SATCOM checks.

(b) Updates to collection priorities and targets.

(c) Battlefield geometry including forward line of own troops (FLOT), fire support coordination line (FSCL), etc.

(d) Changes to operational graphics.

(e) Requests for aircrew support when ground stations are in degraded operations.

(f) Notification when key phases of the operation commence.

(g) Changes to active and passive ground station status.

(h) RSRs.

(3) The E-8C crew provides the supported ground unit staff with—

(a) Changes in the GRCA.

(b) Information concerning system problems that may affect support.

(c) Special E-8C missions that may interfere with, or interrupt, the ground unit's system coverage or support (such as CSAR).

(d) Aircraft problems that result in the system having to depart station.

(e) Changes to mission times.

(f) Any RSR that cannot be executed, or changes to the RSR.

(g) Other information that could affect support to the ground force.

b. Mission Tasking Changes. During the mission, changes in JSTARS aircraft mission tasking may be required. Requests for changes in coverage area, times, or radar priorities that require changes in the E-8C's orbit must be coordinated with the JAOC. Once coordinated, the changes can be made by direct voice communication with the E-8C MCC. Direct requests from a supported unit will be coordinated with the JAOC to deconflict with other joint force assets. Changes made by the mission crew are coordinated with the combat operations director in the JAOC.

(1) Conflicts in employment priorities for the E-8C radar should be resolved at the lowest level of authority (such as the E-8C MCC). Conflicts will be resolved according to the following guidelines (see Table IV-1).

Table IV-1. E-8C Mission/Priority Change Approval Authority

Type of Change	***Coordinating Authority***	***Approval Authority*** [1]
Coverage change only	MCC	Supported Commander
Coverage requiring orbit change	Requesting Commander [2]	JFACC
Coverage change affecting collection plan	Requesting Commander [2]	Affected Component CC(s)
Orbit change affecting level of support	Requesting Commander [2]	JFACC [1]
Preplanned priorities, as published in ATO	Requesting Commander [2]	Supported Component CC
Commander with priority of support submits RSR requiring orbit change	Requesting Commander [2]	JFACC [1]
Commander with "lower" priority support has dynamic request for support	Requesting Commander [2]	JFC

[1] The E-8C aircraft commander has the authority to alter the orbit as required for safety of flight factors such as weather, terrain, or threats. The E-8C mission crew will notify the JAOC of the alterations, as time permits.
[2] A JSTARS LNO in the CAOC/JAOC will inform the MCC of a change via voice, CGS, and/or JSWS.

(2) Table IV-2 is an example mission support priority matrix. This matrix helps deconflict competing dynamic support requests. The MPT for the E-8C prepares this matrix to assist the crew in applying component priorities as they execute RSRs from supported commanders, in accordance with the JFC intent. To prepare the matrix, the MPT must have information clearly defining the relative priorities of any component commander they may support during that mission. Note that the supported commanders listed in the left column and the times across the top of the table vary according to the operational situation.

Table IV-2. JSTARS Support Priority Matrix

JSTARS Support Matrix—Dynamic Requests			
Time	***0001Z to 0830Z***	***0830Z 0/0***	***0/0 to 2400Z***
CINC Event	NEUT IADS to facilitate attack	JFLCC attack	JFMCC amphibious attack
JFACC	1	2	3
JFLCC	2	1	2
JFMCC	3	3	1
JSOTF	4	4	4

Notes:

1. JCMB prioritizes E-8C deliberate collection deck for each ATO cycle, in accordance with JFC's priorities. J2 (via JCMB) designates relative priority of support for dynamic RSRs (during the mission).
2. Supported ground commanders specify key TAI and engagement areas.
3. SMO services RSRs in priority above from each component commander's designated master CGS (if designated).
4. E-8C mission crew resolves conflicts between the planned collection task list (from JCMB) and dynamic RSRs. SMO on-board supports, as timeline allows.

(3) In general, deconfliction will be attempted at the lowest level of authority (normally the E-8C MCC). If the MCC is unable to resolve major conflicts involving changes in mission tasking or priority, the JAOC and the supported commander's higher headquarters are the next higher authority for resolution (see Figure IV-2).

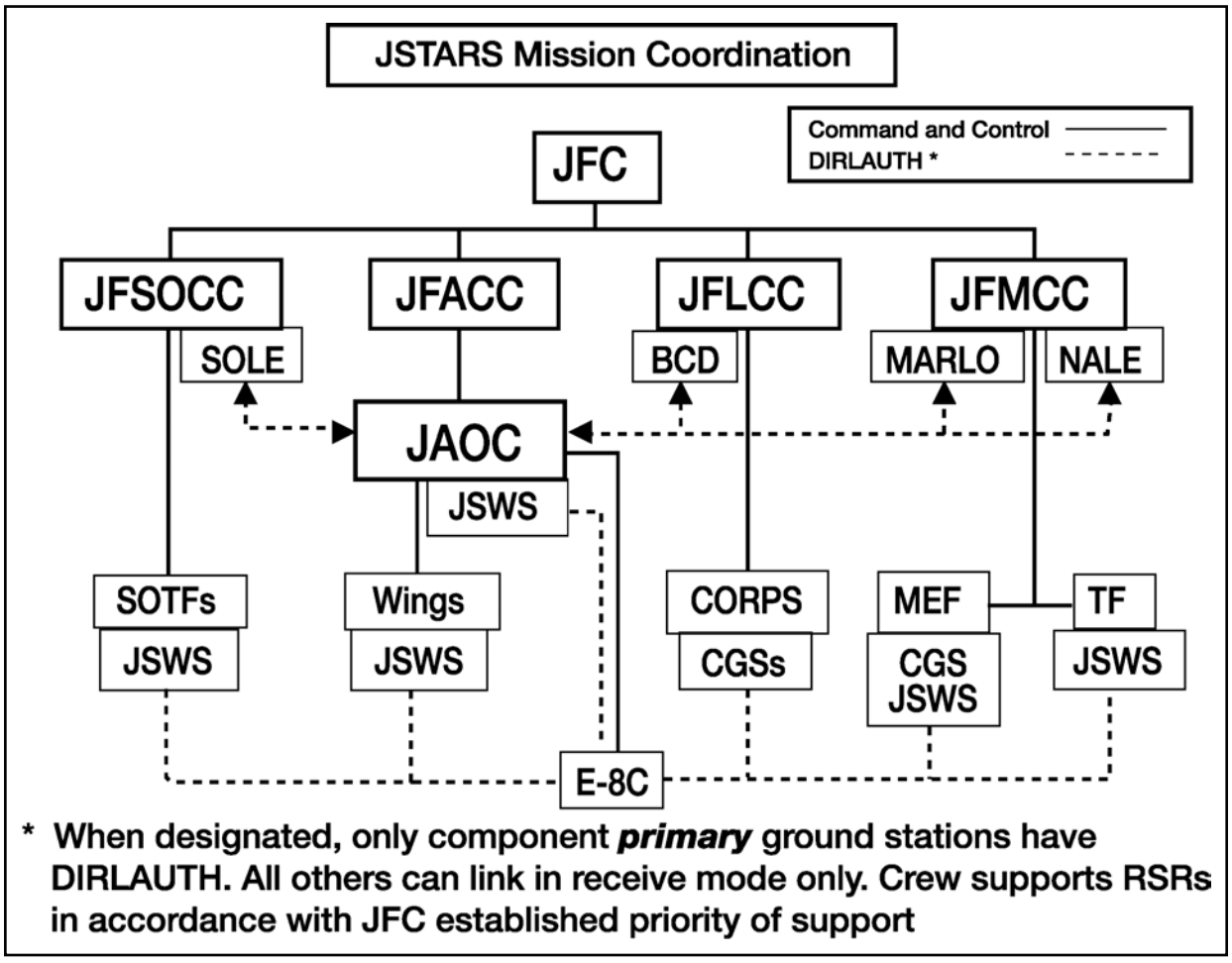

Figure IV-2. E-8C Mission Tasking

(4) The battlefield coordination detachment/Marine liaison officer (BCD/MARLO) should be authorized to adjudicate competing ground force requests for E-8C support to promote prompt and efficient use of the platform. Support decisions (which requests get supported and when) are based on the most current guidance, objectives, intent, and priorities established by the supported unit commander.

(5) At times, there may be a requirement to adjudicate competing support requests. The components will resolve competing requirements, in accordance with guidance from the JFC. The JFC is the final decision authority if component commanders cannot resolve competing requirements.

c. E-8C Mission Crew.

(1) Surveillance. Surveillance (on board the E-8C) may be broken down into four distinct phases: detecting, tracking, reporting, and identification.

(a) Detection. Detection is the phase in which the E-8C crew and ground station operators locate activity in accordance with tracking criteria/priorities. Examples of JFC tracking priorities are 10+ MTI moving south, 5+ MTI leaving known garrison locations.

(b) Tracking Plan. The E-8C crew may divide the area of responsibility (AOR) geographically or functionally (based on levels of activity in given areas) to allow individual trackers to focus on one area, minimizing task saturation. Figure IV-3 is an outline of a typical JSTARS tracking format:

Track Number	
Track Identification	
Size (number of vehicles)	
Activity (Description — such as convoy)	
Location (WGS 84 UTM Grid)	
Time (Zulu)	

Figure IV-3. Tracking Format

(c) Symbology Standards. Symbology will be maintained within 2 kilometers (km) or more of the MTI data being tracked. MTI within 3 km of one another, moving in the same direction and at the same relative speed, will be considered a single group represented by a single track placed at the center of mass.

(2) Reporting. There are four methods for reporting JSTARS data to other command and control agencies and other ISR platforms or systems: JTIDS, SCDL, SATCOM data, and SATCOM/UHF/VHF voice.

(a) JTIDS. Tracks will be JTIDS enabled based on mission reporting criteria. This data is provided to the customer and the track quality is used to determine its applicability.

(b) Ground/Reference Points. Ground/reference points for rotators and staging areas will be JTIDS enabled if they enhance situational awareness (SA). OB known at the beginning of a Zulu day should not be enabled.

(c) SCDL and SATCOM Data. The primary means to receive JSTARS data is the associated ground station (CGS or JSWS). The ground station receives information from the aircraft via SCDL (CGS) or SATCOM (JSWS) and provides commanders with updated information via voice or automated relay. The ground station is a critical component in the display and exploitation of JSTARS data for the commander. It is critical that a coherent and well-organized command and control architecture be available to prioritize requests from competing command elements.

(d) Voice-Tell. Voice-tell will be used to pass track information when JTIDS is inoperable or when working with non-data link units. The following procedures will be used:

- Check in with receiving agency on designated frequency.
- Perform authentication, as required.
- Confirm voice tell update requirements with the receiving agency.
- Use size, activity, location, time (SALT) format and the JTIDS track number.
- Continue to voice tell until the link is re-established or receiving agency directs crew to stop.

- Trackers may voice tell their own tracks, deconflicting net usage with other trackers.

(3) Identification. The E-8C has no inherent identification capabilities. Identification consists of cross cueing MTI/SAR with other agencies and platforms. The ultimate goal of cross cue is to provide a positive identification on a particular track. SIGINT, ELINT, imagery, and visual data may be used as a cross cue with MTI and/or SAR data to achieve either a target classification or identification on a specified track.

(a) Identification—Friendly. If the track is declared friendly through one of the methods of identification, the identification must be updated to friendly either by JTIDS or by voice-tell. The track should still be monitored and maintained unless directed by higher authorities to drop the track.

(b) MTI Lost due to Track Movement. If MTI data is lost because vehicles have stopped, the track will be modified to reflect a speed of zero. Symbology will be placed on the last known location of the vehicle and a SAR will be shot to refine vehicle location, if possible. For JTIDS equipped systems, the operator will inhibit JTIDS for all IDLE tracks, unless the track has been nominated/selected for execution.

(c) MTI Lost due to Screening. If MTI is lost due to radar screening, continue track on last known heading and speed, or based on terrain features until MTI data is re-acquired or until it is determined SA on the given track is lost. If SA on the MTI data is lost, inhibit JTIDS and drop the track.

(d) Voice-Tell. Both airborne and ground station operators should prepare a SALT format for each track. This will allow rapid relay of tracking information if the automated track is lost.

d. Tactical Reports (TACREPs). TACREPs are used to forward time sensitive, perishable combat information. TACREPs will be numbered chronologically as they are issued. E-8C TACREPs will be identified as "JULIET." The basic TACREP format is as "TACREP type—type of activity (rotator, jammer, site, scrub, mover)—location." SIGINT—derived TACREPs typically use the same basic format prefaced as follows:

(1) "ALPHA" to indicate air activity.

(2) "GOLF" for ground activity.

(3) "ECHO" for ELINT reports.

Note: For "ECHO" series TACREPs, radio frequency will be appended after location.

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e. Time Sensitive Targeting (TST). Theater sensors/platforms may be cross cued or re-tasked to rapidly detect, identify, and continuously track TSTs, thereby providing the SA necessary for flexible and timely support to decision makers. An example of sensor cross cueing could include the JSTARS aircraft detecting a potential target and then cueing an UAV or EP-3 aircraft to provide more detailed information. Operations and intelligence must coordinate if sensor cross cueing is required for more definitive targetable data. Component collection manager staffs should coordinate with the headquarters or JTF/J2 to request cross cueing or re-tasking of collection assets. Ad hoc tasking requests are processed through collection manager channels. The collection

manager at the headquarters or JTF/J2 evaluates re-tasking/cross-cueing impacts on current collection operations and directs adjustments as appropriate. The JFACC or executive agent is the final approving agent for ad hoc re-tasking.

(1) The JSWS/CGS ground station provides NRT visualization to the commander and intelligence staffs. Staffs observe their AOI, AO, and area of influence.

(2) During on-going missions, the intelligence staff analyzes ground-station-derived information and reports it to the battlestaff to refine course of action (COA) analysis. The intelligence staff works with the ground station to determine how the ground station can best support the mission. The intelligence staff determines key terrain that is masked from E-8C surveillance and ensures its coverage by other sensors. The collection manager coordinates dynamic mission requirements through the JSWS/CGS directly to the JSTARS aircraft.

(3) The intelligence staff uses ground-station-derived information in a very deliberate fashion. E-8C information is used to cue organic point sensors for confirmation and/or identification of enemy activity. The intelligence staff uses CGS MTI and other intelligence data to complement other forms of intelligence for intelligence fusion.

(a) The supported intelligence staff—

- Queries intelligence databases and sources for existing information to complement MTI and SAR information.
- Requests the CGS /RWS operator review the CGS historical database for MTI supplementation of existing intelligence.
- Updates enemy locations and movement, based on MTI.
- Creates graphic intelligence products on the CGS workstations.
- Requests additional information for identification of MTI movement.

(b) The collection manager, G-2, ACE chief, or operations officer at each echelon has the authority to direct CGS operations in support of TOC or MI enclaves operations by—

- Focusing the CGS on critical areas of the battlefield.
- Confirming coverage of the collection requirements by the E-8C.
- Working with the SMO on the E-8C to resolve inability to service RSRs within specified parameters.
- Cueing point sensors based on CGS information.
- Determining when hard-copy products should be produced.
- Disseminating exploitable CGS information verbally or visually to other intelligence processors.
- Determining when to disseminate digital information to other systems.
- Coordinating RSRs through the master CGS, if designated.

- Providing changes to PIR or operational graphics to the CGS/RWS operator.

- Conducting cursory analysis of CGS correlated data and reporting time critical information to the battle staff.

(4) Theaters with multiple CGSs and JSWSs, designate primary (and secondary) ground stations to manage ad hoc requests for JSTARS aircraft support outside the collection management cycle. The designation of a primary (and secondary) ground station avoids saturation and confusion inherent in multiple users.

(a) Theaters must designate a primary CGS/JSWS/GCS operator to filter requests at the component level. Within the land component, corps and division G2s designate their primary CGS systems. The primary ground station, once identified, is written into the theater SPINS and any changes to primary operators must be annotated in the daily SPINS and/or ATO.

(b) Primary operators submit RSRs directly to the E-8C.

(c) SMO will attempt to satisfy that RSR; if unable, default to the JAOC for resolving.

3. Post-Mission Considerations

a. Off-station Coordination.

(1) Crew provides the JAOC when reporting off station.

(2) The supported unit staff provides the E-8C crew—

(a) Summary of E-8C support to the ground force with recommendations for improvements.

(b) Tentative requirements for follow-on E-8C support.

(c) Requests for information concerning follow-on E-8C support.

(3) The E-8C crew provides the supported unit staff—

(a) Mission summary.

(b) Recommendations for improved support.

(c) Information concerning follow-on missions.

b. E-8C Mission Crew. The E-8C crew debriefs the results of the mission including tracking data, effectiveness of surveillance taskings, and offensive air results with ground intelligence to be included in a MISREP (appendix A, paragraph 2).

c. Supported Commanders. Ground station operators assess the E-8C's effectiveness of support to their surveillance operations. They pass this information to the E-8C crew and respective collection managers. Collection managers evaluate the support and revise requests for future support accordingly.

Appendix A

JSTARS Data Analysis

1. Overview

The JSTARS aircraft provides NRT GMTI and SAR imagery information to the warfighter while the E-8C is airborne. The mission crew does not conduct in-depth GMTI or SAR analysis on the jet. Data is analyzed post-mission at various levels within the theater. GMTI and SAR data can be databased and fused with other ISR sources to provide trend analysis, identify essential elements of intelligence, address PIR, and support IPB. JSTARS data is processed, exploited, produced, and disseminated as explained in the following paragraphs.

2. Wing Level Analysis

The wing intelligence analysts supporting the E-8C located in a forward operating location can provide limited analysis.

a. MISREP. Ground intelligence personnel debrief the aircrew upon mission completion and send out a MISREP with tracking data and other significant items of interest debriefed from the aircrew. This report meets theater reporting requirements (normally two hours after aircraft lands); therefore, little or no GMTI analysis is conducted at this level.

b. SAR. Imagery analysts located at the forward operating location (FOL) exploit SAR imagery after each mission. The analysts annotate and disseminate to the theater, via the IPL, imagery that meets reporting requirements. This is level 1 imagery analysis.

3. Theater and Component Level Analysis

a. ISR Tasking, Processing, Exploitation, and Dissemination (TPED). Analysis conducted at these levels is in accordance with ISR TPED architecture. TPED controls the collection and transformation of information into actionable intelligence. Department of Defense (DOD) and Service-specific TPED networks and systems (such as Distributed Common Ground System [DCGS] and Distributed Ground Systems) generate products at the component commander level and above. This level of analysis provides long-term trends of MTI data, historic reference to address PIR, and IPB. JSTARS SAR imagery is used in the fusion of various intelligence sources for an assessment; if required, level 2 analysis of SAR imagery is conducted at this level.

b. GMTI Analysis. Fusion of JSTARS MTI data with additional intelligence sources is mandatory for meaningful interpretation. The GMTI team analyzes this data using the E-8C MISREP, the JSWS, and the Falcon-View controlled image base (CIB). The GMTI team uses the history playback functions on the JSWS to customize the track times and route of travel. The Falcon-View CIB imagery is used to assess the terrain the MTI travels over and the validity of the track speed, direction, and screening in

relation to the MTI information. These sources may feed directly into the JSWS or come from stand-alone workstations.

(1) Cross Cueing. E-8C missions should be scheduled to be flown and cross cued with positive identification (PID) platforms such as the UAV (Predator or Global Hawk), P-3 AIP or U-2. JSTARS aircraft and PIDs cross cue between platforms during the mission. Fusion of E-8C data is required for missions not flown in conjunction with PID platforms and for targets that require additional amplifying intelligence of those with whom they fly.

(2) Fusion. Fusion of GMTI data is accomplished by using the JSWS, along with National Imagery and Mapping Agency (NIMA) exploitation services (NES), Intelink, imagery databases (5D, IPL, IESS) and a JSTARS database created by the MTI team. They use these tools to find routes of travel, JTIDS track start and stop points, and find known facilities that are within the JTIDS track. The GMTI team also fuses data with ground intelligence, air intellligence, and targeting. The results are ultimately passed to the fusion cell chief.

(3) Database. The GMTI database catalogs all JTIDS tracks found by the aircrew during the mission and reports on information found by the GMTI team post mission. The database provides fused information about track start and stop points and known facilities near which the track started or stopped. Trend analysis is accomplished by comparing coordinates with plotted data from previous missions. A JSTARS database can be created after two weeks of JSTARS flying in a theater.

Appendix B

JSTARS Liaison Team

1. Overview

a. The 93rd Air Control Wing provides a LNO Team to the air operations center and, normally, an Army LNO to a component commander's headquarters. These elements consist of JSTARS aircrew members who provide planning and tasking expertise and coordination for JSTARS operations.

b. The LNO team is sized adequately to represent appropriate mission areas for the assigned tasking and/or the need to sustain 24-hour operations. E-8C LNO personnel will be dispatched to the theater, as required, to ensure effective utilization and integration of the platform. The optimum LNO team is composed of one flight deck member (pilot or navigator), one air battle manager (ABM), one airborne intelligence officer/technician (AIO/T), one deputy mission crew commander (DMCC), and one JSWS operator, if required. Team composition may be augmented depending on circumstances or specific mission requirements.

2. LNO considerations

a. Initial Entry into Theater. The JSTARS LNO team coordinates with other component liaisons to obtain ISR plan, CSAR plan, attack support requirements, hold points, air refueling, and dynamic taskers. This type of information is crucial during the initial weeks of planning and for development of the ATO. The goal of this information is to give operational planners an idea of the information required early on to help use JSTARS effectively. LNOs will—

(1) Integrate JSTARS.

(2) Educate users on JSTARS capabilities.

(3) Educate relevant sections on how to use JSTARS information.

(4) Assist collection managers in planning.

(5) Assist joint intelligence center (JIC), joint analysis center (JAC), and JAOC personnel in reporting and posting JSTARS information via appropriate means.

(6) Provide thorough, up-to-date information to the deployed JSTARS unit.

(7) Develop feedback mechanism.

(8) Flag important information for pre-mission planning.

(9) Ensure documents and taskings are understood and communicated in a timely manner.

(10) Coordinate JSWS connectivity and placement, as required.

b. Employment. In addition, the LNO team facilitates all aspects of E-8C employment. The LNO team assists the JAOC in employing the JSWS to monitor NAI to the JFACC and to communicate with the E-8C.

Appendix C

Logistical Planning Considerations

1. E-8C Support Requirements

a. Fuel Requirements. The E-8C can use several types of fuels with little or no adjustment to the fuel system or engines. The primary fuel is JP-8 or commercial Jet B. Alternate fuels are JP-4, JP-5, Jet A-1, and Jet A. Aviation gasoline (AVGAS), AVGAS +3 percent grade 1065, and 1100 oil can be used as emergency fuels.

b. Refueling. On the ground, the E-8C uses single-point refueling and is capable of receiving fuel pumped at 45 to 55 pounds per square inch. For an onload of 100,000 pounds, the E-8C will require approximately 90 minutes of ground time. Over wing refueling requires approximately two hours of ground time. Airborne, the maximum rate for refueling is 6,600 pounds per minute (ppm). Since onload rate slows as the E-8C's tanks fill, use 5,000 pounds per minute, as a rule, to calculate time required to onload fuel. The E-8C radar must go to standby while air refueling, but can be operated immediately afterwards.

c. Runway and Taxiway Requirements. Typical E-8C operations require a runway configuration of 9,000 feet by 135 feet. These requirements may be lowered on a case-by-case basis. Runways of 10,000 feet or longer generally allow for operations with heavy fuel loads and high-pressure altitude and/or high temperature situations. For more information (see Tables II-1 and II-2 and AFTTP 3-1.30).

2. CGS Support Requirements

a. CGS Configuration. The complete AN/TSQ-179(V)2 CGS is comprised of a mission shelter consisting of a GDT, a communications system, and an operations system enclosed in a LMS and mounted on a M1097 or M1113 HMMWV. The CGS mission shelter houses two operator consoles and includes a CGS RWS. Two additional HMMWVs, designated support vehicles, will be provided and used to transport the CGS crew, their personal equipment, and CGS mission equipment. A single trailer with 10-kilowatt tactical generator will be towed by one of the vehicles, either mission or support. (The trailer must be towed behind the mission vehicle for conducting operations on the move.) The objective CGS will consist of a mission vehicle, one support vehicle, and two M1102 HMTs, each mounting a 10-kilowatt tactical quiet generator. The mission vehicle consists of a LMS housing all essential equipment mounted on a heavy variant M1097A2 (USMC) or M1113 (USA) HMMWV. The support vehicles are heavy variant M1097 HMMWVs. The CGS is self-contained for storage and transport of all mission equipment, six crewmembers, and support equipment.

b. CGS Power Requirements. The power conditioning equipment includes a power distribution vault, circuit breaker panel, volt meter, frequency meter, and uninterruptible power supply (UPS) for the receipt of three-phase, 50/60 hertz alternating current, protection of mission critical ADP, and to allow for controlled shutdown.

c. CGS Antenna. The CGS includes a folding mast for mounting the SCDL antenna masthead above the vehicle roofline. A tripod and cabling is provided to remote the antenna masthead up to 100 meters from the CGS mission vehicle.

d. CGS Positioning. The mission shelter must be placed in close proximity to the supported unit TOC. The primary emplacement consideration must be the LOS from the CGS to the E-8C orbit. If the geometry is good from the TOC location to the orbit, the SCDL antenna masthead may be placed on the three-meter mast attached to the mission shelter. If the TOC is located in an area surrounded by trees or in a depression, the SCDL antenna may be remoted to a position providing unobstructed LOS to the E-8C track. The SCDL antenna may be remoted on a tripod up to 100 meters from the CGS mission shelter. If remoting the antenna does not provide the requisite LOS to the aircraft, the mission shelter must be moved to a location where it can receive link with the E-8C. The CGS RWS can then be remoted into the TOC. As fielded, the CGS comes with 300 meters of cable to connect the RWS to the CGS. The remoting distance may be increased up to one kilometer with additional cable.

e. CGS Forced Entry. CGS may be called upon to deploy worldwide with 24-hour notice. These CGSs are part of a Forced Entry Brigade. The CGS may initially deploy with just the mission shelter and a crew of two.

f. CGS Personnel/Operators. The Modified Table of Organization and Equipment (MTOE) for a CGS is six Army MOS 96H (Imagery Ground Station Operator) or USMC MOS 0241 (Imagery Analysis Specialist)/0231 (Intelligence Specialist) personnel. This crew consists of one E-6 CGS team leader, one E-5 assistant team leader, and four E-4/3 CGS operators. The CGS crew trains to operate the system, provide hard and soft-copy products, establish interfaces, and provide rudimentary analysis of E-8C imagery products. Analysis is limited to determining if MTI represent moving vehicles or is simply ground clutter, and determining ground patterns that may define certain types of enemy activity (such as assembly areas). These operators receive limited order of battle and imagery interpretation training. More detailed analyses of correlated CGS products and target development activities are conducted by the supported unit's intelligence and targeting staffs.

3. JSWS Support Requirements

a. System Support. Support for JSWS will depend on the ownership of the system. Theater organizations are responsible for manning, maintenance, and administration of their own systems. Currently, JSWS deployed into a theater will be maintained and administrated by contract.

b. Components. The JSWS baseline hardware configuration consists of a server, a single workstation and monitor, a network router, and associated support equipment, all of which is housed in transit cases (see Table C-1).

c. Size. The JSWS, along with its communications equipment, nominally consists of six transit cases (or four cases without the communications). A seventh case may be added if a remote video system is added:

(1) Weight: Approximately 1800 pounds.

(2) Floor space: 12 feet by 6 feet.

(3) Storage space: 6 feet by 6 feet for transit case covers.

(4) Two complete systems (12 transit cases) may be palletized on a 463L pallet.

d. Map Underlays of the AOI. The deploying squadron should order the map underlays (EMAPs) two weeks in advance. If the in-country requirements change, coordinate with the site map custodian (media librarian). The custodian must have a DOD Ammunition Code (DODAC) account with NIMA or request map through the website.

Table C-1. JSWS Hardware

Case	***Purpose***	***Case Contents***	
Assembly, Transit Case 1, labeled FLAT PANEL	Part of baseline JSWS	Workstation monitor Keyboard	Keyboard tray Mouse
Assembly, transit Case 3, labeled SERVER	Part of baseline JSWS Contains the Enterprise server and its components	Sun E4002 eight-slot Enterprise server Sun CD4 Sbus serial input/output (I/O) card Aurora Eight RS-232 module WS-C108 Fast Hub 45-2005 Serial A/B Switch 4-mm, 4 to 8 GB digital tape drive Two 2610A I/O modules	Four 400 MHz CPUs with ultra 512 KB cache Three 256 MB Memory Modules with ECC Two Sbus Fast/Wide Differential Small Computer System Interface II (SCSI II) Adapters 1553 Bus I/O Board X1053 Ethernet Card 10 BaseT Power Supply AT-MX26F Fiber Optic Tramsceover (Used with GSM Access Only)
Assembly, Transit Case 4, labeled SATCOM AN/PRC-140 (Not included for USMC)	Optional communications kit Enables connectivity to SATCOM sources via PRC-140 radio	PRC-140 SATCOM radio AM-7175/URC power amplifier KG-84A	DC power supply PTPC-100 SATCOM control unit PTPE-201 SATCOM preamp
Assembly, Transit Case 5, labeled UPS	Part of baseline JSWS Provides trusted, filtered, uninterrupted power to Cases 1, 2 and 3	1500 TRX, 2000 TRX uninterruptible power supply (UPS)	
Assembly, Transit Case 6, labeled PRINTER	Part of baseline JSWS Provides black and white and color text and graphics output capability	Canon BJ-30 text printer Tektronix 2440/A color printer Ink sheets Printer	
Assembly, Transit Case 7, labeled REMOTE VIDEO	Optional fiber optic remote video support kit Provides connectivity to “Big Screen” projector system	300 M video and power cable stored on reels Fiber optic transmitter Fiber optic receiver	
Assembly, Transit Case 8, labeled SATCOM RT-1273AG (USMC use CTT3)	Optional communications kit Enables connectivity to SATCOM sources via MUST radio (AF only) USC-55 (Army SATCOM)	MUST SATCOM radio, RT-1273AG(V)4 Remote control unit, MUST, C-1218AG KG-84A Power Supply Diplexer	
Assembly, Transit Case 9, labeled POWER TRANSFORMER	Optional European power transformer kit Enables JSWS to use 220VAC, 50 Hz power	Two power transformers Three-phase converter Circuit breaker	
Assembly, Transit Case 10, labeled SATCOM ANTENNA (Not used by USMC)	Optional communications kit Enables connectivity to SATCOM sources via MUST radio	Trivee Avant AV 2011	

e. Mode of Operation.

(1) Primary: Stand Alone. A JSWS with a communications suite is considered a stand-alone system. This means that the JSWS needs only a platform source or multiple platform sources to feed it information.

(2) Alternate: Networked through Server. A JSWS with a communications suite can have four additional workstations connected through the server. This communications suite needs an Ultra 60 workstation and monitor. The Ultra 60 workstation is the size of a desktop CPU.

f. Connectivity. JSWS deployed into a theater will typically be set up in a stand-alone configuration (two-way communication with the E-8C). Each stand-alone JSWS may be networked to support an additional six local workstations.

(1) Primary: UHF SATCOM

(a) Suite: MUST radio/CTT3 (USMC), KG-84A encryption device, KYK-13 or CYZ-10 fill devices. 25 kilohertz bandwidth satellite channel.

(b) Power: 110, 60 hertz single phase, 1 x 20 amp capacity breaker (separate circuit breaker from rest of JSWS).

(2) Alternate: SCDL GDT, CTT3, UAV, IDM, SIPRNET. Satellite BLOS operations require pre-coordination to obtain UHF SATCOM channel allocation from the satellite controlling agency.

g. Power. 110, 60 Hertz, single phase, 2 x 20 amp, circuit breaker (one for the baseline JSWS and a separate one for each communications suite). Request Civil Engineers perform a power check of the building in which the JSWS will be set up. If the power is unknown (for example in foreign countries), use a generator. A 10-kilowatt generator or the light cart used for the aircraft will be sufficient.

h. Antenna Site. 100 foot cable and LOS to the satellite. Ensure that the antenna is not near or between two metal buildings. There should be at least 25 feet between the JSWS antenna and other site antennas. This distance is based on other antenna output watts.

i. Set-Up Time. Experienced technicians and operators can set up a JSWS in approximately one day, if adequate power and SATCOM antenna connectivity are available. They can dismantle and prepare the JSWS for shipment in about three hours.

j. Security. The JSWS system is primarily unclassified, however the RAID disks, system CD-ROMs, and cryptographic materials are classified SECRET and must be shipped, handled, and stored accordingly. With the RAID disks loaded, the JSWS is classified SECRET. Any communications security (COMSEC) cryptographic materials needed to load the KG-84A for secure SATCOM data exchange are also SECRET and handling will require individuals who have had COMSEC training . The KG-84A is the encryption device for the JSWS with a SATCOM suite. The KYK-13 or the CYZ-10 are the fill devices used to load the crypto.

(1) The JSWS will have to be set up in a secure area that has open storage or the RAID disk will have to be removed after each mission. The deploying unit will need to provide a cleared courier if these materials are to be handcarried, or the unit must

arrange for the shipment of classified materials. The deployed location must also have proper approved storage facilities.

k. COMSEC. The normal crypto that the JSWS uses is the short title USKAT B13230. The availability of this material will have to be coordinated prior to deployment. The choices are—

(1) Use the deployed site short title.

(2) Have the material electronically transferred to the deployed site by the 93ACW COMSEC manager.

(3) The unit will bring its own. This requires that the unit have a courier with orders and a courier card. The security manager can help obtain these. The deployed site will also need to store the material in a COMSEC cleared safe. At least one person operating the JSWS will need to be COMSEC qualified.

Appendix D

Army CGS Echelon Support

CGSs are collocated with Army maneuver units from brigade level to EAC. CGS supports each echelon differently. Many CGSs forward deploy throughout the world. U.S. based CGSs can be alerted and deployed within 24 hours, either individually or as part of a force projection brigade. This section defines how these CGSs support Army operations at each echelon, from maneuver brigade to corps level.

1. Maneuver Brigade/Armored Cavalry Regiment

CGS supports the maneuver brigade and armored cavalry regiment by providing the current operations picture. The CGS supports these echelons simultaneously with intelligence, targeting, and battle management.

a. CGS Mission. The CGS gives the commander a NRT picture of the battlefield based on MTI and processed SIGINT/IMINT. The CGS and RWS are also used as visual imagery tools to support planning and targeting.

b. Targets. Brigades and Cavalry regiments focus on a templated area in a specific time frame within their AOI, AO, and area of influence. The brigade is concerned with targets from division to company/troop size. CGS can detect and track these targets in combat and pre-combat formations. The brigade uses all sensor inputs to locate and confirm enemy critical nodes such as headquarters, C2 nodes, assembly areas, artillery positions, and logistics centers.

c. Employment. The CGS supporting the brigade is located with the TOC. CGS is also connected to "battle monitors" within a TOC so the entire battle staff can graphically portray and monitor the battlefield as the situation unfolds. Units using ABCS software can connect into the ABCS LAN for threat information from ASAS and the friendly picture from MCS. When the CGS RWS is connected to the ABCS LAN, all ABCS systems running MTI software can overlay the MTI on their systems.

2. Division (TAC/Main)

Division assists the brigades in fighting the current battle and plans and allocates resources for the next battle. This echelon also monitors the current operations and plans for operations 24 to 72 hours in the future.

a. Division CGS Mission. The CGS provides the division commander and staff the same correlated MTI, SIGINT, IMINT, and UAV imagery picture for SA in conducting the current battle, and provides archived JSTARS data for intelligence fusion and target development. CGSs deployed at the Division TAC and Division Main have different missions. The CGS at Division TAC displays the current operational picture of the battle so the commander and his staff can dynamically maneuver subordinate units. CGSs at Division Main/ACE look deeper into the enemy's rear, templated for a specific future time frame.

b. Division Targets. The division is concerned with detecting and tracking targets in their AOI, from company to corps size. These targets consists of corps, division and

brigade command, control, communications, and intelligence (C3I) centers, assembly areas, logistics facilities including forward arming and refueling points (FARPs), and artillery firing positions.

c. Division CGS Employment. There are two CGS assigned to the general support company in the division Military Intelligence battalion. These CGSs, when deployed, will be located with the division forward and main TOC.

d. Interfaces. The battle staff maintains contact with the CGSs operators via land-line or FM communications. The CGS is normally connected to AFATDS at this echelon and is the only JSTARS/division artillery (DIVARTY) connectivity within the division. CGS targetable information is sent to ASAS and then forwarded to AFATDS. The forward and main CGS should be hardwired to the UAV ground station if collocated. The CGS may also be connected to the division LAN for reception and transfer of secondary imagery products.

3. Division Aviation Brigade

Within division aviation brigades, CGS support focuses on operational planning, looking at ingress and egress routes for current or historical enemy activity and monitoring landing zones (LZs) for activity. The aviation brigade will use its CGS to support intelligence, targeting, and battle management for both attack and lift operations.

a. Aviation Brigade CGS Mission. Provides correlated JSTARS imagery, SIGINT, and IMINT to support cross-FLOT operations, rotary wing deep operations, air assaults, and air insertions up to the FSCL.

b. Division Aviation Brigade Targets. CGS will track targets and detect changes to insertion points, flight routes, target areas, and landing zone/pick-up zone (LZ/PZ). The CGS will display SIGINT for avoidance planning and notification, or to support enemy ADA suppression operations.

c. Division Aviation Brigade CGS Employment. A CGS is assigned to the division aviation brigade and will be collocated with their aviation tactical operations center (AVTOC).

d. Interfaces. If within LOS, the CGS can interface with Apache Longbows and provide snapshot pictures of the current battle to their cockpit. If within LOS, the CGS can also receive fire control radar (FCR) imagery from Apache Longbows.

e. Division Aviation Brigade Products. During mission planning, the CGS provides hard and soft copy imagery on insertion penetration points, and routes to LZ/PZ and engagment areas. NRT MTI can provide information on when targeted enemy movement will enter potential engagement area. During mission execution, CGS operators can provide updates to any changes in the engagement/LZ/PZ areas. Following missions, CGS operators may provide rudimentary BDA and/or enemy dispositions.

4. Corps/JTF (TAC/Main)

The corps emphasis is on deep targeting templated out to a specific future time frame, corps FSCL, and engaging in decisive theater operations. This echelon plans operations in excess of 72 hours.

a. Corps/JTF CGS Mission. Provides the commander the deep look at enemy movement and activities in the corps AOI. Generally, this area is within the E-8C's radar coverage. The corps also manages the deep attack, AI, or enemy second echelon disposition.

b. Corps CGS Targets. Primary corps targets include significant rear echelon movement, assembly areas, logistics centers, Army groups of rockets and artillery (AGRA), division artillery groups (DAG), air fields, and HVTs as directed by commanders intelligence/targeting requirements.

c. Corps CGS Employment. A CGS is located in the corps TAC and with the corps main. Power for the CGS is from a shared source either mobile or commercial.

d. Interfaces. The primary interface is ASAS and AFATDS. The CGS can also be connected to MSE and the SIPRNET for reception and transfer of secondary imagery or E-8C imagery. CGS information may be transmitted via Trojan SPIRIT II or retransmitted via SATCOM to another CGS on the move or not in LOS of the JSTARS aircraft.

e. Corps CGS Products. The CGS provides detection of enemy movement, artillery positions, and assembly areas. It tracks high priority targets and assists in cueing other sensors. It provides an electronic database for pattern analysis and change detection.

5. Corps Artillery/Field Artillery Brigade

The corps artillery headquarters and headquarters battery (HHB) and each artillery brigade have their own organic CGS. The corps artillery HHB CGS supports the corps FSE or DOCC at the Corps Main. This CGS works closely with the targeting staff to develop and nominate targets based on requirements. Once targets have been nominated, the fire mission is then handed off to an artillery brigade.

a. Corps Artillery Brigade Mission. The corps artillery brigade mission is to track and monitor targets identified by corps for targeting; upon meeting trigger criteria, provide most accurate position information for successful targeting engagements; provide information for follow-on engagements; and support centralized and decentralized fire missions.

b. Corps Artillery CGS Targets. Primary targets include follow-on forces, assembly areas, logistics centers, AGRA, DAG, airfields, and other high-value targets. The corps artillery is concerned with deep targets to strike with the Army Tactical Missile System (ATACMS) or Multiple Launch Rocket System (MLRS).

c. Corps Artillery CGS Employment. A CGS is organic to each corps artillery brigade but may be attached to ATACM or MRLS battalions for select fire missions.

d. Interfaces. The prime interface at an artillery brigade is AFATDS or an artillery fire direction system (FDS). Secondary interfaces may include ASAS RWS and MSE of secondary imagery products.

e. CGS Products. The CGS tracks and confirms the movement and disposition of forces in support of centralized and decentralized fire missions. It may also provide imagery products on engagement areas for fire support.

6. Corps Aviation

The corps aviation brigade is concerned with deep attack on corps HVT/HPT and support for air insertions and air assaults.

a. Corps Aviation Brigade CGS Mission. Primary missions include track and monitor deep targets identified by corps, provide NRT information and intelligence aviation ingress/egress routes, provide updates on enemy activity near these routes, and provide updates on enemy activity for interdiction.

b. Corps Aviation Brigade CGS Targets. Targets monitored by the CGS are solely dependent on the aviation brigade mission and may include assembly areas, logistics convoys, or enemy combat formations. In support of cross-FLOT operations, the CGS will be concerned with enemy movements that threaten ingress/egress routes and activities on the LZ/PZ, such as ADA radar activity.

c. Corps Aviation Brigade CGS Employment. The CGS is located in the AVTOC. The RWS is located with the AVTOC staff to support mission planning, mission operations, threat assessments, and battle management.

d. Interfaces. The prime interface is the Apache Longbow, either direct LOS digital FM connectivity, or relayed through the JSTARS aircraft. Secondary interfaces may include ASAS RWS and MSE.

e. CGS Products. The CGS at the corps aviation brigade provides updates on deep target location, enemy force disposition, and friendly aviation operational information. The CGS can provide correlated sensor information of ingress/egress routes, engagement areas, and LZ/PZ. During cross-FLOT operations, the CGS team chief advises the battle staff of threatening ADA activities based on SIGINT and JSTARS information.

f. Corps Aviation Brigade Cues. The CGS with corps aviation brigade can directly cue Apache Longbows during cross-FLOT missions based on staff guidance.

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GLOSSARY

Section I - Abbreviations and Acronyms

A

ABCS	Army Battle Command System
ABM	air battle manager
ABS	airborne battle staff
AC	attack control
ACC	Air Combat Command
ACO	airspace control order
ACP-FE	airborne command post—forced entry
ADA	air defense artillery
ADP	automatic data processing
AEF	aerospace expeditionary force
AEW	airborne early warning
AF	Air Force
AFATDS	Advanced Field Artillery Tactical Data System
A/G	air-to-ground
AGRA	Army groups of rockets and artillery
AI	air interdiction
AIO/T	airborne intelligence officer/technician
ALSA	Air Land Sea Application (Center)
AMC	airborne mission commander
AO	area of operations
AOC	air operations center
AOI	area of interest
AOR	area of responsibility
ARG	amphibious ready group
ARL	airborne reconnaissance low
ASARS	advanced synthetic aperture radar system
ASAS/ACE	All-Source Analysis System/Analysis and Control Element (Army)
ASOC	air support operations center
ATACMS	Army Tactical Missile System
ATI:CDR	artillery target intelligence: coordination report
ATI:TCRIT	artillery target intelligence: target criteria
ATO	air tasking order
AVGAS	aviation gasoline
AVTOC	aviation tactical operations center
AWACS	Airborne Warning and Control System

B

BCD	battlefield coordination detachment
BDA	battle damage assessment
BLOS	beyond line of sight

C

C2	command and control
C3	command, control, and communications
C3I	command, control, communications, and intelligence
C4I	command, control, communications, computers, and intelligence
CAF	Combat Air Force
CAOC	combined air operations center
CAS	close air support
CATF	commander amphibious task force
CC	component commander; command center
CCIR	commander's critical information requirements
CGS	common ground station
CIB	controlled image base
CLF	commander landing force
COA	course of action
COC	combat operations center
COM	collection operations management
COMINT	communications intelligence
COMJSOTF	commander, joint special operations task force
COMSEC	communications security
CONOPS	concept of operations
COP	common operational picture
CPU	central processing unit
CRC	control and reporting center
CSAR	combat search and rescue
CSARTF	combat search and rescue task force
CTOC	corps tactical operations center
CTT3	commander's tactical terminal three channel
CVBG	carrier battle group

D

DAG	division artillery group
DAMA	demand-assigned multiple access

DASC	direct air support center
DCGS	distributed common ground system
DISUM	daily intelligence summary
DMCC	deputy mission crew commander
DMT	distributed mission training
DOD	Department of Defense
DODAC	Department of Defense Ammunition Code
DTED	digital terrain elevation data
DTOC	division tactical operations center

E

EAC	echelons above corps
ECC	evacuation control center
ELINT	electronic intelligence
EMAP	electronic map
EMTI	enhanced moving target indicator
EO	electro-optical
EP	electronic protection
EW	electronic warfare

F

FAC(A)	forward air controller (airborne)
FARP	forward arming and refueling point
FAST	forward area support terminal
FCR	fire control radar
FLOT	forward line of own troops
FM:CFF	fire mission: call for fire
FOV	field of view
FRAGORD	fragmentary order
FSCC	fire support coordination center
FSCL	fire support coordination line
FSE	fire support element
FTI	fixed target indicator

G

G-2	Army or Marine Corps component intelligence staff officer (Army division or higher staff, Marine Corps brigade or higher staff)
GB	gigabit
GCI	ground-controlled intercept
GCS	ground control station
GDT	ground data terminal

GMTI	ground moving target indicator
GNC	global navigation chart
GRCA	ground reference coverage area
GRD	ground resolved distance
GSM	ground station module

H

HF	high frequency
HHB	headquarters and headquarters brigade
HMMWV	high mobility, multipurpose, wheeled vehicle
HMT	high mobility trailer
HPT	high payoff target
HQ	headquarters
HR	hybrid receiver
Hz	hertz

I

I&W	indications and warning
IADS	integrated air defense system
IAS	intelligence analysis system
IDM	interim data modem
IESS	imagery exploitation support system
IJMS	interim joint tactical information distribution system message specification
IMINT	imagery intelligence
i/o	input/output
IOC	intelligence operations center
IPB	intelligence preparation of the battlespace
IPIR	initial photo-interpretation report
IPL	imagery product library
IR	infrared
ISR	intelligence surveillance and reconnaissance

J

J-2	intelligence directorate of a joint staff
J-3	operations directorate of a joint staff
JAC	joint analysis center
JAOC	joint air operations center
JCMB	Joint Collection Management Board
JCSAR	joint combat search and rescue
JFACC	joint force air component commander

JFC	joint force commander
JFLCC	joint force land component commander
JFMCC	Joint Force Maritime Component Commander
JFSOCC	Joint Force Special Operations Component Commander
JIC	joint intelligence center
JIPB	joint intelligence preparation of the battlespace
JISE	joint intelligence support element
JITC	joint interoperability test command
JNC	jet navigation chart
JOG	joint operations graphic
JSOTF	joint special operations task force
JSTARS	joint surveillance target attack radar system
JSWS	joint Services workstation
JTF	joint task force
JTIDS	joint tactical information distribution system
JTMD	joint theater missile defense
JTT	joint tactical terminal

K

KB	kilobyte

L

LMS	lightweight multipurpose shelter
LNO	liaison officer
LOC	line of communication
LOS	line of sight
LZ	landing zone

M

MAAP	master air attack plan
MAGTF	Marine air-ground task force
MARLO	Marine liaison officer
MCC	mission crew commander
MCCDC	Marine Corps Combat Development Command
MCPDS	Marine Corps Publication Distribution System
MCS	maneuver control system
MEF	Marine Expeditionary Force
MHz	megahertz
MI	military intelligence
MIES	modern imagery exploitation system

MISREP	mission report
MLRS	multiple launch rocket system
MOS	military occupational specialty
MPT	mission planning team
MSE	mobile subscriber equipment
MTI	moving target indicator
MTIX	moving target information exploitation
MTOE	modified table of organization and equipment
MUST	multi-mission ultra high frequency satellite transceiver

N

NAI	named areas of interest
NALE	naval and amphibious liaison element
NES	NIMA exploitation services
NIIRS	national imagery interpretability rating scale
NIMA	National Imagery and Mapping Agency
NITF	National imagery transmission format
NRT	near real time
NTACS	Navy tactical air control system
NWDC	Navy Warfare Development Command

O

OB	order of battle
OCA	offensive counter air
ONC	operational navigation chart
OPORD	operation order
OPTASK	operation task
OTC	officer in tactical command (naval forces)
OWS	operator workstation

P

PC-IDM	personal computer, interim data modem
PID	positive identification
PIR	priority intelligence requirements
PR	personnel recovery
PZ	pickup zone

R

RAID	redundant array of independent disks
RF	radio frequency
ROE	rules of engagement

RRCA	radar reference coverage area
RSR	radar service request
RWS	remote workstation

S

S-2	battalion or brigade intelligence staff officer (Army; Marine Corps battalion or regiment)
SA	situational awareness**,** surface to air
SACC	supporting arms coordination center
SALT	size, activity, location, time
SAM	surface-to-air missile
SAR	synthetic aperture radar
SATCOM	satellite communications
SCDL	surveillance control data link
SCSI	small computers system interface
SEAD	suppression of enemy air defenses
SHF	super high frequency
SIDS	secondary imagery dissemination system
SIGINT	signals intelligence
SINCGARS	single channel ground and airborne radio system
SIPRNET	Secret Internet Protocol Router Network
SMO	senior meteorological and oceanographic officer
SOF	Special Operations Forces
SOF-IVM	Special Operations Forces—Intelligence Vehicle-Migration
SPINS	special instructions
SOLE	special operations liaison element
SSM	surface-to-surface missile
SYS: PTM	system plain text message

T

TA	target acquisition
TAC	tactical command post
TACFIRE	tactical fire
TACON	tactical control
TACP	tactical air control party
TACREP	tactical report
TACS	tactical air control system
TADIL-J	tactical digital information link—joint
TADIXS-B	tactical digital information exchange system—broadcast
TAI	target areas of interest

TBM	theater ballistic missile
TCP-IP	transmission control protocol/internet protocol
TDDS	TRAP (tactical related applications) data dissemination system
TEG	tactical exploitation group
TEL	transporter/erector/launcher
TF	task force
TIBS	tactical information broadcast service
TLAM	Tomahawk land attack missile
TLM	tactical land map
TMD	theater missile defense
TOC	tactical operations center
TPC	tactical pilotage chart
TPED	tasking, processing, exploitation, and dissemination
TRAP	tactical related applications
TRIXS	tactical reconnaissance information exchange system
TRP	target reference point
TST	time sensitive targeting
TT	terminal transfer
TTP	tactics, techniques, and procedures
TUAV	tactical unmanned aerial vehicle

U

U.S.	United States
UAV	unmanned aerial vehicle
UHF	ultra high frequency
UPS	uninterrupted power source
USMC	United States Marine Corps
USMTF	U.S. message text format
USSOCOM	United States Special Operations Command
UTM	universal transverse mercator

V

VHF	very high frequency
VPN	voice product network

W

WAN	wide-area network
WAS	wide-area surveillance
WGS	World Geodetic System

X

XCAS	airborne alert close air support
XINT	airborne alert interdiction

Section II - Terms and Definitions

Airborne alert interdiction (XINT). A type of interdiction mission characterized by the employment of air-to-ground aircraft from an airborne alert status against emerging or time critical targets as directed by the appropriate command and control node or agency.

Airborne mission commander (AMC). The commander responsible for coordinating combat search and rescue efforts; an airborne extension of the executing component's rescue coordination center.

Air tasking order (ATO). A method used to task and disseminate to components, subordinate units, and command and control agencies projected sorties, capabilities and/or forces to targets and specific missions.

All-source intelligence. Intelligence products and/or organizations and activities that incorporate all sources of information, most frequently including human resources intelligence, imagery intelligence, measurement and signature intelligence, signals intelligence, and open-source data.

A**rea of influence.** A geographical area wherein a commander is directly capable of influencing operations by maneuver or fire support systems normally under the commander's command and control.

Area of intelligence responsibility. An area allocated to a commander in which the commander is responsible for the provision of intelligence within the means at the commander's disposal.

Area of interest (AOI). That area of concern to the commander, including the area of influence, areas adjacent thereto, and extending into enemy territory to the objectives of current or planned operations. This area also includes areas occupied by enemy forces who could jeopardize the accomplishment of the mission.

Area of operations (AO). An operational area defined by the JFC for land and naval forces. Areas of operation do not typically encompass the entire operational area of the JFC, but should be large enough for component commanders to accomplish their missions and protect their forces.

Area of responsibility (AOR). The geographical area associated with a combatant command within which a combatant commander has authority to plan and conduct operations. In naval usage, a predefined area of enemy terrain for which supporting ships are responsible for covering by fire on known targets or targets of opportunity and by observation.

Armed reconnaissance. A mission with the primary purpose of locating and attacking targets of opportunity (such as enemy materiel, personnel, and facilities) in assigned general areas or along assigned ground communications routes, and not for the purpose of attacking specific briefed targets.

Battlefield surveillance. Systematic observation of the battle area for the purpose of providing timely information and combat intelligence.

Collection management. The process of converting intelligence requirements into collection requirements, establishing priorities, tasking or coordinating with appropriate collection sources or agencies, monitoring results and re-tasking, as required.

Collection plan. A plan for collecting information from all available sources to meet intelligence requirements and for transforming those requirements into orders and requests to appropriate agencies. The collection plan is the main output of the collection management process. Also known as collection list or collection deck.

Current intelligence. Descriptive intelligence that is concerned with describing the existing situation.

Damage assessment. The determination of the effect of attacks on targets.

Details. Request for modified J-FIRE nine-line brief

Detection. The determination and transmission by a surveillance system that an event has occurred.

Exploitation. Taking full advantage of any information that has come to hand for tactical, operational, or strategic purposes.

GUARDRAIL. Guardrail common sensor (GR/CS) is a Corps Level Airborne Signal Intelligence (SIGINT) collection/location system. The GR/CS provides near real-time SIGINT and targeting information to Tactical Commanders throughout the corps area with emphasis on Deep Battle and Follow-on Forces Attack support. It collects selected low, mid, and high band radio signals, identifies/classifies them, determines locations of their sources, and provides near-real-time reporting to tactical commanders.

Identification. The process of determining the friendly or hostile character of an unknown detected contact. In imagery interpretation, the discrimination between objects within a particular type of class.

Imagery. Collectively, the representations of objects reproduced electronically or by optical means on film, electronic display devices, or other media.

Imagery exploitation. The cycle of processing and printing imagery to the positive or negative state, assembly into imagery packs, identification, interpretation, mensuration, information extraction, the preparation of reports, and the dissemination of information.

Indicator. In intelligence usage, an item of information that reflects the intention or capability of a potential enemy to adopt or reject a course of action.

Information requirements. Those items of information concerning the enemy and his environment that need to be collected and processed to meet the intelligence requirements of a commander.

Intelligence. The product resulting from the collection, processing, integration, analysis, evaluation, and interpretation of available information concerning foreign nations, hostile or potentially hostile elements, or areas of actual or potential

operations. The term is also applied to the activity that results in the product and to the organization engaged in such activity.

Intelligence estimate. The appraisal (written or oral) of available intelligence relating to a specific situation or condition with a view to determining the courses of action open to the enemy or potential enemy and the order of probability of their adoption.

Intelligence process. The process by which information is converted into intelligence and made available to users. There are six phases in the process: planning and direction; collection; processing and exploitation; analysis and production; dissemination and integration; and evaluation and feedback.

Mosaic. An assembly of overlapping photographs that have been matched to form a continuous photographic representation of a portion of the surface of the Earth.

Moving target indicator (MTI). A radar presentation that shows only targets that are in motion. Signals from stationary targets are subtracted out of the return signal by the output of a suitable memory circuit.

Named area of interest (NAI). The geographical area where information that will satisfy a specific information requirement can be collected. NAI are usually selected to capture indications of adversary courses of action, but also may be related to conditions of the battlspace.

Near real time (NRT). Pertaining to the timeliness of data or information that has been delayed by the time required for electronic communication and automatic data processing. This implies that there are no significant delays.

Priority intelligence requirements (PIR). Those intelligence requirements for which a commander has an anticipated and stated priority in his task of planning and decisionmaking.

Reconnaissance. A mission undertaken to obtain (by visual observation or other detection methods) information about the activities and resources of an enemy or potential enemy, or to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area.

Rotator. A display of GMTI information that is consistent with movement of a radar antenna. Also known as stationary GMTI, this information, by itself, indicates movement in a specified area and needs some type of cross cueing to other systems to confirm the identity of the movement.

Surveillance. The systematic observation of aerospace, surface or subsurface areas, places, persons, or things, by visual, aural, electronic, photographic, or other means.

Synthetic aperture radar (SAR) . SAR is an active remote sensing technology which uses microwave electromagnetic energy to form complex images of terrain reflectivity. Because SAR is largely unaffected by the presence of dense cloud cover, it delivers flexibility over weather constraints, and introduces the possibility of nighttime operations.

SAR imagery. SAR imagery is a medium resolution photo-like radar image of a specified area on the ground. SAR imagery is a display of radar information in the SAR format. This information may be displayed in photographic or digital form.

Target acquisition. The detection, identification, and location of a target in sufficient detail to permit the effective employment of weapons

Target analysis. An examination of potential targets to determine military importance, priority of attack, and weapons required to obtain a desired level of damage or casualties.

Target area of interest (TAI). The geographical area where high-value targets can be acquired and engaged by friendly forces.

Targeting. The process of selecting and prioritizing targets and matching the appropriate response to them, taking account of operational requirements and capabilities.

Track. To display or record the successive positions of a moving object.

Track production area. An area in which tracks are produced by one radar station.

Verify. To ensure that the meaning and phraseology of the transmitted message conveys the exact intention of the originator.

INDEX

L

M

N

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17 March 2003

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