UNITED STATES
JOINT FORCES
COMMAND

U S J F C O M

JFIIT Tactical Leaders Handbook

Joint Fires Integration and Interoperability
Team (JFIIT)
104 Biscayne Road
Eglin AFB FL 32542-5310

November 2008 (Version 5)

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Preface

The purpose of the JFIIT Tactical Leaders Handbook (Version 5) is to provide ground maneuver commanders, battle staffs, and soldiers with information regarding Joint Intelligence, Surveillance, and Reconnaissance (ISR) and attack systems and how to leverage these combat multipliers during planning, preparation, and execution of military operations. JFIIT publishes a classified version of this document on the SIPRNET. The For Official Use Only (FOUO) Web version can be located at the NIPRNET address listed below.

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List of Key Abbreviations and Acronyms

AC2	Army Command and Control
ADAM	Air Defense and Airspace Management
AFATDS	Advanced Field Artillery Tactical Data System
ALO	Air Liaison Officer
ASR	Air Support Request
ATO	Air Tasking Order
BAE	Brigade Aviation Element
BCT	Brigade Combat Team
BDE/BN	Brigade/Battalion
C2	Command and Control
CAOC	Combined Air and Space Operations Center
CAS	Close Air Support
CCD	Charge-Coupled Device
CGS	Common Ground Station
COMINT	Communications Intelligence
CTT	Commander's Tactical Terminal
EHF	Extremely High Frequency
EO	Electro-optical
FAC(A)	Forward Air Controller (Airborne)
FLIR	Forward-Looking Infrared
FSO	Fire Support Officer
FTI	Fixed Target Indicator
GCCS	Global Command and Control System
GCS	Ground Control Station
GPS	Global Positioning System
HF	High Frequency
IBS	Integrated Broadcast Service
IBS-I	IBS-Interactive (IBS contributor)
ID	Identification
IDM	Improved Data Modem
IFF	Identification, Friend or Foe
IMINT	Imagery Intelligence
IR	Infrared

ISR	Intelligence, Surveillance, and Reconnaissance
JFO	Joint Fires Observer
JSTARS	Joint Surveillance Target Attack Radar System
JTAC	Joint Terminal Attack Controller
JTAR	Joint Tactical Airstrike Request
JTT	Joint Tactical Terminal
LANTIRN	Low-Altitude Navigation and Targeting Infrared for Night
LOS	Line of Sight
LRF	Laser Range Finder
MGRS	Military Grid Reference System
MTI	Moving Target Indicator
NAI	Named Area of Interest
OPTASK COMM	Operation Task Communications
OPTASK LINK	Operation Task Link
RFI	Request for Information
ROA/ROZ	Restricted Operations Area/Zone
ROVER	Remotely Operated Video Enhanced Receiver
SADL	Situation Awareness Data Link
SAR	Synthetic Aperture Radar
SATCOM	Satellite Communications
SCDL	Surveillance Control Data Link
SEAD	Suppression of Enemy Air Defenses
SIGINT	Signals Intelligence
SINCGARS	Single-Channel Ground and Airborne Radio System
SPINS	Special Instructions
TACP	Tactical Air Control Party
TACREP	Tactical Report
TAI	Target Area of Interest
TOC	Tactical Operations Center
UAS	Unmanned Aircraft System
UHF	Ultrahigh Frequency
VHF	Very High Frequency

URL List and Phone Numbers

JFIIT
  Classified: http://jfiit.eglin.af.smil.mil/
  Unclass: https://www.jec.jfcom.mil/jfiit/

BCT Joint ISR MTT briefing (as of 14 Feb 08)
  http://www.intelink.sgov.gov/inteldocs/view.php?
  fDocumentID=10986

CAOC ISR Ops (Collections)
  https://my.afcent.af.rel.smil.mil/cfacc/directorates/
  caoc/Pages/ISRDOPSKnowledgeWall.aspx
  SIPRNET: isrd.collshft@auab.afcent.af.smil.mil
  DSN: 318-436-3167
  JWICS VoIP: 998-3123
  VoSIP: 308-436-2017

CAOC Unit Support
  SIPRNET: isrd.unsptshft@auab.afcent.af.smil.mil
  DSN: 318-436-3088
  JWICS VoIP: 998-3193
  VoSIP: 308-436-2010

CAOC Targets
  SIPRNET: isrd.tgtsshft@auab.afcent.af.smil.mil
  DSN: 318-436-3117
  JWICS VoIP: 998-3126
  VoSIP: 308-436-2015

CAOC Imagery Support Element (ISE)
  SIPRNET: isrd.iseshft@auab.afcent.af.smil.mil
  DSN: 318-436-3160
  JWICS VoIP: 998-3293
  VoSIP: 308-436-2014

CAOC PED Assessment Web Page
  https://my.afcent.af.rel.smil.mil/cfacc/directorates/caoc/
  Pages/ISRDPEDKnowledgeWall.aspx

MNF-I Intel Web Site (collection mgmt. products)   http://www.slayer.s-iraq.centcom.smil.mil/default.aspx
JIOC-A Web Site   http://oneteam.centcom.smil.mil/sites/cfcj2/default.aspx

480 IW Operations Center (Langley AFB, VA)
  https://intelink.480iw.langley.af.smil.mil/index.htm
  Comm: 757-225-0586/0587 (or 312 prefix)
  DSN: 575-0586/0587
  VoIP (JWICS): 984-4707/4706

Joint Electronic Warfare Center (JEWC)   http://jewc.jiowc.smil.mil

DGS-1	
DSN: 312-575-4018	TS VoIP: 984-4757

DGS-2 (13 IS, Beale AFB, CA)—DART
  DSN: 312-368-4171/4373
  TS VoIP: 980-3003
  SIPRNET: dgs-2.fusioncell@beale.af.smil.mil
  JWICS: dgs2_fc@dgs2.ic.gov (reads as: dgs2_fc@...)

9 IS (Beale AFB, CA)—orthorectified IMINT products
  Note: 9 IS does not conduct 24/7 operations
  SIPRNET: 9is.dom@beale.af.smil.mil
  Secure DSN: 368-3088
  Comm: 530-634-3088

27 ISS (Langley AFB, VA)—IAS and IPL
  480 IW SIPRNET Web (access IAS/IPL):
  http://intelink.480iw.langley.af.smil.mil
  IAS SIPRNET search page:
  http://ias.480iw.langley.af.smil.mil/Search.asp
  DSN: 575-3479
  VoIP: 984-4762
  Comm: 757-225-3479

UNICORN
  https://unicorn2.480iw.langley.af.smil.mil/unicorn/index.cfm

INSCOM Portal (Army G2 Home Pages)
  http://www.portal.inscom.army.smil.mil/Lists/Portal%
  20Top%20Sites/defaultview.aspx

Google Earth: http://giat-khs.nga.smil.mil

Knowledge & Information Fusion Exchange (KniFE) Portal
  http://knife.jfcom.smil.mil.knifepub/Pages/Default.aspx

MNF-W Tactical Fusion Center (TFC)
  http://204.223.218.228/version2/

MNF-W Counter-IED Portal
  http://www.mnf-w.usmc.smil.mil

MND-B ISR LNO	
VoIP: 318-847-2475	VoSIP: 308-535-7132

MND-N
  VoSIP: 708-778-0023

MND-SE	
VoIP: 318-858-1417	VoSIP: 708-243-8030

MNF-W
  VoIP: 318-340-4246

MND-C	
VoIP: 318-822-7361	VoSIP: 708-670-1004

RC-S	
VoIP: 318-841-1460	VoSIP: 708-331-7586

Capability-to-Platform Reference Chart

Capability					
FMV	**MTI/SAR**	**EW**	**MASINT/ COMINT/ IMINT/ SIGINT**	**Armed Recce/ NTISR**	**C2**
Platform					
MQ-1 MQ-9 I-Gnat MQ-5B RQ-7B Warrior A Scan Eagle Desert Hawk RQ-11A/B FQM-151A Dragon Eye A-10* AV-8B* F-15E* F-16* F/A-18* AC-130H/U* B-1* B-52	JSTARS P-3C(AIP) RQ-4B	EA-6B EC-130H	RC-135 RC-12Q EC-130E EP-3E Nimrod R1 RC-7 U-2 C-130H	A-10 AV-8B F-15E F-16 F/A-18 AC-130H/U AH-1W UH-1N OH-58D AH-64A/D GR-1/4 GR-7/9 B-2	AWACS E-2C

* If platform is equipped with Video Downlink (VDL)-capable targeting pods.

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RC-135V/W Rivet Joint

Service	U.S. Air Force
Mission	SIGINT
Products	Threat warning, TACREPs by text and voice, radio direction finding and emitter location, data link messages
Requesting procedure	RFI via S2 and collection management channels
Comms	Clear HF, HaveQuick, clear and secure VHF, UHF, SATCOM
Data links	Links 11/16, IBS-I, IDM, Secret and Sensitive Compartmented Information (SCI) chat

Rivet Joint provides theater- and national-level consumers with near-real-time, on-scene intelligence collection, analysis, and dissemination capabilities. Data link-reported data are typically displayed on GCCS and JTT. Target data can also be disseminated via Link 16. When arriving on station, Rivet Joint may contact TACP via secure comms to receive additional tasking and receive/ provide situational updates.

Nimrod R1

Service	United Kingdom (U.K.) Royal Air Force
Mission	SIGINT
Products	Threat warning, TACREPs by text and voice, radio direction finding and emitter location, data link messages
Requesting procedure	RFI via S2 and collection management channels
Comms	UHF
Data links	Link 16 (receive only), IBS

EC-130E Senior Scout

Service	U.S. Air Force
Mission	SIGINT collection/ monitoring
Products	Threat warning, TACREPs by text and voice, radio direction finding and emitter location, data link messages
Requesting procedure	RFI via S2 and collection management channels
Voice comms	HF, UHF, VHF, SATCOM
Data links	IBS, Link 16

Senior Scout collects SIGINT. Senior Scout-reported data are shared with tactical users over Link 16, IBS, and secure/unsecure voice. Data link-reported data are typically displayed on CGS, CTT/JTT, and GCCS. When arriving on station, Senior Scout may contact the TACP via secure comms to receive additional tasking and receive/provide situational updates.

EP-3E SIGINT Aircraft

Service	U.S. Navy
Mission	SIGINT
Products	Threat warning, TACREPs by text and voice, radio direction finding and emitter location, data link messages
Requesting procedure	RFI via S2 and collection management channels
Voice comms	HF, VHF, UHF, SINCGARS, SATCOM, HaveQuick
Data links	Links 11/16, IBS-I, IDM

The EP-3E provides fleet and theater commanders worldwide with near-real-time tactical SIGINT. The aircraft exploits a wide range of electronic emissions from deep within targeted territory. When arriving on station, the EP-3E may contact TACP via secure comms to receive additional tasking and receive/provide situational updates.

RC-7 Airborne Reconnaissance-Low (ARL-M/C)

Service	U.S. Army
Mission	Multifunction reconnaissance platform
Products	COMINT, IMINT collection, designated area surveillance, MTI/SAR
Requesting procedure	RFI via S2 and collection management channels
Comms	HF, VHF, UHF

The ARL is a multifunction, day/night, all-weather reconnaissance system. There are three configurations of the ARL system: 1) the ARL-IMINT (ARL-I) configuration with an imagery payload consisting of a FLIR sensor, an IR line scanner, and a Daylight Imagery System (DIS), 2) the ARL-COMINT (ARL-C) configuration with a conventional comms intercept and direction finding (location) payload, and 3) the ARL-Multifunction (ARL-M) with IMINT, COMINT, and MTI/SAR subsystems.

RC-12Q Guardrail Common Sensor

Service	U.S. Army
Mission	SIGINT collection/location
Products	Threat warning, radio direction finding and emitter location
Requesting procedure	RFI via S2 and collection management channels
Comms	VHF/UHF, AM/FM, SSB, Continuous Wave (CW), FDM
Data links	IBS, Interoperable Data Links (IDLs) to the integrated processing facility, secure fax, Automatic Digital Network (AUTODIN), Mobile Subscriber Equipment (MSE), CTT/JTT

Key features include integrated COMINT and Electronic Intelligence (ELINT) reporting, enhanced signal classification and recognition, fast direction finding, and precision emitter location. It collects selected low-, mid-, and high-band radio signals, identifies/classifies them, and determines locations of their sources.

P-3C Orion Anti-Surface Warfare Improvement Program (AIP)

Service	U.S. Navy
Mission	Long-range surveillance, AGM-65 Maverick attack
Products	SAR, MTI, EO, and FMV
Requesting procedure	ASR for platform
Voice comms	UHF secure/nonsecure
Data links	ROVER capable
	Link types: Ku-Common Data Link (CDL); Links 11/16
	Freq.: 14.4 to 15.35 GHz
	Player: Ku player
	— or —
	Link type: C ROVER
	Freq.: 5.24 to 5.85 GHz
	Player: ROVER player

The P-3C AIP functions in an overland mission as a surveillance aircraft. It has limited strike capability with AGM-65 Maverick missiles (usually carries two). The EO video can be streamed to ROVER; however, MTI and SAR products cannot be sent off of the aircraft in a digital format. The P-3C, when equipped with the Littoral Surveillance Radar System (LSRS) can provide MTI and SAR products. A Liaison Officer (LNO) can ride aboard the P-3C to enhance C2 with ground maneuver units.

TRADITIONAL ISR PLATFORMS

C-130H Scathe View

Service	U.S. Air Force
Mission	ISR
Products	FLIR, day TV, spotter scope and LRF, imagery analysis
Requesting procedure	ASR for platform
Voice comms	2 × UHF (HQ II), 2 × VHF-AM, 2 × VHF-FM (KY-58), HF, 2 × SATCOM/Demand Assigned Multiple Access (DAMA)
Data links	ROVER capable Downlink frequencies: 55.10 and 55.74 GHz Link 16 and Blue Force Tracker (BFT)

The mission of the Scathe View system is to provide unobtrusive, long-range, and long-loiter ISR collection capability in a permissive environment. Scathe View consists of a roll-on/roll-off sensor pallet carried by specially modified C-130H aircraft. Employed with ROVER, it provides still frame and Full Motion Video (FMV) imagery downlink to ground units and can talk directly to them via assorted voice comms. The system has the capability for maintaining situational awareness via BFT and can support an LNO.

U-2

Service	U.S. Air Force
Mission	Multifunction reconnaissance platform
Products	Imagery/video
Requesting procedure	RFI via S2 and collection management channels
	Real-time RFIs can be transmitted via secure chat channels; the resulting products can be received via SIPRNET
Comms	UHF, VHF, HF

The U-2 provides continuous day or night, high-altitude, all-weather, stand-off surveillance of an area and provides critical intelligence to decision makers through all phases of conflict. The U-2 can carry a variety of sensors and cameras as well as communications relays. When arriving on station, the Distributed Common Ground System [DCGS] Analysis and Reporting Team (DART) may contact the TACP, through the U-2 pilot, via secure comms to receive additional tasking and receive/provide situational updates.

**E-8C Joint Surveillance Target
Attack Radar System (JSTARS)**

Service	U.S. Air Force
Mission	Radar ground tracking/ surveillance/C2
Products	UHF/SATCOM voice reports, Link 16 tracks, MTI, FTI, SAR images
Requesting procedures	RFI via S2 or Radar Service Request (RSR) from the CGS operator
Voice comms	HF, VHF, UHF, SATCOM, HaveQuick
Data links	SCDL, Link 16, IBS receive, BFT, Mardam-Bey Internet Relay Chat (mIRC), SIPRNET

JSTARS is designed to locate and track ground targets in all weather conditions. JSTARS can look more than 150 miles to detect ground movement. JSTARS can sense rotators, but the aircraft has no onboard ID capability. Data link-reported data are typically displayed on CGS, Joint Services Workstation (JSWS), GCCS, and Link 16 systems.

Airborne Warning and Control System (AWACS) E-3 Sentry

Service	U.S. Air Force
Mission	Airborne C2
Products	Aircraft ID, aircraft control/ deconfliction/tasking, intercept control, radio relay
Requesting procedures	C2 platform, coordinate with ALO
Comms	HF, VHF-AM, VHF-FM, UHF, SATCOM, HaveQuick
Data links	Links 11/16

AWACS provides all-weather surveillance and C2. The AWACS radar is able to detect high- and low-flying aircraft. The radar range extends beyond 200 miles (320 kilometers) for low-flying aircraft and farther for aerospace vehicles flying at medium to high altitude. Its surveillance volume is scanned by IFF, which provides a means of identifying friendly aircraft. Data link-reported data are typically shared via Links 11 and 16.

E-2C Hawkeye

Service	U.S. Navy
Mission	Airborne C2
Products	Links 11/16 surveillance air picture, aircraft ID, aircraft control/deconfliction/tasking, intercept control, radio relay
Requesting procedures	C2 platform, coordinate through the Air Officer (AO)
Comms	HF, VHF, UHF, SATCOM, HaveQuick
Data links	Links 4A, 11, and 16 Naval Tactical Data System (NTDS)

The E-2C provides all-weather, airborne early warning, airborne battle management, and C2 functions for the Carrier Strike Group and Joint Force Commander (JFC). It uses computerized radar, IFF, and electronic surveillance sensors for early warning and threat analysis for air and surface targets. The E-2C radar is able to detect high- and low-flying aircraft.

ELECTRONIC ATTACK PLATFORMS

EC-130H Compass Call

Service	U.S. Air Force
Mission	Comms counter-measures
Product	Comms jamming
Requesting procedure	RFI via S2 and collection management channels, Electronic Attack Request Form (EARF), and DD 1975
Voice comms	HF, VHF, UHF, SATCOM, HaveQuick
Data links	Links 11/16

Compass Call performs tactical Command, Control, and Communications Counter-measures (C3CM) to deny and disrupt enemy C2. The aircraft provides communications jamming and other unique capabilities to prevent communications or degrade the transfer of information essential to the C2 of weapon systems and other resources. The ATO lists the contact frequencies. The OPTASK COMM, OPTASK LINK, and SPINS list procedures, data link coordination, data link frequencies, and crypto information.

EA-6B Prowler

Services	U.S. Marine Corps, U.S. Navy
Mission	Electronic attack
Products	Electronic jamming/ attack
Requesting procedure	ASR via S2 and collection management channels, Electronic Attack Request Form (EARF), and DD 1975
Voice comms	HF, VHF (AM/FM), UHF

The EA-6B is an electronic attack aircraft. Standard missions are SEAD, communications jamming, and fleet defense. The EA-6B normally targets radar, radios, and data links.

ELECTRONIC ATTACK PLATFORMS

EC-130E/J Commando Solo

Service	U.S. Air Force
Mission	Psychological Operations (PSYOPS)
Products	Audio/visual broadcasts
Request procedure	ASR via S2 and collection management channels
Comms	HF, VHF (AM/FM), UHF, SATCOM, HaveQuick

The EC-130 conducts information operations, PSYOPS, and civil affairs broadcasts in AM, FM, HF, TV, and military communications bands. A typical mission consists of a single-ship orbit offset from the desired target audience—either military or civilian personnel.

RQ-4B Global Hawk

Service	U.S. Air Force
Mission	High-altitude, strategic ISR UAS
Products	Cloud-penetrating SAR/ ground MTI, EO and IR sensors
Requesting procedure	RFI via S2 and collection management channels
Data link	X band; not ROVER capable; Link 16

Global Hawk provides strategic reconnaissance to support Joint operations and battlefield commanders with near-real-time, high-resolution ISR imagery.

MQ-1 Predator

Service	U.S. Air Force
Mission	Medium-altitude, long-endurance, multimission UAS
Products	Full motion EO/IR video, laser designator/IR illuminator, Hellfire attack capability
Requesting procedure	RFI via S2 and collection management channels
Data links	ROVER capable
	Link type: C ROVER
	Freq.: 5.24 to 5.85 GHz
	Player: ROVER player
	— or —
	Link type: C analog
	Freq.: 4.4 to 4.85 GHz
	Player: C_L analog mIRC, Link 16, UHF

MQ-1 provides persistent ISR, targeting, strike, or other support applications to U.S. Joint strategic and tactical forces. Capabilities include LOS, SATCOM C2, SAR, real-time video and system status, and reach back for data/video dissemination, processing, and exploitation. The aircraft can employ two laser-guided Hellfire antitank missiles with the sensor ball turret. The MQ-1 aircraft will not fly into clouds and weather.

UNMANNED AIRCRAFT SYSTEMS

MQ-9 Reaper

Service	U.S. Air Force
Primary mission	High-altitude, long-endurance weapons delivery vehicle
Secondary mission	High-altitude, long-endurance persistent ISR
Products	Full motion day EO/IR video, laser designation/IR illumination, Hellfire, Guided Bomb Unit (GBU)-12, GBU-38, GBU-39, AGM-114 attack capability
Requesting procedure	ASR via S2 and collection management channels
Comms	UHF/VHF/FM mIRC, Voice-over Internet Protocol (VoIP)
Data link	ROVER capable

The MQ-9 is designed specifically as a combat (weapons delivery) vehicle. It can provide persistent ISR to U.S. Joint strategic and tactical forces. Operations include LOS, SATCOM C2, SAR, real-time video and system status, and reach back for data/video dissemination, processing, and exploitation.

Improved Gnat (I-Gnat)

Service	U.S. Army
Mission	Medium-altitude, long-endurance, multimission UAS, Hellfire attack capability
Products	Full motion EO/IR video, SAR
Requesting procedure	RFI via S2 and collection management channels
Data links	ROVER capable
	Link type: C analog
	Freq.: 4.4 to 4.85 GHz
	Player: C_L analog
	— or —
	Link type: C ROVER
	Freq.: 5.24 to 5.85 GHz
	Player: C_L analog

Missions include damage assessment, standard reconnaissance, and tactical imagery support. Capabilities include LOS, SATCOM C2, SAR, real-time video and system status, and reach back for data/video dissemination, processing, and exploitation.

Warrior A

Service	U.S. Army
Mission	Medium-altitude, long-endurance, multimission UAS, Hellfire attack capability
Products	Full motion video, EO/IR/ laser designation, SAR
Requesting procedure	RFI via S2 and collection management channels
Data links	ROVER capable
	Link type: C analog
	Freq.: 4.4 to 4.85 GHz
	Player: C_ analog
	Ku band_digital
	Freq.: 14.5 to 15.35 GHz

Missions include damage assessment, standard reconnaissance, and tactical imagery support. Capabilities include LOS, SATCOM C2, SAR, real-time video and system status, and reach back for data/video dissemination, processing, and exploitation.

MQ-5B Hunter

Service	U.S. Army
Mission	Medium-altitude, medium-endurance, multimission UAS
Products	Full motion EO/FLIR video, Green Dart (SIGINT), laser designation, Viper Strike attack capability
Requesting procedure	RFI via S2 and collection management channels
Data link	ROVER capable
	Link type: C analog
	Freq.: 4.4 to 4.85 GHz
	Player: C_L analog

Hunter supports Army field units and C2 nodes. The system is capable of assisting with real-time IMINT, artillery adjustment, battle damage assessment, reconnaissance and surveillance, target acquisition, and battlefield observation. Variants include the modified MQ-5B (weaponized) and MQ-5C Extended Hunter (E-Hunter).

RQ-7B Shadow

Services	U.S. Army brigade, U.S. Marine Corps regiments
Mission	Low- to medium-altitude, tactical ISR UAS
Product	Full motion EO/IR video, laser pointer (IR)
Requesting procedure	RFI via S2 and collection management channels to brigade or regiment staffs
Data link	ROVER capable
	Link type: C analog
	Freq.: 4.4 to 4.85 GHz
	Player: C_L analog

Shadow is designed for tactical employment at the Army brigade/battalion level. The system provides field units and C2 nodes with organic day/night ISR, target acquisition, and battlefield damage assessment capability. The system acts as an interim Class III (battalion level) UAS under the Future Combat System program. The Shadow weapon system includes four air vehicles and one ground control station, which has the capability of flying one air vehicle at a time.

UNMANNED AIRCRAFT SYSTEMS
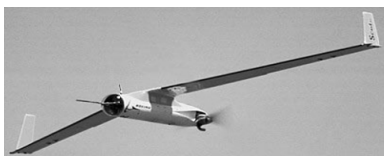
Scan Eagle

Services	U.S. Marine Corps, U.S. Navy, U.S. Army/Special Operations Forces (SOF)
Mission	Low- to medium-altitude, medium-endurance, surveillance platform
Product	Full motion EO/IR video
Requesting procedure	BCT organic asset
Data links	Link type: S band
	Freq.: 2.7 to 2.9 GHz
	— *or* —
	ROVER capable (with L band modification)
	Link type: L band
	Freq.: 1.71 to 1.85 GHz
	Player: C_L analog

Missions include damage assessment, standard reconnaissance, and tactical imagery support.

Desert Hawk

Service	U.S. Air Force
Mission	Low-altitude, short-endurance, multimission UAS
Product	Full motion EO/IR video
Requesting procedure	Organic unit asset
Data link	ROVER capable
	Link type: L band
	Freq.: 1 .71 to 1.85 GHz
	Player: C_L analog

Desert Hawk is primarily employed with the Air Force for airfield/installation/personnel protection. The complete system is known as the Force Protection Airborne Surveillance System (FPASS).
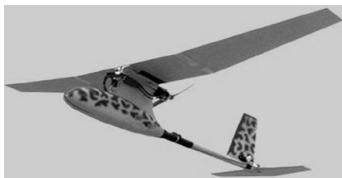
RQ-11B Raven

Services	U.S. Air Force, U.S. Army
Mission	Low-altitude, close-range tactical UAS
Product	Full motion EO/IR video, laser Illuminator
Requesting procedure	Organic unit asset
Data link	ROVER capable*
	Link type: L analog
	Freq.: 1.71 to 1.85 GHz
	Player: C_L analog

* No changes to linking ROVER with Raven A or B.

Raven is a low-altitude, close-range tactical UAS. It is a lightweight, hand-launched, close-range UAS making extensive use of FQM-151A Pointer subsystems including communications architecture and GCS. The system uses standard EO and IR sensors. It is designed for two-soldier transport, flexibility, and concealment.

FQM-151A Pointer

Service	U.S. Air Force
Mission	Low-altitude, close-range tactical UAS
Product	Full motion video, high-resolution, day color EO or black and white Low Light Level (LLL) EO camera
Requesting procedure	Organic unit asset
Data link	ROVER capable, one-way uplink with GCS
	Link type: L analog
	Freq.: 1.71 to 1.85 GHz
	Player: C_L analog

This system provides real-time, high-resolution video imagery to support maneuver battalion commanders or other users needing a short-range "eye in the sky." The one-way uplink allows a range of about 5 to 7 kilometers from the GCS.

Dragon Eye

Service	U.S. Marine Corps
Mission	Low-altitude, short-endurance, multimission UAS
Product	Full motion EO/IR video
Requesting procedure	Organic unit asset
Data link	ROVER capable
	Wearable GCS with two-way link
	Link type: L analog
	Freq.: 1.71 to 1.85 GHz
	Player: C_L analog

Dragon Eye provides real-time, high-resolution video imagery following a predetermined mission to support maneuver battalion commanders and company commanders needing a short-range "eye in the sky." The two-way uplink allows a range of about 10 kilometers from the GCS or ROVER.

A-10 Thunderbolt II

Service	U.S. Air Force
Mission	CAS/FAC(A)
Sensor	Litening pod (if equipped)
Products	Full motion EO/IR video, laser marking, command IR pointer
Requesting procedure	Preplanned ASR through the Fires cell; immediate with the Joint Tactical Airstrike Request (JTAR) through TACP
Comms	UHF, VHF-AM, VHF (AM/FM), SINCGARS,* HaveQuick
Coordinate systems	Military Grid Reference System (MGRS), L/L DD.MM.XXX (SS)?
Data links	ROVER capable** SADL X or XY

*   Currently only in theater.
** When equipped with the Litening AT pod (pg. 47), it can feed EO/IR streaming video to ROVER.

The A-10 is a CAS and FAC(A) platform with long endurance and a large weapon payload.

AV-8B Harrier II

Service	U.S. Marine Corps
Mission	CAS
Sensor	Litening pod
Products	Full motion EO/IR video, laser marking
Requesting procedure	Preplanned ASR through Fires cell; immediate with JTAR through TACP
Comms	UHF
Coordinate systems	MGRS L/L DD.MM.XXX
Data links	Automatic Target Hand-off System (ATHS) II, ROVER capable,* StrikeLink

* When equipped with the Litening AT pod (pg. 47), it can feed EO/IR streaming video to ROVER.

The AV-8B provides responsive CAS to ground forces.

GR-1/4 Tornado

Service	U.K. Royal Air Force
Mission	Interdictor/strike aircraft
Sensors	FLIR, Thermal Imaging Airborne Laser Designator (TIALD) pod
Product	Voice reports
Requesting procedure	Preplanned ASR through Fires cell; immediate with JTAR through TACP
Comms	UHF
Coordinate systems	MGRS L/L DD.MM.XXX
Data link	Link 16

The GR-1/4 provides interdiction and CAS.

ARMED RECCE/NTISR CAPABILITY

F-15E Strike Eagle

Service	U.S. Air Force
Mission	Strike fighter
Sensors	1. Sniper pod
	2. Litening pod
	3. LANTIRN pod
Products	1. IR/CCD TV, LRF, laser marking (Sniper)
	2. IR/CCD TV, laser marking (Litening)
	3. IR only, laser marking (LANTIRN)
Requesting procedure	Preplanned ASR through Fires cell; immediate with JTAR through TACP
Comms	UHF, UHF HaveQuick
Data links	Link 16, ROVER III*

* When equipped with the Litening AT
   pod (pg. 47), it can feed EO/IR
   streaming video to ROVER.

The F-15E performs day and night, all-weather
air-to-air and air-to-ground missions including strategic
strike and interdiction. Although primarily a deep
interdiction platform, it can also perform CAS and
escort missions. Sniper/Litening pod-equipped F-15Es
can provide targeting data, laser designation, and
observation capability to ground forces.

ARMED RECCE/NTISR CAPABILITY

F-16 Fighting Falcon

Service	U.S. Air Force, Coalition and NATO air forces
Mission	Multirole attack/fighter
Sensors	1. Sniper
	2. Litening
	3. LANTIRN
Products	1. IR/CCD TV, LRF, laser marking (Sniper)
	2. IR/CCD TV, laser marking (Litening)
	3. IR only, laser marking (LANTIRN)
Requesting procedure	Preplanned ASR through Fires cell; immediate with JTAR through TACP
Comms	UHF, VHF (AM/FM)
Data links	Link 16, IDM, IDT, SADL, ROVER capable*

* EO/IR streaming video to ROVER when equipped with Litening AT pod (pg. 47). F-16C (Block 25/30) SADL capable. F-16CG (Block 40)/CJ (Block 50) Link 16/IDM capable. Block 40/50 collectively referred to as F-16CM. SADL and Link 16 need the Air Support Operations Center (ASOC) Gateway for digital messaging. IDM is an LOS system not requiring a gateway.

The F-16 is a multirole attack fighter. Sniper/Litening AT pod-equipped F-16s provide targeting data, laser designation, and observation capability to ground forces. F-16C/J models are used primarily for SEAD missions employing the AN/ASQ-213 High-Speed Antiradiation Missile [HARM] Targeting System (HTS).

ARMED RECCE/NTISR CAPABILITY

F/A-18 Hornet

Services	U.S. Marine Corps, U.S. Navy
Mission	Multirole fighter/attack
Sensors	FLIR, SAR, ATARS (D model only, EO/IR camera), Litening targeting pod (Marine Corps), ATFLIR targeting pod (Navy), SHARP EO/IR photo reconnaissance
Products	Full motion EO/IR video, laser marking, target data, observation capability
Requesting procedure	Preplanned ASR through Fires cell; immediate with JTAR through TACP
Comms	Multiband (UHF/VHF), SINCGARS
Data links	Link 16 Digital CAS system (modem) StrikeLink ROVER capable* Link type: L analog Freq.: 1.71 to 1.85 GHz Player: C_L analog

* When equipped with Litening AT pod (pg. 47), it can feed EO/IR streaming video to ROVER.

Roles include air superiority, fighter escort, SEAD, reconnaissance, forward air control, close and deep air support, and day and night strike missions. It is also F/A-18D Advanced Tactical Aerial Reconnaissance System (ATARS) capable. Navy F-18s carry the Advanced Targeting FLIR (ATFLIR) targeting pod; Marine Corps F-18s carry the Litening targeting pod.

ARMED RECCE/NTISR CAPABILITY

GR-7/9 Harrier

Service	U.K. Royal Air Force
Mission	Multirole attack/ fighter
Sensor	FLIR
Product	Voice reports
Requesting procedure	Preplanned ASR through Fires cell; immediate with JTAR through TACP
Comms	UHF

The aircraft has a comprehensive weapons capability including bombs, rockets, or missiles and can operate at night, at low level, using Night Vision Goggles (NVGs).

ARMED RECCE/NTISR CAPABILITY

AC-130H/U Gunship

Service	U.S. Air Force
Mission	CAS, precision fire support, armed reconnaissance, limited ISR
Sensors	EO TV, Low Light Level (LLL) TV, FLIR, IR
Products	Full motion EO/IR video, laser designation, laser illumination
Requesting procedure	Preplanned ASR through Fires cell; immediate with JTAR through TACP
Voice comms	HF, VHF (AM/FM), UHF, SATCOM, HaveQuick
Data links	ROVER capable
	Link type: C ROVER
	Freq.: 5.24 to 5.85 GHz
	Player: ROVER player
	Cursor on Target (CoT) link with Special Operations Forces (SOF) Battlefield Air Operations (BAO) kit

Roles of the aircraft include CAS, air interdiction, and armed reconnaissance.

B-1B Lancer

Service	U.S. Air Force
Mission	All-weather, long-range, multirole heavy bomber capable of strategic and tactical interdiction missions
Sensor	Sniper pod fleet upgrade ongoing
Requesting procedure	Preplanned ASR through Fires cell; immediate with JTAR through TACP
Comms	HF, VHF, UHF, EHF, Combat Track II, HaveQuick capable

The B-1B is a long-range, multirole, heavy bomber capable of delivering precision-guided conventional and nuclear munitions. Inertial navigation equipment enables aircrews to navigate globally, update mission profiles and target coordinates in-flight, and precision bomb without the need of ground-based navigational aids. Upgrades are improving the B-1B's limited ISR capability. The aircraft is ROVER capable and is equipped with the Litening AT pod (pg. 47).

B-52 Stratofortress

Service	U.S. Air Force
Mission	All-weather, long-range, multirole heavy bomber capable of strategic and tactical interdiction missions
Sensor	Litening II pod upgrade
Products	IR/CCD video, laser marking (Litening)
Requesting procedure	Preplanned ASR through Fires cell; immediate with JTAR through TACP
Comms	HF, VHF, UHF, EHF, SATCOM, HaveQuick capable
Data link	ROVER capable*

* When equipped with the Litening AT pod (pg. 47), it can feed EO/IR streaming video to ROVER.

The B-52 is a heavy bomber capable of delivering both precision-guided conventional and nuclear munitions. The aircraft has long-range strike and is used in the CAS role using Joint Direct Attack Munitions (JDAMs). The fleet is being fitted with the Litening II pod. Upgrades will make the aircraft capable of limited ISR.

B-2 Spirit

Service	U.S. Air Force
Mission	Multirole heavy bomber capable of deep strike missions
Requesting procedure	Preplanned ASR through Fires cell; immediate with JTAR through TACP
Comms	VHF/UHF, HF, EHF, SATCOM, HaveQuick capable
Data link	Link 16 capable

The B-2 is a multirole bomber capable of delivering both conventional and nuclear munitions.

Fixed-Wing Aircraft Capabilities and Communications Equipment

Aircraft	Ordnance	Marking Capability	Beacon	Other Systems	Freq. Band	Freq. Hopping	Secure Capable
AV-8B	LGB, AGM-65E, GP bombs, CBU, JDAM, 2.75-in rockets, 5-in Zuni	Rockets, 25-mm, LTM, LUU-2/19 flares	None	CCD TV, NVG, GPS, FLIR, Litening pod, SAR[1]	UHF VHF-AM/FM	HQ II SINCGARS	KY-58
A-10A/C	LGB, AGM-65, GP bombs, CBU, JDAM[2], 2.75-in rockets, 30-mm cannon	Illum/WP rockets, LTD, LTM, 30-mm, LUU-⅛/ 5/6/19 flares	None	NVG, GPS, Litening pod	UHF VHF-AM/FM	HQ II	KY-58
AC-130H	105-mm howitzer (136 rds), 40-mm cannon (512 rds)	105-mm, 40-mm, IZLID, ATI	PPN-19, SST-181, SMP-1000/2000	FLIR, GPS, PLS, LLLTV, beacon, tracking rdr	UHFx2 SATCOM HF VHF-AM/FMx3	HQ II No No SINCGARS	KY-58/100 KY-58/100 KYV-5 KY-58
AC-130U	105-mm howitzer (100 rds), either 2x30-mm (1004 rds) or 1x40-mm (256 rds), 1x25-mm cannon (3000 rds)	105-mm, 40-mm, 25-mm, LIA	PPN-19 SST-181 SMP-1000/2000	FLIR, GPS, ALLTV, SAR[1]	UHFx2 SATCOM HF VHF-AM/FMx3	HQ II No No SINCGARS	KY-58/100 KY-58/100 KYV-5 KY-58
B-1B	JDAM, GP bombs, CBU/WCMD	None	PPN-19 SMP-1000	SAR[1], GPS, NVG	UHF or SATCOM VHF/UHF HF	HQ II SINCGARS	KY-58 KY-100
B-2	JDAM, JSOW, GP bombs, CBU	None	X band KU band	SAR[1], GPS	VHF/UHF HF SATCOM	HQ II No	KY-58 KY-100
B-52	JDAM, GP bombs, CBU/WCMD, LGB	None	PPN-19 PPN-20 SMP-1000	FLIR, LLLTV, radar, NVG, GPS	VHF/UHF HF SATCOM	HQ II	KY-58/100 KYV-5
F-15E	JDAM, LGB, CBU/WCMD, EGBU-28, GP bombs, AGM-130/65, GBU-15/24, JSOW, 20-mm	LTD, LTM	None	NVG, FLIR, GPS, SAR[1], Link 16, Sniper, Litening, LANTIRN	UHF UHF/ VHF/FM	HQ II HQ II	KY-58 KY-58
F-16	JDAM, LGB, GP bombs, CBU/WCMD, HARM[5], AGM-65, JASSM, 2.75-in rockets, 20-mm cannon	LTM, LTD, rockets	None	GPS, SADL[3], IDM/IDT[4/5], NVG, Link 16[5/6], Sniper/ Litening, HTS[5], HMCS[5/6]	UHF VHF-AM/FM	HQ II No	KY-58 KY-58

Source: FM 3-09.32/MCRP 3-16.6A/NTTP 3-09.2/AFTTP(I) 3-2.6, Table 17, Dec 07

Fixed-Wing Aircraft Capabilities and Communications Equipment

Aircraft	Ordnance	Marking Capability	Beacon	Other Systems	Freq. Band	Freq. Hopping	Secure Capable
F-18A/ C/D/E/F	JDAM, JSOW, HARM, AGM-65E/F, CBU, GP bombs, SLAM (+ER), LGB, 2.75-in rockets, 5-in Zuni, 20-mm cannon	LTM, LTD, rockets, LUU-2/19 flares	None	GPS, SAR[1], Link 16, NVG, Litening AT, ATFLIR, NightHawk	UHF VHF-AM/ FM	HQ II SINCGARS	KY-58
F-22A	JDAM	None	None	GPS, NVG, Link 16	UHF VHF-AM	HQ II	KY-58 KY-58
P-3	SLAM-ER, various	None	None	SAR[1]	VHF/UHF HF SATCOM	HQ II	KY-58 Link 11
MQ-1B Predator	AGM-114[7] (K, M, N, P)	LTD, LTM	None	FLIR, GPS, EO	UHF VHF-AM/ FM SATCOM ROVER	No	KY-100
MQ-9 Reaper	AGM-114[7], (K, M, N, P), GBU-12	LTD, LTM	None	FLIR, GPS, EO	UHF VHF-AM/ FM SATCOM ROVER	No	KY-100
Pioneer		None	None	FLIR, EO			
RQ-7 Shadow		LTD		FLIR, EO			
RQ-11 Raven		LTM[8]		FLIR, EO			
GR-4 Tornado (U.K.)	EPW II & III, PW II &III, PW IV (IOC 2009), Mk-83, CBU, ALARM, Storm-shadow, Brimstone, 27-mm cannon	LTD, LTM	None	FLIR, LST, NVG, gnd mapping radar with TFR	UHF VHF-AM	HQ I & II	Yes
GR-7/9 Harrier (U.K.)	EPW II , PW II/III/IV, GP 1000-lb and 540-lb, CBU, Brimstone, (IOC 2008), CRV7, AGM-65	LTD, LTM, GP	None	FLIR, LST, NVG, gyro binoculars, TIALD, Sniper	UHF VHF-AM Tac VHF	HQ I & II	Yes

Notes:
[1] SAR with ground mapping modes [5] Block 50/52
[2] A-10C only [6] Some Block 40/42
[3] Block-25/30/32 [7] Predator equipped with Hellfire; no SAR capability
[4] Block 40/42 [8] Raven B only
HQ is HaveQuick

Source: FM 3-09.32/MCRP 3-16.6A/NTTP 3-09.2/AFTTP(I) 3-2.6, Table 17, Dec 07

ARMED RECCE/NTISR CAPABILITY

AH-1W Super Cobra

Service	U.S. Marine Corps
Mission	Attack helicopter, CAS/FAC(A)
Sensors	FLIR, CCD TV, Direct View Optics (DVO)
Products	Recorded day TV/FLIR video (VHS), voice reports
Request procedure	Air request
Comms	Multiband (UHF/VHF/FM), SINCGARS/HaveQuick
Data link	Not applicable

The AH-1W standard mission includes all-weather attack, direct air support, antitank, armed escort, and Nontraditional ISR (NTISR).

UH-1N Huey

Service	U.S. Marine Corps
Mission	Light utility helicopter
Sensors	FLIR, CCD TV
Products	Recorded day TV/FLIR video (8 mm), voice reports
Request procedure	Air request
Comms	Multiband (UHF/VHF/FM), SINCGARS/HaveQuick
Data link	Not applicable

The Marine Corps uses the UH-1N for a variety of missions to include C2, transport, troop insertion/extraction, fire support coordination, medical evacuation, search and rescue, and armed escort/visual reconnaissance. It is capable of delivering rocket and machine gun fires, and its third-generation FLIR makes it a more capable observation platform than its Marine Corps counterpart, the AH-1W Super Cobra. The UH-1N is also FAC(A) capable.

OH-58D Kiowa Warrior

Service	U.S. Army
Mission	Light scout helicopter
Sensors	Thermal Imaging System (TIS), day/night Automatic Target Hand-off System (ATHS)
Product	Airborne Video Tape Recorder (AVTR)
Request procedure	Via Air Mission Request (AMR)
Comms	VHF-FM, SINCGARS, UHF, HaveQuick, VHF-AM
Data link	IDM

The Kiowa provides armed reconnaissance for attack helicopter and air cavalry units.

AH-64A/D Apache

Service	U.S. Army
Mission	Attack helicopter
Sensors	Pilot Night Vision System (PNVS), Target Acquisition Designation Sight (TADS), day TV, TADS FLIR, Direct View Optics (DVO)
Products	Recorded day TV/FLIR video, tactical voice reports
Request procedure	Via Air Mission Request (AMR)
Comms	VHF-FM, UHF, VHF-AM
Data link	IDM (where fielded), Blue Force Tracker (BFT)

Apache is the Army's primary attack helicopter. The principal mission is the destruction of high-value targets with the Hellfire missile.

Rotary-Wing Aircraft Capabilities and Communications Equipment

Aircraft	Service	Ordnance	Marking Capability	Other System	Freq. Band	Freq. Hopping	Secure Capable
UH-1N/Y	USMC	7.62 MG, .50-cal MG, 2.75-in rockets	WP rockets, LTM, LTD	NVG, GPS, BRITE STAR, STAR SAFIRE	UHF VHF-AM/ FM	HQ II SINCGARS	KY-58
AH-1F[1]	Foreign	TOW, 2.75-in rockets, 20-mm cannon	Rockets	NVG	UHF VHF-AM/ FM		
AH-1W/Z	USMC	TOW, Hellfire B/K/ N/M, 2.75/5-in rockets, 20-mm cannon	Rockets, LTM, LTD[2]	NVG, GPS, NTS (W only), TSS (Z only)	UHF VHF-AM/ FM	HQ II SINCGARS	KY-58
AH-64A	USA	Hellfire, 2.75-in rockets, 30-mm cannon	LTM, LTD[3], rockets	FLIR, GPS, NVG, DTV/DVO	UHF VHF-FMx2 VHF-AM	HQ I or II SINCGARS	KY-58 KY-58
AH-64D	USA	Hellfire (laser or RF), 2.75-in rockets, 30-mm cannon	LTM, LTD[3], rockets	FLIR, INS/ GPS, NVG, MMW rdr, DTV/DVO, IDM	UHF VHF-FMx2 VHF-AM	HQ II SINCGARS	KY-58 KY-58
OH-58D	USA	Hellfire, 2.75-in rockets, .50-cal MG	Laser, rockets	FLIR, TVS, NVG, IDM	VHF-FM UHF	SINCGARS HQ II	KY-58
MH-53J	USAF	7.62 MG, .50-cal MG	None	FLIR, GPS, INS, NVG, TFR	UHF UHF-AM/ FM VHF-AM HF SATCOM	Yes Yes SINCGARS Yes No	KY-58 No KY-100 USC-43 (ANDVT)
AH-6	USA	7.62 MG, .50-cal MG, Hellfire, TOW, 2.75-in rockets, 30-mm chain gun, MK 19 40-mm grenade MG, ATAS	Rockets	NVG, GPS, FLIR	VHF-FM UHF	SINCGARS	KY-58
CH-47	USA	7.62 MG	None	NVG, GPS	VHF-FM UHF	SINCGARS	KY-58

Notes:
[1] AH-1F is no longer in service in the U.S. Army but is widely used by other nations
[2] AH-1W can designate codes 1111-1788 but has max. effectiveness from 1111-1148
[3] AH-64 can designate codes 1111-2888 but cannot designate codes containing "9"

HQ is HaveQuick

Source: FM 3-09.32/MCRP 3-16.6A/NTTP 3-09.2/AFTTP(I) 3-2.6, Table 18, Dec 07
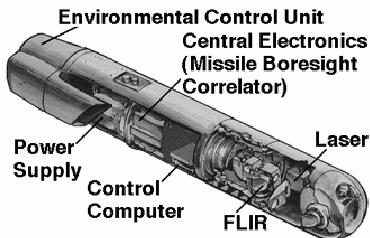
LANTIRN Targeting Pod AN/AAQ-14

Aircraft	F-15E, F-16C/D
Sensors	IR, IR laser designator, and ranging
Product	Full motion IR video (no TV) in cockpit only
Data link	No ground data link; the pilot can share target designations with wingmen via Link 16 and convey target data to others via voice communications

Role: Pod contains a high-resolution FLIR sensor, a laser designator range finder for precise delivery of laser-guided munitions, and a missile bore-sight correlator for automatic lock on of AGM-65D-imaging IR Maverick missiles.

Legacy pod: Marginally capable of positive ID of targets at low altitude.

PODS

Litening

Aircraft	AV-8B, A-10, B-52H, F-15E, F-16 Block 25/30/32/40/42/50/52, F/A-18
Sensors	IR marker, Laser Spot Search (LSS), Laser Spot Track (LST), LRF and laser designation (guidance), CCD TV (day TV)
Products	Day/night video, laser designation, IR/EO targeting (all in cockpit). Coordinate generation for targeting with GPS-guided weapons. Positive ID at medium altitudes using TV. Positive ID at low to medium altitudes using IR.
Data links	Some models are ROVER capable— if data link module is installed
	Link type: C ROVER
	Freq.: 5.24 to 5.85 GHz
	Player: ROVER player
	— *or* —
	Link type: C analog
	Freq.: 4.4 to 4.85 GHz
	Player: C_L analog

Litening provides day, night, and under-the-weather attack of ground targets with a variety of weapons (i.e., laser-guided bombs, conventional bombs, and GPS-guided weapons).

Advanced Targeting FLIR (ATFLIR) AN/ASQ-228

Aircraft	F/A-18A-F
Sensors	Common optical path EO/IR camera, IR marker, Laser Spot Search (LSS), Laser Spot Track (LST), LRF, and laser designation (guidance)
Products	Day/night video, laser designation, IR marker; Cat. II coordinate generation; positive ID at medium altitudes day or night
Data link	ROVER capable—if data link module is installed in aircraft
	Link type: L-band analog
	Freq.: 1.71 to 1.85 GHz
	Player: C_L analog

The ATFLIR is the U.S. Navy's most recent targeting pod for its fleet of F/A-18 Hornets and Super Hornets. The common optical path allows operators to simultaneously view, track, laser designate, and IR mark a target. ROVER video may be sent if the aircraft has the proper antenna and link modules installed.

PODS

Shared Reconnaissance Pod (SHARP) AN/ASD-12(V)

Aircraft	F/A-18E/F
Sensors	CA-279M—EO, IR Medium Altitude Sensor (MAS)
Products	High-resolution (positive ID), EO/IR imagery from up to 15 nautical miles (nm); able to provide image swaths up to 2-nm wide
Data link	Airborne Modem Assembly (AMA)
	Ku band: 274 Mbps
	Freq.: 14.4 to 14.93 GHz downlink
	Freq.: 15.15 to 15.35 GHz uplink

This pod contains a high-resolution EO/IR camera able to image up to a NIIRS 4 rating in the visual spectrum and a NIIRS 3 in the IR spectrum. The data link system is capable of transmitting these images directly from the Digital Storage System (DSS) to a ground station (TCDL or CMDL 274 Mbps capable). The ground station must be able to view NITFS 2.1 file formats and must have coordinated communications uplink and downlink frequencies prior to aircraft launch. Postflight imagery is downloaded, processed by intelligence, and disseminated via the SIPRNET or other secure channels. Ground/Intel units may request preplanned imagery of NAIs via an ASR for On-call Reconnaissance (XREC) or immediate support may be requested through the ASOC.

Sniper Extended Range (XR)/ Advanced Targeting Pod (ATP)

Aircraft	F-15E, F-16 Block 30/40/50, A-10, B-1*
Sensors	IR marker, Laser Spot Search (LSS), Laser Spot Track (LST), LRF and laser designation (guidance), CCD TV (day TV)
Products	Full motion IR/EO video in cockpit. Positive ID at medium to high altitude (IR/TV). Coordinate generation for targeting with GPS-guided weapons. Laser designator, laser spot tracking, and marking.
Data link	ROVER capable
	Link type: C analog
	Freq.: 4.4 to 4.85 GHz
	Player: C_L analog

* Being integrated on the B-1.

The long-range targeting pod features a third-generation, mid-wave FLIR system and is very capable of identifying, tracking, and targeting at medium to high altitudes. The F-16 carries the pod for tactical reconnaissance.
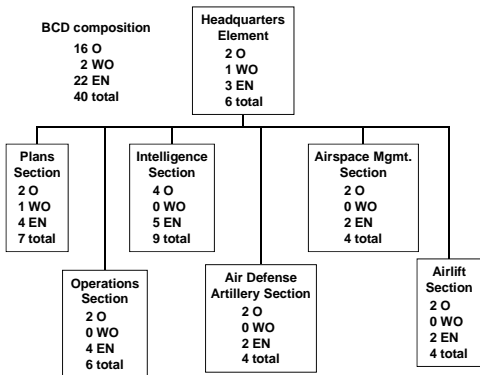
Combined Air and Space Operations Center (CAOC)

Service: U.S. Air Force

Description: Centralized planning and execution cell for Air Force and Joint/Combined air and space operations.

Role: The CAOC planning cell provides assets for gaining/maintaining air superiority and matches airstrike assets against the Joint/Combined Forces Commander's prioritized target list including preplanned CAS. The CAOC allocates assets to cover immediate CAS requests and to support time-sensitive target requirements. The CAOC is the nerve center in which C2 for the air war is accomplished. The planning staff produces a Master Air Attack Plan (MAAP). When the MAAP is approved, the CAOC produces the ATO. The ATO provides the details (e.g., sortie counts, timing, ordnance loads, and target locations) necessary for the individual flying units and C2 elements to plan for MAAP execution. The Current Operations cell monitors ATO execution and makes adjustments, as needed, to meet requirements levied after the ATO was published (including immediate requests for CAS and discovery of high-priority and fleeting targets). The current AOC has a very large footprint and consists of multiple systems providing information and planning tools on multiple work-stations. The CAOC normally includes a Naval Aviation Liaison Element (NALE), a Marine Corps Liaison Officer (MARLO), a Joint Interface Control Officer (JICO) cell, an Army Air Defense Artillery Fire Control Officer (AADAFCO) or an Air Defense and Airspace Management (ADAM) cell, a Battlefield Coordination Detachment (BCD), and a Special Operations Liaison Element (SOLE). These liaison elements enable the CAOC to make coordinated, real-time adjustments to the ATO when needed.

C2 NODES/RECEIVERS AND DISPLAY SYSTEMS/ DIGITAL CONNECTIVITY NETWORKS

BCD composition
16 O
2 WO
22 EN
40 total

Headquarters Element
2 O
1 WO
3 EN
6 total

Plans Section
2 O
1 WO
4 EN
7 total

Intelligence Section
4 O
0 WO
5 EN
9 total

Airspace Mgmt. Section
2 O
0 WO
2 EN
4 total

Operations Section
2 O
0 WO
4 EN
6 total

Air Defense Artillery Section
2 O
0 WO
2 EN
4 total

Airlift Section
2 O
0 WO
2 EN
4 total

Battlefield Coordination Detachment (BCD)

Service: U.S. Army

Description: Senior liaison element provided by Commander Army Forces (COMARFOR) to integrate ground force requirements.

Role: The BCD facilitates the synchronization of air operations with Army ground operations through the coordination of air support and the exchange of operational and intelligence data. As the senior liaison unit for COMARFOR, the BCD serves as the conduit for which Army requests for air support and airspace are managed. The BCD uses the following Army Battle Command Systems (ABCSs)—Advanced Field Artillery Tactical Data System (AFATDS), All Source Analysis System (ASAS), Tactical Airspace Integration System (TAIS), Air and Missile Defense Workstation (AMDWS), and Global Command and Control System-Army (GCCS-A). The BCD receives preplanned ASRs and the Army's airspace plan from the senior Army element in theater (can be a division, corps, or Army headquarters) and facilitates getting the Army's requests on the ATO/ACO.

Air Support Operations Center (ASOC)

Service: U.S. Air Force

Description: Key Air Force Tactical Air Control System (TACS) agency involved in coordinating CAS for ground forces; it is comparable to the Marine Corps Direct Air Support Center (DASC).

Role: It performs coordination, direction, and control of the air effort to support land forces' maneuver objectives, usually at Army corps level and below. The ASOC is an operational component of the TACS, subordinate to the Air and Space Operations Center (AOC). The ASOC usually collocates with the tactical or main Fire Support Element (FSE) and Army Command and Control (AC2) element in the corps Tactical Operations Center (TOC). The ASOC processes requests for immediate CAS (submitted by ground maneuver forces).

Direct Air Support Center (DASC)

Service: U.S. Marine Corps

Description: Central coordination point for all aircraft support to Ground Combat Element (GCE) agencies at all echelons; it is comparable to the Air Force ASOC.

Role: The DASC processes requests for immediate air support, casualty evacuations, and assault support. It is responsible for integrating Marine aviation as a supporting arm to ground maneuver forces and uses procedural control to route itinerant aircraft through the Marine Corps Air Officer (AO). It is subordinate to the Marine Tactical Air Command Center (TACC) and is in direct support of the senior Marine Air-Ground Task Force (MAGTF) commander.

Air Defense and Airspace Management (ADAM) Cell and Brigade Aviation Element (BAE) Cell

Service: U.S. Army

Description: AC2 management

Role: Plan, coordinate, and establish connectivity and interoperability with available Joint and coalition sensors and forces in order to provide real-time data for Air Missile Defense (AMD) early warning, aerial situational awareness, and airspace management.

ADAM/BAE mission

- Air assault
- Air-ground integration and close combat attack
- Attack
- Reconnaissance and surveillance
- Staff planning and coordination
- Air defense

Communications

Agency	Freq. Band[1]	Freq. Hopping	Secure Capable
ASOC (USAF)	HF/VHF, AM/FM/UHF multiband SATCOM, JTIDS microwave	SINCGARS HQ II	KY-57 KY-99
DASC(A) KC-130 (USMC)	UHF-AM, VHF-AM/FM, HF, UHF SATCOM, VIASAT	HQ I/II SINCGARS[2]	KY-58 KY-58 KY-99 KY-99
DASC (USMC)	UHF/VHF-AM, HF, SATCOM	HQ II SINCGARS	KY-58 KY-99
JSTARS[3]	VHF-AM/FM, UHF-AM, UHF SATCOM, JTIDS, Link 16, IDM, SCDL, HF	HQ II	KY-58 KY-58 KYV-5 (ANDVT)
E-3 AWACS	VHF-AM/FM, UHF-AM, UHF SATCOM, HF	HQ II	KY-58 KY-58 KY-75/KYV-5
E-2C (USN)	VHF/UHF-AM/FM, HF, SATCOM JTIDS/Link 16	HQ II, JTIDS	KY-57/-58 JTIDS

[1] Frequency bands for ground radios are as follows:
  HF = 2.000 to 29.999 MHz in 1 kHz increment
  VHF-FM = 29.950 to 79.950 MHz in 50 kHz increments
  VHF-AM = 116.000 to 149.975 MHz in 25 kHz increments
  UHF = 225.000 to 399.975 MHz in 25 kHz increments
[2] No frequency hopping capability
[3] JSTARS frequencies:
  HF = 2.000 to 29.999 MHz in 1 kHz increment
  VHF-FM = 30.000 to 87.975 MHz in 25 kHz increments
  VHF-AM = 108.000 to 115.975 MHz in 25 kHz increments (receive only)
  VHF-AM = 116.000 to 151.975 MHz in 25 kHz increments (transmit/ receive)
  UHF = 225.000 to 399.975 MHz in 25 kHz increments

HQ is HaveQuick

Source: FM 3-09.32/MCRP 3-16.6A/NTTP 3-09.2/AFTTP(I) 3-2.6, Dec 07

Distributed Common Ground System (DCGS)

Service: Joint

Description: DCGS is the architecture that integrates the processing, exploitation, and distribution operations for Air Force U-2s, Global Hawks, and Predators. It includes five Deployable Ground Systems (DGSs) located around the globe.

Role: The DGS acts as the "back-end" crew for U-2, Global Hawk, and Predator missions fusing intelligence from multiple sources. The DGS conducts first-phase exploitation and produces and distributes IMINT, SIGINT, and imagery-derived Measurement and Signature Intelligence (MASINT) products to customers in all Services. They all share the DCGS Integration Backbone (DIB). For more information, reference the following SIPRNET Web site:

http://www.goodfellow.af.smil.mil.17TRSS/
TSW/dcgs101/index.html

Common Ground Station (CGS) JSTARS

Services: U.S. Army, U.S. Marine Corps

Description: CGS is a mobile, multisensor IMINT tactical data processing and evaluation center.

Role: CGS processes data from JSTARS CTT, JTT, and UAS. It disseminates intelligence, battle management, and targeting data to Command, Control, Communications, and Intelligence (C3I) nodes via Local Area Network (LAN), wire, or radio. A CGS can feed a Joint Services Workstation (JSWS) in a TOC to give C2 visibility into JSTARS MTI, FTI, UAS video, and IBS data on a single workstation. This enables integrated battle management, surveillance, targeting, and interdiction plans to be developed/executed using near-real-time data.

Prophet

Service: U.S. Army

Description: The Military Intelligence (MI) battalion at the division Tactical Center (TAC) and TOC, or the regimental equivalents, employs Prophet Control. Prophet Control can be deployed at the brigade TOC when in a force protection contingency operation. Prophet Control is capable of supporting operations during displacement (hot jump). All sensors will receive their technical data from the Prophet Control element.

Role: Prophet Air is fielded to the aviation element of the division or Armored Cavalry Regiment (ACR). Prophet Ground is deployed into the area of operations to facilitate the mobility of the team and enhance the sensor capabilities through additional receivers and/or extended antennae mounted on the vehicle. The Prophet Control element, along with the SIGINT section of the division Airborne Command Element (ACE), should support BCT execution of tactical control by recommending suitable sites for the Prophet Ground sensors to deploy based on technical and tactical factors.
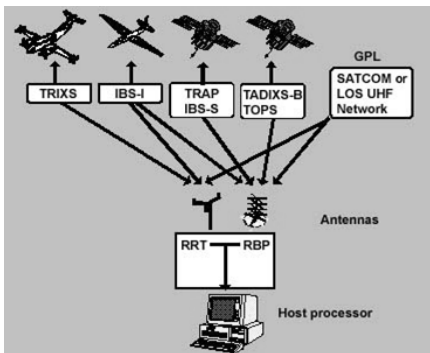
Joint Tactical Terminal (JTT)

Service: Joint

Description: JTT is a special application, UHF tactical intelligence terminal that provides the capability to disseminate time-sensitive Command, Control, Communications, Computers, and Intelligence (C4I) and battlefield targeting information to tactical commanders and intelligence nodes.

Role: The terminals supply the critical data link to battle managers, intelligence centers, air defense, fire support, and aviation nodes across all Services. JTT is integrated into other weapon systems and is transported with the host system/platform. The equipment is mounted in fixed- and rotary-wing aircraft, surface ships, and fixed or mobile ground platforms and vehicles.
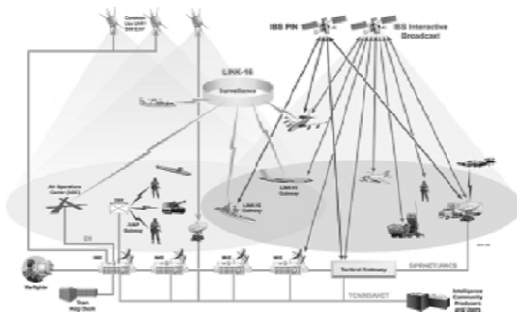
Integrated Broadcast Service (IBS)

Service: Joint

Description: IBS integrates multiple intelligence broadcasts into a system of systems and migrates tactical receive terminals into a single, related JTT family. The goal of the IBS is to resolve the uncoordinated proliferation of "stove-piped" intelligence/information (SIGINT) broadcasts by providing the tactical commander with integrated time-sensitive tactical information. IBS incorporates Integrated Broadcast Service-Simplex (IBS-S) and Integrated Broadcast Service-Interactive (IBS-I), Tactical Related Applications (TRAP), Multi-TADIL Network (MTN), Near-Real-Time Dissemination (NRTD), and Tactical Reconnaissance Intelligence Exchange System (TRIXS).

Role: IBS data are received and displayed on CTTs, JTTs, and Tactical Receive Equipment (TRE), which also populate intelligence databases used to display data on GCCS. See OPTASK COMM for frequencies and crypto requirements.

Link 16 Network

Service: Joint and Combined

Description: Link 16 is the designation of a tactical data link that is integrated into the operations of Joint Services, NATO, and other allies.

Role: Link 16 exchanges real-time tactical data among military units. Most aircraft and ground-based air operations C2 nodes use Link 16.

The OPTASK COMM, OPTASK LINK, and SPINS list Link 16 procedures, data link coordination, data link frequencies, and crypto information.

Link 16 is an air-to-air, air-to-ground, and ground-to-ground LOS capability.

Link 16 has frequency hopping capability and is a secure data link.

TACP CASS Interoperability

Legend:

– →	VMF
←→	Compatibility issue
·····	AFAPD
→	Link 16
→	MTS
•—•	SADL
=	SATCOM
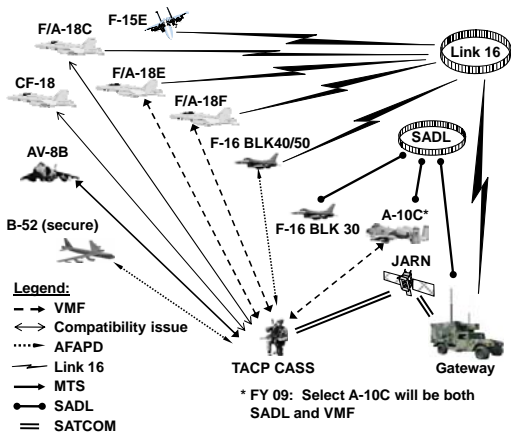
AFAPD	Air Force Applications Program Development	SADL	Situation Awareness Data Link
		SATCOM	Satellite Communications
CASS	Close Air Support System	TACP	Tactical Air Control Party
JARN	Joint Air Request Net	VMF	Variable Message Format
MTS	Marine Tactical System		

*** FY 09: Select A-10C will be both
SADL and VMF**

TACP CASS is a combination of hardware and software tools that provides digital messaging capability between conventional U.S. Air Force JTACs and TACPs, select JCAS platforms (AV-8B, F-16 Block 40/50, and F/A-18), and the ASOC.

Catalyst for initial fielding
- Reduce fratricide potential
- Provide a digital SATCOM-based air request net and the ability to track TACP positions in the battlespace.

When employed with the ASOC Gateway, TACP CASS can receive select Link 16 and SADL messages and publish targets (land tracks) and reference and emergency points (J3.5, J3.0, and J3.1). The ASOC Gateway provides TACP CASS users with beyond line-of-sight "electronic" target mark capability to Link 16 and SADL aircraft, thereby expediting the target acquisition process.

TLDHS Interoperability

Legend:
- – – → VMF
- ·····► AFAPD
- ——► MTS

* FY 09: Select A-10C will be both
  SADL and VMF

AFAPD	Air Force Applications Program Development
MTS	Marine Tactical System
SADL	Situation Awareness Data Link
TLDHS	Target, Location, Designation, and Hand-off System
VMF	Variable Message Format
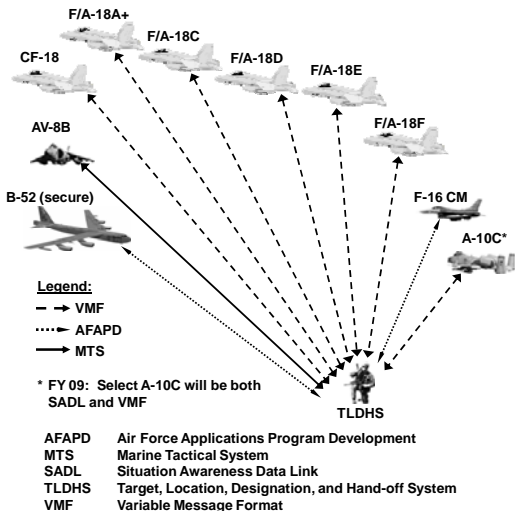
The Target Location, Designation, and Hand-off
System (TLDHS), also known as StrikeLink, is a
modular, man-portable equipment suite that
provides the ability to quickly acquire targets in day,
night, and near-all-weather conditions. Operators
are able to accurately determine their own position
as well as that of their targets and digitally transmit
(hand-off) data to supporting arms elements.
TLDHS will be fielded to Forward Observer (FO)
teams, Naval Gunfire (NGF) spot teams, TACPs,
reconnaissance teams, Fire Support Team (FIST)
leaders, and battalion air officers. TLDHS requires
line-of-sight capability.

BAO Kit Interoperability

Legend:

↔	CoT
– →	VMF
●—●	SADL
⟋	Link 16
⋯►	AFAPD
=	SATCOM (CoT)

AFAPD	Air Force Applications Program Development
BAO	Battlefield Air Operations
C2	Command and Control
CoT	Cursor on Target
SADL	Situation Awareness Data Link
SATCOM	Satellite Communications
UAV	Unmanned Aerial Vehicle
VMF	Variable Message Format
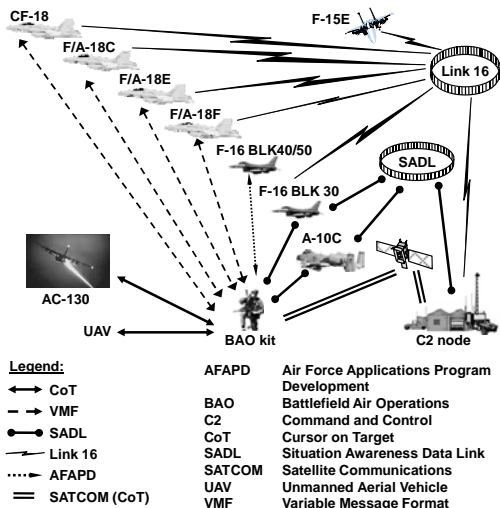
The Special Operations Forces (SOF) BAO Human-Machine Interface (HMI) family of systems includes a fielded baseline-configured PC device, integrated GPS, laser designator and range finder, PRC-117F/G radio, Raven/Wasp UAS, interoperable Internet Protocol (IP)-based applications, and associated wired and wireless connections. The BAO HMI capability includes a light-weight, compact information management/comms system that provides Line of Sight (LOS), Beyond Line-of-Sight (BLOS) over-the-horizon capability, and a reduced power requirement to interoperate with legacy systems. The capability provides the operator with an enhanced ability to shoot, move, and communicate on the battlefield. The BAO HMI is net-centric and interoperable with IP systems. The system takes advantage of multiple, fielded legacy capabilities including Link 16 BLOS, SADL LOS/BLOS, via extensible architecture, and VMF LOS using translation software. The architecture and software used to enable BAO kit users is referred to as CoT.

FULL MOTION VIDEO RECEIVERS

Remotely Operated Video Enhanced Receiver (ROVER) III

Description: Portable receiver suite for reception/display of manned and unmanned systems/aircraft. ROVER is an LOS system and can be masked by terrain/man-made obstacles.

- **Multiband reception**
  - Ku band
  - C band
  - L band
- **Include antennae**
  - Ku band omni – integral LNA with DC power via RF cable
  - C/L band – integral LNA with DC power via RF cable
- **User-friendly GUI**
  - Laptop via Ethernet or 802.11b wireless
  - Pocket PC via Ethernet or 802.11b wireless
  - Front panel display
- **Display**
  - Laptop via Ethernet or 802.11b wireless
  - Pocket PC with Ethernet or 802.11b wireless
  - NTSC/RS-170 video via TV monitor or pocket PC with adapter
- **Software**
  - Control GUI
    - Premission configuration
    - Automatic frequency acquisition
    - Easy access to multiple platforms

- **Image tracking map software**
  - Moving maps
  - User position via included GPS
  - Aircraft position
  - Target position (platform data dependent)
- **Video display software**
  - MPEG-2
  - H.261
  - VQ
- **Wireless access point**
  - Allows untethered operation
- **Power**
  - Rechargeable battery, BA-5590 form factor
  - AC adapter
  - DC-DC adapter

Planned additional features/options
- Directional antenna for increased range
- Integrated COMSEC
- MPEG-2 decompressor/ compressor
- Integrated 802.11b/g wireless
- Ruggedized integrated display system

ROVER Operations Checklist

ROVER Operations Checklist
1. Unload all equipment from ROVER III case.
2. Separate ROVER Toughbook laptop and ROVER III receiver from cables and connections (ref. ROVER III User Manual, Section 2.6). **Note:** All ROVER III cable connections are unique. The cables will attach only to the connectors designed for them. Do not force a connector on an improper connection.
3. Antenna cable: Attach the antenna cable to the antenna and to the antenna port (ANT) on the ROVER III receiver. **Caution:** The ROVER III receiver supplies Low Noise Amplifier (LNA) power through the center conductor of the antenna cable. Turn off LNA power before attaching the antenna; use of an antenna from an alternate supplier will result in damage. Using the Graphical User Interface (GUI), open the receiver window and click the off/on button labeled LNA to turn off LNA power.
Bayonet Connector (BNC) Cable (yellow tip with USB plug) a. Attach the BNC cable to the video outport on the ROVER III receiver. b. Attach the cable to the BNC to the video converter and then to the yellow connector of the video capture card. c. Insert USB connector of the video capture card to a USB port on the laptop PC. d. From laptop PC, double click desktop icon to start the C and L band analog player.

ROVER Operations Checklist

Multipurpose cable: Attach the multipurpose cable (P1) to the J2 port on the ROVER III receiver. Attach the RJ45 connector (P4) on the multipurpose cable to the RJ45 port on the laptop PC. (Ref. ROVER III User Manual, Section 3.)
4. Configuring a data link a. LFP concept—requires selection of the following b. Link (L)—link protocol c. Frequency (F)—comms frequency d. Player (P)—appropriate video player e. (b), (c), and (d) are required to configure the data link easily.   Configuring a data link from the GUI f. Open the ROVER III GUI from the desktop on the laptop PC. g. Select data link from the link list box. Use down arrow to display the selections and then highlight your choice. h. Set freq. using the spin boxes on the freq. controls to set the exact frequency. i. Select the appropriate video player. j. After all steps are completed, streaming video will appear on appropriate video player.

FULL MOTION VIDEO RECEIVERS

One System Remote Video Terminal (OSRVT)

Description: OSRVT is a kit integrated with the E-ROVER III system that provides enhanced situational awareness with near-real-time video and telemetry data from multiple manned and unmanned platforms (e.g., Raven, Shadow, Pioneer, I-Gnat, Hunter, Warrior A, Predator, other UAS and manned Litening pod platforms). The kit consists of a UHF modem, cables, software, and an optional extended-range antenna. Software supports decoding telemetry and metadata from multiple UAS, links data onto FalconView maps, and supports off-target calculations.

Capabilities:
- "DVR/Tivo" like capability—10 hours of recording video
- Telemetry data linked to FalconView with 2525 symbology
- JPEG files with embedded metadata
- Off-target calculations
- Tri-band (C/L/Ku) extended-range antenna— up to 50 kilometers (optional)
- S-band planned for FY 08 (second quarter)

VideoScout

Description: VideoScout provides the capability to capture, archive, and retrieve video and metadata from manned and unmanned ISR systems, UAS, data link receivers, common sensors, and Intel feeds. Warfighters can then easily add "knowledge" to the video assets by annotating, making clips, or extracting images to create intelligent video that is more timely, actionable, and relevant to the mission.

FULL MOTION VIDEO RECEIVERS
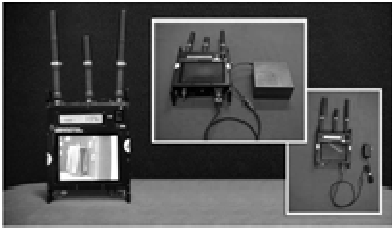
MVR III

Description: MVR III is a compact, rugged, and lightweight multiband receiver that provides its user with the capability to receive live, full motion video from a wide range of video transmission systems.

Brevity Terminology

FMV Brevity Communications
Handshake: ROVER operator comms to indicate good full motion video signal and data to ROVER.
Hollow: Lost full motion video signal and/or data to ROVER. ROVER screen freezes or is not updating. When the picture is not rotating or the slant range is not changing, these are the indicators of not updating.
Expect hollow: Informative call from the pilot/sensor operator to the ROVER operator that a condition will likely exist that limits ROVER reception (e.g., maneuvers, terrain).
Switch camera: Request from the ROVER operator to the pilot/sensor operator to switch the full motion video to EO or IR.
Switch polarity: Request from the ROVER operator to the pilot/sensor operator to switch the full motion video IR polarity to black hot or white hot.
Zoom (in/out): Request from the ROVER operator to change the full motion video Field of View (FOV). The "zoom" command is to be given with a 1, 2, 3, or 4 attached to it. The 1, 2, 3, or 4 indicates the number of full motion video change in or out. Recommend only one full motion video FOV change at a time (in or out).

Brevity Terminology

ROVER Brevity Communications
Slew (left/right/up/down or clock position and distance—quarter, half, or full screen): Directive call from the ROVER operator to the pilot/sensor operator to slew the full motion video source a given direction and distance.
Set: Informative call from the pilot/sensor operator to the ROVER operator indicating no longer slewing the full motion video source and waiting for further updates.
Stake: A full motion video system mark has been set and used as a frame of reference; reference point for air to surface.
Check capture: Informative call from the ROVER operator to the pilot/sensor operator that the target appears to be no longer tracked by full motion video source.
Check focus: Informative call from the ROVER operator to the pilot/sensor operator that the full motion video image appears to be out of focus.
Telemetry on/off: Informative call from the ROVER operator to the pilot/sensor operator requesting the ROVER telemetry overlay may be turned on/off.

Dynamic/Immediate ISR Request Format (8-line Request)

1	Desired ISR support or effect (full motion video, positive ID, EO, IR, MTI)
2	Target name
3	Target location
4	Essential Elements of Information (EEIs)
	What do you want to know?
5	Latest Time Information of Value (LTIOV)
6	Reporting instructions (mIRC, IPL, classification)
7	ISR asset detection concern (low, medium, or high)
	If spooking target is a concern
8	Airspace deconfliction information
	If you need the asset to stay clear of an area for deconfliction
Note: Lines 1 to 6 are mandatory; lines 7 to 8 are optional	

Collection Request Flow

```
                          ┌─────────────────┐
                          │ Is the request  │
                          │ required in less│
                          │ than 48 hrs?    │
                          └─────────────────┘
  Preplanned       No                          Yes
                                    ┌──────────────────────────┐
                                    │ Is the request required  │
          Standard                  │ immediately?             │    Dynamic
          ad hoc                    │ (within 3 hrs)           │    ad hoc
┌──────────────┐                    └──────────────────────────┘
│ Submit to    │         No                          Yes
│ CM using     │                       ┌──────────────────────────┐
│ non-PRISM    │                       │ Does the request involve │
│ worksheet    │                       │ a PR, TIC, or TST?       │
└──────────────┘                       └──────────────────────────┘
┌──────────────┐  ┌──────────────┐        No            Yes
│ CM enters    │  │ Submit ad hoc│   ┌──────────────┐ ┌──────────────┐
│ request in   │  │ request form │   │ Are you      │ │ Send request │
│ PRISM        │  │ to CM (ISR   │   │ talking to   │ │ direct to    │
└──────────────┘  │ Ops Web page)│   │ the ISR      │ │ ISARC        │
┌──────────────┐  └──────────────┘   │ platform?    │ └──────────────┘
│ Request      │  ┌──────────────┐   └──────────────┘
│ validated    │  │ Request      │      Yes       No
│ and          │  │ coordinated  │   ┌──────────┐ ┌──────────────┐
│ prioritized  │  │ through      │   │ Pass 8-  │ │ Pass 8-line  │
│ through      │  │ MNC-I CM     │   │ line     │ │ request to   │
│ corps CM     │  └──────────────┘   │ request  │ │ CM/ISARC(ISR │
└──────────────┘  ┌──────────────┐   │ direct to│ │ Ops Web page)│
┌──────────────┐  │ Request      │   │ ISR      │ └──────────────┘
│ Assessment   │  │ assessed by  │   │ platform │ ┌──────────────┐
│ and asset    │  │ ISARC        │   │ (ISR Ops │ │ Will request │
│ tasking      │  └──────────────┘   │ Web page)│ │ adversely    │
│ approval by  │  ┌──────────────┐   └──────────┘ │ affect       │
│ ISR Ops      │  │ Ad hoc       │                │ collection   │
└──────────────┘  │ collection   │                │ deck?        │
┌──────────────┐  │ coordinated  │                └──────────────┘
│ Aircraft     │  │ with platform│                  No       Yes
│ tasked in    │  │ LNO and SIDO │   ┌──────────────┐ ┌──────────────┐
│ ATO; sensor  │  └──────────────┘   │ Retasking    │ │ ISARC will   │
│ tasked in    │                     │ coordinated  │◄│ coordinate   │
│ RSTA annex   │                     │ with SIDO/   │ │ with MNC-I to│
└──────────────┘                     │ CCO          │ │ move asset   │
┌──────────────┐                     └──────────────┘ └──────────────┘
│ Reporting    │
│ IAW          │
│ instructions │
└──────────────┘
```

Air Support Request (ASR) Writing

ASRs must be clear and detailed, leaving no question as to the effect desired or task to the aircraft, to ensure the air component achieves the effects desired by the ground component.

Describe effects by doctrinal terms in current Joint publications.

State the security classification of the ASR.

State the named operation the ASR supports.

List two points of contact (e-mail, phone number).

Establish a Standard Operating Procedure (SOP) for attaching graphics to the request, the concept of operation, and the fire support plan to build the Ground Liaison Officer's (GLO) and pilot's situational awareness (Web site, e-mail, posting to chat).

Provide as much detail as possible if requesting attack of a specific target. Build and maintain a target folder with target measurements, type of construction material, thickness, digital photos, and so forth.

Fill out an Electronic Attack Request Form (EARF), if applicable.

Label all changes and confirm they were received.

AFATDS ASR Requests

Use a standard naming convention for the Air Support List (ASL).

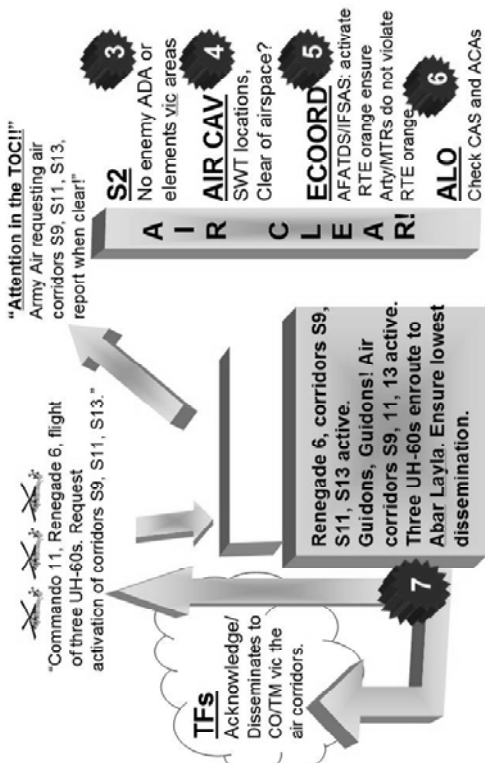ASL should cover one ATO period (ASL = 1 ATO day).

If an ASR splits two ATO periods, an additional ASR must be submitted for that period.

Establish an SOP for submitting additional graphics; information to higher headquarters should be established (e-mail, Web site, or chat).

Note: For guidance to complete DD Form 1972, refer to Joint Pub. 3-09.3, Appendix B.

Air-Ground AC2 Battle Drill

"Attention in the TOC!!" Army Air requesting air corridors S9, S11, S13, report when clear!

3 — S2
No enemy ADA or elements vic areas

4 — AIR CAV
SWT locations, Clear of airspace?

5 — ECOORD
AFATDS/IFSAS: activate RTE orange ensure Arty/MTRs do not violate RTE orange.

6 — ALO
Check CAS and ACAs

A I R C L E A R!

"Commando 11, Renegade 6, flight of three UH-60s. Request activation of corridors S9, S11, S13."

Renegade 6, corridors S9, S11, S13 active. Guidons, Guidons! Air corridors S9, 11, 13 active. Three UH-60s enroute to Abar Layla. Ensure lowest dissemination.

7

TFs
Acknowledge/ Disseminates to CO/TM vic the air corridors.

77

TUAS Launch/Recovery Process
Battle Drill Example

Timeline

30 minutes prior to mission execution (launch)
- Tactical Unmanned Aircraft System (TUAS) operators notify ADAM/BAE of intention to launch in 30 min.
- ADAM/BAE notifies division ADAM AC2 of 30-min. strike warn of TUAS launch and requests authorization code
- TUAS operators establish comms with local Airspace Control Authority (ACA) and pass the authorization code
- Local ACA/Air Traffic Control (ATC) will blanket broadcast—30 min. strike warn

10 minutes prior to launch
- TUAS operators provide 10-min. strike warn to local ACA and battalion Air Officer (AO)
- All air operations within the assigned Restricted Operations Area (ROA)/Restricted Operations Zone (ROZ) are suspended until cleared by the local ACA
- Local ACA/ATC will blanket broadcast—5 min. strike warn (assigned ROA/ROZ activated)

Launch
- TUAS notify battalion AO/S3 and local ACA/ATC of airborne status
- Battalion AO/S3 will notify BCT ADAM/BAE that the TUAS is airborne
- BCT ADAM/BAE will notify division ADAM cell of TUAS launch status

TUAS Launch/Recovery Process
Battle Drill Example

During mission
- TUAS operators will notify local ACA/ATC once above the coordinating altitude, if applicable
- Local ACA/ATC blanket broadcast—assigned ROA/ROZ airspace is deactivated below the coordinating altitude, if applicable
- TUAS operators will notify the local ACA/ATC once established at altitude, position report every 15 min., or when transitioning between keypads or local airspace control measures

Recovery
- TUAS operators will notify local ACA/battalion AO 10 min. prior to descent
- TUAS operators will notify local ACA/battalion AO once established at the coordinating altitude (TUAS operators will not descend TUAS below the coordinating altitude until authorized by local ACA)
- Local ACA/ATC will blanket broadcast—activation of assigned ROA/ROZ airspace (all air operations within the assigned ROA/ROZ are suspended until cleared by the local ACA)
- TUAS operators notify local ACA/battalion AO of recovery
- Local ACA/ATC will blanket broadcast— deactivation of assigned ROA/ROZ and normal air operations can resume
- Battalion AO/S3 will notify BCT ADAM/BAE that the TUAS has been recovered
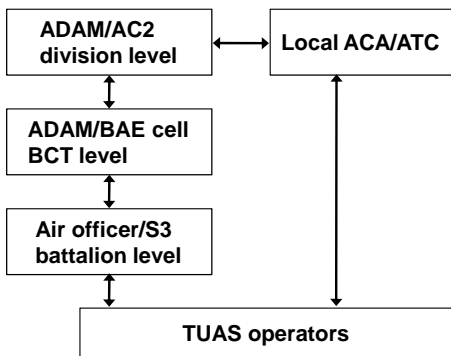- BCT ADAM/BAE will notify division ADAM cell that the TUAS has been recovered

TUAS Launch/Recovery Process
Battle Drill Example

Communications

Positive communications must be maintained 100 percent of the time from 30 min. prior to launch to mission completion with the local ACA/ATC.

```
┌─────────────────┐         ┌─────────────────┐
│  ADAM/AC2       │◄──────► │  Local ACA/ATC  │
│  division level │         │                 │
└─────────────────┘         └─────────────────┘
        ▲                            ▲
        ▼                            │
┌─────────────────┐                  │
│  ADAM/BAE cell  │                  │
│  BCT level      │                  │
└─────────────────┘                  │
        ▲                            │
        ▼                            │
┌─────────────────┐                  │
│  Air officer/S3 │                  │
│  battalion level│                  │
└─────────────────┘                  │
        ▲                            │
        ▼                            ▼
     ┌──────────────────────────────────┐
     │        TUAS operators            │
     └──────────────────────────────────┘
```

UAS Immediate Launch Briefing

SITUATION: A convoy 2 km north of our position is being attacked.

MISSION: Your mission is to assess the situation and determine location and strength of hostile force areas surrounding the convoy.

EXECUTION: It is my intent that you follow this route directly to the location of the attack, stay within a 300-meter radius of the convoy's center vehicle, and remain on station until told otherwise. Your LRS will be here.

(A)—AIRSPACE & ALTITUDE CLEARANCE: In accordance with the BN SOP for immediate launch. Wait for my signal to launch.

(C)—COMMUNICATIONS PLAN: Monitor the air-to-ground frequency and Eagle Radio for helicopters approaching your mission area.

(T)—TIMELINE: Launch ASAP.

(U)—UNPLANNED EVENTS: Immediately contact Eagle Radio and Autoland AV, if necessary, if helicopters enter the area.

(P)—PLANNING FACTORS: AV lighting in accordance with BN SOP for immediate launch.

SERVICE SUPPORT: (At LRS) You will use my vehicle to charge batteries as necessary.

COMMAND: I am your mission commander and will be collocated to you.

SIGNAL: AV Channel 3.

Immediate launch briefing should include the following:
1) **Location of Launch and Recovery Site (LRS)**
2) **Mission statement**
3) **Ingress and egress routes**
4) **Max. radius center point of mission area**
5) **Time of launch**

Mission commander assesses the situation, issues briefing to Raven crew, and is responsible for ensuring unit SOP guidelines are followed.

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Organic UAS Immediate Launch Request

UAS contact frequency/aircraft frequency:

_____

Call sign of UAS mission commander/aircraft
call sign: _____

1. Check in: _____
   "(Mission commander) this is (call sign);
   request for immediate UAS launch."

2. Center grid: _____
   (of the area you want looked at)

   Maximum radius: _____
   (of the intended UAS orbit)

   "PU 12345678, 300 meters."

4. Mission statement: _____
   "I need to assess the enemy situation and
   determine the location and strength of
   hostile forces in areas surrounding the
   convoy."

5. Remarks/intent: _____
   "The center grid is the center of my convoy.
   I want to specifically check out the tree line
   200 meters east of the burning KBR truck.
   Let me know if you see any vehicle or foot
   movement to the east of my position."

JSTARS Checklist
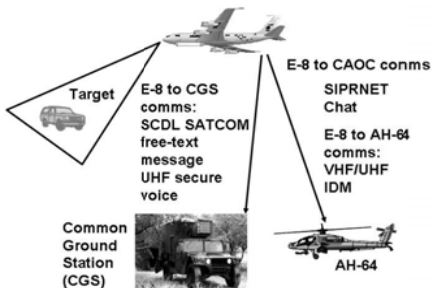
Capabilities
(12) UHF (HaveQuick)/(3) VHF/(2) HF Joint Tactical Information Distribution System (JTIDS)/Interim JTIDS Message Specification (IJMS)/SATCOM/SATCOM data text/Broadcast Intel (BI)
CGS linkup capable at BCT (SCDL SATCOM/UHF/VHF)
11-hr. mission endurance (unrefueled) 20-hr. mission endurance (refueled)
High-resolution ground search radar (can detect but cannot identify)
Can provide accurate target location for area or precision-guided weapons depending on sensor used to gather target data
Can track ground movement in a specified area (counter-ambush/ Improvised Explosive Device [IED])
SARs capable of detecting stationary objects (i.e., vehicles in dug-in positions or concertina wire)

JSTARS Checklist

Planning Checklist	
	Time on station_____
	Orbit: SCDL LOS?
	Primary nets: UHF_____ Tactical Satellite (TACSAT)_____
	Secondary nets: UHF____ TACSAT___
	Mission:
	Task/purpose:
	Priorities by order
	Crypto requirements
	BCT operational graphics
	Named Area of Interest (NAI)/Target Area of Interest (TAI)/DP/R&S plan
	MTI/FTI/SAR
	Coordinate with AH-64s working in conjunction with JSTARS
Setup/Coordination Requirements	
	Identify area for JSTARS to scan (R&S plan, NAI/TAI, EEIs)
	Submit JSTARS support request to ALO/ Fire Support Officer (FSO)
	ALO/FSO submits Joint Tactical Airstrike Requests (JTARs)/RFI
	Get contact information for JSTARS unit for coordination
	Ensure CGS is set up to receive JSTARS feed
	Comms rehearsal

JSTARS Checklist

Mission Battle Rhythm
TACP receives check-in briefing from JSTARS
Control of JSTARS is given to tasking authority (S2/S3, etc.) at CGS
Tasking authority maintains contact with JSTARS and continually updates taskings, NAIs, TAIs; also ensures necessary intelligence is recorded
Tasking authority ensures recorded data are processed and passed to staff for action

Notes:

1. JSTARS can provide MTI; analysis is dependent on S2 and Multi-source Information Control Officer (MICO) analysts.
2. Ensure unit has the same crypto as the JSTARS aircraft.
3. CGS operator should record missions for playback to detect changes or to research new NAIs.
4. Call signs change daily in theater; ensure unit has the updated call sign.
5. CGS feeds in training often come from virtual or constructive sources, which require detailed effort from the S6 to accomplish.

Observation Platforms Checklist
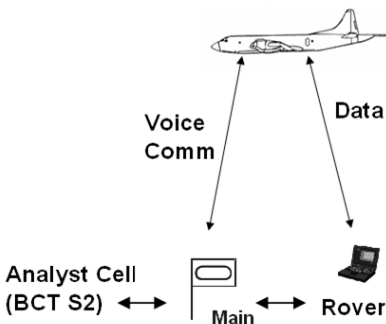
Capabilities	
	Real-time ROVER live-feed ground monitoring
	High-resolution IR/thermal imaging (turret based)
	Rapid postmission ISR feedback via SIPRNET
	Can provide accurate targeting data for precision-guided weapons
Planning Checklist	
	Orbit: An orbit too far from TOC results in degraded comms and imagery
	ROVER antenna placement: Must have LOS to aircraft
	Stay above/below_____
	Time on station_____

Continued on next page.

Observation Platforms Checklist

	Primary comms:
	UHF_____
	HF_____
	VHF_____
	TACSAT_____
	Secondary comms:
	UHF_____
	HF_____
	VHF_____
	TACSAT_____
	Secure crypto requirements
	Mission and tasking:
	Task
	Purpose
	Priorities in order
	Route/zone recon?
	BCT operational graphics?
	R&S plan?
	NAI/TAI?
	Lat./long. conversion to Military Grid Reference System (MGRS)?
	Inform all ROVER-capable units of EP-3
Setup/Coordination Requirements	
	Submit support request to ALO
	ALO or FSO submits JTARs or ASR request
	Get contact info for EP-3 unit for coordination; discuss the mission with the pilot via secure line or e-mail
	Comms/digital linkup rehearsal

Continued on next page.

Observation Platforms Checklist

Mission Battle Rhythm	
	TACP receives check-in briefing from platform
	Control of platform is given to tasking authority (S2/S3, etc.) in the TOC
	Tasking authority maintains contact with platform and continually updates taskings, NAIs, TAIs; also ensures necessary intelligence is recorded
	Tasking authority ensures recorded data are processed and passed to staff for action
Notes:	

1. Observation platforms can provide real-time streaming video to the ROVER computer.
2. Observation platforms can cross cue with JSTARS to "see" and identify targets that JSTARS is tracking.
3. P-3 and Predator can "see" the same size geographical areas.
4. Link the ROVER feed to the TOC graphic displays during real-time flight (option).
5. Use AFATDS, FalconView, Defense Advanced GPS Receiver (DAGR), or Precise Lightweight GPS Receiver (PLGR) to translate lat./long. to MGRS; the ROVER computer does not have that capability.
6. Ensure unit has the most recent call sign.

Observation Platforms Checklist

P-3 Specific Considerations

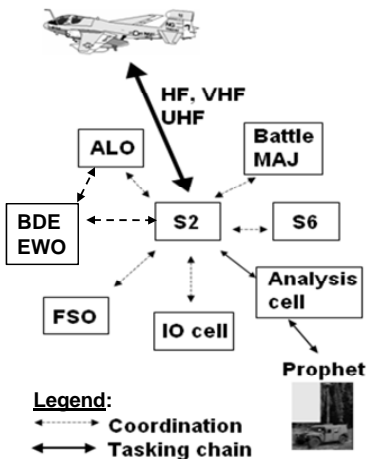| Capabilities	
	Comms: Duel HF/UHF/VHF/UHF SATCOM radios
	Navy should provide the Liaison Officer (LNO) with live-feed capability (ROVER)
	AGM-65 standard for combat missions
	10- to 12-hr. mission endurance
	Best used as an observation/ intelligence gathering platform (think manned/armed UAS that you can talk to and get feedback from)
Planning Checklist	
	Alternate plan for ISR data transfer if Navy LNO unavailable
LNO Coordination	
	Navy LNO ideal, but not required
	If no Navy LNO, ensure the unit has a BCT LNO in the P-3 Anti-Surface Warfare Improvement Program (AIP)
	BCT LNO carries copy of BCT operational graphics and R&S plan
	Coordinate transport for LNO to airfield

Observation Platforms Checklist

P-3 Specific Considerations (cont.)

Notes:
1. If Navy LNO is attached to the BCT, integrate him into the S3, S2, Fires and Effects Coordination Cell (FECC), and effects working group. Teach him how to provide Size, Activity, Location, and Time (SALT) reports to the TOC.
2. Set the P-3 orbit as close to the TOC as possible, not the target area. The P-3 sends streaming video via a radio frequency and can "see" much further than it can send quality video.
3. Share operational graphics and the R&S plan with the BCT P-3 LNO.
4. P-3C AIP is designed primarily for o
5. IRC chat room capability.

EW Platforms Checklist

Capabilities	
	Best used for jamming enemy comms and convoy route support
	Can jam multiple, specified frequencies simultaneously on request
	Can assist in enemy signal triangulation and interception
Planning Checklist	
	Time on station_____
	Primary nets:
	VHF_____
	UHF_____
	HF_____

Continued on next page.

EW Platforms Checklist

	Secondary nets:
	VHF_____
	UHF_____
	HF_____
	Crypto requirements?
	Mission:
	Taskings:
	Primary:
	Secondary:
	BCT operational graphics?
	Frequency analysis conducted before jamming (S6)?
	Specified ingress/egress route and times for IED jamming
Setup/Coordination Requirements	
	Get frequencies from S2/S6/Prophet/ Information Operations (IO) cell for jamming
	Submit support request (Electronic Attack Request Form [EARF]) to ALO
	ALO or FSO submits EARF request
	Contacting the supporting squadron and discussing the mission with the pilots will reduce confusion and ensure the mission is executed according to unit plan

EW Platforms Checklist

Mission Battle Rhythm
	TACP receives check-in briefing from the Electronic Warfare (EW) platform
	Supported commander maintains contact with EW platform/TOC; updates mission, route; jams frequencies as necessary

Notes:

1. Prophet collection feeds Analysis cell and S2/S3 to determine best use of EW platform.
2. Call signs change daily in theater; ensure unit has the current call sign.
3. May interfere with friendly force comms despite frequency hopping; be aware.
4. Times effected must be distributed within affected Area of Operations (AO).

UAS Mission Planning Checklist

UAS Mission Planning Checklist
____ Duty assignments
____ Enemy situation
____ Friendly situation
____ Mission planning
____ Fuel planning
____ Communications plan
____ Packet/card preparation
Duty Assignments
____ Authorized MOS on hand
____ Critical MOSs identified and on hand
____ Additional personnel necessary for 24-hr. operations (if commander directed)
Enemy Situation
____ Unit/order of battle/uniforms
____ BN/company locations plotted on map
____ Strengths/weaknesses
____ Most probable Course of Action (COA)
____ Most dangerous COA
____ Air def. artillery threat (for ea. wpn. system)
• System
• Location plotted on map
• Max./min. range (threat rings plotted on map)
• Min. engagement altitude
• Strengths
• Weaknesses
• How to defeat
____ Night vision capability
____ Electronic Warfare (EW) threat
• MIJI of UAS uplink/downlink
____ Chemical, Biological, Radiological, and Nuclear (CBRN) threat
• AV should avoid CBRN presence
• Place M9 paper on AV

UAS Mission Planning Checklist

Friendly Situation
_____ BDE mission/intent
_____ BN mission/intent
_____ Maps or imagery of operating area
_____ Friendly unit loc. (BN HQ plotted on map)
_____ Friendly graphics posted on map
_____ UAS readiness status
_____ Supported unit task/purpose
_____ Adjacent unit task/purpose
_____ Abort criteria
_____ Other UAS units task/purpose
_____ Other UAS units graphics posted on map
_____ Army aviation/friendly scheme of maneuver
_____ Rules of Engagement (ROE)
_____ GCS/GCU and L/R site security
_____ Additional UAS equipment necessary for
24-hr. operations (if commander directed)
_____ Evaluate all specified tasks from:
   - Operation Order (OPORD)
   - Warning Orders (WARNORDs)
   - Fragmentary Orders (FRAGORDs)
_____ Verify Airspace Control Order (ACO), ATO,
SPINS requirements
   - Restricted Operations Zone (ROZ)/
     Restricted Operations Area (ROA)
     locations, dimensions, freq., call signs
   - Artillery position area locations plotted
   - Active routes/air control points plotted
_____ Verify method of airspace control
   - Positive control measures
   - Procedural control measures
_____ Verify H-hour time
_____ Spare AV procedures
_____ Emergency procedures
_____ Downed AV recovery plan
_____ Weather (WX) decision time

UAS Mission Planning Checklist

Mission Planning
- ____ Sensor selection (if not dual selectable) EO and IR imagery payload for day/night operations EO or IR (Raven only)
- ____ Map reconnaissance of mission area
- ____ Identify terrain that will interfere with LOS data link
- ____ Named Areas of Interest (NAIs)
  - Grids defining NAIs, heading and distance to NAI from launch point, heading and distance between NAIs
- ____ Identify/mark natural and man-made hazards to flight
  - Local hazards, sectionals
- ____ Primary route (ingress and egress)
- ____ Alternate route (ingress and egress)
- ____ Threat plotted along route
- ____ Weather
  - Clouds, precipitation, wind, visibility, temperature, illumination
- ____ Flt route outside threat engagement rings
- ____ Route time
- ____ Loiter time
- ____ Verify grids
- ____ Check all altitudes, azimuths, and distances
- ____ Times submitted to higher HQ
- ____ Way point card printed
- ____ Air control points plotted on map
- ____ Primary/alternate routes plotted on map
- ____ Contingency actions

UAS Mission Planning Checklist

Fuel Planning

____ Availability and on-hand stock of Aviation Gasoline (AVGAS) or Motor Gasoline (MOGAS)

____ Availability and on-hand stock of batteries (Raven only)
  - BB-390, BA-5590

____ Availability and on-hand stock of ammunition

____ Estimated fuel burn rate

____ Estimated battery usage rate (Raven only)

____ Minimum fuel at departure

____ Bingo fuel

Communications Planning

____ Flight operations

____ TOC, Command nets

____ Air Battle Net

____ Fire Support Coordinator (FSC) Net

____ Administrative and Logistics Operation Center (ALOC) Net

____ Air Traffic Control (ATC) (airfields, approach, etc.)

____ ROZ

____ LOS characteristics of terrain because AV limits of operation based on LOS data link
  - Hunter: 125 km (200 km with second Hunter as airborne relay)
  - Shadow: 50 km
  - Raven: 10 km

UAS Mission Planning Checklist

Communications Planning (cont.)

_____ Contingency actions
- Frequency compromise
- Communications Security (COMSEC) compromise
- Emergency procedures for loss of signal

_____ Communications frequency bandwidth of UAS operation

_____ Frequency management

_____ Operations Security (OPSEC) requirements

_____ EW considerations to include friendly communications interference

Packet/Card/Map Preparation

_____ Enemy graphics

_____ Friendly graphics

_____ ROZ graphics

_____ Flight routes

_____ Crew card

_____ Time flow

_____ Mission sequence

_____ Way point card

_____ Rehearsal setup

CAS Battle Drill

Who		Action
ALO/FSO		**Review ATO (confirm requested aircraft are on the ATO)**
ALO/FSO		**Confirm aircraft inbound (announce to the staff)**
		Verify the number and type of aircraft and munitions carried
		Contact all JTACs and JFOs
		Conduct battle staff huddle (this can be executed prior to aircraft being on station)
FSO/S3/ XO/ALO		Confirm task and purpose for aircraft—attack or ISR
S2		Verify the disposition of the enemy, size, activity, equipment, and location of the enemy
S2		Review BN/BCT ISR priorities and decide aircraft surveillance and reconnaissance priorities
S2/MICO		Provide the current status, location of Intelligence and Electronic Warfare (IEW) assets
BAE/ ADAM		Provide the current Air Defense Artillery (ADA) posture and enemy air threat; notify the air defense community of inbound friendly aircraft
		Provide current status or organic aircraft flying in AO (helicopters and UAS)

Continued on next page.

CAS Battle Drill

FSO/S3/ XO/ALO/ BCT CDR		Decide the best target type to engage based on the aircraft/ munitions Essential Fires Support Tasks (EFSTs)/ scheme of fires/commander's intent
ALO/FSO		Verify JFO or JTAC in position and comms systems are working
S2		Decide/verify the NAI for surveillance based on R&S plan
BAE/ ADAM/ FSO		**Establish AC2: Decide/ develop Airspace Coordination Areas (ACAs) to support the ingress and egress of aircraft**
S2/MICO		**Update air threat**
		Update the enemy ADA threat
		Confirm the enemy ADA locations (enemy ADA systems should be destroyed as soon as they are located)
		Allocate MI assets to attack nonlethal targets
		Update the current enemy ADA hits that can affect airspace
FSO		**Develop the SEAD plan based on the updated enemy ADA threat analysis**
FSO		**Send the SEAD plan for lethal fires to the DS/R battalions (to include marking rounds)**

CAS Battle Drill

ALO	**Update CAS by briefing:**	
		In-brief the aircraft or the FAC(A); pass control of the aircraft to the JTAC or pass to the S2/MICO if the aircraft is conducting an ISR mission
		Enemy formation/location/ NAIs/specific location for surveillance
		Receive aircraft status
		AC2 and SEAD plan
		Nonlethal target attack confirmation
ALO	**Issue the 9-line briefing to the aircraft and establish the target Time on Target (TOT)**	
FSO		Initiate the ingress SEAD plan "at my command" with the DS and (or) R battalion FDC
ADAM/ BAE		Activate ACAs through the division FSE
FSO	**Activate ACAs on the brigade fires net (follow-up digitally)**	
ADAM	**Change the ADA weapons control status**	
FSO		Initiate the ingress SEAD plan
JTAC/ JFO		Ingress aircraft in accordance with the SEAD plan's timing

CAS Battle Drill

FSO		**Initiate the egress SEAD plan "at my command" with the DS and (or) R battalion FDC**
FSO		Initiate the egress SEAD plan
JTAC/JFO		Egress aircraft in accordance with the SEAD plan's timing
JTAC/ JFO/ ALO		**Confirm the aircraft are clear of the brigade's airspace; collect battle damage assessment and pilots' reports**
ADAM/ BAE		Inactivate ACAs on the brigade fires net and through the division FSE (follow-up digitally)
S2/MICO		Stop IEW jamming
ADAM/ BAE		Return to previous ADA weapons control status
ALO		**Report CAS battle damage assessment to the battle staff**
ALO		Collect and analyze the battle damage assessment and pilots' reports
FSO/S3/ XO/ALO		Assess the mission's effectiveness and determine if reattack is necessary

JTAC/JFO Precombat Checks

"JFO and JTAC employed as a team concept, the team does not necessarily need to be collocated."

— AFTTP 3-3, Chapter 6.9

Plan, coordinate, synchronize CAS and other fire support assets; request as needed
JFO reviews commander's intent for fires
Plan and submit CAS targets (DD Form 1972)
Update locations of critical targets
Update/verify current Fire Support Coordination Measure (FSCM) and operational graphics
Plan/coordinate SEAD execution procedures
Review AC2 plan
Plot Initial Points (IPs) and Contact Points (CPs)
Plot or verify airspace coordination measures
Assist in the planning of organic UAS
Verify target marking procedures
Verify friendly marking procedures
Review and determine available air support assets from ATO
Coordinate timing of air assets and surface fires, ATO, and Fire Support Execution Matrix (FSEM)
Review SPINS
Review Type 1, 2, and 3 control guidance
Verify communications plan (to include COMSEC)
Is your JTAC on the same fill?

JTAC/JFO Precombat Checks

Confirm call signs and code words
Confirm nets (BN fires/mortar, BDE FSC, air request, Tactical Air Direction [TAD])
Confirm JTAC frequencies (VHF/UHF/FM)
Confirm JFO frequencies (FM; if available, VHF/UHF)
Confirm SATCOM if applicable
JTAC/JFO capabilities (e.g., ROVER, lasers, Precision Strike Suite for Special Operations Forces [PSS-SOF], SATCOM)
Confirm authentication procedures (RAMROD)
Confirm digital communications
Perform communications checks on all nets and devices
Review target lists with FSC, JTAC, and firing units
Confirm the use of Gridded Reference Guides (GRGs) with JTAC and air elements; was it disseminated to all units involved with the mission?

JTAC/JFO Terminal Attack Control

From AFTTP 3-3, Chapter 6.9:

Joint Fires Observer Employment

- Think of the JFO as an extension of the TACP.
- The JFO is a combat force multiplier acting as the eyes and ears of the JTAC. JFOs provide timely and accurate targeting data for Type 2 and 3 controls to either the JTAC or FAC(A).
- The JTAC or FAC(A) maintains final control of the flight and issues clearance calls. At any time, the JFO, JTAC, or FAC(A) can issue an abort to prevent fratricide or for safety of flight.
- JFOs receive additional training and are capable of providing targeting information and target talk-ons. In the absence of a JTAC or FAC(A), the JFO is a better-trained soldier for "in extremis" CAS situations.

Joint Fires Observer Locations

- JFOs can be located at the platoon level (collocated with the platoon leader, with scouts, or on an Observation Point [OP]).
- Reports to the company FSO/FSNCO.
- Will monitor the company fires net and/or the battalion fires net (per unit SOP).

JTAC/JFO CAS Targeting Execution

- The JFO passes Observation Point Coordinates (OPCO)/Observation Location (OBLOC) by grid or through target reference points and possibly his elevation to the JTAC. If not passed, ask for it immediately.
- Plot the JFO's OP on your map.

JTAC/JFO Terminal Attack Control

JTAC/JFO CAS Targeting Execution (cont.)

- The JTAC will read back the JFO's location to the JFO.
- The JFO will pass the JTAC a situation update to include unit mission, friendly positions, enemy disposition, ground commander's intent, threats/ weather, and current fire support coordination measures.

Note: The JTAC should verify how the JFO derived the target coordinates (i.e., LRF, laser, PSS-SOF, map/compass).

The JFO will pass a target to the JTAC in a 9-line format or modified 9-line—lines 1-3 (unknown or 1-3 N/A), lines 4-8 (standard), line 9 (unknown, N/A, or will be recommended).

- If target coordinates passed in MGRS-new, the JTAC needs to be prepared to convert grids into lat./long., DM (munitions/platform dependent).
- The JTAC must be prepared to have the JFO pass the 10-digit MGRS-new coordinate if JDAM or PGM ordnances are to be employed.

Note: The JTAC will read back lines 4 and 6 to JFO.

Pass remarks to the JTAC (restrictions or recommended attack restrictions).

- The JFO will pass danger close if the situation warrants and ground commander initials.
- The JTAC may need to ask the JFO what extra steps of protection the friendlies are taking in the target area.

Note: The JTAC provides a read back to the JFO of all mandatory read back restrictions or recommended Final Attack Heading (FAH). If the JTAC does not concur with JFO's FAH, the JTAC will brief the JFO the new FAH.

JTAC/JFO Terminal Attack Control

The JFO will pass a target talk-on:

- The JTAC and JFO need to reference the same map/imagery, Common Grid Reference System (CGRS), urban grid, No-Fire Area (NFA), Restrictive Fire Area (RFA), protected sites, and TRPs to speed target location/verification.
- Establish a unit of measure that can be seen on the map as well as on the ground.
- The JTAC stays on the net with the JFO should the aircraft have specific questions.
- The JFO stays on the net for target verification and situational awareness.

Note: The target talk-on should be conducted as soon as possible, preferably prior to aircraft check-in if time allows.

During execution, the JFO passes the following to the JTAC:

- Any target updates, target movement, collateral damage updates, change in priority of targets
- Bomb corrections, new Desired Mean Points of Impact (DMPIs)
- Battle damage assessment.

Note: Bomb corrections are passed from the JFO in cardinal direction and distance from lead bomb impact.

JFO Laser CAS

- Ensure all proper laser brevity terminology are utilized.
- During CAS operations that involve IAMs, ensure to pass to the JFO the "off hot" or "weapons release" call with a "time of fall" call.

JFO Night CAS

- Ensure all proper IR brevity terminology are utilized.

JFO Briefing Card

Observer Location
"JTAC (call sign _____), this is (your call sign _____), say when ready for my location."
"My position _____ (no less than 6-digit grid), marked by (VS-17 or use GRG, orientation, major terrain features, etc.)

Situation Update (TTFACOR)	
Threat activity: Surface-to-air threats observed—who, what, when, where	
Target: General enemy situation—Size, Activity, Location, Unit, Time, Equipment (SALUTE) format	
Friendly situation: Disposition/posture, locations	
Artillery activity: GTL, max. ord., etc.	
Clearance authority: Who has final control?	
Ordnance requested:	
Restrictions:	

JFO Briefing Card

CAS 9-Line Briefing
1. IP/BP: "_____"
2. Heading: "_____"
(degrees magnetic, IP/BP-to-target)
Offset: "_____"
3. Distance: "_____" (IP-to-target
in nautical miles, BP-to-target in meters)
4. Target elevation:* "_____" (in ft. MSL)
5. Target description: "_____
_____"
6. Target location:* "_____
_____"
(Lat./long. or grid to include map datum or offsets
or visual)
7. Type mark: "_____"
Code: "_____"
(WP, laser, IR, beacon) (actual laser code)
8. Location of friendlies: "_____"
(From target cardinal direction and distance in
meters)
9. Egress: "_____"
Remarks (as appropriate): "_____
_____
_____"
(Restrictions, ordnance delivery, threats, FAH,
hazards, ACAs, weather, target information,
SEAD, LTL/GTL [degrees magnetic], night vision,
danger close [with commander's initials])
Time on target: "_____" or
Time to target: "_____"
"Standby _____ plus _____,
ready, ready, HACK" (minutes) (seconds)
Do not transmit line numbers. Units of measure
are standard unless briefed.
* Lines 4, 6, restrictions—mandatory read back.
The JTAC may request additional read back.

Combined Arms and Fire Support Rehearsals

Rehearse CAS execution with ground maneuver, Fire Support Element (FSE), and JTAC

Rehearse primary and alternate observation plans
 	
    Identify observers
    Identify force protection
    Identify infiltration/exfiltration routes
    Identify CAS triggers
    Identify displacement criteria
    Review weather considerations
    Review night considerations
    Review Fire Support Execution Matrix (FSEM) and Attack Guidance Matrix (AGM) for CAS targets

Rehearse actions when CAS triggers are met
Purpose, location, observer (primary and secondary), trigger, commo net

Rehearse engagement procedures for each CAS target
 	
    Identify observers (primary and secondary)
    Review ROE/positive ID requirements
    Identify closest friendly locations
    Verify friendly marking procedures
    Review AC2 plan

Rehearse SEAD plan procedures with firing element Fire Direction Center (FDC)

Combined Arms and
Fire Support Rehearsals

Rehearse CAS target marking procedures

Coordinate air and surface fires

Review indirect fire assets available

Review marking and SEAD plan, method of control

Review Position Areas (PAs)

Review gun target lines for all planned targets

Review min./max. ordinate

Review shell/fuze combination

Rehearse communications connectivity

Confirm call signs. What primary and secondary JTAC do I contact and on what net?

Confirm code words

Conduct radio checks; BN fires/mortar, BDE FSC, air request, Tactical Air Direction (TAD)

Conduct authentication procedures

Artillery Precision Guided and Multiple Launch Rocket System (MLRS) Chart

Munitions	Variant	Payload	Range
Guided 155-mm projectile	XM982 Block 1a-1	Similar to HE M107	7.5-24 km
Target types: Precisely located targets—personnel, lightly armored targets (stationary), and structures where collateral damage must be restricted.			
Note: Excalibur is fired only by M777 and M109A6 cannon weapons.			

Munitions	Variant	Payload	Range	Targets
Rockets (MLRS)	M26	644 M77 DPICM	10-32 km	Personnel, light armor, soft vehicles (stationary), buildings, (GMLRS only)
	M26A2 ER-MLRS	518 PI M77	13-45 km	
Guided rockets (GMLRS)	M30	404 PI M77 DPICM	15-60 km	
	M31	51.5-lbs. unitary HE	15-60 km	
ATACMS	Block 1 M39 (JEE)	950 M74 APAM bomblets	25-165 km	Personnel, light armor, soft vehicles (stationary)
	Block 1A M39A1 (JEN)	300 M74 APAM bomblets	70-300 km	
	Quick reaction unitary (QRU)	Single burst, HE/PD fuze	70-270 km	Block 1-1A targets when duds/collateral damage are precluded. Fixed infra- structure sites (building, etc.)
	ATACMS unitary	Single unitary warhead with multifunction fuze— proximity, PD, or delay	70-300 km	
APAM	Anti-Personnel, Antiarmor			
DPICM	Dual Purpose, Improved Conventional Munitions			
JEE, JEN	Computer Munitions Identification Codes			
PD	Point Detonating			
PI	Product Improved			
Note: Default rates of fire are 5 seconds between rockets and 15 seconds between missiles.				

***Source:*** FM 3-09.32/MCRP 3-16.6A/NTTP 3-09.2/AFTTP(I) 3-2.6, Dec 07

Keyhole Template Holding Techniques

Although not official doctrine within the DOD, keyhole template is the predominate technique used by JTACs and FACs to control aircraft in Operations Enduring Freedom/Iraqi Freedom. This procedure is an effective and efficient method of selecting an IP anchor point that is based on a direction and distance from a given target reference point. It allows for unlimited flexibility in hasty IP selection, allows you to pick the IP that best fits your final attack cone/heading, and allows you to conduct IP-to-target run-ins with aircraft that do not have CP/IP matrix from the SPINS/ACO.

Keyhole template is defined off of a target reference point; there is no requirement for precision in the coordinates. It can be a 4-, 6-, or 10-digit MGRS grid, or the target reference point can be in lat./long. Once the target reference point and elevation have been passed to the aircraft, there are two keyhole methods for controlling aircraft: 1) cardinal direction and 2) radial direction.

Method 1: Cardinal direction (A, B, C, D, E)
Each cardinal direction on the compass is given a letter code: A (360), B (090), C (180), D (270), and E (overhead). The letter code defines the IP given with distance in nautical miles (nm): "Alpha 8" is 8 nm north of the previously given target ref. point.


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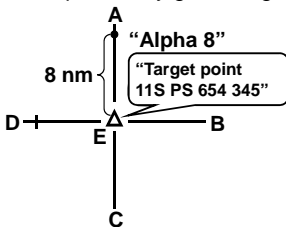
Keyhole Template Holding Techniques

Method 2: Radial direction and DME
Each direction (subcardinal) is given in a magnetic bearing <u>from the target</u> (when not using the cardinal method). The IP is defined by giving a direction <u>from the target reference point</u> with a distance in nautical miles. <u>Any radial direction, within 360 degrees of a compass, can be used</u>.
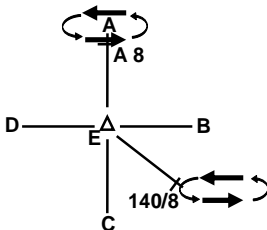"140 at 8" is 8 nm southeast of the target ref. point.
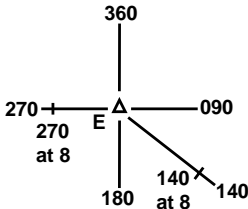
Keyhole IP Holding: If aircraft hold at the IP while awaiting further instruction, they need to be given a holding direction, distance, and altitude at the IP.

Examples:

Method 1 (cardinal): "Proceed Alpha 8, hold East-West, 12K."

— or —

Method 2 (radial): "Proceed 140 at 8, hold East-West, 12K."

Continued on next page.

Keyhole Template Holding Techniques

Keyhole Template 9-Lines: Lines 1-3 of the 9-line format can be read as a single line when using this technique. Line 1 refers to the IP, line 2 refers to the attack heading/aircraft offset, and line 3 refers to the distance from the IP to the target.

Lines 1-3 of Standard 9-line	Keyhole Template 1 Line
1. Alpha	1. Alpha 8 left
2. 180/offset left	(Line 2 is implied as 180 since Alpha is 360 from the target)
3. 8.0	(Line 3 is implied as 8.0 since Alpha 8 is the given IP)

Lines 4-9 of the 9-line remain the same. *Note:* The technique can also be used to tell an aircraft its egress route in line 9. Remarks remain the same.

An example of keyhole 9-line (cardinal) with three transactions is below:

1. Lines 1-3: "Alpha 8 left"
2. Lines 4-6: "One hundred five feet, supply convoy oriented East-West; 11S PS 65487 34589"
3. Lines 7-9: "Illum on deck; northeast one thousand (friendly position); egress Delta 5 to Alpha 8"
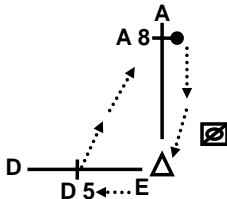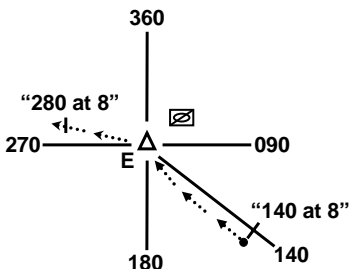

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Keyhole Template Holding Techniques

Here is an example of a keyhole 9-line using the radial technique.

1. Lines 1-3: "140 at eight, left"
2. Lines 4-6: "One hundred five feet; supply convoy oriented East-West; 11S PS 65487 34598"
3. Lines 7-9: "Illum on the deck, northeast one thousand (friendly position), egress two-eight-zero at eight and hold East-West, 12K"

Global Area Reference System (GARS)

GARS was developed to replace theater-specific common geographic reference systems to meet the requirements of combatant commanders to improve Joint coordination and reduce the risk of fratricide.

Though established as the standard reference system authorized for reporting and referencing areas, GARS is currently not the standard used in Operation Enduring Freedom and Operation Iraqi Freedom.

GARS is latitude/longitude based and provides an integrated common frame of reference from which C2 can be exercised for Joint force operations and situational awareness. It is not intended for precise targeting or navigation. It provides the potential to digitize and share information electronically about the dynamic battlespace for a near-real-time picture of control and coordination measures.

Labeling and identification

GARS uses a single origin and divides the world into 30 by 30-minute cells. Each cell is subdivided into four 15 by 15-minute quadrants. Furthermore, each quadrant is subdivided into nine 5 by 5-minute keypads.

GARS uses a standard over-and-up cell address convention; a five-character designation (e.g., 006AG) identifies each cell.

Global Area Reference System

The first three characters designate a 30-minute-wide longitudinal band. Beginning with the 180-degree meridian and proceeding eastward, the bands are numbered from 001 to 720 so that 180E to 179 30'W is band 001, 179 30'W to 179 00'W is band 002, and so on.

The fourth and fifth characters designate a 30-minute-wide latitudinal band. Beginning at the south pole and proceeding northward, the bands are lettered from AA to QZ (omitting I and O) so that 90 00'S to 89 30'S is band AA, 89 30'S to 89 00'S is band AB, and so on.
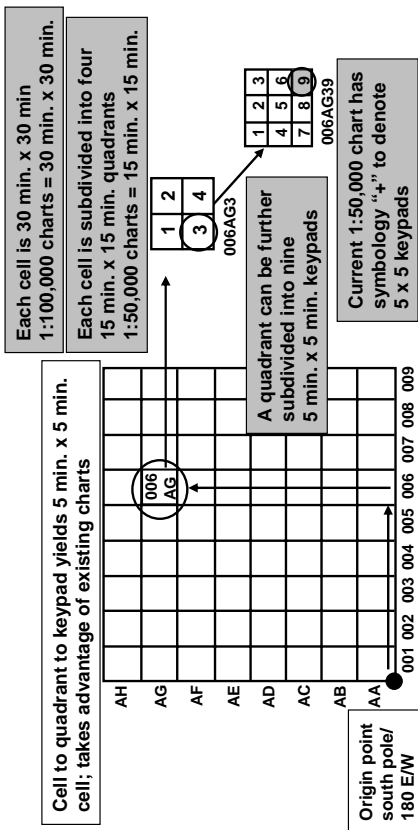
Each 30-minute cell is divided into four 15 by 15-minute quadrants. The quadrants are numbered sequentially, from west to east, starting with the northernmost band. Specifically, the northwest quadrant is "1," the northeast quadrant is "2," the southwest quadrant is "3," and the southeast quadrant is "4." Each quadrant is identified by a six-character designation (e.g., 006AG3). The first five characters comprise the 30 by 30-minute cell designation. The sixth character is the quadrant number.

Each 15 by 15-minute quadrant is divided into nine 5 by 5-minute areas resembling a telephone keypad. The areas are numbered sequentially, from west to east, starting with the northernmost band. A seven-character designation identifies each 5 by 5-minute area or keypad "key." The first six characters comprise the 15-minute quadrant designation. The seventh character is the keypad "key" number (e.g., 006AG39).

Global Area Reference System

Each cell is 30 min. x 30 min
1:100,000 charts = 30 min. x 30 min.

Each cell is subdivided into four
15 min. x 15 min. quadrants
1:50,000 charts = 15 min. x 15 min.

1	2	3
4	5	6
7	8	9

006AG39

| 1 | 2 |
| 3 | 4 |

006AG3

A quadrant can be further
subdivided into nine
5 min. x 5 min. keypads

Current 1:50,000 chart has
symbology "+" to denote
5 x 5 keypads

Note: From NGA.

Cell to quadrant to keypad yields 5 min. x 5 min.
cell; takes advantage of existing charts

006
AG

AH
AG
AF
AE
AD
AC
AB
AA

001 002 003 004 005 006 007 008 009

GARS provides structure to "digitize" Joint airspace coordination

Origin point
south pole/
180 E/W

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