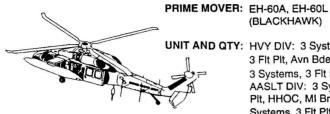
APPENDIX G

IEW SYSTEMS

QUICKFIX (AN/ALQ-151(V1)) Advanced QUICKFIX (AN/ALQ-151(V2))

FUNCTION: VHF DF intercept, VHF EA, VHF DF (nets w/TRAILBLAZER for DF). Component of IEWCS AF/VHF/UHF ES



(BLACKHAWK) UNIT AND QTY: HVY DIV: 3 Systems 3 Fit Pit, Avn Bde; LT DIV:

3 Systems, 3 Flt Plt, Avn Bde; AASLT DIV: 3 Systems, 3 Flt Plt, HHOC, MI Bn; ABN DIV: 3 Systems, 3 Fit Plt, Cbt Avn Sqdn; ACR: 3 Systems, 3 Fit Plt, Cbt Avn Sqdn

INTEL APPLICATION: COMINT

Airborne Reconnaissance Low (ARL)



 FUNCTION: Ground processing station, ACT 101 remote rcv sets, TACLINK video rcv sets, FLIR system, daylight imaging systems, infrared line scanner, radio intercept/DF systems; interoperates w/ASAS & CTT

PRIME MOVER: DHC-7 arrives ready for immediate employment

UNIT AND QTY: Select Brigades

INTEL APPLICATION: COMINT/IMINT

Commander's Tactical Terminal (CTT), AN/TSC-125



FUNCTION: Communications terminal; GUARDRAIL downlink on TRIXS network; RRS on board RC-12 & U2-R, RRTS; includes OT, RBP, RRT, LOS adaptive array antenna, SDS, embedded COMSEC

PRIME MOVER: NA

UNIT AND QTV: 1- MI at all echelons

INTEL APPLICATION: SIGINT

Joint Tactical Terminal: JTT/H3 (AN/USC-55) JTT/H-R3 (AN/USR-6)

FUNCTION: Communications terminal, 2 LRUs, 1 RBP, 1 RRT, host processor & antenna array (both user provided); mobile & mountable in F/W & R/W, tracked & wheeled vehicles, shelters

PRIME MOVER: NA

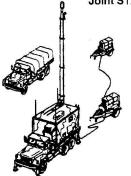
UNIT AND QTY: Avn, ADA, FA, MI at all echelons; integrated into GSM/CGS, ASAS, ETRAC, THAADS, Patriot, JTAGS, TROJAN SPIRIT, AFATDDS, other multiservice systems

INTEL APPLICATION: SIGINT

Ground-Based Common Sensor (GBCS) FUNCTION: ES (intercept& DF); EA (jamming); COMINT targeting location data; common subsystems with AQF & MEWSS PRIME MOVER: EFVS (HVY DIV) or HVY HMMWV (LT DIV) UNIT AND QTY: 6 GBCS-H per MI Bn (H); 4 GBCS-L per MI Bn (ABN, AASLT, LT); 6 per MI Bn (H, LT, ABN, AASLT, DIV); 6 per MI Co; ACR

INTEL APPLICATION: COMINT/ELINT

Joint STARS Ground Station Module (GSM) (AN/TSQ-132)

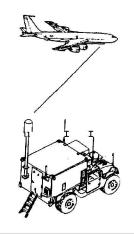


FUNCTION: MTI, FTI, SAR imagery; supports situation development, battle mgt, targeting, force protection, limited BDA/TDA, operations planning

PRIME MOVER: LT - 2xHMMWV; MED - 2X5-ton HMMWV

UNIT AND QTY: 6- Selected DIV; 6- Selected Corps; 1- ACR; 1- EAC

INTEL APPLICATION: IMINT/SIGINT/INTEL/ ARTY/AVN SUPPORT



Joint STARS Common Ground Station (CGS)

FUNCTION: MTI, FTI, SAR imagery; supports situation development, battle mgt, targeting, force protection, limited BDA/TDA, operations planning; includes SATCOM & CTT communications

PRIME MOVER: LT - 2xHMMWV

UNIT AND QTY: 5 to 7- DIV; 5 to 7- Corps; 1- ACR; 1- SEP BDE; 1 to 5 EAC

INTEL APPLICATION: IMINT/SIGINT/INTEL/ ARTY/AVN SUPPORT

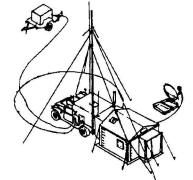
Integrated Meteorological System (IMETS)

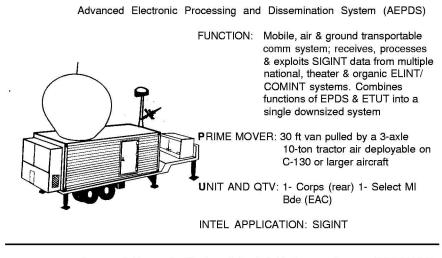
FUNCTION: Receives, processes & disseminates weather data.

PRIME MOVER: Heavy HMMWV mounted

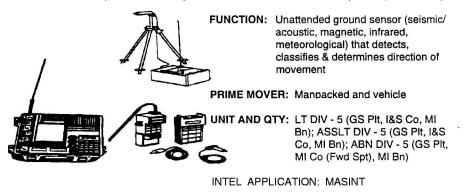
UNIT AND QTY: DIV, Corps, EAC, SEP BDE, ACR, AVN BDE, other task organized contingencies

INTEL APPLICATION: Intelligence Support





Improved Remotely Monitored Battlefield Sensor System (IREMBASS)



Mobile Integrated Tactical Terminal (MITT)

FUNCTION: Replaces THMT & FAST-I in force structure; compatible w/TROJAN, MSE, TIBS, DIN/DSSCS, STU III, TENCAP; TRAP/TADIXS-B, UHF SATCOM, S-BAND w/ROTERM/ CHARIOT



PRIME MOVER: Mobile, ground, air transportable (heavy duty HMMWV, cargo HMMWV, generator trailer, C-130, CH-47)

UNIT AND QTY: DIV and Corps ACE - 1

INTEL APPLICATION: SIGINT/IMINT

Tactical Unmanned Aerial Vehicle (TUAV) - OUTRIDER

PRIME

FUNCTION: Operates fwd of FLOT, in all conditions; provides NRT intel, recon, battlefield survl, color E-O camera, FLIR, plug-in optronic payload; future payloads: MTI, SAR, comm/ noncomm DF, intercept, jamming; MET

PRIME MOVER: C-130 or larger, roll-on/roll-off; ground equipment mounted on HMMWVs

UNIT AND QTY: 3 - HVY/AASLT DIV; 5 - LT DIV; 3 - ABN DIV; 3 - ACR; 5 - LT ACR: 1 - SEP BDE

INTEL APPLICATION: IMINT/SIGINT/PSYOP

Unmanned Aerial Vehicle-Short Range (UAV-SR) HUNTER

FUNCTION: Operates fwd of FLOT, in all conditions; provides NRT intel, recon, battlefield survl, color CCD, TA, BDA, recon, battlefield survl, E-O/FLIR, UAV data relay; future payloads: MTI, SAR, MET, ES, EA, mine detection, PSYOP, SIGINT, NBC recon

PRIME MOVER: NA

UNIT AND QTY: Not fielded. For training use only

INTEL APPLICATION: IMINT/SIGINT/PSYOP

Unmanned Aerial Vehicle (UAV)-Endurance PREDATOR

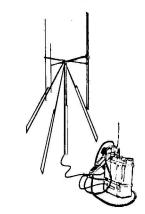
FUNCTION: Operates as stand-off system in all conditions, behind friendly lines; can penetrate into enemy territory; payloads: E-O/FLIR, MTI/SAR, SIGINT, MET, PSYOP, NBC recon, comm/data relay

PRIME MOVER: 2 C-141s or multiple C-130s

UNIT AND QTY: USAF Asset - Deployed in support of Joint Operations

INTEL APPLICATION: IMINT/SIGINT/PSYOP

Lightweight Man-Transportable Radio Direction Finding System (LMRDFS) AN/PRD-12



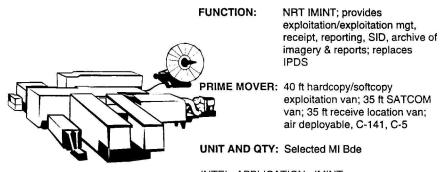
FUNCTION: Lightweight manportable comm intercept/DF system; on emitter location missions, works w/TEAMMATE; ideal in LT, ABN, AASLT, SOF opns; rapid relocation; optimizes collection in fwd AO; CNR for external comm

PRIME MOVER: Manpacked; 60 lbs, carried by 2 soldiers

UNIT AND QTY: 1 - LT ABN; 3 - HVY/AASLT DIV; 3 - ACR; 1 - SEP BDE; 7 - SOF BN; 10 - SOF SA

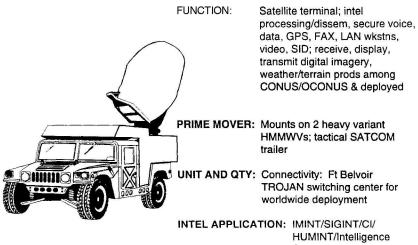
INTEL APPLICATION: COMINT

Modernized Imagery Exploitation System (MIES)



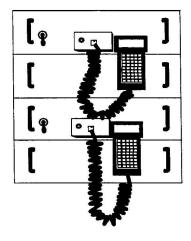
INTEL APPLICATION: IMINT

TROJAN SPIRIT (AN/TSQ-190V)



Support

Synthetic UHF Computer-Controlled Equipment Subsystem (SUCCESS) UHF Radio



FUNCTION:	Auto microprocessor UHF band radio; used w/TENCAP; simultaneous comm when stacked; 2 XMIT/6 RCV channels; SATCOM, point-to-point, TADIXS-B, direct data downlinks; comm w/abn, terrestrial & satellite systems; contains TRE processor
PRIME MOV	ER: Designed for ground/mobile

PRIME MOVER: Designed for ground/mobil sheltered environments

UNIT AND QTY: Demand assigned multiple access

INTEL APPLICATION: Intelligence Support

Enhanced TRACKWOLF (AN/TSQ-199)

 FUNCTION:
 Targets HF jammers/emitters; 3 netted or stand-alone stations; produces COMINT, TACREPs; spts EAC w/organic long-distance comm resources; open architecture; scaleable tier I-III; external comm via SINCGARS LPI VHF radio, DIN, DSSCS, TROJAN SPIRIT II, SSP-SIGINT, CROSSHAIR, UHF MIL SATCOM (DF Flashnet)

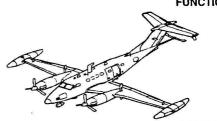
PRIME MOVER: NA

THE

UNIT AND QTY: Special missions at EAC

INTEL APPLICATION: COMINT

Guardrail Common Sensor (GRCS)



 FUNCTION:
 Collects, identifies, classifies, locates radio signals; provides NRT reporting; gathers LOB & TDOA data; ARF relays platforms btwn IPF & cmds; incorp CHAALS; interfaces w/fixed locations & tactical users; future; expanded coll, LPI capability, embedded trng, 3-channel CTT, retrofit, and auto reporting

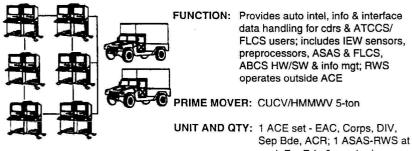
PRIME MOVER: Self-deployable; 4 - IPF vans; 3 - IDL trackers

UNIT AND QTY: 1 - Corps AEB

INTEL APPLICATION: ELINT/COMINT

G-1 0

All-Source Analysis System (ASAS)

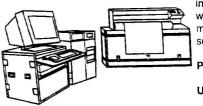


Sep Bde, ACR; 1 ASAS-RWS a each Bn, Bde & required collateral locations EAC-DIV

INTEL APPLICATION: COMINT/ELINT/IMINT/ CI/HUMINT

Digital Topographic Support System Multi-Spectral Image Processor (DTSS/MSIP)

FUNCTION:



Automates terrain TM; produces terrain anal prod; improves response time for IPB; collocated w/ASAS; msg traffic thru MSE; generates/updates multi-spectral imagery; contains 3-D visualization, scanning, map-sizing printer

PRIME MOVER: NA

UNIT AND QTY: 1 DIV Terrain TM; 2 - EAC/Corps Terrain TM

INTEL APPLICATION: IMINT/Intelligence Support

Digital Topographic Support System Quick Response Multicolor Printer (DTSS/QRMP)



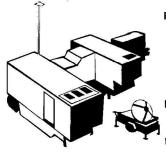
FUNCTION: Automates terrain TM; produces terrain anal prod; improves response time for IPB; collocated w/ASAS; msg traffic thru MSE; provides digital data/terrain anal from battlefield in hard/soft copy

PRIME MOVER: Tactically mobile; 2 LMS-788/gs shelters; 2 HMMWV-H

UNIT AND QTY: 1 DIV Terrain TM; 2 - EAC/Corp Terrain TM

INTEL APPLICATION: IMINT/Intelligence Support

Enhanced Tactical Radar Correlator (ETRAC)



FUNCTION: Advanced mobile SAR processor; receives data from ASAR-2 via U2-R; converts radar to imagery; limited organic exploit for stand-alone opns; includes SUCCESS radio, TENCAP CSP; STU-III, DSVT

PRIME MOVER: Air deployable via C-130, C-141, C-5

UNIT AND QTY: XVIII ABN Corps and V Corps

INTEL APPLICATION: IMINT

G-1 2

CI/HUMINT Automation Tool Set (CHATS)



FUNCTION: Provides direct access into CI/HUMINT collateral LAN; uses INMARSAT, TROJAN SPIRIT, SINCGARS, MSE, DSN & phone lines; 2-way data comm; secure FAX; future: GPS, cellular comm, power mgt

PRIME MOVER: 2-manportable cases

UNIT AND QTY: 66th MI Group, Augsburg, GE

INTEL APPLICATION: CI/HUMINT

AN/PPS-5B



FUNCTION: Moving Target Indicators Range: 6 km-Personnel 10 km-Vehicle

PRIME MOVER: Manpacked and vehicle

UNIT AND QUANTITY: HVY DIV: 12 systems 4/GSR Squad (3) Survi Pit, I&S Co., MI Bn

AN/PPS-15A

FUNCTION: Moving Target Indicators Range: 1.5 km-Personnel 3.0 km-Vehicle

PRIME MOVER: Manpacked and vehicle



0 0

UNIT AND QUANTITY: LT DIV: 12 systems 3/GSR Squad (4) Survi Pit, I&S Co., MI Bn

> ASSAULT DIV; 8 systems 3/GSR Squad (3) Survl Plt, I&S Co., MI Bn

ABN DIV: 9 systems 3/I&S Pit (3) MI Co., (Fwd Spt), MI Bn

APPENDIX H

MILITARY INTELLIGENCE UNITS AND CAPABILITIES

This appendix shows the structure of the MI Battalion (Heavy Division), the MI Battalion (Light Divisions, Airborne, Air Assault), and the Corps MI Brigade. The MI unit structures constitute approved MI force design.

DIVISION MI BATTALION

The MI Battalion (Heavy Division) (Figure H-1) provides dedicated IEW support to the heavy division. It responds to missions assigned by the commander and staff. (MI battalion IEW assets are shown in Appendix G.)

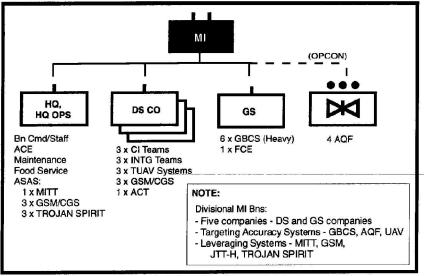


Figure H-1. MI Battalion (Heavy Division).

LIGHT, AIRBORNE, AND AIR ASSAULT DIVISION

The MI Battalion is organized as shown in Figure H-2.

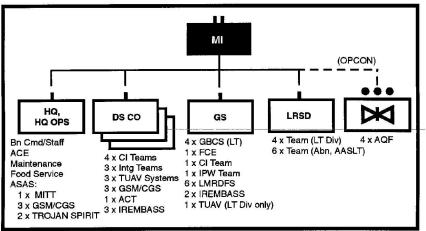


Figure H-2. MI Battalion (Light, Airborne, Air Assault Division).

CORPS MI BRIGADE:

The Corps MI Brigade (Figure H-3) provides dedicated IEW support to the Corps and its subordinate units.

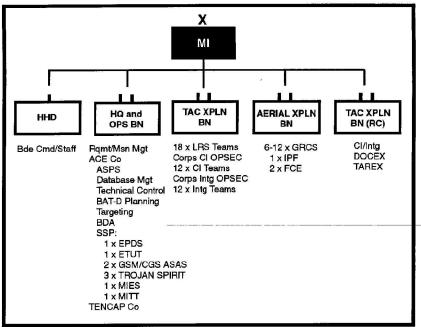


Figure H-3. Corps MI Brigade.

Figures H-4 and H-5 show the organizations of the MI Detachment, Support Company, Special Forces Group and the Special Forces Battalion, respectively.

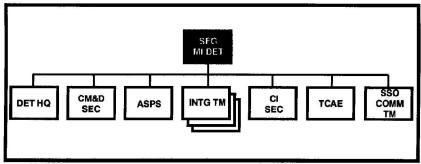


Figure H-4. Organization, MI Detachment, Spt Co, SFG.

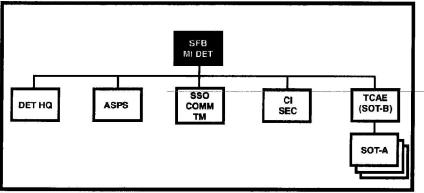


Figure H-5. Organization, MI Detachment, Spt Co, SFB.

APPENDIX I

INTELLIGENCE TRANSITION CHECKLIST

This checklist provides for transition of intelligence responsibility for an area between units. Status of all items listed must be thoroughly coordinated between the transitioning S2s to ensure an effective hand-off of responsibility.

INTELLIGENCE TRANSITION CHECKLIST		
CURRENT SITUATION.		
Threat disposition:		
Maneuver. Artillery. Counter-Air. Intelligence. Mobility-Countermobility-Survivability. Logistics. C ³ . Deception.		
Threat strength:		
Percentage strength of units. BDA.		
Personnel. Equipment. Weapons. Logistics.		
Threat vulnerabilities. Threat capabilities. Probable COA.		
FRIENDLY INTELLIGENCE SITUATION.		
Collection plan		

	equired coverage. ocus (CCIRs).
	equired coverage. ocus (EEFI/PIR).
CI	Als. urveillance. I/IPW.
As	i asset status. ssets. sset schedule - previous 24 hours next 24 hours.
POCs. Downlinks Reporting COS/DEA	times (as of time to report and due times).
Lists of stay-beh Lists of stay-beh Intelliger Commun CIA. DIA nation JCMEC	nce assets. nications architecture and frequencies. onal MIST.
SIGINT. Technica MCSF.	al data (adds, changes, deletes).
EPW. Numbers Handove HN hand	s, locations, Category A, SOFA. er to JTF or ARFOR. dover.
HN Intelligence/ Support POCs au	, assets, communications.

_ KEY TERRAIN.

___ MAP UPDATES AND CORRECTIONS.

_____ DETAINABLE, OF INTEREST, AND PROTECTABLE LISTS.

INTELLIGENCE COLLECTION PLAN.

COORDINATION FOR STAY-BEHIND PERSONNEL.

COVER, SECURITY, OPSEC STATUS, AND PLAN.

LIST OF STAY-BEHIND PRODUCTS:

_____ Intelligence map with current situation and sources.

_____ All-source intelligence support and sources.

_____ Imagery products and sources.

_____ Current weather forecast and on-hand weather, light data, and sources.

_____ Historical documents, locations, and sources.

_ ENCLOSURES:

- List of threat, strengths, capabilities, COAs, weaknesses and vulnerabilities, and effects of friendly action.
- _____ Threat situation overlays.
- _____ Troop list of friendly collectors.
- Friendly collector location overlays.
- _____ Intelligence communications net diagrams and POC list.
- _____ Key terrain overlays.
- Map updates and corrections (may be overlay).
- _____ Detainable, of interest, and protectable lists.
- _____ Intelligence collection plan.

APPENDIX J

INTELLIGENCE REFERENCE LIST

NOTE: This list is not all inclusive. Include the series of field manuals for your particular unit; for example, FM 44-series for Air Defense. Make sure the publications clerk is aware of your requirements. Refer also to the References section in this manual.

AR 190-11	Physical Security of Arms, Ammunition and Explosive
AR 190-13	The Army Physical Security Program
AR 190-14	Carrying of Firearms and Use of Force for Law
	Enforcement and Security Duties
AR 190-51	Security of Unclassified Army Property
AR 525-13	The Army Combating Terrorism Program
AR 380-5	Department of the Army Information Security Program
AR 380-10	Technology Transfer, Disclosure of Information and Contacts with Foreign Representatives
AR 380-19	Information Systems Security
AR 380-67	The Department of the Army Personnel Security Program
AR 381-1	Security Controls on Dissemination of Intelligence
AR 381-10	US Army Intelligence Activities
AR 381-12	Subversion and Espionage Directed Against the US Army (SAEDA)
AR 381-20	The Army Counterintelligence Program
(U) AR 381-172	Counterintelligence Force Protection Source Operations (CFSO) and Low Level Source Operations (LLSO), Secret.
AR 530-1	Operations Security (OPSEC)
FM 1-111	Aviation Brigades
FM 5-30	Engineer Intelligence
FM 5-36	Route Reconnaissance and Classification
FM 6-20	Fire Support in the AirLand Battle
FM 6-20-10	Tactics, Techniques, and Procedures for the Targeting Process
FM 6-121	Tactics, Techniques, and Procedures for Field Artillery Target Acquisition
FM 7-98	Operations in a Low-Intensity Conflict

FM 11-50	Combat Communications Within the Division (Heavy and Light)
FM 17-95	Cavalry Operations
FM 19-1	Military Police Support for the AirLand Battle
FM 19-30	Physical Security
FM 25-100	Training the Force
FM 25-101	Battle Focused Training
FM 33-1	Psychological Operations
FM 34-1	Intelligence and Electronic Warfare Operations
FM 34-2	Collection Management and Synchronization Planning
FM 34-2-1	Tactics, Techniques, and Procedures for Reconnaissance and Surveillance and Intelligence Support to Counterreconnaissance
FM 34-3	Intelligence Analysis
(U) FM 34-5	Human Intelligence and Related Counterintelligence Operations, Secret.
FM 34-7	Intelligence and Electronic Warfare Support to Low- Intensity Conflict Operations
FM 34-8	Combat Commander's Handbook on Intelligence
FM 34-10	Division Intelligence and Electronics Warfare Operations
FM 34-13	Military Intelligence (MI) Battalion, Combat Electronic Warfare Intelligence (CEWI) (Div), Leaders Handbook for Platoons and Teams
FM 34-25	Corps Intelligence and Electronic Warfare Operations
FM 34-25-1	Joint Surveillance Target Attack Radar System (JOINT STARS)
FM 34-25-3	All-Source Analysis System and the Analysis and Control Element
FM 34-36	Special Operation Forces Intelligence & EW Operations
FM 34-37	Echelons Above Corps (EAC) Intelligence & Electronic Warfare (IEW) Operations
(U) FM 34-40	Electronic Warfare Operations, Secret.
(U) FM 34-40-3	Tactical Signals Intelligence (SIGINT) Analysis Operations, Confidential.
FM 34-40-7	Communications Jamming Handbook
FM 34-40-9	Direction Finding Operations
(U) FM 34-40-12	Morse Code Intercept Operations, Confidential.
(U) FM 34-40-13	Electronic Intelligence (ELINT) Operations, Secret.
FM 34-52	Intelligence Interrogation
FM 34-54	Battlefield Technical Intelligence
FM 34-60	Counterintelligence
FM 34-80	Brigade and Battalion Intelligence and Electronic

	Warfare Operations		
FM 34-81	Weather Support for Army Tactical Operations		
FM 34-81-1	Battlefield Weather Effects		
FM 34-82	Military Intelligence Unit Exercise Development Guide		
FM 34-130	Intelligence Preparation of the Battlefield		
FM 41-10	Civil Affairs Operations		
FM 71-3	Armored and Mechanized Infantry Brigade		
FM 71-100	Division Operations		
FM 90-2	Battlefield Deception		
(U) FM 90-2A	Electronic Deception, Secret.		
FM 90-14	Rear Battle		
FM 90-29	NEO		
FM 100-5	Operations		
FM 100-6	Information Operations		
FM 100-19	Domestic Support Operations		
FM 100-20	Military Operations in Low-Intensity Conflict		
FM 100-23	Peace Operations		
FM 100-25	Doctrine for Army Special Operations Forces		
FM 101-5	Staff Organization and Operations		
FM 101-5-1	Operational Terms and Graphics		
TC 34-55	Imagery Intelligence		
Joint Pub 1	Joint Warfare for the US Armed Forces		
Joint Pub 1-01 series	Joint Publication System, Joint Doctrine and Joint Tactics, Techniques, and Procedures Development Program		
Joint Pub 2-0 series	Joint Doctrine for Intelligence Support to Operations		
Joint Pub 3-0 series	Doctrine for Joint Publications		
Joint Pub 5-0 series	Doctrine for Planning Joint Operations		
(U) Joint Pub 6-02	Joint Doctrine for Employment of Operational/		
Tactical Command, Contro	I, Communications, and Computer Systems,		
Secret.			

NOTE: DOCTRINE WRITTEN PRIOR TO 1992 IS BEING REVISED. UPDATE YOUR REFERENCE LIST AS NEW DOCTRINE IS PUBLISHED.

APPENDIX K

WEATHER ELEMENTS AND SUPPORT

A working knowledge of weather elements is essential to provide your commander with a complete picture of potential adverse weather effects on the battlefield.

INTERACTION OF BATTLEFIELD ENVIRONMENT ELEMENTS

Weather conditions, terrain, BIC, illumination, and background signatures are some primary conditions found in a battlefield environment (Figure K-1).

A weather element is an atmospheric variable that is measured in a weather observation. A weather parameter is derived from one or more weather elements. Example: Density altitude is a weather parameter derived from the element's barometric pressure and temperature.

Weather conditions such as wind, precipitation, and clouds can impact or can be influenced by the other conditions of the battlefield. All of these conditions are interdependent, to a certain degree, and must be considered as a whole (Figure K-2).

WEATHER EFFECTS AND TERRAIN

Terrain features affect weather elements such as visibility, temperature, humidity, precipitation, winds, clouds. The most common example of terrain affecting weather is that on the windward side of high terrain, such as mountains, the rainfall rate will be greater than on the leeward (opposite) side.

Weather conditions have a definite effect on the terrain and can enhance or limit military operations such as trafficability, water crossing (fording), and the first-round accuracy of supporting FA fires. The responsibility for determining mobility and counter-mobility is given to the terrain team at division.

ATMOSPHERIC PRESSURE: Atmospheric pressure is the pressure exerted by the atmosphere at a given point and measured by a barometer in inches of mercury (Hg) or in millibars (Mb).

Pressure Altitude:	This is indicated in an altimeter when 29.92 is set in the barometric scale window. High pressure altitude is critical to the lift capability of fixed wing aircraft.	
Density Altitude:	This is a place in the atmosphere corresponding to a particular value of air density. High pressure is critical to helicopter operations.	

CLOUDS: The amount of sky covered by clouds is usually described in eighths: Overcast (8/8ths), broken (5 to 7/8ths), or scattered (1 to 4/8ths). Cloud conditions are described by the amount of cloud cover and the height of the base of the cloud AGL. A cloud ceiling is the height of the lowest broken or overcast layer, and is expressed in feet. A higher layer of several scattered layers of clouds is designated as a cloud ceiling when the sum of the coverage of the lower layers exceeds 4/8ths.

DEW POINT TEMPERATURE: Dew point is the temperature to which the air must be cooled for the air to become saturated and allow dew, and probably fog, to form.

HUMIDITY: This is the state of the atmosphere with respect to water vapor content. It is usually expressed as:

Relative Humidity:	The ratio between the air's water content and the
	water content of saturated air.
Absolute Humidity:	The measure of the total water content in the air. It is high in the tropical ocean areas and low in the arctic.

PRECIPITATION: Precipitation is any moisture falling from a cloud in frozen or liquid form. Rain, snow, hail, drizzle, sleet, and freezing rain are common types. The intensity of precipitation is described as light, moderate, and heavy.

Light Rain:	Drops are easily seen, very little spray, and puddles form slowly, and accumulation is a trace to 0.10 in/h.

Figure K-1. Common weather elements.

Moderate Rain:	Drops are not easily seen, spray noticeable, puddles form rapidly, and accumulation rates are 0.11 to 0.30 in/h.
Heavy Rain:	Drops are not seen, rain comes in sheets with heavy spray, puddles form quickly, and the rate is more than 0.30 in/h.
Light Snow:	Visibility is equal to or greater than 5/8 miles, or 1,000 meters in falling snow; and a trace to 1 in/hr accumulates.
Moderate Snow:	Visibility is 5/16 to ½ statute miles, or 500 through 900 meters in falling snow with 1 to 3 in/hr accumulation.
Heavy Snow:	In heavy snow, visibility is cut to less than 1/4 statute miles, or 400 meters, with more than accumulation of 3 in/h.

TEMPERATURE: Temperature is the value of heat or cold recorded by a thermometer normally at 6 feet AGL at the observation site. Temperatures are normally given in both Fahrenheit and Celsius values. It is sometimes referred to as the ambient air temperature.

VISIBILITY: A measurement of the horizontal distance at the surface or aloft that the unaided human eye can discern a large object or terrain feature. Visibility is reported in meters or fractions of a mile, and is reported as a prevailing value of the visibility in all directions. Thus, a visibility report of 1,600 meters may not reveal that fog is diminishing visibility to 400 meters in the northwest if the observer has good visibility in other directions. However, such an event would typically be carried in the weather observation's remarks section.

WIND SPEED AND DIRECTION: These two measure the rate of movement of the air past a given point and the direction from which the wind is blowing. A gust is a rapid fluctuation in wind speed with a variation of 10 knots or more between peak and lull. Gust spread is the instantaneous difference between a peak and a lull and is important for helicopter operations.

Figure K-1. Common weather elements (continued).

WEATHER ELEMENTS	THRESHOLD VALUES	IMPACTED SYSTEMS
VISIBILITY	1.0 km 3.0 km	 DRAGON, Machine guns. Main gun, TOW, CAS, thermal viewers.
CLOUDS	500 ft 1,000 ft 1,500 ft 5,000 ft	 NOE operations, airborne, helicopter TA. CAS. COPPERHEAD engagements. Visual reconnaissance, ADA TA.
SURFACE WIND	6 kn 13 kn 18 kn 30 kn	 Chemical. Airborne-round parachute. Military free fall-ram air parachutes, artillery smoke loses its effectiveness, artillery fire accuracy. Helicopter maneuver.
TEMPERATURE	>32 ^c C < 0 ^c C	 Helicopter lift capabilities. NVG (PVS-5).
WINDCHILL	<10 ^c C	Personnel survival.
PRECIPITATION	Moderate Freezing	 Ground maneuver, chemical, laser systems, GSR. Ground maneuver.

Figure K-2.	IPB weather	overlay criteria.
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BATTLEFIELD-INDUCED CONTAMINANTS

During combat operations, visibility can become severely reduced by BIC. These contaminants are either induced directly by combatants or occur as by-products from battlefield operations.

Two significant sources of battlefield contaminants are dust produced by HE artillery or mortar rounds and deliberately employed smoke. HE rounds used in a pre-attack barrage not only may kill enemy forces but also may restrict the visibility of your own troops by dust caused by the HE if you do not consider the direction of the wind. Smoke produced by smoke generators, vehicle exhaust emission

systems, smoke pots, indirect fire, and smoke rounds also produce battlefield contaminants.

Wind speed and direction are critical to maintaining an effective smoke screen. Rain can remove BIC quickly. Weather inversions over valley areas can sustain airborne contaminants for long periods.

Other sources of BIC that will lower visibility in the AO are clouds of dust from vehicle traffic or smoke from fires. These types of contaminants not only blind you but also may help your adversary in detecting troop movements and pinpointing your location.

A unique BIC affecting visibility occurs in conditions when temperatures are in the range of -30 EC or -22 EF or colder. When a source of moisture or water vapor is released into the cold air by internal combustion engines, artillery fires, or launched self-propelled munitions, visibility can be reduced to zero when the moisture freezes instantly and changes into ice fog.

Ice fog may restrict visibility across a whole valley and can linger for hours. Ice fog crystals permit ground objects to be seen from above while severely restricting visibility on the ground—an advantage for aerial reconnaissance.

On airfields an ice fog created by fixed-wing aircraft may cover an entire runway. Visibility can be reduced so that other aircraft cannot take off or land if the wind is calm. The ice fog also draws attention to the airfield location.

Launching missiles such as the TOW in very cold air can create an ice fog. As the TOW moves to the target, the exhaust blast exits into the air where it condenses and creates the ice fog. If the wind is calm, this fog follows the trajectory of the missile and reduces launch point visibility to such an extent that the operator loses sight of the target. Also, the launch point can be identified by threat forces from the condensation trail of the missile.

ILLUMINATION

Natural light is critical in planning operations where NVD are used or in operations timed to use only available light. Natural light values vary as a function of the position of the sun, moon, stars, and clouds. Light data are available from your SWO for any time period and place. These data are particularly important for determining first and last light, moonrise, and moonset, and are most effective for planning use of NVD.

Variables such as altitude, cloud cover, terrain-produced shadows, visibility, and direction of vehicle or aircraft movement in relation to the sun or the moon can also affect light level availability.

Artificial light is intended to increase visibility but, under certain weather conditions, this does not always occur. Example: Low cloud ceilings will limit the area covered and effective time of flares. Rain, snow, or fog can reduce flare effectiveness. However, under the right conditions, cloud cover can enhance the effects of artificial light due to cloud base reflection. Snow- or sand-covered terrain also reflect both natural and artificial light.

BACKGROUND SIGNATURES

Temperature, wind, and precipitation have a major influence on your ability to pick out a target from the background in the infrared spectrum. They also affect seismic (sound and acoustic) signatures. Detection of objects in the infrared spectrum depends on a temperature contrast between the object and its surrounding environment. This difference is known as the background signature.

Snow, rain, and wind influence the background signature because they can change the surface temperature of objects. These elements lower object temperatures and thus reduce the differential between a target and its background.

A heavy layer of snow produces a washout during any part of the day since it causes both the object and the background to exhibit the same temperature.

Precipitation also degrades seismic sensors through the introduction of background noise (rain), while a snow-covered surface will dampen sound and the movement of troops.

SEVERE OR HAZARDOUS WEATHER

In addition to a continuous need for forecast updates, you need non-forecasted or unanticipated severe or hazardous weather warnings. WETMs normally issue severe weather warnings and advisories. Check for the values at which each weather element becomes known as severe. You will be concerned with conditions such as—

- Tornadoes.
- Thunderstorms producing winds in excess of 45 knots and hail greater than 3/4 of an inch.
- Hurricanes and typhoons.
- Precipitation (rain or snow) when X inches fall in Y hours.
- Surface winds in excess of X knots.
- Maximum and minimum temperatures; when a forecast value misses the actual temperature by X degrees.

You want to know that an earlier forecast for light snow was amended to a forecast of a 16-inch accumulation within the next 12 hours. We cannot over emphasize that you need to work with your next higher HQ S2/G2 and the SWO so that your needs are realistically stated and can be supported. All of your weather support needs should be reviewed every 6 months in garrison and as required in the field.

LIGHT DATA

Another weather-related element that your commander needs is light data. NVD and NVG have made many night operations feasible. Your SWO provides official times for sunrise and sunset, BMCT and EECT, BMNT and EENT, length of absolute darkness, moonrise, moonset, lunar phase in percent, and time periods for using NVD and NVG. Light data to support NVD is needed because there are times when there is not enough moon or starlight to use them.

Civil twilight is sufficient for conduct of combat operations while nautical twilight permits most ground movements without difficulty. Nautical twilight allows a general visibility of up to 400 meters (1,320 ft) and lets you distinguish silhouettes from the background.

The actual duration of light varies with latitude and time of year. For example, in the vicinity of 35 to 40 degrees north latitude, civil twilight generally occurs 30 to 45 minutes before sunrise and after sunset. In the tropics, twilight is shorter.

Once light requirements are determined, relay them to your next higher S2 and SWO. This information is important for your commander because he needs to know not only when he can begin friendly military operations (day or night) but also when threat operations could begin.

OTHER CONSIDERATIONS

Although HF radio wave propagation forecasts are not normally available to the SWO, he can make arrangements before he deploys to receive these forecasts. When available, they should be given to every signal and intelligence organization. The SIGO should know that when HF is not effective, it may be because of solar activity rather than enemy jamming.

The USAF Global Weather Central can routinely provide solar forecast products to the SWO even in the field. Other data, such as tidal information and sea state conditions, can be obtained from the SWO but are normally provided only to specific Army units upon request.

RECEIPT OF FORECASTS

Every tactical echelon should receive the weather forecast prepared and briefed to the commander at the next higher echelon. With no SWO at a maneuver brigade, you receive both the forecast briefed at division covering the division AO and the forecast made by the division SWO specifically for your brigade. Each forecast message received should be worked by you to discover the direct weather impacts on your unit.

A commander wants the weather forecast. He also needs the effects and impacts of the forecasted weather interpreted for his specific operations, systems, and personnel. Schedule your forecasts so they arrive in time for you to prepare your commander's briefing.

HOW G2 OR S2 RECEIVE WEATHER SUPPORT

It is your responsibility to provide weather and weather effects information to your commander and supported or subordinate units. Methods may vary among units and echelons. At higher echelons, the SWO has primary responsibility for providing weather support. There, the G2 simply contacts the SWO, states requirements, and receives the needed weather support.

If you have no SWO, you must pass the request up the chain of command to a level where one is assigned. Once your requirements have been validated, weather support products flow back over the same path. In addition to weather forecast products, the SWO can provide specialized weather effects products. You must provide the threshold values used in developing these products.

You alert your commander and staff about the adverse impact of the forecasted weather. You prepare two simple charts to use during your commander's stand-up briefing. You can post these charts in the CP for reference.

Update the charts when a new forecast is issued by the WETM. Methods used in briefing your commander during the morning and evening briefings may vary greatly among commands. The formats below are a guide and should be modified to suit your situation.

The first chart (Figure K-3) illustrates how the weather elements and parameters contained in the forecast might be displayed on the board. Blown up to poster size and covered with acetate, this chart can be updated easily.

WEATHER FORECAST VALID FOR <u>121200Z to 131200Z</u>				
LOCATION: <u>PUNGSAN</u>				
24-HOUR FORECAST:				
SKIES:	CLEAR MORNING AND NIGHT, PARTLY CLOUDY IN THE AFTERNOON, BASES 3,000 FEET.			
VISIBILITY:	UNLIMITED, OCCASIONALLY 1 TO 2 MILES IN BLOWING SNOW DURING AFTERNOON.			
WINDS:	NORTH TO NORTHWEST, 10 TO 15 KNOTS, OCCASIONAL GUSTS TO 25 KNOTS IN AFTERNOON.			
TEMPERATURES:	MAX: <u>10EF</u> MIN: <u>-20EF</u>			
72-HOUR OUTLOOK:				
	CLOUDY SKIES, SNOW FLURRIES DURING AFTERNOON HOURS LOWERING VISIBILITY TO 2 TO 4 MILES.			
	TEMPERATURES: MAX: 20EF MIN: -5EF			
LIGHT DATA:	BMNT: 1247Z MOONRISE: 1924Z BMCT: 2221Z MOONSET: 0819Z SUNRISE: 2251Z SUNSET: 0820Z SUNSET: 0820Z NVG USE: EECT: 0851Z			

Figure K-3. Example of a weather forecast chart.

Figure K-4 shows color codes as one way to display potential weather impacts on operations, systems, and personnel in your unit. Another way would be to write the words "moderate" and "severe" in those blocks affected. Do not list all the equipment or systems, but have the list available to answer questions posed by the commander or staff. Stress those critical systems during the verbal portion of your briefing.

If the weather conditions change significantly during the period covered by the SWO's forecast, then an updated impact chart will have to be prepared. Because a brigade or battalion's AI is small, the SWO's forecast is likely to be uniform across the AI.

IMPACTED ITEMS	CLOUDS	PRECIPI- TATION	WIND	VIŜIBILITY	TEMPER- ATURE
NBC DEFENSE	GREEN	GREEN	GREEN	GREEN	RED
NIGHT VISION DEVICES	GREEN	GREEN	GREEN	ANIBER FROEPT DZ 16 052	AMBER
CSS	GREEN	AMBER	AMBER	AMBER	AMBER
TOW/DRAGON	GREEN	GREEN	AMBER	GREEN	RED
M-1/M-2	GREEN	GREEN	GREEN	GREEN	AMBER
SMOKE/ CHEMICAL	GREEN	GREEN	AMBER	GREEN	GREEN
GROUND RADAR	GREEN	GREEN		GREEN	GREEN
PERSONNEL	GREEN	GREEN	RED	GREEN	RED
THREAT	GREEN	GREEN	GREEN	AMBER	GREEN

Figure K-4. Example of a weather impacts display chart.

CRITICAL WEATHER FACTORS

Figure K-5 shows major critical weather factors that can enhance or degrade combat operations, systems, and personnel.

LOW VISIBILITY :	 Low visibility (less than 3 km). Can be beneficial to threat and friendly forces. Conceals the center of gravity and maneuver of offensive forces. Increases possibility of achieving surprise. Disadvantages. Hinders C^{2.} Reduces effectiveness of R&S and TA, especially during the defense.
SURFACE WINDS:	 Strong winds can reduce effectiveness of downwind forces by blowing dust, smoke, sand, rain, or snow on them. Upwind force generally has better visibility and can advance faster and easier. Strong winds limit airborne and aviation (primarily helicopters) operations. Winds in excess of 35 knots can— Cause personal injury. Damage materiel and structures. Create false radar returns. Reduce visibility because of blowing sand, dust, and other battlefield debris.
PRECIPITATION:	 Affects trafficability, visibility, personnel effectiveness, and a wide variety of tracked and wheeled military equipment. Heavy rains can make some unsurfaced, low- lying, and off-road areas impassable.

Figure K-5. Critical weather factors.

	 Both rain and snow can drastically reduce personnel effectiveness by limiting visibility, causing discomfort, increasing fatigue, and creating other physical and psychological problems.
CLOUD COVER:	 The type and amount of cloud cover and the altitude of cloud bases and tops influence aviation operations. CAS employing fixed-wing aircraft would like a ceiling of at least 2,500 feet (762 m), but can be employed with ceilings as low as 500 feet. Threat CAS rotary-wing aircraft and aerial resupply missions require a minimum ceiling of 300 feet (100 m). Affects ground operations by reducing illumination and visibility or by enhancing effects of artificial light.
TEMPERATURE AND HUMIDITY:	 Have a direct impact on personnel and vehicle performance. Excessively high temperatures cause heat-related injuries to personnel and vehicle engine wear that leads to equipment failure. Very low temperatures increase cold weather injuries, cause damage to vehicle cooling systems and engines, decrease the effectiveness of vehicle lubrication, and create excessive logistics requirements.

Figure K-5. Critical weather factors (continued).

WEATHER EFFECTS ON THREAT SYSTEMS

MILITARY ASPECTS OF WEATHER:

US Forces must be prepared to fight in a variety of climatic conditions on short notice. Key to accomplishing our missions under any circumstances is

understanding how weather affects both friendly and threat forces and their operations, systems, and personnel.

Current weather conditions and weather forecasts for the AO and AI are analyzed to determine the effects on friendly and enemy operations. This is significant when threat forces have the capability to employ NBC weapon systems.

THREAT EQUIPMENT:

Some of the major arms merchants today are the former Soviet Union, Sweden, Brazil, Britain, Germany, France, Italy, and the United States. However, the major arms purchasers continue to be the underdeveloped or Third-World countries in the Middle East, Latin America, and Asia.

The types of threat equipment we may encounter on future battlefields will vary from artillery and mortars produced during World War II to the Austrianproduced GHN-45, a 155-mm towed gun with a range of 39,600 meters (using ERFB-BB technology). Almost all the Third-World countries have bought or made their own versions of Soviet-produced tanks, APCs, artillery, AAA, and assorted SAM and SSM systems. Tables K-1, K-2, and K-3 list the weather effects from cloud ceilings, reduced visibility, and precipitation, respectively.

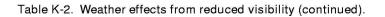
			3	
WEATHER	SEVERE DE	GRADATION	MODERATE DE	GRADATION
VALUE (FEET)	SYSTEM/ EVENT	REMARKS	SYSTEM/ EVENT	REMARKS
LT 1,000			SA-9 SAM SA-14 SAM	
LT 2,500			ZU-23 ZSU-23-4 SA-13 (Contrast mode) SA-16 SA-19	

Table K-1. Weather effects from cloud ceilings.

Table K-2. Weather effects from reduced visibility.

FM 34-8-2

WEATHER	SEVERE DEGR		MODERATE D	EGRADATION
VALUE (METERS)	SYSTEM/ EVENT	REMARKS	SYSTEM/ EVENT	REMARKS
LT 200			RPG-18 (RL) AKM/AKMS (7.62-mm) TKN-1T infrared periscope	ATW Rifle E-O device
LT 500	SA-14 GREMLIN SAM SA-13 SAM SA-16 SAM SA-19 (FSU) SAM		OU-3GK White infrared search light RPG-7 (GL) PT-76 (5.45- mm) AK-74	E-O device ATW AG/LT Rifle
LT 600			ERYX	
LT 750	SA-9 GASKIN SAM			
LT 800	AT-2 SWATTER AT-3 SAGGER AT-6 SPIRAL	ATGM ATGM ATGM	ASU-85 BMD (73-mm) BMP (73-mm) Sniper rifle, SVD RPK-74, squad AGS-17, GL RPG-16, GL	AG/LT LAV LAV Rifle MG



WEATHER	SEVERE DEGI	RADATION	MODERATE DEC	GRADATION
VALUE (FEET)	SYSTEM/ EVENT	REMARKS	SYSTEM/ EVENT	REMARKS
LT 1,000	All Types	ATGM	SPG-9 (73 mm recoilless rifle) SD-44 (85-mm) 14.5-mm KPU hvy MG 7.62-mm PKT MG DShK NSV/NSVT PK Series MT-LB 7.62-mm coaxial machine gun for all tanks	ATW ATW AA AA MG LAV MT
LT 1,500			7.62-mm 15.5-mm heavy BTR-50,-60,-70 (14.5-mm) KPVT ACRV M1974 DShK NSV/NSVT T-54, T-55, T-62 (main gun)	MG MG AA/LAV AA LAV MG MG MT
LT 2,000			T-12, MT-12 (100-mm) KPVT BRDM-2 (14.5- mm) T-80, T-72, T-64 (main gun) MATHOGO MILAN 2 RBS-56 SPIGOT	ATW MG LAV MT

Table K-2. Weather effects from reduced visibility (continued).

WEATHER	SEVERE DE	GRADATION	MODERATE DE	GRADATION
VALUE (METERS)	SYSTEM/ EVENT	REMARKS	SYSTEM/ EVENT	REMARKS
LT 2,500			SA-7 GRAIL ZU-23 ZSU-23-4	FSU SAM AA AA
LT 3,000			RED ARROW 73 RED ARROW 8 SUSONGP'O AT-3 SAGGER	
LT 4,000			SA-9 GASKIN HOT 2 SWINGFIRE AT-2 SWATTER AT-5 SPANDREL AT-8 SONGSTER AT-10 STABBER SA-13 (contrast mode)	FSU SAM FSU SAM
LT 4,500			MAPATS	
LT 5,000			NIMROD AT-6 SPIRAL AT-11 SNIPER SWIFT (SF)	ATGM
LT 6,000			120-mm, M-1943 S-60 (57-mm)	MO AA
LT 8,000			160-mm, M-160	МО

Table K-3. Weather effects from precipitation.

WEATHER	SEVERE DEGRADA	TION	MODERATE DEGR	ADATION
CONDITION	SYSTEM/EVENT	REMARKS	SYSTEM/ EVENT	REMARKS
Light rain			LOW BLOW (fire control) STRAIGHT FLUSH (12gHz)	SAM radar SAM radar
			(tracking) THIN SKIN (height finder)	SAM radar
Moderate rain			STRAIGHT FLUSH (acquisition)	SAM radar
Heavy rain			LOW BLOW (fire control) THIN SKIN (height finder)	SAM radar SAM radar
	NOTE: The list of AD radars on this page should be considered as a sample of the various other types of threat radars associated with EW operations and tactical and strategic SAM systems.			
	Not listed are a large variety of threat combat equipment (wheeled and tracked) affected by moderate or heavy rain and snow.			

WEATHER AND ENVIRONMENTAL ELEMENTS AND PARAMETERS IMPACTING ARMY SYSTEMS AND OPERATIONS:

Table K-4 is compiled from a study conducted by the US Army Intelligence School as part of the IEWMAA. Each TRADOC branch was asked to survey the impact of weather and environmental elements on their operations, systems, and personnel and rate them as either essential (E) or desired (D). Also included are other Army agencies' requirements.

- E—Some positive action had to be taken by the user based on severe current or forecasted weather conditions.
- D—Some impact, but the degree of impact is uncertain or not missionthreatening.

For each element or parameter listed, at least one responder identified it as essential for one or more of their operations, systems, or personnel.

Some data elements and parameters are known to have an impact, but exact critical thresholds have not been determined. Others cannot be measured or sensed with present technology. But identifying these data elements or parameters now allows for further research in how to collect the raw data (where applicable), determine the frequency of collection, establish data accuracy, and learn other supporting information.

As users and planners continue to learn more about weather and environmental impacts, the misconception that there is a hypothetical Army "all-weather" system or operation fades.

Table K-5 shows windchill factors.

Table K-4. Weather and environmental data elements impacting Army systems and operations.

WEATHER AND ENVIRONMENTAL DATA ELEMENTS IMPACTING ARMY SYSTEMS/OPERATIONS																								
A = AIR DEFENSE	=	FIN	ANC	Æ	-				-				-				NCE		_	-		-		┥
B = ADJUTANT GENERAL C = ARMOR		HE.					S						R				AFF							
D = AVIATION	ι=		AN										T		SIG		ERM	AS	i EM					
E = CHAPLAIN	м :				ovo								Ú				L FO	RC	ES					
F = DEFENSE AMMUNITION CENTER G = ENGINEER	N =	CH			PO	LIC	E						Y				RSL							
		OR															POR					'EN	TEO	
REQUIREMENT DESIGNATORS:		ESS	SEN	TIA	LSI	JPP	ORT	NE	EDS		D =	DE					ORT		-	-				۲
SPECIAL GROUP CATEGORIES: (GS) =	GR(DUN	D S	TAT	TE I	(66		SEA	ST	AT	2 (5	wi	= 1	SEV	ERE	WE	ATH	IER	CR	ITER	AIA	2	-	۲
DATA ELEMENT CATEGORY	marin		c		E	-	G	-	1	J	ĸ	L	M	N	0	P	0	R		т	U	v	W	x
1. ALTIMETER SETTING				E		1		Ĩ		E	Ĩ.	Í		Γ		h					13			-
2. ATMOSPHERIC CONTAMINANTS				E	D	D	E	D		-				-	Ê			D				-		Н
3. ATMOSPHERIC DENSITY				Ē		F	T.	E		Ē	71				Ľ					-	ñ	-		Н
4. ATMOS. TRANSMISSION COEFFICIENT	1.2					1		E				F		-		-						-		Н
5. BAROMETRIC PRESSURE	D			E				E		E		-	Ŵ	_							1000			E
6. CLOUD COVER AMOUNT	D		E	E		E	E	ε		E		E		Ð				D			M	E	893 1993	E
7. CLOUD BASE HEIGHT	E			E		E	1	E		E	E	_	D	-	1	-		-			m	-	m	E
8. CLOUD TOP HEIGHT				E		-				E	E	-		-		-					÷.			-
9. DAMAGING WINDS [SW]	E	E	E	E	E	D	E	E	n	E	-	E	E	E		D	m	E	n	E	**	E	1	-
10. DENSITY ALTITUDE		-		ε		È				E		-		Ē		-		-		-	2	-		-
11. EXTINCTION COEFFICIENT								E	Ŵ	-	F			-		-								-
12. EXTREME HEAT/COLD [SW]	E	E	m	ε	E	E	E	E	E	E		E		E		D		E		E	Ħ	E		-
13. FLOODING, RIVER STAGE [GS]	E	E	E	ε	E		E	D		E		E		E		D	m	_	h	-	ñ	E	8.33 9703	-
14. FREEZE/THAW DEPTH [GS]	D		E	E			E	D		E	i i	E		F		E	m	-	h	-	M	-		-
15. FREEZING PRECIPITATION ISWI	E	E	E	E	F		E	E		E	Ē	E	Ē	E		D	m	E		-	m	E		-
16. HEAVY RAIN/SNOW ISWI	E	_	È	E		D	E		E	E	E	E	ñ	-	m	E		-		-		E		÷
17. HUMIDITY, ABSOLUTE	D			E		F	Ē	-		-	R	-		-		-		-		•	n	-		Ē
18. HUMIDITY, ABSOLUTE, PROFILE	D			E	÷.		Ē			-	13								*		***	-		-
19. HUMIDITY, RELATIVE						E	E	D		-	ñ									-		E		Ē
20. HUMIDITY, RELATIVE, PROFILE		-	ġ.	-				E													R	-		-
21. HURRICANES/TYPHOONS [SW]	E	E	E	E	E	-	E	E	E	E		E	ñ	E	E	D	E	E	E	E	ñ	E		E
22. ICE/SNOW DEPTH/COVER [GS]	D			E				D		E		E			Ð	D		-		-	ň	-		E
23. ICING, FLIGHT [SW]	÷.			E		-		Ē		_	Ē	E		-		-				-	ñ	-		E
24. ILLUMINATION	£		E	E		-	E	E		-	E	E		E		D			5	-	ř	E	Å	Ē
25. IR TARGET/BACKGROUND CONTRAST			£	E				D		E	0	Ē		-		-				-	ř	-		E
26. IR THERMAL CONTRAST X-OVER TIME			E	E				D		E		-									ñ	+		E
27. IONOSPHERIC DISTURBANCES				D				-		D	Ē									E	m	-		-
28. LIGHT DATA	E		E	E		D	E	D		E	E	E		D	0				D.	D	i i	-	Ð	
29. LIGHTNING/THUNDERSTORMS [SW]			di k	D		E	E	E		-	E	-		-						-	n			E
30. LITTORAL CURRENT [SS]	44			D		D	E	Ē		-	D	E	886			-		-		-		-		듹
31. PRECIPITATION, ACCUMULATION		D	E	E	D	-	E	D	D	-	6	-		E	Ø	E		D	7	E		E	E	

Table K-4.Weather and environmental data elements impacting
Army systems and operations (continued).

DATA ELEMENT CATEGORY	A	B	C	D	E	F	G	Н	1	Ĵ	K	L	M	N	٥	P	Q.	R	5	т	U	V	W	X
32. PRECIPITATION, RATE	E	D		E	D		E	E	0	E	E	E	D	E		D		D		E		E		E
33. PRECIPITATION, HAIL SIZE	E			E				D		E				E		E					873	-		
34. PRECIPITATION, TYPE	E	D	E	E	D		E	E	D	Ε	E.	E	D	E	E	D		D		E	ã	E	m	E
35. PRESSURE ALTITUDE				Ε						E	6	E		_								_		E
36. REFRACTIVE INDEX	E		E	E				D		E	E			D				-		-		_		
37. RESTRICTION TO VISIBILITY			8 0	E			E	D		D	£			£						E	m			Ε
38. SEEABILITY MALMETER WAVE INFRANED, LATRAVIOLET)	E		Ē	E			E	E		E	E	E		E	D	-								D
39. SEVERE WEATHER CONDITIONS [SW]	E	Ε	E	E	£		E	E	E	E	E	E		E	6	D	h	E	83	E		E		Ē
40. SNOW STATE CONDITION [GS	0		E	E			E	E		E	E	E			D	D	E		n	_	1	-		E
41. SNOW DRIFT DEPTH [GS	D			D			E	D		D		E		E		E			D.	-	n			E
42. SOIL/GROUND MOISTURE [GS]	D		6	E		D	E	D		E		E		E	Ø	D			6		m	-		E
43. SOIL/GROUND TEMPERATURE [GS]	D		E	E		D	E	D		E	8	E		E		E		D	D		m	E	13	E
44. SOLAR RADIATION	32					E				D	D			-							n			
45. STABILITY INDEX						E	12									-								E
46. STANDING WATER/POOLING [GS]	D		£	Ε	D		E	D		E	E	E		E	O	D	ñ	D	Ē	E				ε
47. STATIC ELECTRICITY POTENTIAL			22	E						E	E			_										Ē
48. SURF HEIGHT [SS				D			E			D	D.	E									83	-		
49. SWELL DIRECTION/HEIGHT ISS	133			D						D	D	E									n		E	П
50. TEMPERATURE, AIR, SURFACE	E	E	E	E	E	E	E	E	E	E	E	Ε		E	£	D	F		D	E	n	E	E	E
51. TEMPERATURE, AIR, PROFILE			100	E		E	::::	E		E	6				-			. 1	22		6			
52. TEMPERATURE, AIR, UPPER AIR				E			2003	E		Ε	E										D.			E
53. TEMPERATURE, DEWPOINT			£	E				D		ε	E	11												ε
54. TEMPERATURE, DEWPOINT, PROFILE				E				E		E	E										D			П
55. TEMPERATURE, WINDCHILL FACTOR		D		D	D		E	D	Ð	E		E	Ð	E		E		D	C			E	Ť.	П
56. TEMPERATURE, INVERSION LEVEL(S)			22	E		E		E		E	E									1	D	-		E
57. TEMPERATURE, SEA SURFACE [SS]				D			8			D	D	E					8 ,			5 R.S.	E	- 194	E	П
58. TEMPERATURE, WATER, INLAND [GS]				D			E			D		E									E		E	П
59. TEMPERATURE, WBGT				D			E	D		E	Đ			E	E	E								E
60. TORNADO (SW	E	E	Ē	E	E		E	E	E	E	Æ		E	E	W	D	E	E		E	E	E	E	E
61. TURBULENCE, FLIGHT				E						E	E										E			Π
62. TURBULENCE, OPTICAL			Ŵ	E			ŧ	E		E	D		345	1				-			1.3			П
63. VISIBILITY, VISIBLE SPECTRUM, ALOFT				E				E														E		E
64. VISIBILITY, VISIBLE SPECTRUM, SFC	E			E			£	E		E	ŧ	E		Ē		D			0		E	E		E
65. WAVE PERIODICITY [SS				D						D	D	E									E			П
66. WAVE DIRECTION/HEIGHT [SS				D						0	D	E											£	П
67. WIND, PROFILE				E	1			E		E	Ē											[П
68. WIND, PROFILE, TARGET, AGL - 3KM				E				E							E									П
69. WIND, SHEAR				E						E	E													E
70. WIND, SURFACE, SPEED/DIRECTION	E		EL2	E		E	100	_		E	1	É		E	8	D		D	Ø	E	E	E	D	E
71. WIND, SURFACE, GUST SPEED			ш			D	E	£		E	E	E		D						E	E			E
72. WIND, SURFACE, GUST SPREAD				Ε				E		E	E										E			E
73. WIND, UPPER AIR, SPEED/DIRECTION	E			E				E		E	E				£						E			E

Table K-5. Windchill chart.

WIND SPEED	WIND SPEED				LOC	AL TEM	MPER/	ATURE	(日)			
(KNOTS)	(MPH)	32	23	14	5	-4	-13	-22	-31	-40	-49	-58
				E	QUIVA	LENT	TEMP	ERATU	JRE (E)		
	CALM	32	23	14	5	-4	-13	-22	-31	-40	-49	-58
4	5	29	20	10	1	-9	-18	-28	-37	-47	-56	-65
9	10	18	7	-4	-15	-26	-37	-48	-59	-70	-81	-91
13	15	13	-1	-13	-25	-37	-49	-61	-73	-85	-97	-109
17	20	7	-6	-19	-32	-44	-57	-70	-83	-96	-109	-121
21	25	3	-10	-24	-37	-50	-64	-77	-90	-104	-117	-127
26	30	1	-13	-27	-41	-54	-68	-82	-97	-109	-123	-137
30	35	-1	-15	-29	-43	-57	-71	-85	-99	-113	-127	-142
35	40	-3	-17	-31	-45	-59	-74	-87	102	-116	-131	-145
39	45	-3	-17	-31	-45	-59	-74	-87	102	-116	-131	-145
43	50	-4	-18	-33	-47	-62	-76	-91	-105	-120	-134	-148
		LIT DAN FC PROP CLOT PERS	GER)R ERLY 'HED	CONSIDERABLE VERY DANGER GREAT DANGER								
	DANGER FROM FREEZING OF EXPOSED FLESH											

HOT WEATHER ENVIRONMENT:

In hot weather, important factors are temperature and relative humidity. Primary concerns are physical exhaustion and dehydration. You must consider both because a common work task will take longer and additional water may have to be transported during hot weather. The following are specific concerns:

Water Adequacy. Water supplies and the enforcement of its intake before, during, and after physical activity is critical for survival.

Workload Correlation. Adapt workload or training activities to environmental heat stress conditions.

Rest Periods. Provide adequate break time for physically active personnel in a hot environment.

Chilled Drinking Water. Soldiers will often reject warm drinking water even when they are significantly dehydrated.

Physical Activity. Soldiers' introduction to physical exertion in a hot climate upon arriving from a temperate climate should be as gradual as circumstances allow. They will need 1 to 2 weeks' time to physiologically adjust to the new climate. Lighten physical activity during this period to ensure optimum performance.

Salt. Sodium intake must be maintained in hot weather. Two good meals a day normally provide enough salt for most soldiers.

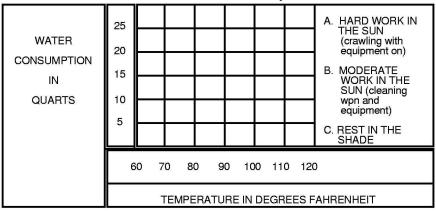
Humidity. A low WBGT index (e.g., in the morning) may not be a totally safe indicator if the humidity is high. High humidity retards cooling by evaporation of sweat and decreases the urge to drink sufficient water.

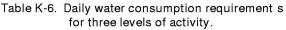
Water Spray. A water mist will cool a person. But it should never be substituted for adequate consumption of water before, during, and after strenuous activities in the heat.

The SWO can provide temperature measurement, forecast, and relative humidity forecasts from the following tables. If you need air temperature values measured at your particular location, use the thermometer included in the FALOP BWK.

HOT WEATHER WATER REQUIREMENTS:

Table K-6 shows the water needs for soldiers at 3 activity levels over an 8hour work period. To determine soldiers' average water needs, you have to know the air temperature and decide the level of activity the troops will be doing. Example: If a soldier is doing 8 hours of hard work in the sun (curve C) when the average temperature for the day is 100F, his water requirements for the day will be around 15 quarts. This amount of water can be converted into extra weight the soldier must carry. One quart is equal to 2 pounds, so the 15 quarts of water would weigh 30 pounds.





HOT WEATHER WORK TIME LIMITS:

Table K-7 shows the time limits during which work can be performed safely in hot weather. In computing the time limits, consider both air temperature and relative humidity. The values are based on a sitting soldier in BDUs doing light work. Do not consider these tables as absolute limits—especially since light, moderate, or heavy work are difficult to quantify. Table K-8 indicates work time in hot weather based on the WBGT index. Table K-9 shows conversion factors.

Table K-7. Work time in hot weather operations.

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TEMPE	RATURE		RELATIVE HUMIDITY (%)								
(EC)	(盱)	10	30	50	70	90	100				
60	140	1 HR	.25 HR		~						
54	130	2 HR	.5 HR	.25 HR	NO WORK	RECOMM	ENDED				
49	120	4 HR	2 HR	.5 HR	.25 HR		_				
43	110	12 HR	4 HR	2 HR	.5 HR	.25 HR					
38	100	NO LIMIT	12 HR	4 HR	2 HR	1 HR	.5 HR				
32	90	WITH	PRECAL	JTIONS	12 HR	6 HR	4 HR				

Table K-8. WBGT index (light work).

HEAT CONDITION/ CATEGORY *	WBGT(°F)	WATER INTAKE QUARTS/HOUR	WORK/REST CYCLE (MINUTES)
1	78.0 to 81.9	AT LEAST 1/2	CONTINUOUS
2	82.0 to 84.9	AT LEAST 1.2	50/10
3	85.0 to 87.9	AT LEAST 1	45/15
4	88.0 to 89.9	AT LEAST 1-1/2	30/30
5 **	90.0 and ABOVE	MORE THAN 2	20/40

* MOPP gear or body armor adds at least 10 °F to the WBGT index.
 ** Suspend PT and strenuous activity. If operational (non-training) mission requires strenuous activity, enforce water intake to minimize expected heat injuries.

TO CONVERT:	TO:	USE:
TO CONVERT:	10.	USE.
	TEMPERATURE	
Degrees F Degrees C	Degrees C Degrees F	°C = 5/9 °F - 32) °F = (9/5 °C) + 32
	DISTANCE	
Kilometers Kilometers Kilometers Miles Miles Miles Nautical Miles Nautical Miles Nautical Miles Meters Yards	Miles Nautical Miles Feet Kilometers Nautical Miles Yards Feet Kilometers Miles Feet Feet Feet	0.62 0.54 3,280.80 1.61 0.87 1,760.00 5,280.00 1.85 1.15 3.28 3.00
	SPEED	
Kilometers/Hour Kilometers/Hour Miles/Hour Miles/Hour Miles/Hour Knots Knots Meters/Second Meters/Second	Miles/Hour Knots (Nautical Miles/Hour) Kilometers/Hour Knots Feet/Second Kilometers/Hour Miles/Hour Feet/Second Miles/Hour	0.62 0.54 1.61 0.87 1.467 1.85 1.15 3.281 2.237
	PRESSURE	
Inches of Mercury (Hg) Millibar (Mb)	Millibar Inches of Mercury	33.86395 0.295299
	LENGTH	
Feet Meters Feet Centimeters Inches Meters Yards	0.3048 30.48 Meters Centimeters Yards Meters	0.0254 2.54 1.094 0.9144

Table K-9. Conversion factors.