JOINT PUB 3-55.1

JOINT TACTICS, TECNIQUES, AND PROCEDURES FOR UNMANNED AERIAL VEHICLES

27 AUGUST 1993

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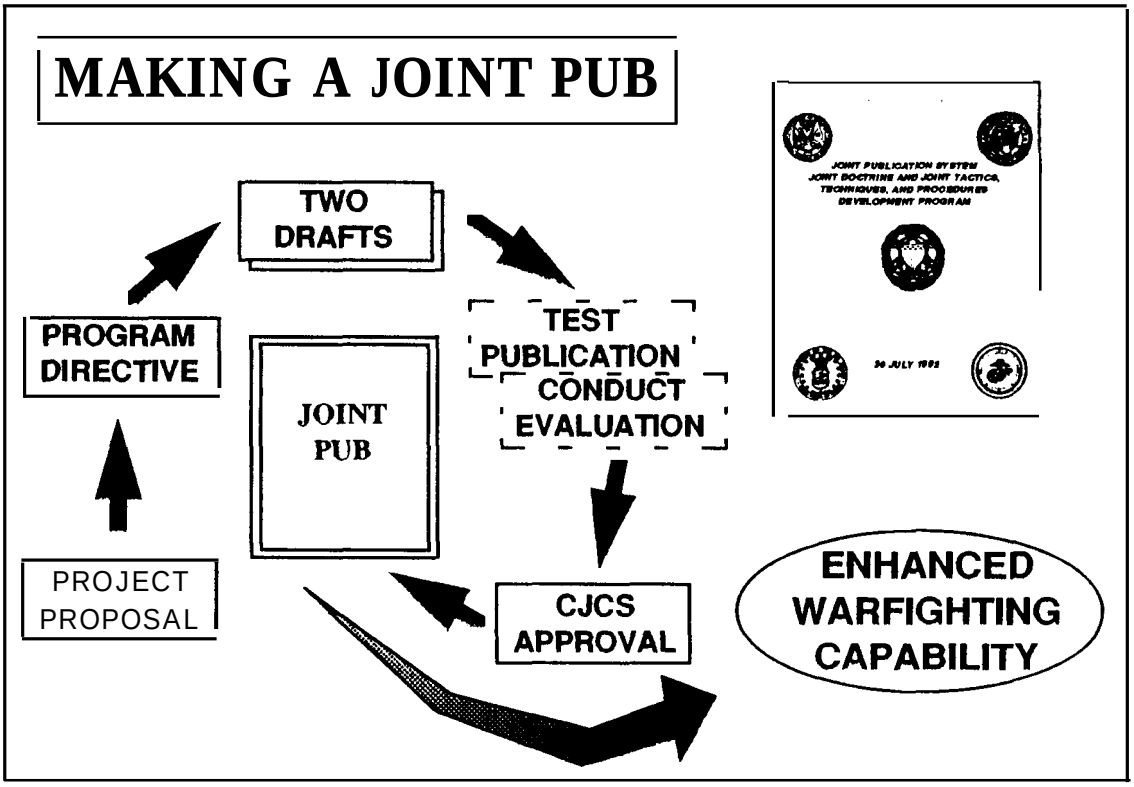

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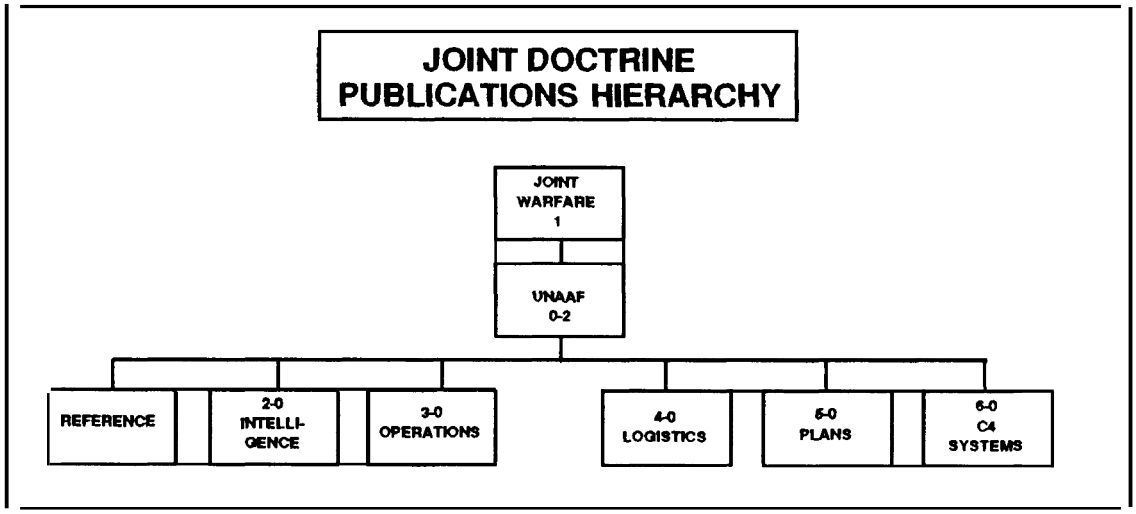

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Joint Pub 3-55.1
27 August 1993

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1. This publication has been prepared under the direction of the Chairman of the Joint Chiefs of Staff. It sets forth doctrine and military guidance to govern the joint activities and performance of the Armed Forces of the United States.

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For the Chairman of the Joint Chiefs of Staff:

T. R. PATRICK
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JTTP FOR UNMANNED AERIAL VEHICLES

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i thru vi	O	A-1 thru A-2	O
I-1 thru 1-4	O	B-1 thru B-10	O
II-1 thru II-20	O	GL-1 thru GL-4	O

JOINT TACTICS, TECHNIQUES, AND PROCEDURES FOR UNMANNED AERIAL VEHICLES

PREFACE

1. Purpose. This publication sets forth joint tactics, techniques, and procedures (JTTP) to govern the joint activities and performance of the Armed Forces of the United States in joint operations as well as the doctrinal basis for US military involvement in multinational and interagency operations. It provides military guidance for the exercise of authority by combatant commanders and other joint force commanders and prescribes doctrine and selected tactics, techniques, and procedures for joint operations and training. It provides military guidance for use by the Armed Forces in preparing their appropriate plans. It is not the intent of this publication to restrict the authority of the joint force commander (JFC) from organizing the force and executing the mission in a manner the JFC deems most appropriate to ensure unity of effort in the accomplishment of the overall mission.

2. Application

a. Joint tactics, techniques, and procedures established in this publication apply to the commanders of combatant commands, subunified commands, joint task forces, and subordinate components of these commands. These principles and guidance also may apply when significant forces of one Service are attached to forces of another Service or when significant forces of one Service support forces of another Service.

b. In applying the JTTP set forth in this publication, care must be taken to distinguish between distinct but related responsibilities in the two channels of authority to forces assigned to combatant commands. The Military Departments and Services recruit, organize, train, equip, and provide forces for assignment to combatant commands and administer and support these forces. This authority is, by law, subject to the provisions of title 10, United States Code, chapter 6, which is the section that details the authority of combatant commanders. Commanders of the unified and specified commands exercise combatant command (command authority) over their assigned forces. Service component commanders are subject to the orders of combatant commanders and, subject to the combatant

commander's direction, are also responsible to the Military Departments and Services in the exercise of their administrative and support responsibilities.

c. This publication is authoritative but not directive. Commanders will exercise judgment in applying the procedures herein to accomplish their missions. This JTTP should be followed except when, in the judgment of the commander, exceptional circumstances dictate otherwise. If conflicts arise between the contents of this publication and the contents of Service publications, this publication will take precedence for the activities of joint forces unless the Chairman of the Joint Chiefs of Staff, normally in coordination with the other members of the Joint Chiefs of Staff, has provided more current and specific guidance. Commanders of forces operating as part of a multinational (alliance or coalition) military command should follow multinational doctrine and procedures ratified by the US. For doctrine and procedures not ratified by the US, commanders should evaluate and follow the multinational command's doctrine and procedures, where applicable.

3. Scope. This publication provides JTTP to guide UAV operations in support of joint operations across the operational continuum, including roles, mission, functions and tasks; description of the threat; UAV system capabilities; employment considerations; C3; airspace control; and planning considerations. This discussion is in the context of the DOD-approved UAV class categories.

4. Basis. Joint Pub 3-55.1 is based on the sources listed in Appendix A.

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CHAPTER I

OVERVIEW

1. General

a. Present reconnaissance assets available to the commander are generally large, costly, and usually manned, or are satellite systems. The unmanned aerial vehicle (UAV) provides an additional capability to the commander to conduct day or night reconnaissance, surveillance, and target acquisition (RSTA), rapid battle damage assessment (BDA), and battlefield management (within line-of-sight (LOS) of the ground control station (GCS)) in high-threat or heavily defended areas where the loss of high-value, manned systems is likely and near-real-time information is required. Employment of UAVs in Vietnam and Operation DESERT STORM proved the capability of the UAV in a combat environment. UAVs require relatively few maintenance, control, and operating personnel or transportation assets for deployment (versus manned fixed-wing, helicopter, or radio units). Satellite systems are national assets and may not be available, or it may take too long to get the information from these assets to the supported commander. UAVs provide commanders with an enhanced capability to collect, disseminate, and exploit combat intelligence information in near real time.

b. UAVs are significant force enhancers. When first introduced, the UAVs were referred to as remotely piloted vehicles (RPVs). With the development of DOD-approved class categories, the name has been changed to UAV. The term UAV will be used throughout this publication.

c. Future improvements promise mission area growth. The UAV also provides fire support agencies an ability to target and adjust supporting arms at significantly greater distances and at reduced risk when compared to current forward observer (FO), forward air controller (FAC), and forward air controller (airborne) (FAC(A)) procedures. The UAV provides near-real-time target information and weapon designation capabilities, which can reduce the risk to manned aircraft performing air-to-surface weapon spotting and delivery. UAV assets can be task organized, and UAV class categories can be selected to achieve maximum flexibility and mission success. Present mission assignments center on the UAV's ability to perform RSTA and BDA.

2. UAV Class Categories. Presently, only one UAV system is fielded, the Pioneer system. Since the short-range UAV (SR-UAV) system will be fielded in the near future, replacing the Pioneer system, the joint tactics, techniques, and procedures (JTTP) in this publication are presented in the context of this category. Other UAV categories are described in general terms to anticipate the employment of newer systems when they become available. The following is a description of UAV class categories and their capabilities.

a. The close-range UAV (CR-UAV) category addresses the needs of lower level tactical units for a capability to investigate activities within their area of interest and influence. The systems in this category will be easy to launch, operate, and recover. They will require minimum manpower, training, and logistics, and will be relatively inexpensive.

b. The SR-UAV category supports Army divisions, including detached battalion and brigade task forces and corps, Navy and Air Force combatants, and Marine Air-Ground Task Forces (MAGTFs), meeting the need to cover enemy activities out to a range of 150 kilometers or more beyond the forward line of own troops (FLOT) or launch platform (in naval operations). The UAV systems in this category are more robust and sophisticated, can carry a wider variety of payloads, can consist of more than one air vehicle, and perform more kinds of missions than the close-range systems.

c. The vertical takeoff and landing UAV (VTOL-UAV) category, formerly referred to as Maritime or VIPER (vertical takeoff and landing integrated platform for extended reconnaissance), will be designed to complement the SR-UAV inventory with a VTOL-capable vehicle and provide a low cost extension of warship sensors, enhance maritime warfighting capabilities, thereby increasing the security of high value naval assets.

d. The medium-range UAV (MR-UAV) category addresses the need to provide prestrike and poststrike reconnaissance of heavily defended targets at significant ranges and augment manned reconnaissance platforms by providing high quality, near-real-time imagery. MR-UAV systems will differ from other UAV systems in that they will be designed to fly at high subsonic speeds and spend relatively small amounts of time over target areas.

e. The endurance UAV (E-UAV) category will provide high altitude, heavy payload, multimission, and surrogate satellite support across all mission areas with a flight duration in excess of 24 hours. E-UAV systems will be capable of employing the widest variety of sensors and payloads in support of joint forces.

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CHAPTER II

EMPLOYMENT

1. Mission. The primary mission of UAV units is to support their respective Service component commands as a tactical RSTA system providing the commander a capability to gather near-real-time data on opposing force position, composition, and state of readiness. However, as is the case with all assets and groupings within the joint force, the joint force commander (JFC) has full authority to assign missions to and task component UAVs to conduct operations in support of the overall joint force. When appropriately tasked, UAV units are capable of providing support to the JFC or other components of the joint force, during day and night operations on land, air, or sea. The UAVs discussed in this publication are nonlethal. Missions may include, but are not limited to:

a. RSTA missions.

b. Surveillance for search and rescue (peacetime (SAR) and combat (CSAR)).

c. Deception operations.

d. Maritime operations:

(1) Naval surface fire support (NSFS).

(2) Over-the-horizon targeting (OTH-T).

(3) Ship classification.

(4) Antiship missile defense (ASMD).

(5) Antisubmarine warfare (ASW).

(6) Search and rescue (SAR).

(7) Mine defense support.

e. Electronic warfare (EW) (including electronic attack (EA)), signals intelligence (SIGINT), and directed energy sensor reconnaissance.

f. Nuclear, biological, and chemical (NBC) reconnaissance.

g. Special and psychological operations:

(1) Resupply for special operations and psychological operations teams (scheduled and emergency).

(2) Leaflet delivery and broadcast.

h. Meteorology missions.

i. Route and landing zone reconnaissance support.

j. Adjustment of indirect fires and close air support (CAS).

k. Rear area security support.

l. BDA.

m. Radio and data relay.

2. Intelligence Requirements, Exploitation, and Dissemination

a. Requirements

(1) Through their RSTA collection capabilities, UAVs satisfy many intelligence requirements. Operational objectives create essential elements of information (EEI) which, in turn, orient intelligence operations to support land, air, and maritime operations. EEIs in turn determine the payload, flight paths, and locations of RSTA activities conducted by UAVs. Intelligence requirements, therefore, significantly influence UAV mission tasking and planning.

(2) The UAV is a platform that can have single or multiple sensors on board. A UAV can be described as a directed collection sensor system gathering data as programmed by the ground or as a result of shared (cued) sensor data available to ground control or dictated by on-board sensor data. A successful mission is dependent on detailed geographic guidance (i.e., exact area to be surveyed) and collection requirements (i.e., mission statement to help determine the optimum UAV payload) from the higher headquarters' intelligence staff.

b. Exploitation. UAV product exploitation can be accomplished at various command levels, depending on the UAV system sophistication, the payloads used, the

specific collection requirements to be satisfied, and the UAV unit expertise. Considerations for determining who will do exploitation are:

(1) Urgency between product receipt and exploitation.

(2) Type and sophistication of payload used.

(3) Security levels required to exploit the product.

(4) Mission (BDA, etc.).

(5) Dissemination channels (i.e., desired communications flow from the UAV payload to end user, to include any intermediate processing facilities).

(6) Data format, method and rate of transmission, and type of exploitation equipment.

c. Dissemination. Dissemination is the conveyance of intelligence from the UAV payload to end-user, to include any intermediate processing facilities, in a suitable form and timely manner.

(1) Dissemination formats include video, freeze-frame, voice communications, recorded message traffic, and digital data. Commonality and interoperability are the end user's primary concerns. Prior planning should identify types and numbers of communications paths to be used, the load requirements, and the level of security.

(2) Effective dissemination of UAV intelligence products occurs through a coordinated effort by producers, consumers, and dissemination managers.

3. Command and Control, Tasking, and Communications

a. Command and Control of UAVs Supporting the Joint Force. The UAV provides the commander the ability to perform near-real-time RSTA to develop and receive information. However, UAV units are only designed to support a single command or component. When UAV units are tasked to support more than one command or Service component simultaneously, degradation of effectiveness can result.

(1) The Services have developed and integrated UAV employment techniques to enhance their overall warfighting capabilities. The UAVs, their support

personnel, and GCSs will normally remain under operational control of their Service component commander.

(2) The JFC has the authority to direct UAV assets for the overall support of the joint force. The JFC may direct one Service component to conduct UAV operations in support of another component or task a Service component to provide UAV support to the joint force or to another component on a mission-by-mission basis. In any case, the supported commander's relationship with the supporting UAV units should be clear. All Service component UAV assets remain under the operational control of the Service component. When a UAV capable commander is directed to support another component or unit commander, the establishing authority's directive should include the supporting mission priority relative to other missions. Flight control of individual UAVs is always retained by the UAV unit commander.

(3) UAV missions require coordinated flight planning. JFCs can establish specific UAV flight routes and altitudes within their respective areas of responsibility (AORs) through their airspace control authority (ACA). Prior coordination with subordinate component commanders should be accomplished prior to the establishment of joint force UAV flight routes and altitudes. Multiple different UAV flight routes and altitudes may be established for such purposes as outbound and return UAV flights. Specific UAV flight routes, established by connecting appropriate air control points, can be designated in the airspace control plan (ACP). Specific UAV operating altitudes can also be established and published in the ACP. UAV flights, like manned aircraft flights, must be coordinated to ensure deconfliction with other airspace users, to include flights that cross component boundaries. UAV missions should be coordinated with the ACA, area air defense commander (AADC), and the JFACC. The detailed procedures used to deconflict UAVs and other airspace users are described on pages II-6 to II-13.

b. Tasking

(1) The JFC does not need to establish a separate and distinct requesting process for UAV support. Requesting procedures for UAV support, from either intelligence agencies or operational units, should be

included in the normal air request procedures of the joint force. Component requests for UAV support from another Service component should be made through the JFC. Joint Pub 3-56.24 contains examples of air request support (AIRREQSUP) and air request reconnaissance (AIRREQRECON) messages.

(2) The UAV has both an intelligence and operational application. Joint force procedures for resolving conflicting joint UAV support requests should be established. Conflicting UAV missions being planned or conducted within the operational boundaries of a particular commander should be resolved by that commander. Joint force procedures must provide for resolution of conflicts between Service component and joint force requirements. Normally, the J-3 should prioritize requests and resolve any conflicts in tasking joint force UAV assets.

(3) These requests will be forwarded to the appropriate component commander with supporting UAV assets. The categories of missions are the same as those for normal air support--preplanned or immediate.

(4) Planning for UAV missions begins when the UAV unit receives the tasking for UAV support. Preplanned missions may be scheduled or on call. Scheduled missions occur at a definite time; on-call missions place the UAV on standby, awaiting launch instructions. In either case, UAVs with predesignated payloads are assigned for specified periods according to mission requirements from a supported unit. UAV flights within a Service component's boundaries may be conducted without appearing in either the joint force air tasking order (ATO) or special instructions (SPINS). However, safety of flight reference to airspace boundaries, altitudes, and times should be included in the air control order (ACO).

(5) The UAV is ideally suited for immediate missions that were not previously anticipated because of rapidly changing tactical situations. As with any immediate mission, however, the supported unit will have to take a predesignated payload that may not be the payload of choice. Requests for immediate UAV support are submitted by the fastest means to the joint force airspace control agency; i.e., JAOC.

c. Communications. To the greatest extent possible, existing communications nets should be used between the UAV unit, supported units, and fire support or airspace control agencies. When the tactical situation permits, the UAV unit should maintain radio communications with the supported command centers and airspace coordination element throughout flight operations. However, covert or semicovert operations in emission controlled (EMCON) conditions may preclude use of voice communications for operations security (OPSEC) reasons. Additional working nets can be maintained with supported units as appropriate. Units requesting support should coordinate frequency management of UAV uplinks and downlinks and UAV unit frequencies if the UAV is operating in areas other than its normal operating areas. If downlinking information via the remote video terminal (RVT) to the supported unit, the UAV unit will provide the RVT while the supported unit will normally provide the RVT operator.

4. Airspace Control. Airspace control is provided to prevent mutual interference from all users of the airspace, facilitate air defense identification, and accommodate and expedite the flow of all air traffic safely. The JFC, normally through his ACA, establishes joint force airspace control procedures in the ACP in accordance with the guidance contained in Joint Pub 3-52, "Doctrine for Joint Airspace Control in the Combat Zone." UAV operations must be coordinated with the ACA to provide safe separation of UAVs and manned aircraft and to prevent engagement by friendly air defense systems. The established principles of airspace management used in manned flight operations normally apply to UAV operations but may be waived by the JFC. UAV airspace requirements do not differ from other low performance aircraft. The UAV is difficult to acquire visually and does not provide a clear radar signature presenting a potential hazard to high performance aircraft. To limit the hazard to fixed-winged aircraft, separation between manned aircraft and UAVs is required. UAV missions are both preplanned and immediate in nature. Preplanned UAV flights in support of the JFC or another service component should be included in the joint force ATO, SPINS, or ACO. Immediate UAV missions will be coordinated with appropriate airspace control agencies (i.e. ASOC, DASC, AOC, TACC) to provide safe separation between manned and unmanned aircraft and prevent inadvertent engagement by friendly air defense artillery (ADA) or fighters. UAVs are launched from UAV launch and recovery sites (LRSs), which may be either airfields, unimproved field locations, or large flight decks afloat depending on the type or size of UAV. After launch, the UAV can climb to flight route or transit altitude (normally above

the coordination altitude) over the LRS, or climb enroute to the UAV's mission area. Once at the mission area, the UAV climbs or descends, as required to conduct its mission. During the UAV mission, route and altitude changes may be required. Any changes must be coordinated with the ACA. Upon mission completion, UAVs return to their LRS again using a UAV flight or transit altitude. The following procedures should be used to deconflict UAVs and other airspace users:

a. Restricted Operations Zones (ROZs). A ROZ should be established for a LRS and for each UAV mission area. Launch and recovery of UAVs from an LRS that is not located at an airfield can be facilitated by establishing a ROZ around the LRS. The ROZ around the LRS is normally circular, centered on the launch site, is 2 to 3 kilometers in diameter, and allows the UAV to climb and/or descend from transit altitude over the LRS. A ROZ established for shipboard UAV operations will conform to the ship's normal airspace control zone. A ROZ may be established around the UAV's mission area to facilitate mission accomplishment. The size and altitudes for the UAV mission area ROZ is dependent on UAV capabilities and mission requirements.

b. Airport Traffic Areas (ATAs) and Terminal Control Areas (TCAs). ATAs and TCAs can be used to facilitate launch and recovery of UAVs if the LRS is located at an airfield.

c. UAV Flight Routes and Transit Altitudes. JFCs can establish specific UAV flight routes and altitudes within their respective AORs through their ACA. Coordination with subordinate component commanders should be accomplished prior to the establishment of joint force UAV flight routes and altitudes. Multiple UAV flight routes and altitudes may be established for such purposes as outbound and return UAV flights. Specific UAV flight routes, established by connecting appropriate air control points, can be designated in the ACP. Specific UAV operating altitudes can also be established and published in the ACP. UAV flight routes can consist of a designated mean sea level (MSL) altitude, the airspace 500 feet above and below that altitude and approximately 1,000 feet wide. UAV flight routes are similar to an air corridor; however, they are normally located above the coordinating altitude. The LRS, air control points used, and specific UAV mission area will normally determine the length and width of the flight route. Although manned aircraft flight through or in UAV flight routes and altitudes is not restricted, all precautions associated

with visual flight rules (VFR) apply to manned aircraft operating through or in them. UAV flight routes and transit altitudes are established and approved based on the UAV's mission and in accordance with the ACP. Any deviation from established or approved routes and altitudes must be coordinated with the ACA with cognizance over that particular airspace in question.

d. Airspace Coordination Area. An airspace coordination area, a restrictive fire support coordination measure, may be used to deconflict the UAV's mission area with other airspace users.

e. Route and Altitude Separation. Route and altitude separation can be used to deconflict the UAV with other airspace users throughout the entire UAV mission. UAV routing is normally accomplished through existing air control points.

f. Deconfliction. Any combination of the above measures can be used, as required. Deconfliction depends on the command and control (C2) function and coordination between the joint force components. All aircraft working within a unit's boundaries will check in with the appropriate airspace control agency for that area upon entry and be advised of UAV status (LRS, location of airborne UAVs, route, altitude, mission area, activation of UAV ATAs, TCAs, ROZs, ACAs, etc.) The UAV mission flight crew will change the flight route, altitude, and location of the UAV, as necessary, to deconflict with other airspace users when directed by the appropriate ACA. The flow of UAV status information begins with the UAV unit responsible for launch and recovery of the UAV. Position of the UAV is constantly monitored and controlled by the UAV mission flight crew at the UAV unit via the ground control station (GCS). UAV status is passed from the UAV unit to the supported unit or operational commander (via A2C2, FSCC, etc.) and appropriate airspace control agencies (ASOC, AOC, DASC, JAOC, etc.). The ACAs are responsible for relaying this information to airborne command, control, and coordination platforms (e.g., TAC(A), FAC(A), DASC(A), E-2C, ABCCC, AWACS, etc.). Airspace control agencies and airborne command, control, and coordination agencies are

responsible for advising all affected aircraft of UAV status upon check-in.

(1) Figure II-1 depicts UAV system setup with control stations collocated.

(2) Figure II-2 depicts UAV system setup with control stations at supported unit.

(3) Figure II-3 depicts UAV airspace control measures (overhead view).

(4) Figure II-4 depicts UAV airspace control measures (horizontal view).

5. Planning

a. Actual mission planning is conducted by the UAV unit, based on the requirements of the supported unit. Planning requires the consideration of many factors such as intelligence concerning known or suspected enemy locations, the JFC's priorities, system performance capabilities, and mission payload capabilities, to select a flight path that maximizes mission success.

b. Authorities that may be involved in planning and execution include the J-3, the JFACC, the joint targeting coordination board (JTCB), the joint intelligence center (JIC), the ACA, the AADC, and the fire support coordination center (FSCC). Joint force intelligence and national intelligence sources can be used to cue UAV operations to specific areas of interest throughout the operation.

c. Mission planners must consider airspace management conflicts. Prior to mission planning, mission planners will send the flight route and altitudes to the responsible airspace management or airspace C2 element for initial deconfliction. They will also provide this information to the ACA and other fire support coordination and control agencies in accordance with established joint force procedures.

d. Mission planners must also consider any civil or political constraints that may be imposed on UAV operations. Civilian or politically imposed restrictions may affect operations in and around military and civilian aviation control areas and zones, in the vicinity of friendly forces, or in the vicinity of foreign shipping.

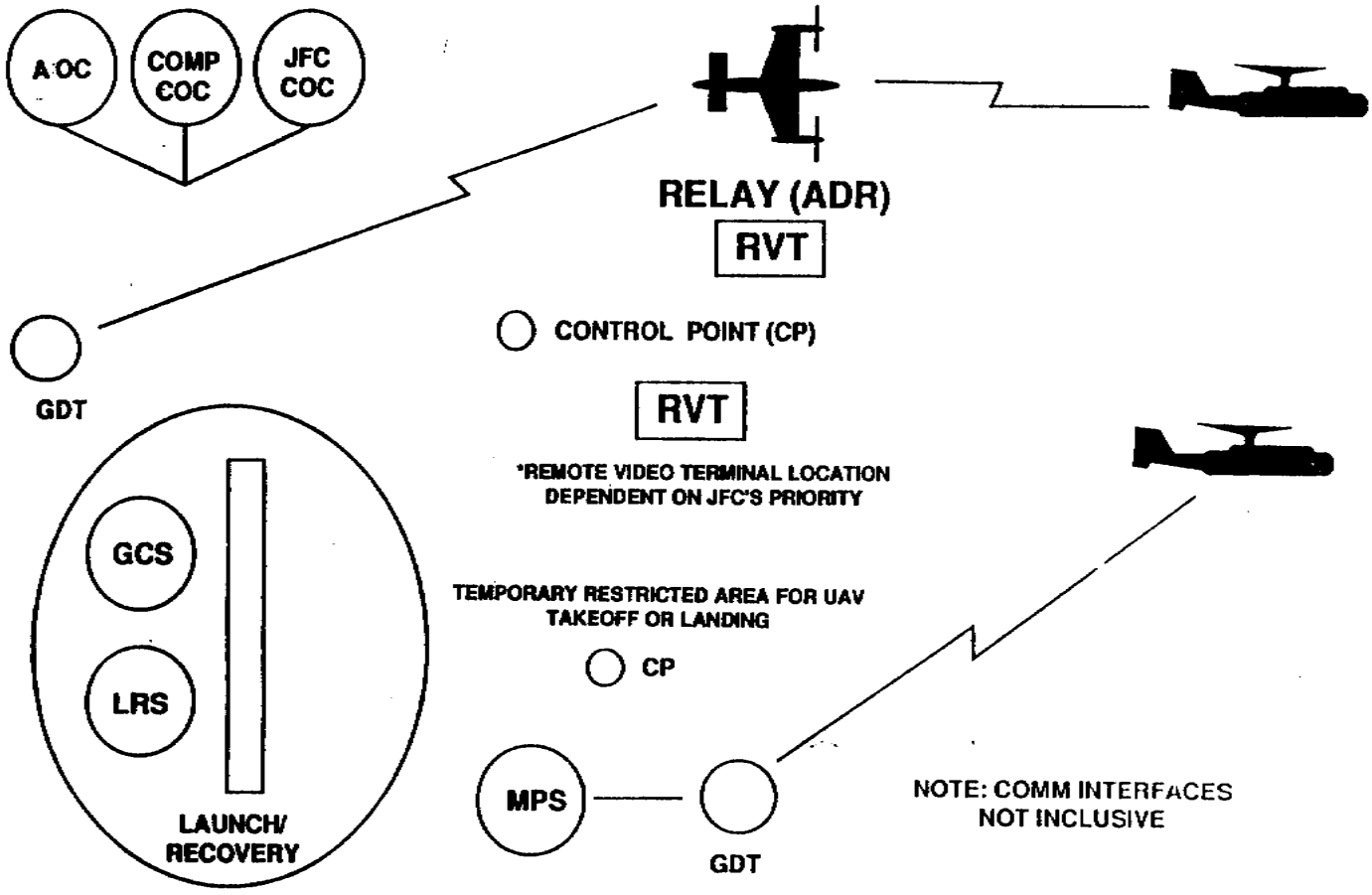

Figure II-1. UAV System Setup with Control Stations Collocated

Figure II-1. UAV System Set up with Control Stations Collocated

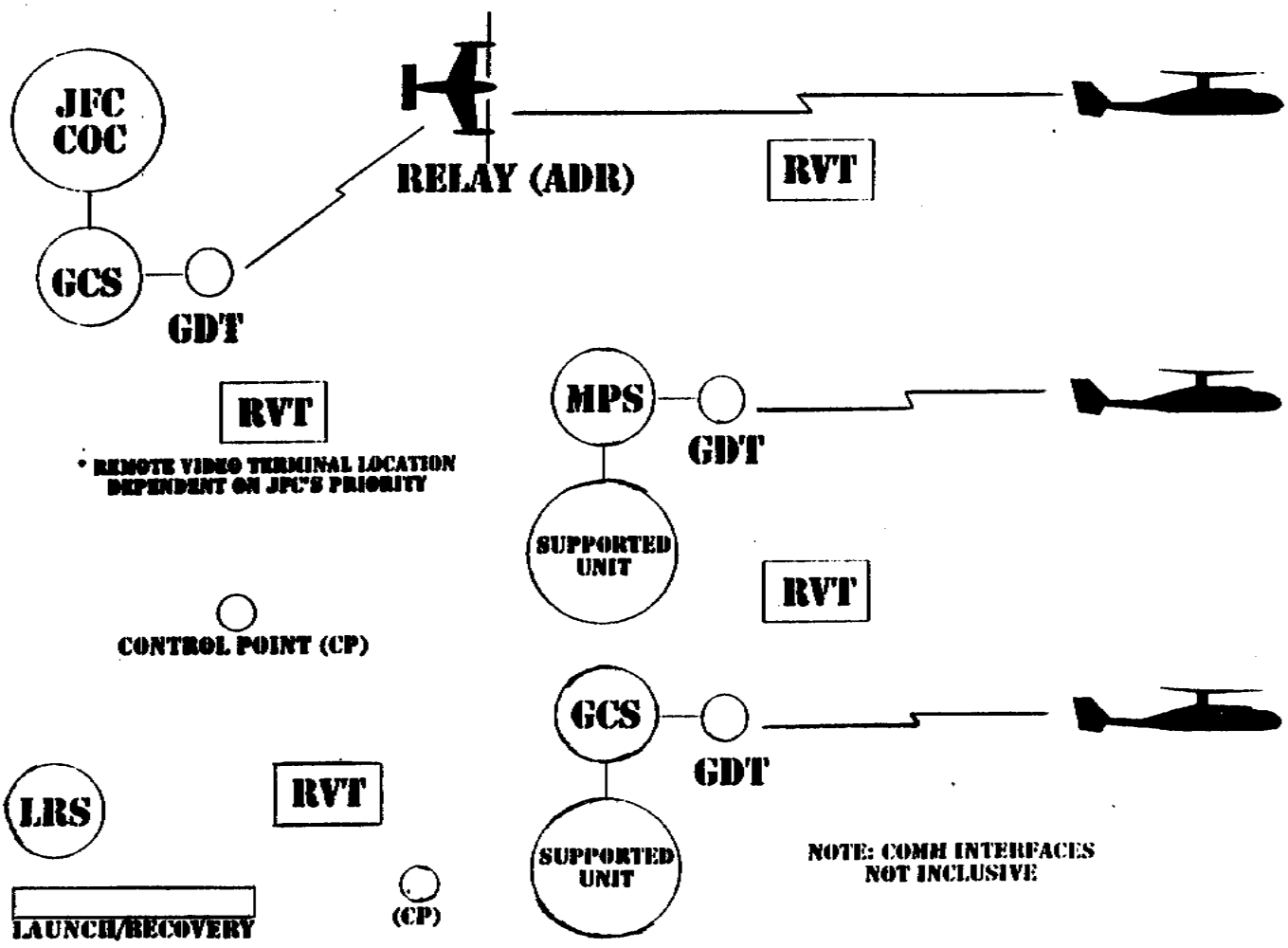

Figure II-2. UAV System Setup with Control Stations at Supported Unit

Figure II-2. UAV System Set up with Control Stations at Supported Unit

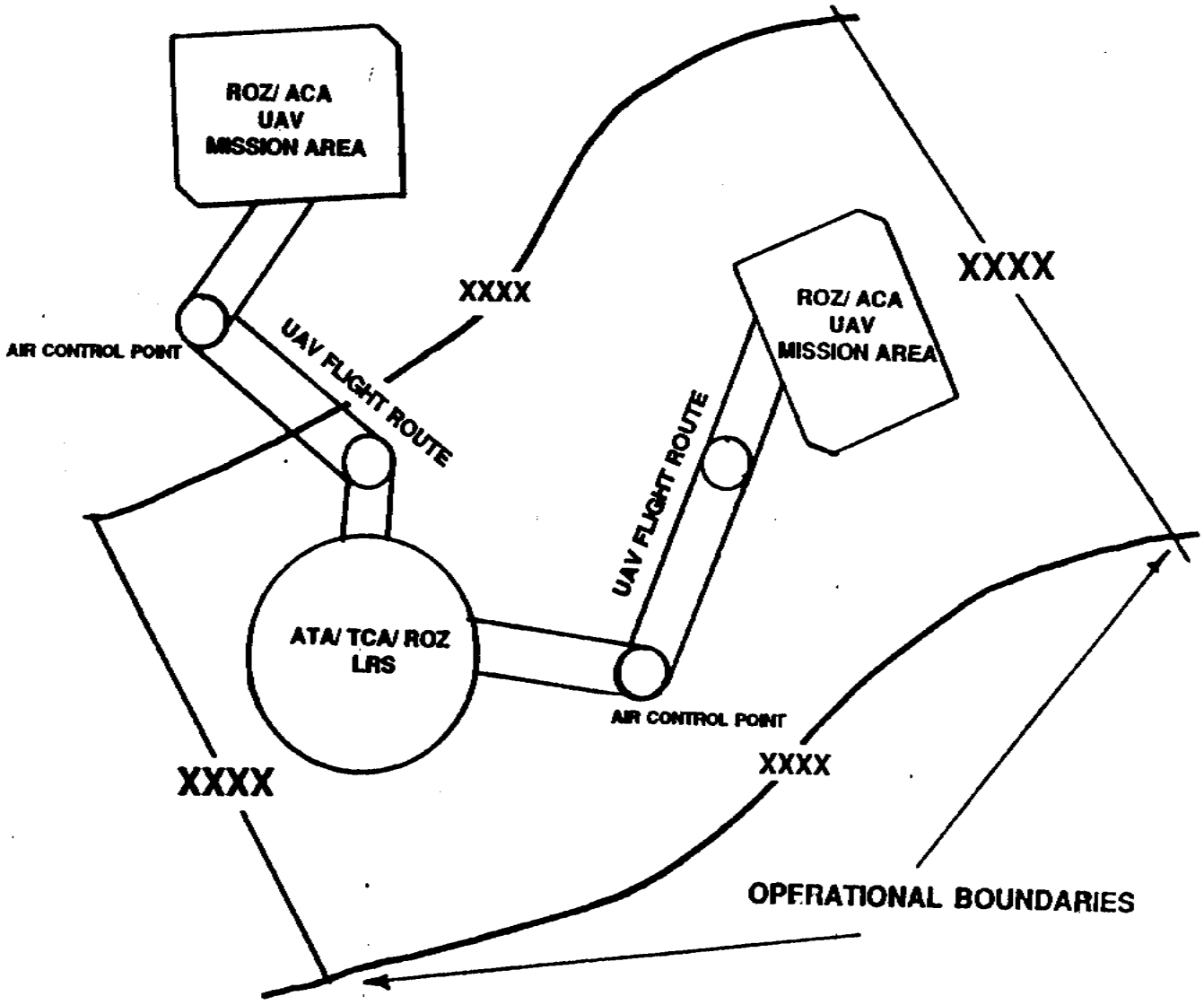

Figure II-3. UAV Airspace Control Measures (Overhead View)

Figure II-3. UAV Airspace Control Measures (Overhead View)

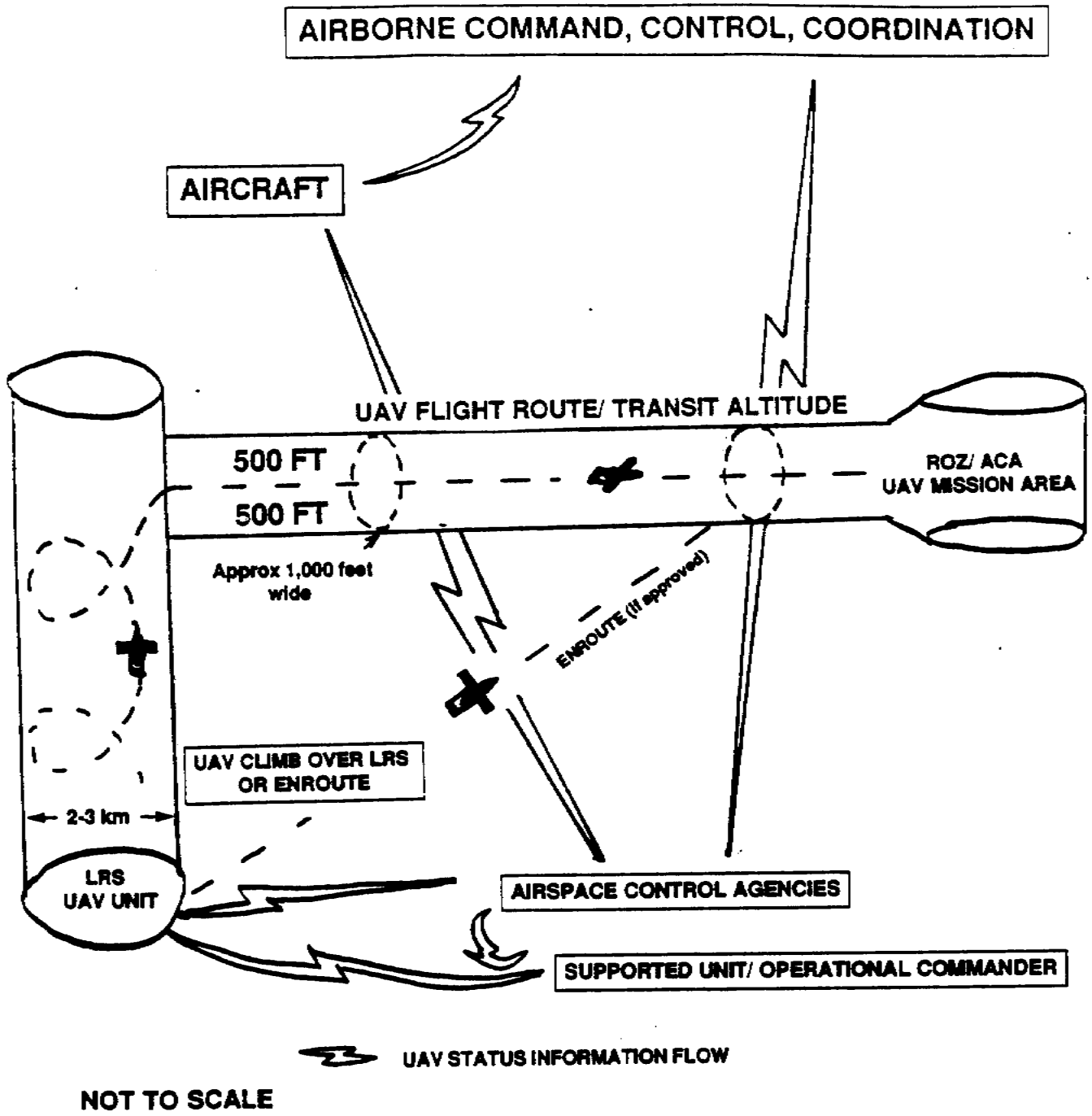

Figure II-4. UAV Airspace Control Measures (Horizontal View)

Figure II-4. UAV Airspace Control Measures (Horizontal View)

e. The following are planning considerations for UAV missions:

(1) Purpose of the mission.

(2) EEI to develop missions.

(3) Joint suppression of enemy air defenses (JSEAD).

(4) EW.

(5) Threat in the target area.

(6) Route weather, especially in the target area.

(7) Coordination with other friendly operations in the target area.

(8) Data links and frequencies required by supported unit to receive UAV signals.

(9) Launch and recovery times and location.

(10) Coordination of the transit route and flight path to minimize UAV vulnerability and maximize expected value of the mission.

(11) Synchronization with other airspace users.

(12) Request for coordination or provision of assets to analyze the information beyond UAV unit capability, as required.

(13) Requested system performance capabilities. Shorter range systems may require the relocation of support personnel and ground equipment. If the requesting unit does not know the exact capabilities needed, it should provide the tasking agency with the most complete list of mission requirements possible.

(14) Security for the UAV units if they are required to move into the supported unit's boundary.

(15) Support of UAV unit. If the UAV unit is not self-supporting, it must coordinate with the supported unit for required logistic support, such as materials handling equipment (MHE), fuel and packaged petroleum, oils, and lubricants (POL) and surface and/or air transportation.

6. Conduct of the Mission. UAVs can be manually controlled or preprogrammed to fly autonomous missions. Most UAV operations require manual launch and recovery. For multi-UAV operations, one UAV may be put in the preprogrammed mode to fly a specified course or to circle a designated target area while an additional UAV is launched and manually controlled.

a. Manual Control. After launch, the UAV climbs to a predetermined altitude under autopilot or manual control of the internal pilot at the GCS. The mission commander ensures that the UAV adheres to the planned mission. The supported unit will coordinate with the appropriate agencies for any changes it directs. UAV positions will be maintained and, when necessary, reported to appropriate airspace control agencies. Upon conclusion of the mission, the UAV returns via designated control points to the recovery area.

b. Preprogrammed or Autonomous Control. The preprogrammed mode allows the UAV to proceed on a preselected course and perform specified patterns during loiter such as an orbit in a selected area where it could be placed under real-time control of an airborne or shipborne control station or as a countermeasure to hostile EW. The UAV will be monitored by the GCS to ensure it maintains the programmed altitude and position. After mission completion, the UAV proceeds via programmed points toward a location where there is manual control for terminal approach and landing. One special feature of all UAV missions is a preprogrammed emergency flight mode called "return home." The sequence for return home is as follows: if data link is lost, the UAV automatically flies to a selected altitude and location and holds. When command is reestablished, the UAV continues the mission as planned. If command signals are not reestablished, the UAV will continue holding until running out of fuel. Each flight includes planning for a remote recovery checkpoint located so that acquisition of the UAV by a control station is enhanced if return home is initiated.

7. UAV System Advantages and Disadvantages

a. Advantages. UAV systems gather combat information in real or near real time and transmit it to their ground stations by data link day or night. This capability reduces the need for manned aircraft to overfly enemy territory. Transportation and logistic requirements to deploy the UAV systems are usually smaller than other airborne intelligence collection resources. Current UAV

systems are fairly interoperable between the Services and extensive special training is not required to use much of the information provided by UAVs. Further, UAV systems are designed to interface with other intelligence systems such as the all-source analysis system (ASAS) and Joint Surveillance Target Attack Radar System (Joint STARS).

b. Disadvantages. The two primary UAV disadvantages include environmental restrictions to flight and the requirement for LOS between the UAV and the controlling or relay stations (ground, airborne, or shipborne) processing the aircraft or payload. Future capabilities for off-tether operations may eventually redress this latter disadvantage.

8. Close-Range Unmanned Aerial Vehicle. The CR-UAV system is composed of a baseline system (US Marine Corps) and an augmented system (US Army, using the baseline system as a launch and recovery unit) as depicted in Figures II-5 and II-6.

a. Advantages. CR-UAV has extremely small transportation requirements when compared to other UAV systems or to reconnaissance (RECCE) units that employ electronic equipment. It can be effectively operated from small clearings, parking lots, or compounds. The UAV's small visual and radar signatures enhance its survivability. CR-UAV is relatively simple to operate, requires few dedicated personnel, and allows resident military specialties, such as forward observer or intelligence analyst, to be integrated easily. This feature increases the operational flexibility of the CR-UAV system. The ground control unit design allows for automatic or mechanical interface with other DOD systems such as the all-source analysis system (ASAS) and the ground station module (GSM).

b. Disadvantages. The reduced size and limited endurance of the CR-UAV requires repetitive launches to maintain surveillance for extended periods. The operating range of the UAV is approximately 50 kilometers; therefore, operational site selection options may be limited. The UAV's small size (200 pounds or less) means that miniaturization is required before multiple payloads that perform several missions can be carried on one flight. The small size of the GCS necessitates support from other sources for complete analysis of payload products.

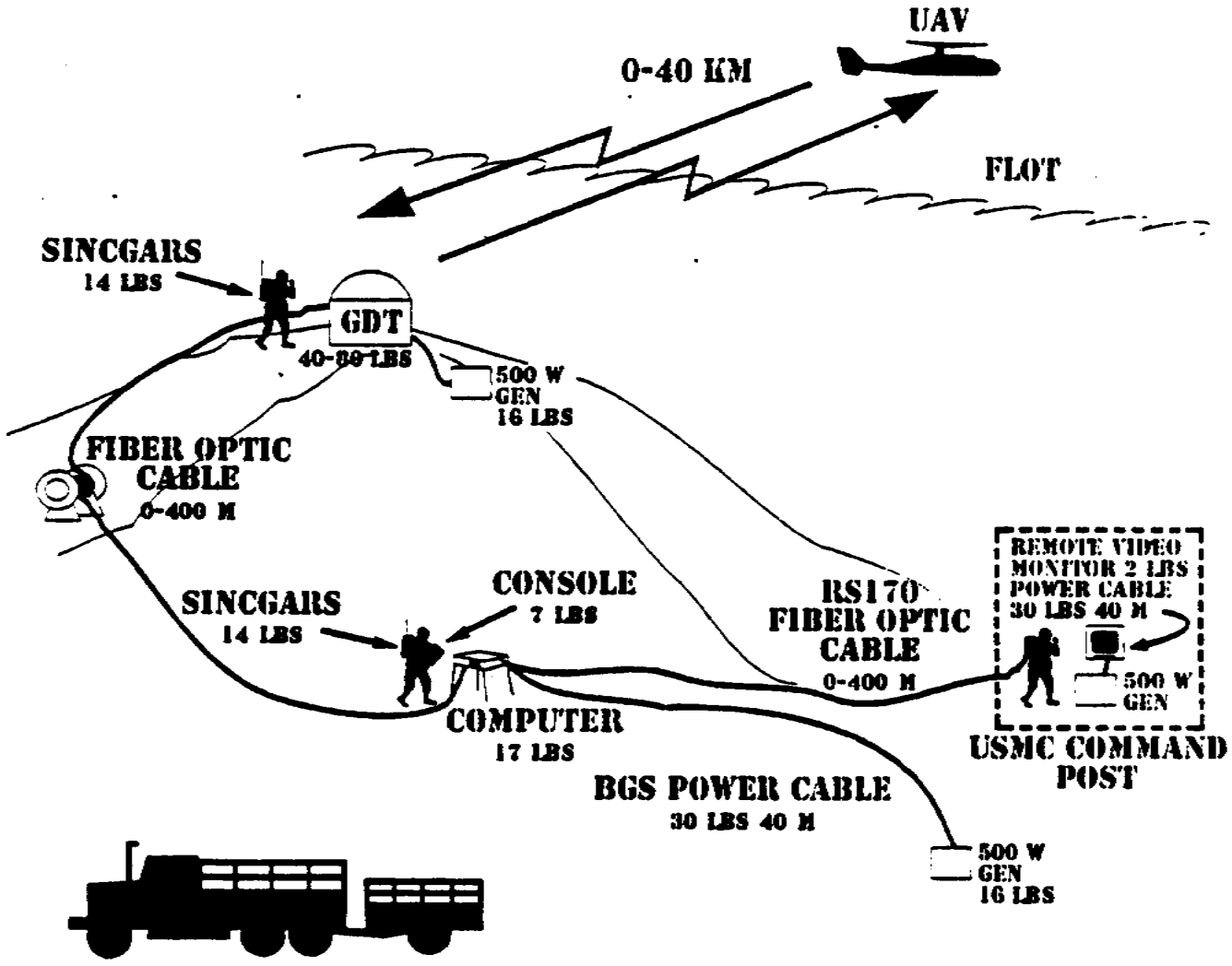

Figure II-5. US Marine Corps CR-UAV

Figure II-5. US Marine Corps CR-UAV

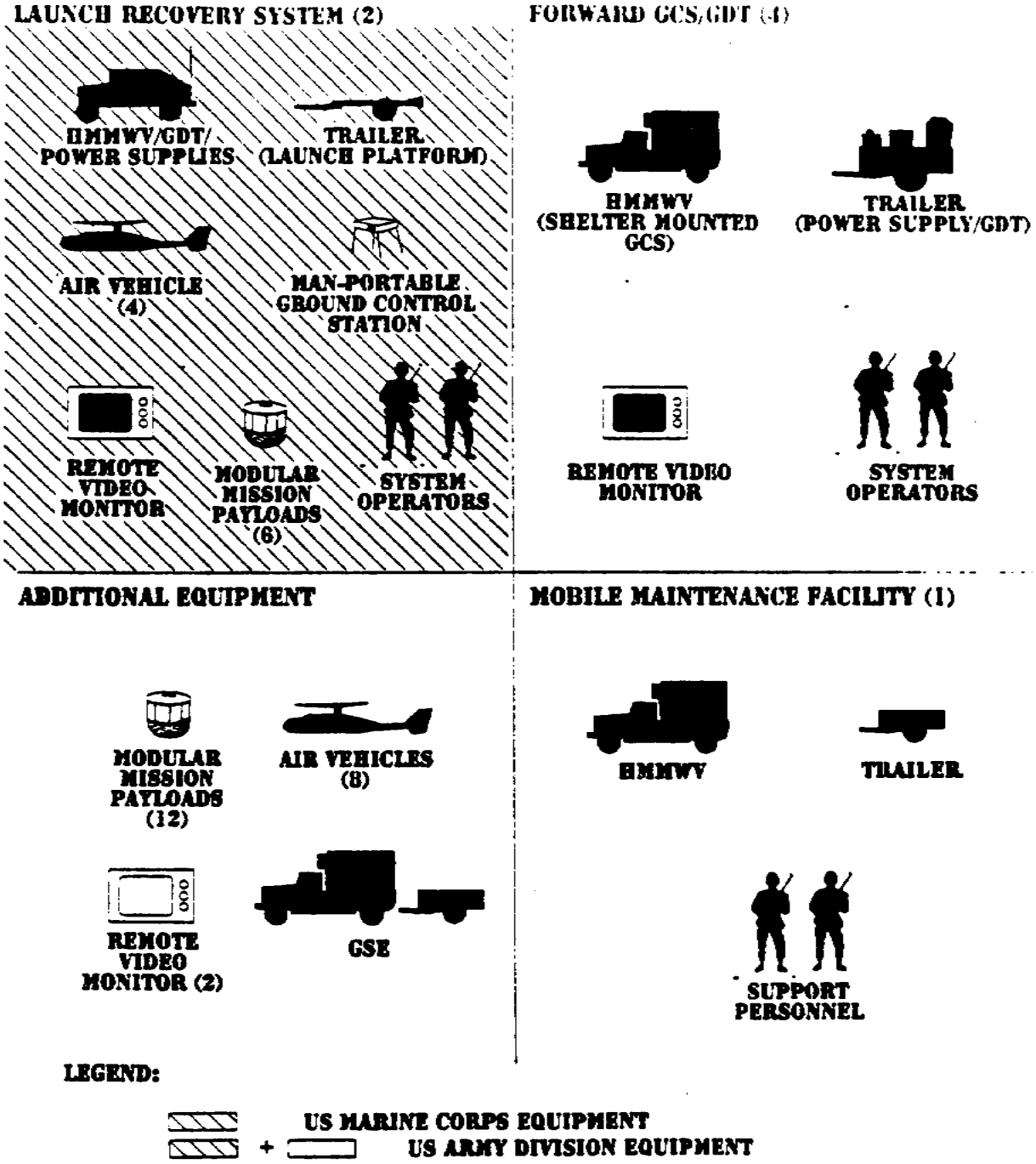

Figure II-6. US Army Augmented System
(USMC system in shaded area)

Figure II-6. US Army Augmented System
(USMC system in shaded area)

9. Short-Range Unmanned Aerial Vehicle. The SR-UAV is composed of a baseline system (Figure II-7) that can be adjusted by the addition or removal of personnel and equipment to meet operational needs. The baseline system consists of an mission planning station (MPS), GCS, air vehicles (AVs), payloads, an LRS, and RVTs. Present SR-UAV payload provides a day or night imagery intelligence (IMINT) capability in addition to radio relay. A variety of additional multiple mission payloads are planned as system growth improvements.

a. Advantages. The SR-UAV's increased range and endurance allows for the system to operate over a significant area. Payload capacity allows for the UAV to carry multiple payloads, executing several missions on a given flight. The ability to analyze the payload product is resident within the system ground or ship component equipment. During preprogrammed autonomous flight, several hours of data can be recorded and stored on board the UAV and then retrieved and interpreted after UAV recovery. The UAV may also maintain a constant link with GCS to provide real-time coverage, albeit at reduced ranges. RVTs can be supplied to provide downlink information during mission execution to selected agencies such as the command centers or joint intelligence centers.

b. Disadvantages. The SR-UAV unit requires significant transportation, personnel, and logistic support. Depending on configuration, three to eight C-141 load equivalents will be needed to deploy the SR-UAV unit. This is not a consideration for the Navy SR system which deploys with the host ship. The UAV size necessitates ground and shipboard handling considerations which limits the opportunity to operate from small clearings or unprepared areas and can impact routine afloat flight operations without prior flight plan integration. The present SR-UAV has engines that operate on gas fuel that is not available through DOD logistic systems, but future block upgrades may include engines that run on available fuel.

		BASELINE
MISSION AND FLIGHT	MPS	1
	GCS	2
	TRANSPORT GDT	2
	RVT	4
AIR VEHICLES AND PAYLOADS	AV	8
	MMP DAY/NIGHT	8
	ADR	4
LAUNCH AND RECOVERY	L / R STATION	1
	PAYLOAD TRANSPORT	1
AV TRANSPORT	AV TRANSPORT	4

Figure II-7. SR-UAV System Description

Figure II-7. SR-UAV System Description

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APPENDIX A

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   e. Joint Pub 3-02, 8 October 1992, "Joint Doctrine for Amphibious Operations."

   f. Joint Pub 3-02.1, (in development), "Joint Doctrine for Landing Force Operations."

   g. Joint 3-52, (in development), "Doctrine for Joint Airspace Control in the Combat Zone."

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   b. FM 6-20, 17 May 1988, "Fire Support in the Airland Battle."

   c. FM 30-60A, 6 June 1989, "Counterintelligence Operations."

d. FM 34-1, 2 July 1987, "Intelligence and Electronic Warfare Operations."

e. FM 34-37, 15 January 1991, "Echelons Above Corps Intelligence and Electronic Warfare Operations."

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h. FM 100-103, 7 October 1987, "Army Airspace Command and Control in a Combat Zone."

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r. NWP 22-2/FM 1-7, 1 June 1990, "Supporting Arms in Amphibious Operations."

s. Concept of Operations for Medium Range Unmanned Aerial Vehicles, 11 June 1991.

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APPENDIX B

USERS EVALUATION REPORT
ON JOINT PUB 3-55.1

1. Users in the field are highly encouraged to submit comments on this pub by removing this page and sending it to JDC. Please fill out the following: users' POC, unit address, and phone (DSN) number.

2. Content

a. Does the pub provide a conceptual framework for the topic?

b. Is the information provided accurate? What needs to be updated?

c. Is the information provided useful? If not, how can it be improved?

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e. Can this pub be better organized for the best understanding of the doctrine and/or JTTP? How?

3. Writing and Appearance

a. Where does the pub need some revision to make the writing clear and concise? What words would you use?

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4. Recommended urgent change(s) (if any).

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GLOSSARY

PART I

ABBREVIATIONS AND ACRONYMS

AADC	area air defense commander
A2C2	Army airspace command and control
ABCCC	airborne command, control, and communications
ACA	airspace control authority
ACO	airspace control order
ACP	airspace control plan
ADA	air defense artillery
ADR	air data relay
AIRREQRECON	air request reconnaissance
AIRREQSUP	air request support
AOC	air operations center
AOR	area of responsibility
ASAS	all-source analysis system
ASMD	antiship missile defense
ASOC	air support operations center
ASW	antisubmarine warfare
ATA	airport traffic area
ATO	air tasking order
AV	air vehicle
AWACS	airborne warning and control system
BDA	battle damage assessment
C2	command and control
CAS	close air support
COC	combat operations center
CP	control point
CR-UAV	close range unmanned aerial vehicle
CSAR	combat search and rescue
DASC	direct air support center
DASC(A)	direct air support center (airborne)
DOD	Department of Defense
EA	electronic attack
EEI	essential element of information
EMCON	emission control
E-UAV	endurance unmanned aerial vehicle
EW	electronic warfare

FAC	forward air controller
FAC(A)	forward air controller (airborne)
FLOT	forward line of own troops
FO	forward observer
FSCC	fire support coordination center
GCS	ground control station
GDT	ground data terminal
GSE	ground support equipment
GSM	ground station module
HMMWV	high mobility multipurpose wheeled vehicle
IMINT	imagery intelligence
JAOC	joint air operations center
JFACC	joint force air component commander
JFC	joint force commander
JIC	joint intelligence center
JSEAD	Joint suppression of enemy air defenses
JSTARS	joint surveillance target attack radar system
JTCB	joint targeting coordination board
JTTP	joint tactics, techniques, and procedures
LOS	line-of-sight
LRS	launch and recovery site
MAGTF	Marine Air-Ground Task Force
MHE	materials handling equipment
MMP	modular mission payloads
MPS	mission planning station
MR-UAV	medium-range unmanned aerial vehicle
MSL	mean sea level
NBC	nuclear, biological, and chemical
NSFS	naval surface fire support
OPSEC	operations security
OTH-T	over-the-horizon targeting
POL	petroleum, oils, and lubricants
RECCE	reconnaissance
ROZ	restricted operations zone
RPV	remotely piloted vehicle
RSTA	reconnaissance, surveillance, and target acquisition
RVT	remote video terminal

SAR	search and rescue
SIGINT	signals intelligence
SINCGARS	single channel ground and airborne radio system
SPINS	special instructions
SR-UAV	short-range unmanned aerial vehicle
TAC(A)	tactical air commander (airborne)
TACC	Tactical Air Control Center
TCA	terminal control area
UAV	unmanned aerial vehicle
UNAAF	Unified Action Armed Forces (Joint Pub 0-2)
VFR	visual flight rules
VIPER	vertical takeoff and landing integrated platform for extended reconnaissance
VTOL	vertical takeoff and landing
VTOL-UAV	vertical takeoff and landing unmanned aerial vehicle

direct support. A mission requiring a force to support another specific force and authorizing it to answer directly the supported force's request for assistance. (Joint Pub 1-02)

general support. That support which is given to the supported force as a whole and not to any particular subdivision thereof. (Joint Pub 1-02)

joint force commander. A general term applied to a commander authorized to exercise Combatant Command (command authority) or operational control over a joint force. Also called JFC. (Joint Pub 1-02)

near real time. Pertaining to the timeliness of data or information which has been delayed by the time required for electronic communication and automatic data processing. This implies that there are no significant delays. (Joint Pub 1-02)

unmanned aerial vehicle.** A powered, aerial vehicle that does not carry a human operator, uses aerodynamic forces to provide vehicle lift, can fly autonomously or be piloted remotely, can be expendable or recoverable, and can carry a lethal or nonlethal payload. Ballistic or semiballistic vehicles, cruise missiles, and artillery projectiles are not considered unmanned aerial vehicles. Also called UAV.

** Upon approval of this publication, this term and definition will be included in Joint Pub 1-02.

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