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REQUIRED OPERATIONAL CAPABILITY (ROC)
FOR THE
INTEGRATED METEOROLOGICAL SYSTEM (IMETS)

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JUN 25 1992
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System Proponent: Directorate of Combat Developments
U.S. Army Intelligence Center and Fort Huachuca
Fort Huachuca, Arizona 85613-7000

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13. ABSTRACT (Maximum 200 words) The Integrated Meteorological System is a vehicle-mounted, shelter-contained operations and control system that includes the real-time processing and memory needed to interface with the All Source Analysis System, the Digital Topographic Support System, as well as manual and other automated Army and Air Force systems through the Army Tactical Command and Control System. Consists of hardware and software necessary to receive and process weather and weather-related inputs and disseminate weather-effects tactical decision aids and forecast products, providing an automated assist to the weather analysis and forecast functions. Receives data from all available sources and provides integrated weather data to the staff weather officer and G-2 for their use in preparing decision aids for tactical commanders and their staffs. The system will be operated by U.S. Air Force personnel and maintained by U.S. Army personnel.				
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1. NEED/THREAT. Army commanders need best available knowledge of future weather in the area of operations to take advantage of friendly strengths and enemy weaknesses provided by weather effects on weapons systems and units. The IMETS will provide such weather information. System initial operational capability is 1QFY95. The IMETS will not counter any specific threat. The IMETS will encounter the same threat capabilities as other command and control systems. The IMETS should not be directly targetted by threat forces.

a. Must provide automated, near-real-time weather support; produce tactical decision aids and high-resolution weather products (such as, forecasts, weather warnings, target area meteorological data) to assist commanders in assessing weather effects on tactics, equipment, and personnel.

c. Must operate 24 hours per day using standard commercial and military power.

e. Must set up in 40 minutes or less and tear down in 20 minutes or less, using a crew of three.

g. Must roll on and roll off C130 when mounted on the vehicle. Must be rail and marine transportable. Components must be transportable (both internally and externally) by medium-lift helicopter. Must have standard military lifting and tie-down provisions.

i. Must use standard Defense Mapping Agency data bases.

k. Must provide the field artillery and aviation with target area meteorological data given appropriate sensor data.

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APPENDIX A: RATIONALE

Paragraph 2.a. Must provide automated, near-real-time weather support; produce tactical decision aids and high-resolution weather products (such as forecasts, weather warnings, target area meteorological data) to assist commanders in assessing weather effects on tactics, equipment, and personnel.

RATIONALE: The IMETS must provide near-real-time information needed by commanders to support the decision-making cycle. The volume and rate of such data precludes operator interaction/entry. Tactical decision aids that are software-derived reports on the effects of weather on tactics, equipment, personnel, e.g., chemical prediction, smoke employment, mission-oriented protective posture (MOPP) operations, electro-optic and electromagnetic systems, and aviation operations will assist in deciding which course of action to select. Target area meteorological information enhances the field artillery's use of high-technology munitions and targeting functions, as well as providing needed information to attack aircraft. The IMETS weather data to support prediction of nuclear fallout and chemical hazards will enhance unit effectiveness.

Paragraph 2.b. Must communicate with and exchange data with Army Tactical Command and Control System (ATCCS) nodes, other military and civilian weather collection and processing systems, and U.S. Air Force's Global Weather Central.

RATIONALE: The IMETS supports multiple ATCCS node users, as well as Digital Topographic Support System (DTSS), other IMETS, and field artillery tactical data systems, to expedite and improve their decision making. Provides and receives weather information to and from Air Force Global Weather Central (AFGWC) for purpose of having a common view of the weather among all users. The IMETS will receive from multiple sources, process, and disseminate to multiple users the weather effects data, forecasts, and TDAs required by battlefield commanders. The IMETS will receive information from weather satellites, as well as military and civilian weather broadcast systems to use the latest and best available weather information to support operational decisions. The IMETS at echelon above corps will normally provide this consolidated data to the Air Force Theater Forecast Unit to update AFGWC with local conditions leading to a more common view of the weather.

Paragraph 2.c. Must operate 24 hours per day using standard commercial and military power.

RATIONALE: The IMETS may be utilized in contingency operations and must be capable of meeting operational needs worldwide. Power availability varies from country to country. AirLand Battle doctrine is characterized by rapidly changing conditions and intensity of combat operations. The fast-paced conduct of the battle requires constant update of information needed by the commander. The IMETS must operate on a 24-hour basis to provide near-real-time weather data to the commander to maximize effectiveness in the decision-making process.

Paragraph 2.d. Must survive-high altitude, electromagnetic pulse and nuclear, biological, and chemical contamination/decontamination process at the shelter level. Must operate with personnel in mission-oriented protective posture IV.

RATIONALE: The IMETS is mission essential and will be located with command posts which are subject to attack by nuclear, biological, and chemical (NBC) weapons and may be required to operate in an NBC environment for extended periods of time. Since the internal components are protected by the shelter, they do not need to be decontaminable. For the IMETS to complete its mission, it must be operable by soldiers in MOPP IV.

Paragraph 2.e. Must set up in 40 minutes or less and tear down in 20 minutes or less, using a crew of three.

RATIONALE: Must displace within the same time constraints as supported elements. The most stringent requirement is division command post displacement.

Paragraph 2.f. Must handle SECRET information with embedded security devices. Must use ATCCS common hardware and software.

RATIONALE: The IMETS interfaces with All Source Analysis System, DTSS, other IMETS, satellite receivers, and other encrypted systems. Therefore, it must handle encrypted traffic and other secure nets. Tactical decision aids depicting effects on friendly weapon system capabilities must not be exploited by enemy collection efforts. Use of ATCCS hardware and software provides operational commonality and compatibility with other ATCCS nodes, eases maintenance and support, and lessens the training burden. The system will be modular in design to facilitate maintenance activities and minimize the burden on the maintenance and supply support system. The IMETS must use software common to other battlefield systems in order to ensure interoperability and enhance ease of operations and learning by Air Force personnel who will be operating the IMETS.

Paragraph 2.g. Must roll on and roll off C-130 when mounted on the vehicle. Must be rail and marine transportable. Components must be transportable (both internally and externally) by medium-lift helicopter. Must have standard military lifting and tie-down provisions.

RATIONALE: These characteristics are required in order to meet all worldwide and theater transportability requirements. Components transportability by medium-lift helicopter is needed to ensure battlefield mobility in support of airmobile operations. Standard lifting and tiedown provisions are required to facilitate loading, tiedown, release, and unloading from different modes of transportation.

Paragraph 2.h. Must be mounted in standard military shelters on standard military vehicles equal to the supported headquarters.

RATIONALE: The IMETS must be in a standard shelter mounted on a vehicle consistent with the supported unit to provide on- and off-road mobility consistent with the supported unit's mobility.

Paragraph 2.i. Must use standard Defense Mapping Agency data bases.

RATIONALE: Use of standard Defense Mapping Agency data bases will ensure compatibility with other automated systems and provide a common frame of reference.

Paragraph 2.j. Must comply with applicable manpower and personnel integration requirements. Must use embedded training.

RATIONALE: An effective manpower and personnel integration (MANPRINT) program will ensure IMETS is supportable, maintainable, and safe throughout its life cycle. Adherence to all applicable policies and regulations for all MANPRINT domains (manpower, personnel, training, human factors engineering, system safety, and health hazards) will be ensured. Embedded training will be included to support all training. A training device is not required. The actual system will be used in a field and classroom environment. To ensure interoperability and enhance ease of operation and learning by Air Force operators, individual and collective unit training will be supported by embedded training in the IMETS and by exportable training materials.

Paragraph 2.k. Must provide the field artillery and aviation with target area meteorological data given appropriate sensor data.

RATIONALE: This data will improve the field artillery's use of high-technology munitions.

APPENDIX 4

OPERATIONAL MODE SUMMARY/MISSION PROFILE

Operational Mode Summary/Mission Profile (OMS/MP)

INTEGRATED METEOROLOGICAL SYSTEM (IMETS)

This document is the capstone system of systems OMS/MP to portray data for all possible uses at all echelons and to meet the requirements of AR 71-9. As such it reflects both peacetime and wartime OMS/MP to portray the extent of requirements as part of the Operational and Organizational Plan.

1. PURPOSE.

The OMS/MP describes how the IMETS will be used in the field. It provides the mission tasks, mission profiles, and deployment and mobility considerations to be used in assessing the operational suitability of the IMETS. Testing and evaluation will be based on the wartime OMS.

2. SYSTEM DESCRIPTION.

The IMETS is a vehicle mounted, shelter contained operations and control system that includes the real time processing and memory needed to interface with the All Source Analysis System (ASAS), the Digital Topographic Support System (DTSS), and manual and other automated Army and Air Force Systems through the Army Tactical Command and Control System (ATCCS). It consists of the hardware and software necessary to receive and process weather and weather related inputs and disseminate weather effects tactical decision aids (TDAs) and forecast products, providing an automated assist to the weather analysis and forecast function. IMETS consists of processors, disk drives, plotter, printer, displays, keyboard, satellite receivers, necessary communications and communications security (COMSEC) devices, generators and the vehicle. The IMETS receives data from all available sources (e.g., satellites, regional high frequency (HF) broadcast system, weather centrals (such as the Air Force Global Weather Central (AFGWC), and unmanned aerial vehicle (UAV), weather radar, artillery meteorological (ARTYMET) sensors, and ground sensors), and provides integrated weather data to the staff weather officer (SWO) and G-2 for their use in preparing decision aids for tactical commanders and their staffs. Weather effects and forecast products will be supplied to the supported ASAS, DTSS, and ATCCS in the form of hard copy graphics, magnetic media, or by wideband machine-to-machine communications. The IMETS will be operated by Air Force personnel and maintained by the standard Army supply and maintenance system. Functionally, the IMETS consists of five major groups: data acquisition, communications, data management and processing, data display, and shelter support. It can be operated either with commercial power or with a towed dual-generator setup.

3. CONCEPT OF EMPLOYMENT.

The IMETS provides 24-hour automated weather support to commanders at echelons above corps (EAC), corps, division, separate brigades, armored cavalry regiments (ACRs), special forces groups, aviation brigades and for contingency operations. The IMETS is operated by US Air Force weather team (WETM) personnel and maintained by US Army personnel. It is located in the vicinity of the supported unit's tactical operations center (TOC).

4. MISSION ESSENTIAL FUNCTIONS.

The IMETS will be capable of performing the following mission essential functions:

4.1 Receive weather (WX) data from all available sources: WX satellites; local and remote sensors; higher, lower, and adjacent echelons; WX radar; Artillery Meteorological (ARTYMET); theater forecast units (TFUs); and AFGWC.

4.2 Process and display weather information: processed weather radar data; weather satellite data and imagery; upper air data and analysis; surface and WX reports and analysis; forecasts and WX reports; and TDAs.

4.3 Disseminate weather data, forecasts, and TDAs via area communications system, to all users and to other IMETS at higher, lower, and adjacent echelons.

4.4 Operate independently using HF receivers, satellites, or communications networks as appropriate.

4.5 Relocate with the unit to which it is assigned.

5.0 SUMMARY OF IMETS MISSIONS

The Intelligence and Electronic Warfare Battlefield Functional Area (IEW BFA) comprises many elements and their supporting equipment. The IMETS is but one of these elements at each echelon to provide equipment and automation support. The IMETS capabilities used to support the wartime and peacetime missions are identical, but differ primarily in their respective profiles, which also differ among echelons. The IMETS provides an automated capability for a function which historically has been performed manually or not at all.

5.1 Operational Modes, Roles, and Tasks. All of the following are concurrently performed and set the foundation for this OMS/MP.

5.1.1. Receive, process and prioritize requests for information. This includes standing requests.

5.1.2. Correlate all input.

5.1.3. Provide tailored products to specific requestors.

5.1.4. Provide general responses directly into the Force Level Control System.

5.1.5. Interface with other echelon G-2, Staff Weather Officer, other IMETS, and users of IMETS data and products.

5.1.6. Interface with parent G-2 staff and supporting logistics and communications elements.

5.1.7. Operate the IMETS and perform preventive and scheduled user maintenance on the system and supporting components.

5.1.8. Move for survivability (i.e., tear down, move, and set up). For some echelons, these tasks involve interoperability with other IMETS at the same, adjacent, or higher echelons.

5.2. Nonoperational Modes. With the system assumed operable, nonoperating modes involve periods when the system is not powered up either by its towed power unit or by commercial power. Tasks occurring during this time include the following:

5.2.1. Perform preventive and scheduled maintenance actions that do not require power.

5.2.2. Physically teardown the system; retrieve barriers, peripheral equipment, and antennas; and prepare for road movement.

5.2.3. Move the system to a new site predicated on relocation of the organization supported.

5.2.4. Set up the IMETS, turn power on, perform preoperational checks and services, load software, ready communications, activate all automated capabilities, test all interfaces/circuits, and announce availability.

6. OPERATIONAL ENVIRONMENT.

6.1. Survivability. Survivability on the battlefield is critical to the effective performance of the desired continuous mission. The survivability profile, discussed later, involves other available IMETS when full performance is required while one IMETS is moving or nonoperational for any reason.

6.2. Intra-echelon Relationships. There will be times when IMETS outages (moving or mission failure) must be overcome by involving an alternate IMETS. For example, if there is one IMETS at a main command post (CP) and one at an airfield, one

must take over a significant part of the input-correlation-output mission while the second is unavailable. Profiles for a single IMETS may not reflect this coordination, communications, and C-2 tasks, but nevertheless, it overlays the mission of any echelon having multiple systems.

6.3. Electronic Collocation. There will be times when one IMETS will temporarily assume the functions of another if it should become inoperable, due either to relocation or failure. With a single IMETS at one location, there will be some delay in requesting and receiving responses to tasking of an alternate IMETS. Further delay will be invoked due to a single workstation system having to take over the processing and dissemination capabilities of the nonoperating system. Accordingly, degradation will occur in input, correlation, and output processing. In these cases, tailored products cannot be expected.

6.4 Vulnerability. All main CPs are vulnerable to missile, rocket, airborne, conventional, chemical, and nuclear attack. For survivability, the main CP is capable of movement. As the IMETS will be electronically located with the TCC and must be compatible with the ASAS, it must be able to deploy with that element. To be as survivable as the organization it supports, the IMETS will move with the main CP.

6.5 Maneuver Profiles. IMETS profiles should be compatible with the OMS/MP for the Maneuver Control System (MCS). This provides for a wide range of potential time and distance parameters, as extracted from the System Description of the ATCCS, Specification ACCS-A1-100-001, May 1988, and the IMS for the ATCCS O&O, Annex D, 20 January 1989. The MCS and ATCCS profiles are based on a 120-hour scenario. From the MCS O&O Plan, the number of moves in this 120-hour time frame are shown in column 2 of Table 2-1. Within a TOC, the ASAS automates the intelligence process. The IMETS automates the weather intelligence functions, as the weather portion of the intelligence preparation of the battlefield (IPB) process, and inputs data to the ASAS and other appropriate users.

6.5.1 Interpretation of Table 2-1. Representative mobility characteristics of command posts at echelons corps and below are as follows:

Table 2-1
Redeployment Characteristics of
Command Posts and Facilities

Echelon	No. of Main CP Moves in 120 hrs	Displacement Time Per Move	Distance Moved (km)	Travel Time at 20 km/hr (hrs)
EAC	1	48.0	40-80	2.0-4.0
Corps	2	24.0	30-70	1.5-3.5
Division	6	7.7	20-60	1.0-3.0
Brigade	7	1.9	10-50	0.5-2.5

6.5.2 Adaptation of the 120-hour Scenario. For mission profiles, IMETS requirements take precedence over allowable ranges of ATCCS factors. For IMETS, displacement time has been replaced by a tear down time of 20 minutes (.33 hrs) and a set up time of 40 minutes (.67 hrs). These times are appropriate for all echelons. The total effect of these changes revises Table 2-1 to appear as Table 2-2 below.

Table 2-2
Effects of Redeployment on IMETS
Electronics Functions Availability

Echelon	No. of Main CP Moves in 120 hrs	Electronic Available Time Per msn/120hr (hrs)	Break down Time (hrs)	Setup Time (hrs)	Distance Moved (km)	Travel Time at 20 km/hr (hrs)
EAC	1	115.5/120	.33	.67	60	3.0
Corps	2	56.5/113.0	.33	.67	50	2.5
Division	6	17.0/102.0	.33	.67	40	2.0
Brigade/ Regiment	7	14.5/101.5	.33	.67	30	1.5

7. OPERATIONAL MODE SUMMARY (OMS).

There is no Alert Time (AT) for the IMETS. Referring to the mission profile, Table 2-4a, one can calculate the Operating Time (OT) and Calendar Time (CT) found in the OMS, Table 2-3.

Table 2-3
Wartime Operational Mode Summary (CMS)

Echelon	a CT per msn (hrs)	b OT per msn (hrs)	c Total OT per 120 hrs (hrs)	d #Msn per Year	e=bx d Total OT Year (hrs)	f Total CT Year (hrs)
EAC	120	118.50	118.5	73	8650.50	8760
Corps	60	58.75	117.5	146	8577.50	8760
Division	20	18.92	113.5	438	8286.96	8760
Brigade/	17	15.93	111.5	515	8203.95	8760

8. MISSION PROFILE (MP).

Wartime MPs for IMETS are shown in Table 2.4a. The maximum number of missions and relocation time required varies with the distance moved and the echelon at which the system is located. Relocation Time (RT) is based on the system moving at 20 km per hour. The 120 hour (5 day) mission profile parallels ATCCS and ASAS.

Table 2-4a
Wartime Mission Profile for the IMETS

Echelon	OT per msn (hrs)	Max set-up (hrs)	Max tear- down (hrs)	PM (hrs)	Average Movement Time (MT) (hrs)	msn time (hrs)	# msn	Cal time (CT) (hrs)
EAC	118.5	.67	.33	.5	3.0	120	1	120
Corps	58.75	.67	.33	.25	2.5	60	2	120
Div	18.92	.67	.33	.083	2.0	20	6	120
Bde/Rgt	15.93	.67	.33	.033	1.5	17	7	120

Operating Time (OT) - When a system is performing at least one if not all of its functions. IMETS will be capable of simultaneous operation of all functions of all its weather related functions. Movement is considered OT because movement is mission essential.

Mission Time - Time required to perform the stated mission function.

Calendar Tome (CT) - Total hours based on 120 hour (5 day) period.

8.1 Preventive Maintenance. Some PM (diagnostic tests and minor cleaning) can be accomplished while the system is up and operating. All equipment is energized at completion of set up and is in "hot/alert" or actually operating for the duration of the mission. Therefore all equipment is considered operating from start to end of the OT periods. Other PM and unscheduled maintenance can only be performed during system down time. It is estimated that this maintenance will not exceed 0.5 hours in any 120 hour period.

8.2 Peacetime Operations. Peacetime operations will be in a Train to Fight Mode. It is expected that IMETS peacetime CMS/MP will be as follows in Table 2-4b and Table 2-4c respectively.

Table 2-4b
Peacetime OMS

Echelon	Garrison Usage (training/maintenance) (8 hours per day)	Exercise Usage (FTX/CPX) 7 days/24 hrs each)
EAC	Manned 2 days per month	1 exercise per qtr
Corps	Manned 2 days per month	2 exercise per qtr
Division	Manned 3 days per month	3 exercises per qtr
Brigade/ Regiment	Manned 3 days per month	4 exercises per qtr

Table 2-4c
Peacetime Mission Profiles

Echelon	OT per msn (hrs)	Max Set up (hrs)	Max Tear Down (hrs)	PM (hrs)	Relocate time (hrs)	Msn # time msn (hrs)	CT time (hrs)
EAC	7.6	.3	.1	.033	0	8 2	16
Corps	7.6	.3	.1	.033	0	8 2	16
Division	7.6	.3	.1	.033	0	8 3	24
Brigade/ Regiment	7.6	.3	.1	.033	0	8 3	24

USAGE DURING EXERCISES

Echelon	OT per msn (hrs)	Max Set up (hrs)	Max Tear Down (hrs)	PM (hrs)	Relocate time (hrs)	Msn # time msn (hrs)	CT time (hrs)
EAC	166.7	.67	.33	.70	0	163 1	163
Corps	80.15	.67	.33	.35	2.5	84 2	163
Division	52.83	.67	.33	.175	2.0	56 3	163
Brigade/	39.41	.67	.33	.088	1.5	42 4	163

9. ENVIRONMENTAL CONDITIONS.

The environmental conditions for wartime and peacetime are listed in Table 2-5. This indicates the majority of the systems will be stationed in a basic environment. All IMETS must be capable of operating in the four climate types of AR 38-70. The IMETS will operate and tolerate storage in all environments in which the Army may be deployed without degradation of functional capabilities. IMETS shelters will include an environmental control system that will maintain the interior humidity and temperature within human and equipment tolerances.

Table 2-5
Environmental Conditions

Climatic Design Types (AR 38-70)	Percent of Systems
Hot	20
Basic	65
Cold	10
Severe Cold	05

10. MOBILITY PROFILE

The Mobility required for this system is indicated in Table 2-6. The prime mover must be at least as mobile as the least mobile system in the unit it will be supporting. The IMETS prime mover is expected to be an Army standard wheeled vehicle that is compatible with vehicles organic to the supported unit. The IMETS will normally relocate with the supported TOC and the ASAS with which it is collocated. Therefore IMETS will have logistical and maintenance support from the supported unit (generator and vehicle), and it is unlikely the system would be unable to relocate in sufficient time to perform its mission, even in the event the IMETS prime mover is nonoperational. For these reasons, the prime mover will not impact upon the IMETS mission.

Table 2-6
Mobility Profile

Echelon	Type Road	Percent
EAC	Primary	70
	Secondary	30
	Cross Country	0
Corps	Primary	50
	Secondary	48
	Cross Country	2
Division	Primary	30
	Secondary	60
	Cross Country	10
Brigade/Regiment	Primary	28
	Secondary	58
	Cross Country	14

11. FIELDING PLAN.

IMETS will be located at EAC, corps, division, ACR, separate brigades, aviation brigade, and SOF groups and battalions. Table 2-7 contains the current IMETS fielding proposal, and Table 2-8 contains the operating time by echelon. Table 2-9 contains information on movement times. It is assumed that the SOF groups will have an OMS/MP similar to an EAC and a SOF battalion will have an OMS/MP similar to an ACR or regiment.

Table 2-7
IMETS Fielding Proposal
(Excluding Training and Software Support IMETS)

NUMBER OF UNITS BY ECHELON TO GET IMETS		NUMBER OF IMETS PER UNIT	TOTAL
EAC	-5	4 (1 ea Main, Rear, IC, Avn Bde)	20
Corps	-5	2 (1 ea CTOC, Avn Bde)	10
Div	-18	2 (1 ea DTOC, Avn Bde)	36
Bde	-4	1	4
ACR	-3	1	3
SOF GP	-5	1	5
SOF Bn	-15	1	15
Ran Rgt	-1	1	1

Table 2-8
Total Wartime Electronic Functions Time

Echelon	a No Msns per yr (a x b)	b OT for ea msn	c Total OT per IMETS	d NO IMETS doing msn OT	e Total OT per yr	f % total
EAC	73	115.5	8431.5	25 Note 1	210787.5	.289
Corps	146	55.25	8212.5	10	82125.0	.112
Div	438	16.9	7402.2	36	256479.2	.365
Reg/Bde	511	14.5	7409.2	23 Note 2	170411.6	.234
Total	xx	xx	xx	94 Note 3	729803.3	1.00

NOTES: 1. Includes 1 IMETS for each of 5 SOF Groups
2. Includes 1 IMETS for a Ranger Regiment and 15 for SOF Bns
3. Does not include 1 IMETS for Software Development or 4 IMETS used for training

Table 2-9
Total Wartime Travel Time

Echelon	a Travel Time per Move per IMETS	b Total Moves per yr per IMETS	c Total Movement Time per yr per IMETS (a x b)	d No. of IMETS Time	e Total Travel OT (c x d)	f % Total
EAC	3	73	219	25	5475	.094
Corps	2.5	146	365	10	3650	.063
Div	2	438	876	36	31536	.541
Reg/Bde	1.5	511	766.5	23	17629.5	.302
Total	xx	xx	xx	94	58299.5	1.00