

ATP 4-48

Aerial Delivery

June 2014

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Headquarters, Department of the Army

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Aerial Delivery

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Preface

Army techniques publication (ATP) 4-48, *Aerial Delivery*, provides documentation of current aerial delivery doctrine and addresses aerial delivery distribution as it applies to the overall Army distribution system. Aerial delivery amplifies the flexibility, agility, and force multiplier potential within the Army distribution system.

The principal audience for ATP 4-48 is all members of the profession of arms. Commanders and staffs of Army headquarters serving as joint task force or multinational headquarters should also refer to applicable joint or multinational doctrine concerning the range of military operations and joint or multinational forces. Trainers and educators throughout the Army will also use this publication.

Commanders, staffs, and subordinates ensure that their decisions and actions comply with applicable United States, international, and in some cases, host-nation laws and regulations. Commanders at all levels ensure that their Soldiers operate in accordance with the law of war and the rules of engagement. (See field manual [FM] 27-10).

ATP 4-48 uses joint terms where applicable. Selected joint and Army terms and definitions appear in both the glossary and the text. Terms for which ATP 4-48 is the proponent publication (the authority) are italicized in the text and marked with an asterisk (*) in the glossary. Terms and definitions for which ATP 4-48 is the proponent publication are boldfaced in the text. For other definitions shown in the text, the term is italicized and the number of the proponent publication follows the definition.

ATP 4-48 applies to the Active Army, Army National Guard/Army National Guard of the United States, and United States Army Reserve unless otherwise stated. Unless this ATP states otherwise, masculine nouns and pronouns do not refer exclusively to men.

The proponent of ATP 4-48 is the United States Army Quartermaster School. The preparing agency is the United States Army CASCOM G-3 Training and Doctrine Development Directorate. Send comments and recommendations on Department of the Army (DA) Form 2028 (*Recommended Changes to Publications and Blank Forms*) to Commander, United States Army Combined Arms Support Command, ATTN: ATCL-TS, Fort Lee, Virginia 23801 or submit an electronic DA Form 2028 by e-mail to: usarmy.lee.tradoc.mbx.lee-cascom-doctrine@mail.mil.

Introduction

Army techniques publication (ATP) 4-48, *Aerial Delivery*, is the Army's manual for aerial delivery. Its purpose is to provide guidance on aerial delivery. It defines aerial delivery; describes the planning, preparation, execution process; and identifies responsibilities in the conduct of aerial delivery. The intent is to provide commanders and staffs with a common understanding of the abilities and limitations of aerial delivery.

ATP 4-48 remains generally consistent with FM 4-20.41, *Aerial Delivery Distribution in the Theater of Operations*, however, significant changes were made to the organization of the information. Change 1 adds key personnel and their responsibilities. Change 2, all data related to each method of aerial delivery is grouped together with the exception of physical security and chemical, biological, radiological, nuclear and high yield explosives (CBRNE). Change 3, all aerial delivery formations were updated. Finally, Change 4, the work excludes all experimental and proposed equipment.

ATP 4-48 contains five chapters:

- **Chapter 1** includes the role of aerial delivery support to sustainment operations and theater distribution. The chapter examines the advantages that aerial delivery offers in sustainment and distribution operations. It provides an overview of aerial delivery support specific to Special Forces and defense support to civil authorities. It discusses aerial delivery in theater opening and ongoing theater distribution operations.
- **Chapter 2** discusses air landing as an aerial delivery method. The chapter identifies airland techniques to include planning factors, aircraft considerations and responsibilities. It also discusses the advantages and disadvantages of this method of aerial delivery. Lastly it examines safety factors and equipment retrograde.
- **Chapter 3** discusses airdrop as an aerial delivery method. The chapter identifies air drop techniques to include planning and responsibilities. It discusses the types and methods of air drop. The chapter also identifies the advantages and disadvantages of air drop. Lastly, it examines safety factors and equipment retrograde.
- **Chapter 4** discusses sling-loading as an aerial delivery method. The chapter identifies sling-load techniques to include planning, responsibilities and rotary-wing aircraft considerations. It also examines the classification of loads and the methods of sling-loading. The chapter identifies advantages and disadvantages of sling-loading. Finally, it examines safety factors and equipment retrograde.
- **Chapter 5** provides an overview of Army aerial delivery units. It also identifies aerial delivery capabilities in the United States (U.S.) Navy, U.S. Marine and U.S. Air Force (USAF). In addition the chapter discusses multinational and contract aerial delivery support.

Chapter 1

Aerial Delivery

This chapter examines aerial delivery as an aspect of sustainment operation and theater distribution. Aerial delivery distribution provides an efficient and effective means of conducting distribution operations. In order for aerial delivery to be effective, friendly forces must control the airspace in the area of operations and enemy ground-based air defenses must be neutralized. Aerial delivery includes airland, airdrop, and sling-load operations.

AERIAL DELIVERY SUPPORT TO SUSTAINMENT OPERATIONS

1-1. Aerial delivery is increasingly employed as a routine distribution method. When applied together with surface distribution operations, aerial delivery enables maneuver forces to engage in a battle rhythm that is not as restricted by geography, supply routes, tactical situations or operational pauses for logistic support.

SUSTAINMENT AND DISTRIBUTION

1-2. *Sustainment warfighting function* is the related tasks and systems that provide support and services to ensure freedom of action, extend operational reach, and prolong endurance (Army doctrine reference publication [ADRP] 3-0). It gives an Army force operational reach, freedom of action and endurance. *Logistics* is planning and executing the movement and support of forces (Joint Publication [JP] 4-0). *Distribution* is the operational process of synchronizing all elements of the logistic system to deliver the “right things” to the “right place” at the “right time” to support the geographic combatant commander (JP 4-0). Aerial delivery is a vital link in the distribution system and provides the capability of supplying the force even when land lines of communications have been disrupted or terrain is too hostile.

1-3. Aerial delivery can support units in various operational environments where terrain limits access. It is used for routine and urgent deliveries of sustainment. Aerial delivery acts as a combat multiplier because it is an effective means of by passing enemy activities and reduces the need for route clearance of ground lines of communications. The goal is to provide combat units freedom of movement by drastically reducing their dependence on surface logistical support.

1-4. Aerial delivery is a valuable force multiplier and is employed based on the mission and conditions in the theater of operations. Its flexibility and effectiveness make it a responsive, but potentially costly, asset to use. Planning, including the coordination of plans with the aviation liaison officer, is essential for a smooth, safe operation. During the planning phase, planners review the mission, aircraft limitations, landing site selection, cargo and cargo weight.

1-5. Logisticians determine the optimal delivery method based on mission variables; the mission, enemy, troops, terrain and weather, troops and support available, time available, civil considerations typically referred to as METT-TC, and the analysis derived from the logistics preparation of the theater. For additional information on METT-TC see ADRP 3-0, *Unified Land Operations*. Aerial delivery can be used to add flexibility in the military decision making process. See ADRP 5-0, *The Operations Process*, for more information on the military decision making process. Aerial delivery of supplies or equipment, like any other mode of delivery, consists of requests for the necessary supplies or equipment, and a request for delivery assets.

1-6. The support operations (SPO) officer at the brigade and the battalion level is the commander’s advisor for aerial delivery support. The SPO officer advises the commander on aerial delivery to support a theater command. The SPO officer will brief the command on the brigade’s aerial delivery capabilities to

support units in a theater environment. The SPO officer in the brigade support battalion advises the commander on aerial delivery to support a brigade combat team (BCT). The SPO officer at battalion level advises the BCT commander on aerial delivery which is specific to the BCT mission.

1-7. The aerial delivery officer in select units at echelons above brigade is the chief planner for aerial delivery. Aerial delivery officers at the sustainment brigade level plan and determine airdrop support for their area of support based on the commands guidance. It is not predetermined, so the aerial delivery officer must always get clear guidance from the command prior to planning any aerial delivery supply. *Supply* is the procurement, distribution, maintenance while in storage, and salvage of supplies, including the determination of kind and quantity of supplies (JP 4-0).

FORCIBLE ENTRY

1-8. Aerial delivery is the key enabler for both airborne and air assault forcible entry operations. The methods of aerial delivery covered in this manual are critical to the success of these combat operations so the joint force can overcome threat and geographical conditions. Adversaries are projected to further develop and utilize anti-access strategies to deny joint forces entry into the theater of operations. Aerial delivery capabilities allow the joint force to rapidly project combat power throughout the depth of an operational area overcoming anti-access actions and the effects of terrain. For more information on joint and Army forcible entry operations see JP 3-18, *Joint Forcible Entry Operations*.

Special Forces Aerial Delivery

1-9. The sustainment brigade (Special Operations) (Airborne), Special Forces groups, and the ranger regiment are the only Army special operations forces (ARSOF) units that have organic aerial delivery planning and operational capabilities. ARSOF sustainment structures differ from Army conventional forces. ARSOF units are not logistically self-sufficient, relying upon regional or theater of operations infrastructure for virtually all support above their organic capabilities.

1-10. The planning and execution of logistics support to ARSOF must be nested within the geographic combatant commander's concepts of operation and support, as well as tailored to interface with the theater logistics structures. Aerial resupply for Special Forces after infiltration can be arranged by either the special operations task force or by the advanced operations base. Supply missions can be automatic, on-call, or emergency in accordance with preplanned schedules or at the request of the deployed detachment.

1-11. The type and method of aerial delivery depends on the specific needs of the ARSOF mission. A variety of special operations, conventional, foreign military and nonstandard or contract aircraft are utilized by special operations for aerial delivery. Associated with these various aircraft are rigging and dispatching techniques and concepts that are used in combat but are not used in training because of safety concerns; however, risks are mitigated based on the mission, situation, availability, and capability of the aircraft and aircrew.

1-12. For additional information on ARSOF aerial delivery capabilities see FM 3-05.210, *Special Forces Air Operations*; FM 3-75, *Ranger Operations*; ATP 3-05.40, *Special Operations Sustainment*; and technical manual (TM) 4-48.04, *Airdrop of Supplies and Equipment: Rigging Loads for Special Operations*.

Defense Support of Civil Authorities

1-13. Title 10 Department of Defense support to civil authorities may involve aerial delivery. Aerial delivery may be utilized in all facets of the defense support of civil authorities' mission including support of national special security events, natural and manmade disasters, civil disturbance, counter drug operations or counter transnational threats. Aerial delivery support is important because many of the missions take place in areas that have been devastated by a disaster. For additional information see ADRP 3-28, *Defense Support of Civil Authorities*.

THEATER DISTRIBUTION

1-14. The Army segment of the distribution system is referred to as theater distribution. *Theater distribution* is the flow of personnel, equipment, and materiel within theater to meet the geographic

combatant commander's mission (JP 4-09). The theater segment extends from the ports of debarkation or source of supply, in theater to the unit. Army theater distribution consists of organizations and processes for providing materiel to Army forces, other Services, and multinational partners across a theater of operation.

1-15. Theater distribution operations begin with theater opening. In an aerial denial or anti-access environment, theater opening is preceded by a joint forcible entry operation that gains entry into the theater by seizing a debarkation airfield or port. Theater opening is a complex joint process involving the geographic combatant commander and its service component commands, as well as strategic partners such as the Defense Logistics Agency, U.S. Transportation Command and Air Mobility Command (AMC). Theater opening requires a seamless strategic-to-operational interface and unity of effort among various commands. Theater opening must remain seamless for aerial delivery operations supporting tactical operations.

THEATER OPENING

1-16. A crucial role the Army plays as a joint interdependent force is opening the theater. *Theater opening* is the ability to establish and operate ports of debarkation (air, sea, and rail), establish a distribution system and sustainment bases, and to facilitate throughput for the reception, staging, and onward movement and integration of forces within a theater of operations (ADRP 4-0). Throughput is the average quantity of cargo and passengers that can pass through a port on a daily basis from arrival at the port to loading onto a ship or plane, or from the discharge from a ship or plane to the exit (clearance) from the port complex. Throughput is usually expressed in measurement tons, short tons, or passengers. Preparing for theater opening operations requires unity of effort among the various commands and a seamless strategic-to-tactical interface. Aerial delivery is a key tool for the sustainer and should be integrated into the plan. Theater opening functions set the conditions for effective support and lay the groundwork for subsequent expansion of the theater distribution system.

1-17. The distribution portion of theater opening is the ability to establish and initially operate ports of debarkations; to establish the distribution system and sustainment bases; and to facilitate the reception, staging, and onward movement of forces and materiel. Theater opening includes communications, personnel protection, intelligence, civil affairs operations, human resources, financial management, Army health system support, engineering, movement (air, land, and water transport, terminal operations), materiel management, maintenance, and operational contract support.

AERIAL PORTS

1-18. Aerial ports are designated airfields supporting strategic air movements (airlift and airlanding) for deployment, redeployment, and sustainment. Aerial ports are further designated as either an aerial port of embarkation, often seen as APOE, for departing forces and sustainment, or as an aerial port of debarkation (APOD) for arriving forces and sustainment. *Air movements*: Air transport of units, personnel, supplies, and equipment including airdrops and air landings (JP 3-17).

1-19. U.S. Transportation Command's AMC is the single port manager for all common user APODs. Ideally, the APOD will provide runways of varying capacity, cargo handling equipment, adequate staging areas, multiple links to the road and rail network, and a qualified work force.

1-20. The U.S. Air Force (USAF) provides lift capabilities to quickly move Army forces across strategic lines of communication to theater operations. The USAF through the AMC provides worldwide cargo and passenger airlift and landing, air refueling, and aero medical evacuation. AMC also provides contingency response elements that provide en route ground support for airlift and airlanding operations.

1-21. Reception at the APOD is coordinated by the senior logistics commander and executed by a USAF contingency response group or element and an arrival/departure airfield control group (A/DACG). Elements of a movement control team and an inland cargo transfer company typically operate the A/DACG however the mission can be performed by any unit with properly trained personnel and the appropriate equipment. *Movement control* is the planning, routing, scheduling, and control of personnel and cargo movements over lines of communications; includes maintaining in-transit visibility of forces and materiel through the deployment and/or redeployment process (JP 4-01.5).

1-22. A/DACGs are designed to coordinate and control the movement of personnel and materiel through air terminals. The capabilities of the A/DACG are tailored based on the mission and military units performing aerial port operations. The A/DACG is task-organized to reflect the type of move and degree of support available at the air terminal. The A/DACG also assists the aviation support element with movement of rotary-wing aircraft in preparation for flight from the APOD.

Logistics Over-the-Shore Operations

1-23. Logistics over-the-shore operations are the loading and unloading of ships in an austere environment or without deep draft capable fixed port facilities. Joint Army Navy logistics-over-the-shore operations will often involve rotary-wing aircraft and sling-load missions in moving personnel and cargo from ship to shore. See JP 4-01.6, *Joint Shipboard Helicopter and Tiltrotor Aircraft Operations*, for additional information.

Ongoing Theater Distribution

1-24. Once the theater is opened, theater supply operations transition into a constant state. Ongoing theater distribution operations are conducted in accordance with the sustainment plan. The sustainment plan is normally prepared in conjunction with the movement plan by the theater sustainment command or expeditionary sustainment command (TSC or ESC) in coordination with all other elements involved in distribution management. *Distribution management* is the function of synchronizing and coordinating a complex of networks (physical, communications, information, and resources) and the sustainment functions (logistics, personnel services, and health service support) to achieve responsive support to operational requirements. (ADRP 1-02) The sustainment plan is an integral part of the operation plan and operations order. It contains a statement of distribution instructions and arrangements supporting the operation that are of primary interest to the supported units and formations. The sustainment plan also provides the commander's plan for sustainment operations based on the information gathered and analyzed during the sustainment preparation of the operational environment process. *Operational environment* is a composite of the conditions, circumstances, and influences that affect the employment of capabilities and bear on the decisions of the commander (JP 3-0). The plan provides information to the supported elements, and it serves as the basis for the plans of supporting commanders to their units. For additional information on theater distribution see ATTP 4-0.1, *Army Theater Distribution*.

1-25. Unified land operations require a highly mobile logistics support capability to sustain our maneuver brigades. Commanders and logisticians must be prepared to integrate aerial delivery operations into their sustainment plans.

Chapter 2

Airland

This chapter discusses aerial delivery airland operations. Airland encompasses all situations where personnel and cargo are offloaded. *Airland* is move by air and disembark, or unload, after the aircraft has landed or while an aircraft is hovering (JP 3-17).

AIRLAND TECHNIQUES

2-1. Airland is the preferred method of aerial delivery because it is the most efficient and cost effective. It permits delivery of larger loads with less risk of cargo loss or damage than airdrop or sling-load methods. Although crews normally accomplish offloading from a stationary aircraft with engines shut down, procedures exist to load and offload with engines running when necessary to reduce ground time. In a higher threat environment, or when sufficient materials handling equipment (MHE) is not available, procedures exist to combat offload from a moving aircraft. This delivery method can be conducted at well-established airbases or may involve tactical deliveries to unimproved, dirt strip assault landing zones.

AIRLAND PLANNING

2-2. The use of airland operations should be weighed and scheduled judiciously. Air landing requests in the continental United States are coordinated between the AMC and U.S. Transportation Command. In theater, the TSC and ESC' SPO officer manages theater-level aerial delivery in close coordination with the transportation directorate and the USAF theater air operations center (AOC). The USAF normally provides airland support through hub and spoke or direct delivery. Hub and spoke operations involve an initial intertheater airlift that offloads personnel and materiel at a main operating location within the theater. This operation is followed by an intratheater airlift that moves designated personnel and equipment to forward operating locations. *Intertheater airlift* is the common- user airlift linking theaters to the continental United States and to other theaters as well as the airlift within the continental United States (JP 3-17). *Intratheater airlift* is airlift conducted within a theater with assets assigned to a geographic combatant commander or attached to a subordinate joint force commander (JP 3-17).

2-3. Intratheater airland capabilities provide for limited transport of time-sensitive or mission-critical cargo and key personnel to forward deployed Army units operating in a joint operations area. Austere airfields within a joint operations area may restrict the use of fixed-wing aircraft. This may be due to threat conditions, airfield classification, or off-load capabilities. In which case, cargo is delivered as far forward as feasible for further movement by Army or contract rotary-wing aircraft or ground transportation.

2-4. The minimum considerations when planning airland operations are listed below:

- The tactical situation
 - The expected conventional and nonconventional threat throughout the mission.
 - The location of countries granting over flight rights and any conditions placed upon them.
 - The duration and location of the operation.
 - The location, landing clearances to, and capabilities of suitable airfields, APODs, bases, and base camps.
 - Airspace considerations, to include the ability to control airspace in the absence of air traffic control facilities.
 - The type and amount of cargo or personnel for delivery.
 - The desired phasing of forces into the operation.
 - The weather conditions.

- Night operation and night vision device requirements.
- The mission requirements
 - Airlift assets available, including the number and type of aircraft and crews.
 - Protection of aircraft.
 - Aircrew survival measures, including escape and evasion points, routes, corridors, and safe haven locations.
 - Aircraft servicing, maintenance, and damage repair capabilities.
 - Airfield capabilities, including pavement strength and clearance requirements.
 - Airfield load and offload capabilities.
 - Transportation capabilities to distribute cargo or personnel to the final destination.
 - MHE support, petroleum, oil and lubricants storage and dispensing capability.

2-5. For additional information on APOD's reception, staging and onward movement see JP 3-35, *Deployment and Redeployment Operations*.

AIRCRAFT CONSIDERATIONS

2-6. Fixed-wing and rotary-wing aircraft can perform airland missions. However, fixed wing aircraft are more commonly utilized to deliver cargo due to their ability to fly longer ranges carrying heavier loads faster and at higher altitudes than rotary-wing aircraft.

2-7. Supplies and equipment requiring processing, loading, and subsequent airland movement are divided into the following categories of cargo:

- Bulk: general cargo, typically preloaded on pallets and transportable by common cargo aircraft.
- Oversize: cargo requiring a C-130 or larger. Typically larger than one pallet.
- Outsize: cargo transportable normally only by C-5 or C-17.
- Rolling stock: equipment that can be driven or rolled directly into the cargo compartment.

2-8. Airland is normally a joint operation between the USAF and Army with the objective of deploying and sustaining the force. The arrival landing zone (LZ) requires additional support to include MHE, an A/DACG and a theater airlift control element.

2-9. The theater airlift control element is an USAF composite organization whose mission is to organize and support USAF airlift assets at the arrival and departure airfield. It serves as the Army's sole USAF point of contact.

2-10. The choice of an USAF airland LZ is based on information gathered from a landing area study that highlights not only large, modern facilities, but also areas suitable for only take-offs and landings and austere airfields. Each identified site will be classified as to suitability in terms of type of aircraft, numbers of aircraft, and support facilities available and required. Army engineers are often responsible for initial LZ improvements as part of forcible and early entry operations. Depending on the operational environment support may be provided by combat or general engineers.

2-11. An LZ can be a rotary wing only position. These LZs, known as heliports, are approved and marked off by Army personnel. The only Air Force interaction in this instance would be for air space clearance. The Air Traffic Service Command (Army) can also coordinate for air space clearance, especially when the environment has not been developed.

2-12. An LZ approval or airstrip approval can be done by either Army or USAF trained personnel. The service that owns the aircraft can make a determination to accept another services' evaluation.

2-13. Desirable characteristics of LZs are ease of identification from the air; suitable airfield capabilities; a straight, unobstructed, secure approach for aircraft; and close proximity to ground objectives and units. LZs to be developed into more sophisticated facilities should possess the following additional characteristics:

- An area of sufficient size and trafficability to accommodate the number and type of aircraft to be landed.
- Parking and dispersal areas to accommodate the planned capacity of the facility.

- Road networks to handle ground vehicular traffic.
- Minimum construction and maintenance requirements.
- Areas and facilities for air terminal operations.
- Facilities for holding patients awaiting evacuation.
- Sufficient aerial port capacity to handle incoming personnel and supplies.
- Facilities to support crash and rescue vehicles and equipment.

2-14. When austere LZs are utilized a USAF special tactics combat control team may be deployed. The combat controllers are a small task organized team of parachute and combat diver qualified personnel trained and equipped to rapidly establish and control drop, landing, and extraction zone air traffic in austere or hostile conditions. The team surveys and establishes terminal airheads as well as providing guidance to aircraft for airlift operations. This includes placing initial en route and terminal navigational aids, and establishing air traffic control and communications. The USAF special tactics combat control team provides mission command, and conducts reconnaissance, surveillance, and survey assessments of potential objective airfields or assault zones. The team can also perform limited weather observations and removal of obstacles or unexploded ordinance with demolitions. If authorized by the USAF, Army pathfinders can operate an austere LZ in place of a tactical air control party.

2-15. For additional information on selecting LZs for fixed or rotary-wing aircraft see FM 5-430-00-1, *Planning and Design of Roads, Airfields, and Heliports in the Theater of Operations – Road Design* and FM 5-430-00-2, *Planning and Design of Roads, Airfields, and Heliports in the Theater of Operations – Airfield and Heliport Design*. For additional discussion regarding USAF and Army responsibilities see FM 3-52.3, *Multi-Service Tactics, Techniques, and Procedures for Joint Air Traffic Control*.

ADVANTAGES AND DISADVANTAGES OF AIRLAND

2-16. Advantages of airland include:

- Allows equipment that is not air-droppable, such as tanks, some artillery, and rotary-wing aircraft, to be brought rapidly in-theater.
- Allows a greater degree of tactical integrity and the capability to rapidly employ units after landing.
- Exposes deploying personnel and equipment to less risk of injury or damage.
- Permits the maximum utilization of aircraft loads by eliminating the volume and weight of preparing loads for airdrop deliveries.
- Allows aircraft to be used for backhaul or evacuation of personnel.
- Has a low cost per ton of cargo moved ratio.

2-17. Disadvantages of airland include:

- Requires moderately level, unobstructed LZs.
- Requires more time for delivery of a given size force than when delivery is by airdrop, especially for a small, restricted LZ.
- Requires more support personnel and MHE.
- Exposes aircraft to prolonged air and ground attack because of the extended time on the ground at forward airfields.
- Requires more engineer assets to maintain the airfield based on the physical composition of the LZ and weight of the cargo aircraft.
- Requires specialty trained personnel to supervise, prepare and certify supply loads.
- Cargo aircraft with heavy loads have limited range and might require refueling at the LZ.

AIRLAND SAFETY

2-18. Airland operations put aircraft at greater risk of enemy fire. Because the aircraft is on the ground during unloading operations the aircraft presents an easier target.

2-19. Improper use of MHE during loading can result in injury to personnel, damage to the aircraft or damage to cargo. Aircraft loading and unloading should be supervised and all safety measures observed.

2-20. Movement in the proximity of aircraft is inherently dangerous. Soldiers must remember to observe the following:

- The recommended flight line speed limit is 15 miles per hour; within 25 feet of the aircraft, the recommended speed limit is 5 miles per hour or less.
- Vehicles are not allowed within the circle of safety (see figure 2-1) unless they are to be loaded or used to service the aircraft.
- Do not back vehicles towards the aircraft without spotters and guides.
- No personnel should stand or walk directly in front of, or behind vehicles during on and off-loading procedures.
- No personnel should stand or walk directly in front of, or behind, aircraft engines (propeller or jet).
- Do not remove restraint or start a vehicle until told to do so by the loadmaster or boom operator.

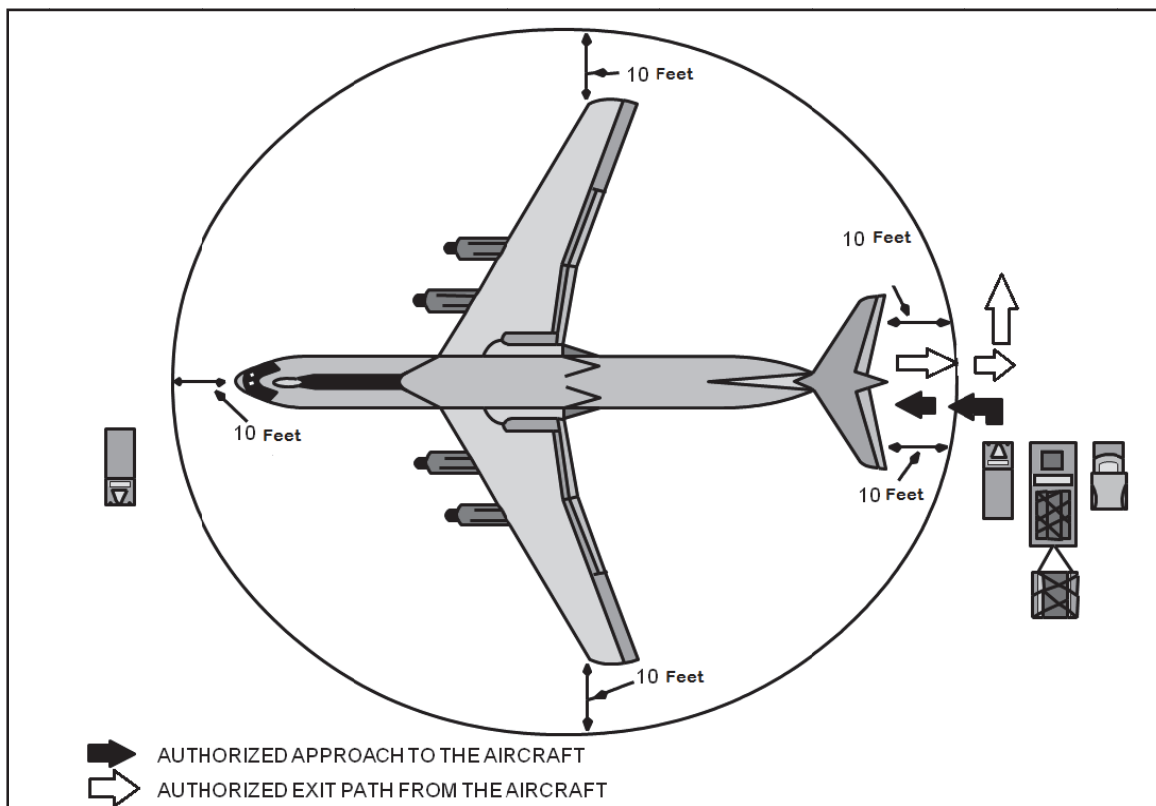


Figure 2-1. Fixed-wing aircraft circle of safety

- Personnel must stay away from the blast area of aircraft engines, which radiates as a cone up to 200 feet behind the aircraft.
- All loose articles on the flight line must be secured to eliminate the risk of debris being ingested into the aircraft engines or hitting and causing injury to personnel.
- If the rotary-wing aircraft is on a slope, approach from the downhill side.
- For rotary-wing aircraft personnel approaching the aircraft should pause outside the rotor's danger zone until the aircraft crew signal that it is safe to approach. Figures 2-2 and 2-3 on page 2-5 depict the circle of safety for the two most common rotary-wing aircraft.

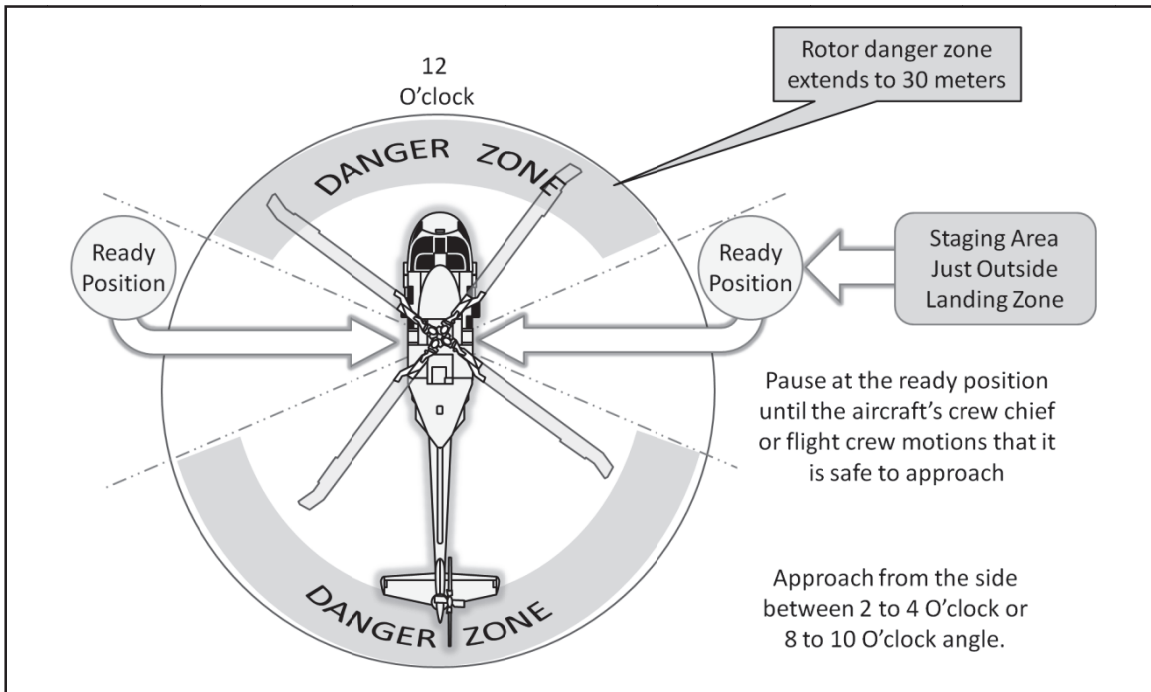


Figure 2-2. UH-60 rotary-wing aircraft circle of safety

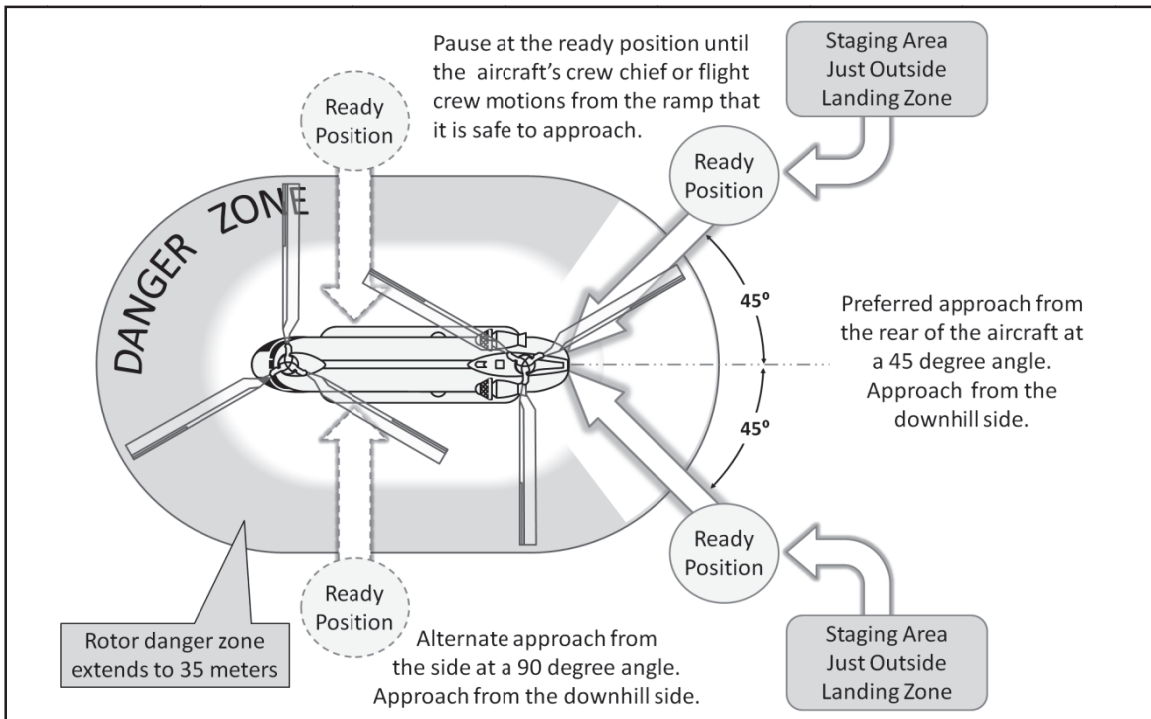


Figure 2-3. CH-47 rotary-wing aircraft circle of safety

AIRLAND EQUIPMENT RETROGRADE

2-21. USAF aerial port personnel on each site maintain overall control of all pallets with the pallet's associated netting material. The aerial port personnel work closely with the local movement control team and A/DACG to expedite the return of assets from customer units. If USAF pallets with associated netting material are broken down at the airfield, the pallets should not be allowed to leave the marshalling area. Air terminals must maintain aerial port tie-down equipment in accordance with applicable regulations. Aerial ports designate a pallet and net monitor to account for all operational assets, both serviceable and repairable, under the control of air terminals. When these pallets are used for throughput to forward units they must be retrograded to the marshalling area. *Retrograde* is the process for the movement of non-unit equipment and materiel from a forward location to a reset (replenishment, repair, or recapitalization) program or to another directed area of operations to replenish unit stocks, or to satisfy stock requirements (JP 4-09).

Chapter 3

Airdrop

This chapter describes airdrop as a method of aerial delivery. *Airdrop* is the unloading of personnel or materiel from aircraft in flight (JP 3-17). Airdrop operations provide the ability to distribute cargo, using parachutes or cushioned packaging to release supplies and equipment from an aircraft while in flight.

AIRDROP TECHNIQUES

3-1. Airdrop systems have a mix of delivery capabilities to support operations ranging from conventional parachutes to platforms that can be dropped at low altitude, to high altitude precision systems with substantial stand-off capabilities. Weather conditions, mission requirements, threat environment, and equipment to be delivered determine the equipment and type of aircraft used for the delivery. Airdrop operations are normally joint operations between the USAF and the Army.

AIRDROP PLANNING

3-2. At echelons above brigade, the assistant chief of staff G-4 has overall responsibility for logistics planning and the G-3 sets priorities. Within the respective support command, the SPO officer determines if airdrop is the most suitable mode of shipment. If the decision is made to utilize airdrop, the SPO officer and his aerial delivery officer initiate coordination. This coordination includes ground transportation to move supplies to the rigging site, the actual rigging of supplies, movement of supplies to the departure airfield and the request for USAF airlift support. The SPO officer will also be involved in the general area selected as the drop zone (DZ) and will forward the exact location of the DZ from the requesting unit to the joint movement center and, ultimately, to the joint air operations center and identified air crews.

3-3. The senior enlisted parachute rigger serves as the subject matter expert at the battalion and brigade level. The senior enlisted parachute rigger works directly with the SPO officer and aerial delivery officer to advise the command on what they can airdrop and how the equipment should be airdropped. The senior enlisted parachute rigger advises the command on how to set up and support an aerial delivery mission.

3-4. The airdrop systems technician, at the company and shop level, supervises parachute pack, parachute maintenance, and aerial delivery rigging to support unit aerial delivery. The airdrop systems technician works closely with the senior enlisted parachute rigger and the aerial delivery officer to ensure all requirements are met for unit airdrop. The rigger facility is where all inspections of airdrop items will take place. It is important that the lines of communication are opened and well received between the shop or company level and the brigade or battalion level in order to ensure equipment is rigged on time to support ground units. Senior enlisted parachute rigger duties are performed at the TSC or ESC level. The senior enlisted parachute rigger serves as the enlisted advisor to the command on aerial delivery, and works closely with the senior airdrop system technician to plan and coordinate aerial delivery in support of airdrop re-supply. The senior enlisted parachute rigger serves as the link to the airdrop rigger shed to ensure the required enlisted personnel are available.

PRE-RIGGED LOADS

3-5. When airdrop support units are limited in personnel and unable to meet airdrop resupply needs, the staff planner should develop alternatives. These alternatives will serve to minimize the impact on combat operations. The primary alternative to offset a shortage of airdrop resupply units is the pre-rigging of critical supplies and equipment. Such supplies and equipment can be set up as an operational project to support a particular unit or contingency. When establishing pre-rigged projects, the planner should consider the following questions:

- Which supplies (and what quantities) are to be pre-rigged for airdrop? This is critical since the operational project will by necessity be of limited size. Planners may wish to check existing pre-rigged projects to get an idea as to what other planners have developed.
- What air delivery equipment is needed to rig the supplies? Airdrop rigging manuals (TM 4-48 series manuals) provide various rigging procedures. Each manual also contains a list of the airdrop items needed to rig a specific load. The airdrop items will normally be listed in the operational project.
- Where will the pre-rigged supplies be stored? Normally, a storage area close to an airfield will be selected. Rigged loads should be stored in an area that is dry, secure, and protected from direct sunlight. Temperature- and humidity-controlled areas are preferred, but not required. A supply manager will be responsible for maintaining the storage area and pre-rigged supplies. Each load should be given a unique number.
- How will the supplies and equipment be tested and rotated? Supply managers monitor the pre-rigged loads for items with a prescribed life span. A system should be set up to test petroleum products with minimum disruptions to the rigging. If water is a part of the pre-rigged project, a system should be set up to fill containers with fresh water at the last moment. Good planning ensures that the supplies and equipment in the pre-rigged projects will be delivered to the combat unit in a usable condition.
- How will the supplies and equipment be called for when needed? The logistics planner communicates the amount and type of supplies available in a pre-rigged state to the combat leader.
- Will procedures be set up for reconstitution of the pre-rigged loads once they have been airdropped? Reconstitution of pre-rigged loads will be difficult unless airdrop units are in place. If logistics planners are not able to reconstitute the pre-rigged loads quickly, the combat leaders should be aware of this information.
- Another planning alternative is to arrange issue of airdrop equipment operational projects for selected high-risk theaters. With this, the combat commander will need only a minimum airdrop force structure in theater. Early deploying aerial delivery units can then use the pre-positioned airdrop equipment. This makes the unit lighter and more deployable. It also reduces the early transportation requirement for airdrop equipment.
- Coordinate use of CONUS based parachute riggers to build pre-rigged loads.

AIR ASSET REQUEST CATEGORIES

3-6. Airdrop operations most commonly are a joint operation involving the USAF and the Army. The Army provides the supplies, rigs them for airdrop, and delivers them to the departure airfield. USAF personnel load the supplies onto the aircraft (usually with Army assistance) and fly the mission. Prior to takeoff, an Army and USAF team will conduct a joint inspection of the load to ensure it is approved for airlift.

Preplanned

3-7. This is a programmed event. Aircraft are allocated or projected in advance within the operational lead-time established by the USAF component commander. This lead-time varies depending on the scale of the request, available forces, and the theater air planning process. The per-unit allocation will normally be expressed in terms of sorties per day per unit, and will be determined based on priorities set by the G-3, projected unit requirements, and available aircraft. All of this information can be found in the applicable operations plan or operations order.

3-8. Army responsibilities include moving the supplies and equipment from the storage site to the rigging site. After the supplies and equipment are rigged, they are moved to the supporting airfield. The rigged load should then be loaded aboard the delivery aircraft. If not loaded immediately, the rigged loads are temporarily stored in a location chosen by the supporting aerial port personnel. Loading of the rigged load onto USAF aircraft is a USAF responsibility, although Army personnel may help. A joint airdrop inspection is required and conducted by representatives of each of the Services participating in the airdrop mission. Requirements for the joint airdrop inspection are found in AR 59-4. *Joint Airdrop Inspection*

Records, Malfunction/Incident Investigations, and Activity Reporting. The senior Army validating authority submits an airlift request to the joint forces commander's designated agent.

3-9. The joint forces commander's agent validates the request, assigns a priority, and then sends it to the USAF airlift control center for execution. The USAF airlift control center directs the USAF actions.

Immediate and Emergency

3-10. Immediate airdrop requests stem from unanticipated, urgent, or priority requirements. These requirements are critical for a unit to survive or complete its tactical mission. Requests for immediate airdrop are passed through Army operational channels (S-3 or G-3) and at the same time through USAF channels. This allows a faster reaction.

3-11. When a unit requests an immediate airdrop a support request is transmitted directly to the air mobility liaison officer. This allows the joint air operations center time to make preparations for the required mission while the actual request is staffed expeditiously through logistics channels. Because the theater airlift force is normally fully employed, the joint movement center may fill immediate requests by redirecting sorties supporting planned requests based on priorities established within G-3 channels. Emergency requests are processed in the same way as immediate requests, but everything is accomplished by voice and followed up with the routine documentation.

AIRDROP RESPONSIBILITIES

3-12. The availability of airdrop equipment is limited. The TM 4-48 series manuals and applicable operation plans and orders can be used to determine the amount and types of equipment required.

Requesting Unit

3-13. Airborne brigade combat teams coordinate airdrop operations through their battalion S-4. Non-airborne brigade combat teams coordinate airdrop operations through a TSC or ESC, or more often through a sustainment brigade that is task organized to provide theater distribution. The battalion SPO officer will request and coordinate airdrop operations through the SPO officer in the sustainment brigade, TSC or ESC. The TSC, ESC or sustainment brigade SPO officer will send the information to the senior parachute rigger. The senior parachute rigger will submit the request to the assigned rigger detachment in the sustainment brigade or in the case of a TSC or ESC to a subordinate sustainment brigade.

Supported Unit

3-14. In most cases, the Army will control the DZ. The joint force commander, coordinating with the USAF component commander, determines the general location of the DZ. Factors that influence the decision include: physical characteristics, threat assessment, the aerial delivery method, the number of airdrop loads, and the length of the desirable dispersion pattern.

- Designated DZs should have no trees, power lines, fences, buildings, and so forth. The terrain should not be prohibitively hard-surfaced (rocky) or deviate more than 300 feet in elevation. DZs should be near the existing road network to assist in the clearing and removal of supplies.
- The DZ should not be close to enemy locations, especially enemy anti-aircraft positions.
- A high-velocity airdrop method allows the cargo aircraft to release the load at a higher altitude that remains accurate enough to use a standard DZ because its drift is less affected by the wind.
- An extensive DZ is required when there are large numbers of loads to be dropped that result in a long and wide dispersion pattern. For example, a small DZ crisscrossed with power lines, under high wind conditions and a significant air defense threat is not an ideal DZ since delivery of the loads requires multiple passes using low-velocity airdrop procedures.

3-15. The receiving unit selects the center of mass eight-digit grid coordinates of the desired DZ. They also mark and secure the DZ, prepare the DZ, remove supplies from the DZ, and retrograde airdrop equipment. Units must have trained personnel who can execute DZ duties. If the unit lacks trained personnel they can request support through G-3 and J-3 channels. Requirements and responsibilities for DZ personnel are

found in FM 3-21.220, *Static Line Parachuting Techniques and Training*. The unit requests the necessary pathfinder assets through the J-3 and G-3.

AIRDROP AIRCRAFT CONSIDERATIONS

3-16. Airdrops can be conducted by fixed and rotary-wing aircraft. As with airland, most airdrop missions are completed by fixed wing aircraft due to their longer ranges, larger cargo capacity, greater speed and ability to fly at higher altitudes. Planners need to consider numerous aircraft factors that may impact the planned mission. These aircraft factors include the size of the cargo compartment, size of ramp or door and presence of rails, locks and rollers on the cargo floor, maximum cargo weight capability, operational range at various cargo weights, and refueling requirements.

TYPES AND METHODS OF AIRDROP

3-17. There are three standard types and methods of airdrop. The types are freedrop, high-velocity and low-velocity. Airdrop types are categorized based on the load's rate of descent. The methods of airdrop are door-load, extraction and gravity. Airdrop methods pertain to how loads exit the aircraft. These types and methods often utilize common components and systems.

TYPES OF AIRDROP

3-18. Freedrop is the delivery of certain non-fragile items of equipment or supply from a slow-flying aircraft at low altitude without the use of parachutes or other decelerators. The load descends at a rate of 130 to 150 feet per second. Energy-dissipating material (such as honeycomb) may be placed around the supplies to lessen the shock when the load impacts with the ground. Humanitarian daily rations, baled clothing, fortification, and barrier materials are other examples of non-fragile freedrop items. See figure 3-1.

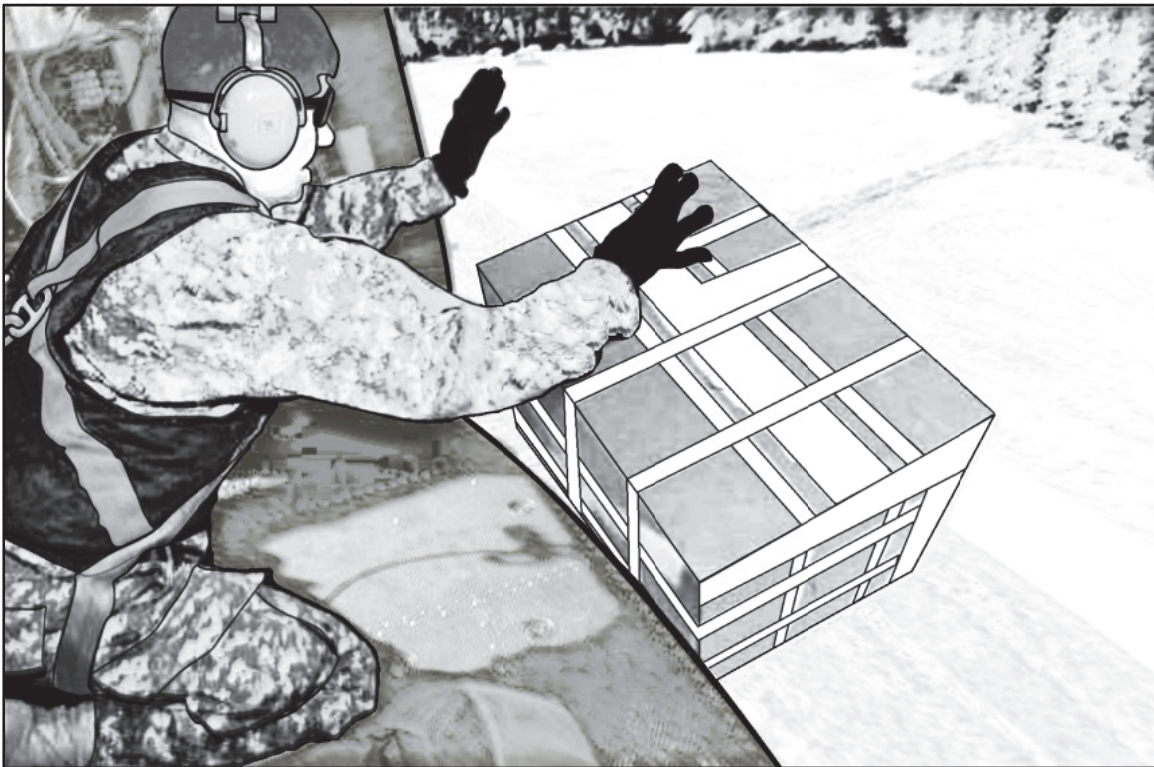


Figure 3-1. Free drop from a rotary-wing aircraft

3-19. High-velocity airdrop is used when threat conditions dictate that the aircraft remain at high altitudes to avoid hostile air defenses but, for accuracy, drift must be minimized. The load descends at a rate of 70 to 90 feet per second. The rapid rate of descent mitigates drift. A small parachute provides enough drag to hold the load in an upright position. Energy absorbing material is used to reduce the effect of the ground impact. Subsistence items, packaged petroleum products and ammunition are the most probable candidates for this type of delivery.

3-20. Low-velocity drop is a procedure in which the drop velocity is less than 28 feet per second. Low-velocity is the preferred method to drop all supplies and equipment certified for airdrop. Loads are specially prepared for airdrop either by packing the items in air-drop containers or by lashing them to airdrop platforms. Multiple parachutes can be used to achieve the desired rate of descent. Many of the Army's light and medium tactical wheeled vehicle fleet along with repair parts and major assemblies can be delivered using this method.

METHODS OF AIRDROP

3-21. Door-load method (figure 3-2) entails personnel sliding or pushing bundles out the aircraft side doors or rear ramp. This method is suitable for freedrop, low-velocity or high-velocity drops. The size of the opening in the aircraft and the capability of personnel to eject the bundle limit the load in size and weight. It can be used to drop supplies with a parachute assault force or to deliver smaller loads or bundles over limited or constricted DZs to conventional forces, special operations forces, indigenous allied forces, and refugees. Door bundles do not exceed 500 pounds total rigged weight and current Army jumpmasters are authorized to rig the loads.

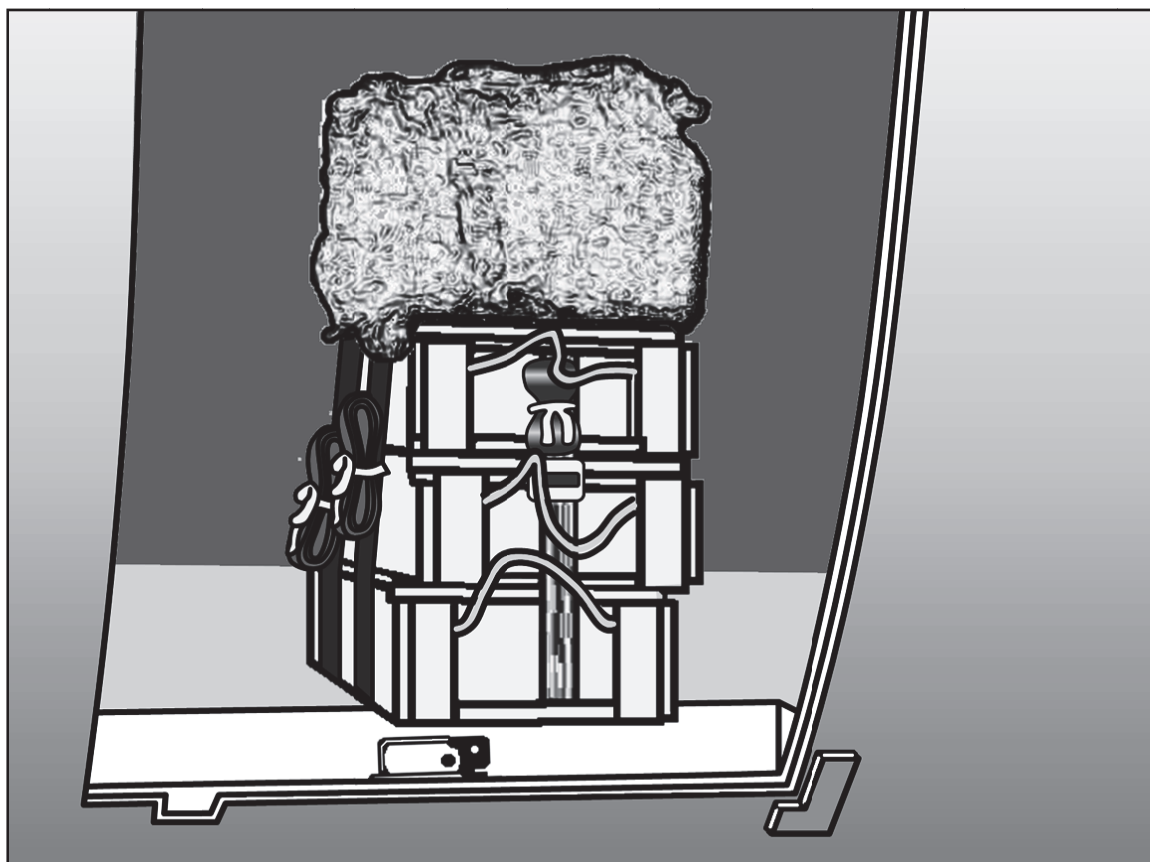


Figure 3-2. Bundle at the door of aircraft.

3-22. Extraction method (figure 3-3 on page 3-6) involves the use of an extraction parachute to pull the load out the rear ramp of the aircraft cargo compartment. It is used for large low-velocity loads, such as vehicles and pallets.

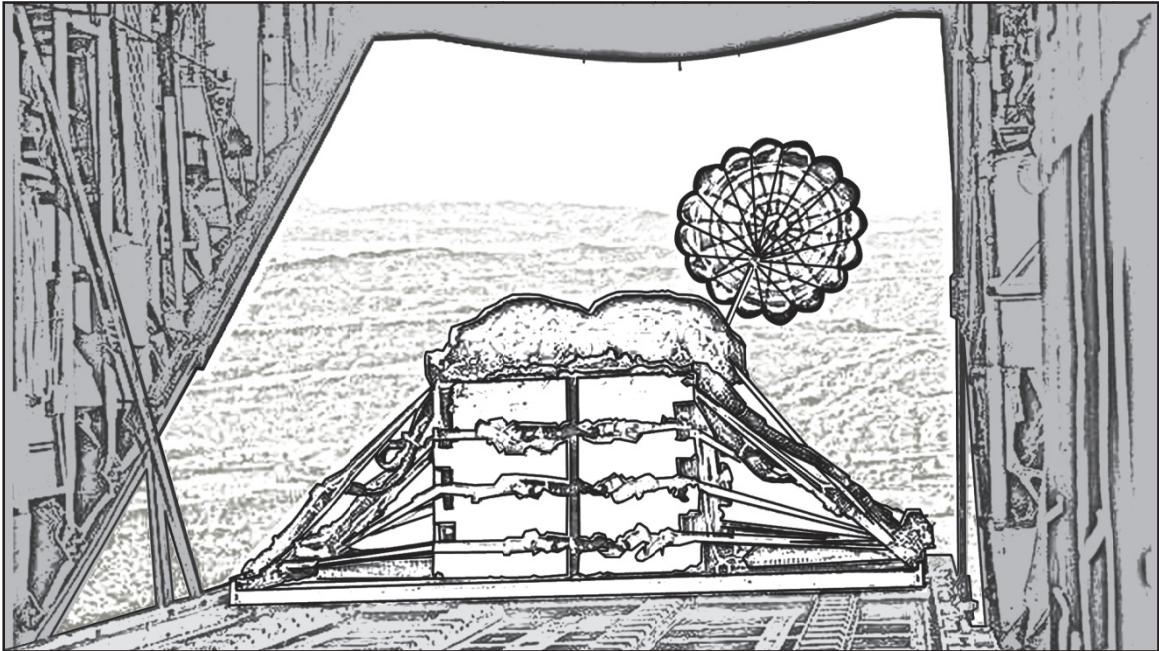


Figure 3-3. Parachute extraction

3-23. Gravity method (figure 3-4) requires the aircraft to fly in a “nose-up” attitude. Prior to release, the load is restrained by nylon webbing and logistics rail locks. At the desired release point, the webbing is cut and the locks are released, allowing the containers or platforms to roll or slide out the rear of the aircraft. This method can be used for either low-velocity or high-velocity type loads.

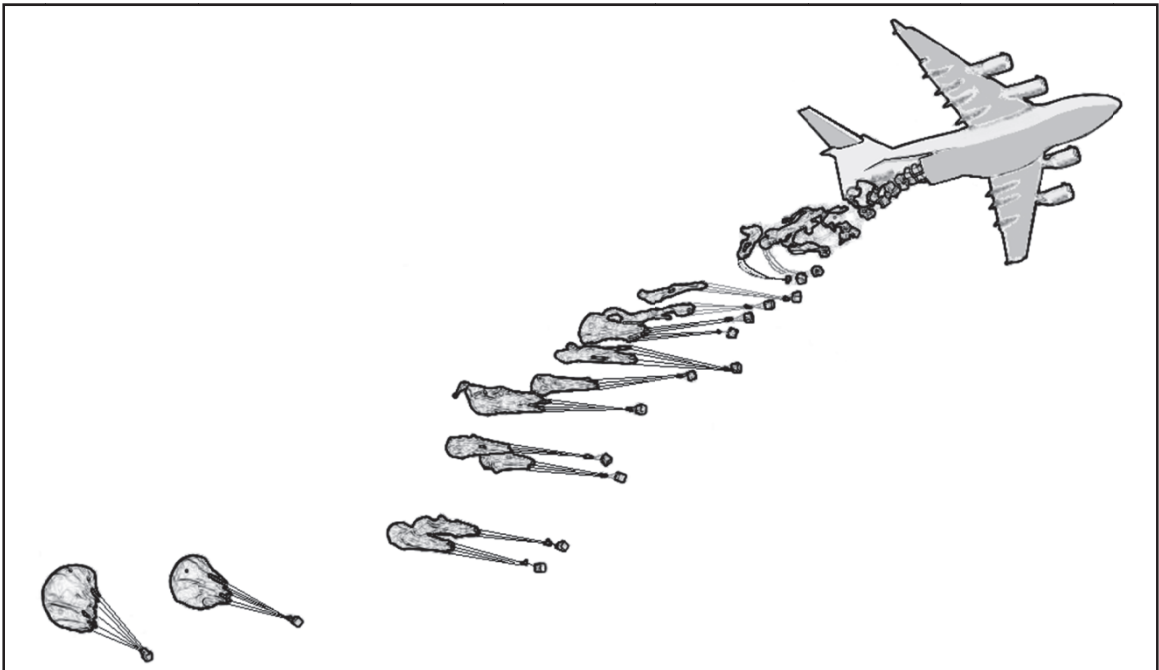


Figure 3-4. C-17 airdrop using the gravity airdrop method

AIRDROP COMPONENTS AND SYSTEMS

3-24. The Type V airdrop platform is a modular component assembly constructed of aluminum extrusions and is used for airdropping loads ranging from 2,500 pounds to 42,000 pounds. The Type V is primarily used in cargo and vehicle low velocity airdrops. Type V platforms range in size from 8 ft. to 32 ft. in length. Platforms are normally airdropped by parachute extraction. The Type V platform drop altitude ranges from 750 to 1,300 feet above ground level depending on the load weight and the number of parachutes required. Type V platforms are also used in the dual row airdrop system. Examples of the rigging of Type V airdrop platform are found in FM 4-20.108, *Airdrop of Supplies and Equipment: Rigging Military Utility Vehicles*, and TM 4-48.12, *Airdrop of Supplies and Equipment: Rigging Typical Supply Loads*.

3-25. The special operations combat expendable platform is a one-time use expendable platform built by the user. The combat expendable platform is normally used to airdrop items like combat rubber raiding craft, motorcycles, and four wheeled quad runners. Information regarding rigging the special operations combat expendable platform is found in TM 4-48.04, *Airdrop of Supplies and Equipment: Rigging Loads for Special Operations*.

3-26. Container loads are loads that are rigged for airdrop in airdrop cargo bags or slings. These containers are packed with supplies, disassembled equipment, or small items of ready-to use equipment. Loads may be required to be cushioned with energy dissipating material (honeycomb), felt, or cellulose wadding depending on the load requirements. The number and types of parachutes required to stabilize the load and slow its descent depend on the type of container used, the weight of the load, and the type of airdrop. Weight range on the cargo delivery system is 501 pounds to 2,200 pounds. Container delivery system loads are employed in both low and high velocity type drops utilizing the gravity method.

3-27. The dual row airdrop system maximizes the cargo space of the C-17 for airdrop by permitting the use of the aircraft's dual logistics rail system (side-by-side). The dual row airdrop system is composed of common rigging items including a modified Type V airdrop platform, named a dual row airdrop platform, and a specialized outrigger assembly to prevent load rollover. The dual row airdrop system is compatible only to the C-17 cargo aircraft and capable weight range is from of 7,500 to 14,500 pounds. The standard drop altitude is 1,200 feet above ground level based on the fact that dual row airdrop system is a gravity extracted system. Information regarding rigging the dual row airdrop system is found in TM 4-48.05, *Airdrop of Supplies and Equipment: Dual Row Airdrop Systems*.

3-28. The joint precision airdrop system (JPADS) is a high altitude, precision guided airdrop system that provides increased control release from the aircraft, and reduces on ground load dispersion through increased accuracy. JPADS provides additional protection for the aircraft by increasing the stand-off and altitude distance from potential enemy anti-aircraft weapons systems. JPADS can be dropped from a maximum altitude of 24,500 feet mean sea level. Loads can be dropped from a single aerial release point and deliver to multiple or single DZs. JPADS is controlled by the assistance of an airborne guidance unit and uses military global positioning satellite data.

3-29. The USAF cargo aircraft mission planner software enables aircrews to plan and initiate load release at a precise computed air release point or within a launch acceptance region through application of accurate JPADS component modeling. The mission planner provides the capability to model parameters of aircraft position, altitude, airspeed, heading, ground speed, course, onboard load position (station), roll-out and exit time, decelerator opening time, and trajectory to stabilization and descent rate.

3-30. The JPADS increases the accuracy of aerial delivery operations, employs the use of smaller (therefore, more) DZs, enhances aircraft survivability, provides delivery to multiple objectives and DZs from one release point, delivers supplies and equipment in unit sets, and compensates for aircraft release point errors. Figure 3-5 on page 3-8 shows how JPADS enables a single aircraft to deliver bundles to multiple DZs utilizing steerable RAM parachutes and global positioning system technology.

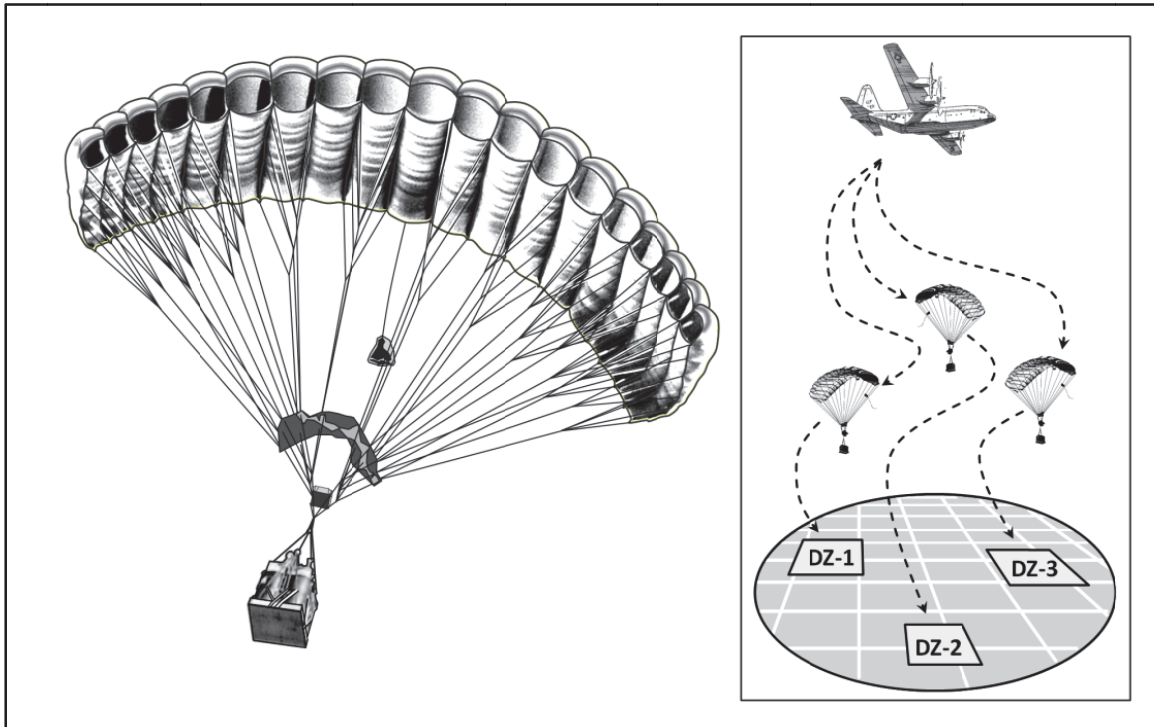


Figure 3-5. Joint precision airdrop system (JPADS)

3-31. The low cost aerial delivery system is a one-time use, stand-alone airdrop system consisting of a modular suite of low cost airdrop items, comprised of parachutes, containers, skid boards, and other air items configured for high-velocity and low-velocity drops. All components are simple in design and operation, require no maintenance, and have low production and lifecycle costs. The low cost aerial delivery system is comparable to the current container delivery system performance and cargo delivery capability of 2,200 pounds. This system was designed to address the persistent lack of retrograde of aerial delivery hardware.

3-32. Low cost low altitude parachutes are a subset of the low cost aerial delivery system. The low cost low altitude parachute is a simplified, low cost, alternative, which is used for high volume delivery of supply items when recovery of airdrop equipment is impractical or disruptive to retrograde operations. It is designed as a one-time use expendable item, low cost low altitude parachutes substantially enhance operational response, improve load survivability, reduce the logistics footprint, hastens DZ recovery operations, and, of critical significance, improves safety and force protection. They are uniquely suited to support Soldiers operating in harsh, austere locations and capable of delivering 500 to 1,000 pound loads depending on the number of low cost low altitude canopies used per load. In addition to increased accuracy, low cost low altitude parachutes require no specialized training for parachute riggers and can be dropped from a variety of aircraft. See figure 3-6.

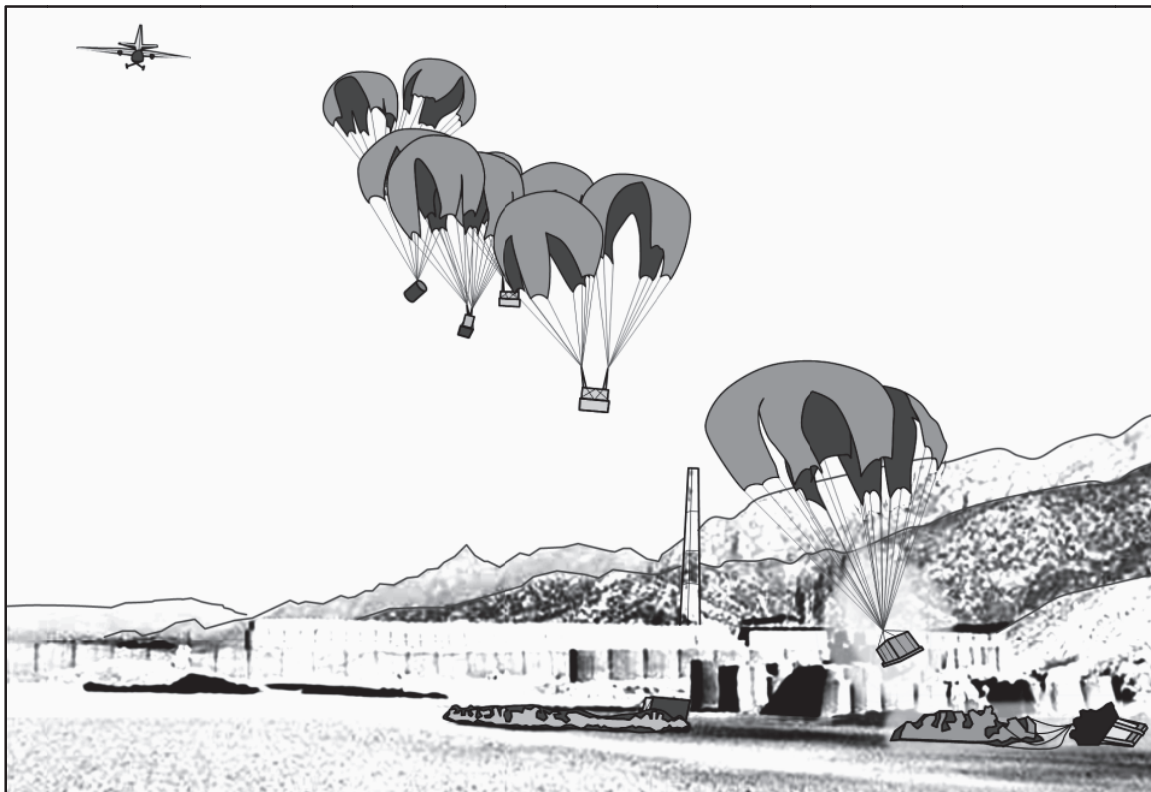


Figure 3-6. Low cost low altitude airdrop

ADVANTAGES AND DISADVANTAGES OF AIRDROP

3-33. Advantages of airdrop include:

- Can be used when no other means for transporting supplies or equipment is available.
- Permits throughput of supplies from the corps and theater areas, and from the national level directly to the using unit, whether or not the unit is located in an isolated area.
- Reduces the need for forward airfields, LZs, and MHE, reducing the battlefield footprint.
- Permits greater dispersion of ground tactical forces.
- Reduces in-transit time and handling requirements from the source of supply to the ultimate user.
- Airdrop, as opposed to airlift, enables a shorter turnaround time for non-landing aircraft, and reduces risks to the aircraft, increasing aircraft availability and survivability.

3-34. Disadvantages of airdrop include:

- Aircraft remains vulnerable to enemy air defense systems based on drop level.
- Allows no backhaul capability.
- Creates a need to recover and retrograde airdrop equipment unless low cost expendable equipment is utilized.
- The net payload is reduced because of the relatively heavy weight of the airdrop rigging equipment.
- Requires specially trained Army rigging personnel and USAF flight crews.
- Airdrop DZs must be secured to prevent supplies from falling into enemy hands.
- Remains dependent on favorable wind conditions.
- Airdrop operations require an extensive planning effort and much longer cycle times.

AIRDROP SAFETY

3-35. Airdrop safety factors are nearly the same as those for airland. As in airland, loads should be rigged and inspected in accordance with the relevant FM or TM. Airdrop carries the additional caution that all personnel must continuously be aware of the dangers encountered as loads exit the aircraft. Aircrew should ensure that they are out of the path of the load when it is deployed. Pilots of both fixed and rotary wing aircraft should ensure that their aircraft are correctly aligned to avoid loads dropped from leading aircraft.

AIRDROP EQUIPMENT RECOVERY AND RETROGRADE

3-36. Much of the damage to airdrop equipment and supplies occurs during derigging and recovery. Airdrop equipment must be de-rigged and recovered correctly to prevent damage to the fragile nylon airdrop items from cuts, water, mildew, petroleum product contamination and excessive exposure to sunlight.

3-37. Recovery team personnel will be trained by parachute riggers, military occupational specialty 92R, prior to any airdrop and JPADS operation. Riggers may be requested to assist the recovery officer in charge or non-commissioned officer in charge and to provide technical assistance. Riggers are not responsible for the recovery of airdrop and JPADS equipment and supplies.

3-38. The return of non-expendable aerial delivery equipment is critical because it is expensive and in short supply. During past aerial sustainment operations, this type of equipment was nearly exhausted because return procedures were lacking or not enforced. Basic salvage collection and classification procedures are the backbone of the retrograde operation. The goal is to return the equipment to an aerial delivery unit, where it will be classified as serviceable, repairable or unserviceable. The equipment classified as non-economically repairable is sent to Defense Logistics Agency disposition services channels for proper disposal. Evacuation of equipment may be by land, rail, water, or air. Innovative retrograde management is the key. For additional information see FM 4-20.107, *Airdrop Derigging and Recovery Procedures*.

Chapter 4

Sling-load

This chapter discusses sling-load operations. The rotary-wing aircraft sling-load method of carrying cargo and equipment overcomes many of the obstacles that hinder other modes of movement. Sling-load operations are used extensively in the ship-to-shore movement of cargo and equipment during amphibious operations, movement of supplies and equipment over operational environment, vertical replenishment of forward units, and firepower emplacement.

SLING-LOAD TECHNIQUES

4-1. Air assault and Army air movement operations are two distinct missions that utilize sling load techniques. Air assault is an operation in which combat units, using the mobility of rotary-wing assets maneuver forces to engage the enemy or to seize and hold key terrain. Army air movements are operations involving the use of utility and cargo rotary-wing aircraft for other than air assaults. They are conducted to move Soldiers and equipment; and transport ammunition, fuel, and other high-value supplies. The same general considerations that apply to air assaults also apply to air movement.

4-2. A sling load is an external load carried beneath a utility or cargo rotary-wing aircraft held in place by a sling, bag, or net. As in airdrop, weather conditions, mission requirements, threat environment, and equipment to be delivered determine the equipment and type of aircraft used for the delivery. Most sling-load operations are conducted by Army aviation in support of Army units.

SLING-LOAD PLANNING

4-3. Sling-load operations, as opposed to airdrop operations, are usually service-specific rather than a joint function. Because sling-load is service specific, it is easier to plan and coordinate and requires less lead-time and, therefore, it is more responsive to the needs of the commander. However, it can be limited by factors such as rotary-wing aircraft range, weather, and load weight. From an operational viewpoint, sling-load planning procedures and assets required are similar to those of airdrop and airland operations. Differences include:

- Type of aircraft and equipment.
- Supported unit, usually the supply support activity, from which the supplies are drawn.
- Designation of a pick-up zone from which the load will be slung to the rotary-wing aircraft and delivered to the receiving unit at the LZ, rather than a DZ.

SLING-LOAD ROTARY-WING AIRCRAFT CONSIDERATIONS

4-4. The flexibility of rotary-wing aircraft allows them to conduct all three methods of aerial delivery: airland, airdrop and sling-load. Rotary-wing aircraft are most commonly utilized for sling-load missions. Several factors affect how much weight a rotary-wing aircraft can carry.

- Altitude. The rotary-wing aircraft rotor efficiency decreases at higher altitudes and requires more power to hover than at lower altitudes. This means less capability to lift cargo.
- Temperature. High air temperature has an adverse effect on the power output of rotary-wing aircraft engines. An increase in temperature decreases engine performance. This means decreased lift capability.
- Humidity. As the relative humidity increases, the rotary-wing aircraft's lift performance decreases.

- Wind. Wind affects rotary-wing aircraft performance by increasing rotor lift without an increase in engine power. Therefore, less power is required to hover into the wind than when no wind conditions exist; also, with constant power, the rotary-wing aircraft can hover into the wind with higher payloads. This is why wind conditions and direction are important to the performance of the rotary-wing aircraft.
- Fuel. Fuel weighs approximately 7 pounds per gallon. The weight of the fuel required to fly the mission and the distance the load must be flown may reduce the lift capability of the aircraft. Compared with fixed-wing aircraft, rotary-wing aircraft are usually slower, have less range, have less cargo capacity, and are more vulnerable to anti-air defenses.

4-5. For additional information on specific rotary-wing aircraft characteristics and planning considerations see ATTP 3-18.12, *Air Assault Operations*.

SLING-LOAD RESPONSIBILITIES

4-6. There are normally three elements involved in sling-load operations: the supporting unit that is providing the supplies requested for the mission, the aviation unit that provides the aircraft, and the unit that receives the cargo. Sometimes, as during unit relocation and air assaults, the supporting is also the receiving unit. Request procedures are the same as those used for airdrop (as discussed in chapter 3). The receiving unit requests supplies from the supporting unit and the appropriate SPO officer determines the mode of delivery. When there is an urgent request, the G-3 sets or adjusts priorities and ensures the requests for rotary-wing assets are forwarded simultaneously as the SPO officer forwards the request through logistics channels. Because sling-load aerial delivery operations are service-specific, neither the air mobility liaison officer nor joint air operations center normally get involved. The responsibilities and functions of each element are discussed below.

4-7. The supporting unit needs to have adequate sling-load-trained and inspector-certified personnel and sling-load equipment on-hand. Personnel are certified after graduating from the sling-load inspector certification course. Sling-load equipment is authorized by the common table of allowances and can be ordered as necessary to support the anticipated frequency of sling-load missions, the characteristics of the possible loads, and the expected recovery rate of the actual rigging equipment. Unit personnel will rig and inspect loads and provide a hook-up team. The hook-up team is composed of a signalman, static-wand person, and the hook-up person. The supporting unit certifies loads to be sling-loaded by completing a DA Form 7382 (Sling Load Inspection Record) according to TM 4-48.09, *Multiservice Helicopter Sling Load: Basic Operations and Equipment*, prior to the arrival of supporting rotary-wing aircraft.

4-8. The supporting unit also designates an adequate pickup zone (PZ). Keep in mind the following criteria when selecting PZs:

- PZs should be shielded from enemy observation by wooded areas or by masking the terrain. Approach and exit routes should be selected based on the availability of good masking features.
- Logistics-oriented PZs should be located near storage or supply points and a good road network.
- The size of PZs will depend on the number of landing sites needed, the type of rotary-wing aircraft expected, and the required tactical dispersion based on the threat.
- When looking for obstacles, obvious factors to avoid include trees, power lines, and fences. Other factors that should be avoided are not so apparent—loose debris could become projectiles when blown by the rotor wash and soft ground might not support the weight of various types of rotary-wing aircraft.
- PZs should be as level as possible and, when slope is unavoidable, it should be uniform. Further, if slope is present, the approaches to the PZs should allow the rotary-wing aircraft to land perpendicular to the slope rather than upslope or down slope.
- Flight paths into and exiting from, a PZ should be clear of obstacles and allow the aircraft to fly into the wind for both takeoffs and landings.

4-9. The supporting unit is also responsible for:

- Controlling the PZ.
- Providing load dispositions and instructions to the aviation unit for the sling-load equipment.

- Verifying the load weight (to include rigging equipment).

4-10. In summary, a good PZ is shielded from direct enemy observation by obstacles such as shrubbery, buildings, or hills; located close to main supply routes; and large enough to host the numbers and types of expected rotary-wing aircraft. The PZ should be clear of trees and high-tension wires have a surface that can support the weight of the type of rotary-wing aircraft expected, be as level as possible, and have clear approach and exit routes. When possible, approach and exit routes should be into the wind. For additional information on choosing LZ and PZ for Sling load operations see ATTP 3-18.12, *Air Assault Operations*.

Aviation Unit

4-11. The aviation unit provides the aircraft and a trained crew at the proper time and place, and delivers the load to the receiving unit. The aviation unit is responsible for:

- Coordinating with the supported and receiving units and, when required, appointing a liaison officer who is familiar with sling-load operations.
- Advising the supported unit on the rotary-wing aircraft capabilities and limitations.
- Advising the supported and receiving units on the suitability of the selected PZ and LZ.
- Providing comments or recommendations on overall operations relative to safety.
- Providing assistance, if possible, for recovery and return of the rigging equipment as required by the supported unit.
- Establish safety procedures and understanding of duties and responsibility between the flight crew and ground crew.
- Arranging for the aircraft to be at the landing site on schedule.

4-12. The liaison officers from the supported, aviation, and receiving units must agree that the mission is supportable prior to execution. The pilots make the final decision on whether the cargo will be moved.

Receiving Unit

4-13. The receiving unit, in coordination with the tasked aviation unit, designates an LZ. The preferred characteristics of an LZ are identical to that of the PZ. The receiving unit needs to have teams trained to de-sling, de-rig, remove the load from the LZ, and certify any back-hauls. The core of these teams must have been trained in accordance with the requirements in TM 4-48.09, *Multiservice Helicopter Sling Load: Basic Operations and Equipment*. The receiving unit is responsible for:

- Selecting, preparing, and controlling the landing site (to include communications).
- Receiving and derigging the load.
- Ensuring proper supervision of the derigging operation.
- Coordinating the return of lifting equipment and support personnel to the supported unit, if required.
- Preparing, coordinating, and inspecting backloads, such as slings, cargo nets, and cargo bags, and preparing them for hookup or loading.

4-14. If supplies are not delivered directly to the end user (usually a maneuver battalion or company), the receiving unit, once in possession of the requested supplies, is responsible for standard issue, handling, storage, and safeguarding practices.

CLASSIFICATIONS OF LOADS AND METHODS OF SLING-LOADING

4-15. The objective of rotary-wing aircraft sling-load certification is to assure the user that the equipment being transported can withstand the stresses of a sling-load flight environment. Certification for sling-load assures the user that the item has met minimum standards for structural integrity and that the associated rigging procedures have been developed specifically for that item.

CLASSIFICATION OF LOADS

4-16. Certified loads are those items of equipment which have completed the evaluation and testing required by the U.S. Army Natick Soldier Center for sling-load certification. Only certified sling-loads are authorized for the Marine Corps. The following restrictions apply for sling-load certification to remain in effect:

- The load must be within the lifting capability of the desired rotary-wing aircraft model and not exceed the rated capacity of the sling set being used.
- The load shall be rigged in accordance with the certified rigging procedure. Failure to rig the load exactly as directed by the certified rigging procedure creates a unique load.
- The maximum tested stable airspeed (straight and level flight determined during one flight test) specified for the load in the applicability section of the rigging procedure or in the appendix of the appropriate sling-load field manual is a recommendation and not a restriction, unless so stated.
- Changes or modifications to load characteristics (weight, model, national stock number, accompanying load, structure of items, etc.) creates a unique load.

4-17. Suitable loads are those items of equipment and their associated rigging procedures that have not been certified but have demonstrated acceptable static lift and flight characteristics during a flight test. In most cases these loads were not formally pull tested, but are known loads which have been flown without incident for years and which U.S. Army's Natick Soldier Center considers to be proven safe.

4-18. Unique loads are equipment carried on a one-time or low-frequency basis, such as telephone poles, artillery targets, or barrier material. The lack of sling-load certification in itself does not preclude a commander from carrying a unique load. Due to the lack of rigging procedures, unique loads should be considered high risk loads. The movement of unique loads should be approved by the high-risk approving authority. Only the most experienced personnel should attempt to rig and inspect a unique load.

METHODS OF SLING-LOADING

4-19. All sling-loads are configured under one of the following definitions:

- Single-point loads utilize one aircraft cargo hook on one rigged load during flight.
- Dual-point loads utilize two aircraft cargo hooks on one rigged load during flight. (See figure 4-1) on page 4-5.
- Tandem loads utilize two aircraft cargo hooks on two rigged loads, one in front of the other, during flight.
- Side-by-side (often referred to as shotgun) loads. Utilize one or two aircraft cargo hooks on two rigged loads, one beside the other during flight.



Figure 4-1. A CH-47 prepares to lift a dual point load

ADVANTAGES AND DISADVANTAGES OF SLING-LOAD

4-20. Advantages of sling-load include:

- Provides for rapid movement of heavy, outsized cargo directly to the user, bypassing surface obstacles.
- Allows the use of multiple flight routes and landing sites, enhancing survivability of the aircraft and the flexibility afforded to the ground commander.
- Planning cycle time is reduced, thus providing a far more flexible and responsive asset.
- Can position combat and support assets without MHE or the need for onward movement.

4-21. Disadvantages of sling-load:

- Rotary-wing aircraft weight capacities are generally less than that of fixed-wing aircraft.
- Can cause the rotary-wing aircraft to be unstable during flight, which may restrict airspeed or maneuvering capabilities.
- Sling-load is more likely to be affected by adverse weather conditions. For example, rotary-wing aircraft lift capacity is affected by atmospheric pressure, altitude, temperature, humidity, and winds.
- Limited number of rotary-wing aircraft currently available in the force may limit sling-load operations.
- LZ surface conditions (debris, dust, and snow) and the size of the LZ will impact the ability to conduct successful operations.
- Sling-load requires specialized training.
- Sling-load increases aircraft detection because the aircraft has to fly above “nap of the earth”.

SLING-LOAD SAFETY

4-22. Safe sling-load operations require that personnel adhere to strict safety protocol. As in airdrop operations, improper use of MHE is a concern in sling-load procedures. Rotary-wing aircraft generate and store static electricity during flight. When the rotary-wing aircraft lands, this charge passes to the ground through the grounding system. However, in flight, this charge remains stored in the aircraft until a path is provided. Ground personnel must apply a grounded, static discharge wand connected to the cargo hook in order to discharge static electricity. The connection must remain in place until the hookup is completed. If contact is lost, the hookup or release operations must stop until the wand to aircraft contact is re-established. A rotary-wing aircraft will generate static electricity within five seconds after grounding is disconnected. A reach pendant may be used instead of a grounded static discharge wand. This device allows the hookup personnel to safely attach the load without the use of the grounded static discharge wand.

4-23. Ground crew personnel have to be careful and alert at all times while working near operating aircraft because the hazards found in operating under a hovering rotary-wing aircraft are not always apparent. Only trained crews should be used to rig loads and hook them to the aircraft.

4-24. Rotor wash is the high-velocity air moving around a rotary-wing aircraft that makes working near aircraft difficult. Rotor wash can move unsecured material; large rotary-wing aircraft can generate rotor wash in excess of 120 knots. The danger can be so great that the hookup and release teams wear armored vests, helmets, and protective eyewear. The strongest rotor wash occurs between 20 and 60 feet outside the rotor disc. The LZ selection is also critical. Larger, dual rotor rotary-wing aircraft require bigger LZs. Multiple rotary-wing aircraft lifts and landings enlarge LZ requirements. Night operations will also expand LZ requirements. At a minimum, each LZ and PZ should have one designated emergency landing area for disabled aircraft and one rendezvous point for the hook-up and release personnel to report to in case of an emergency. Many SOPs require these personnel to report to a rendezvous point after completing every sling-load operation. Poor LZ selection and management can have catastrophic consequences for both personnel and rotary-wing aircraft. For more information on LZ and PZ organization and selection see chapter 4 in JP 3-17, *Air Mobility Operations*.

SLING-LOAD EQUIPMENT RETROGRADE

4-25. The receiving unit has the responsibility of ensuring that sling-load equipment is returned to the supply system. Sling-load equipment is returned to the supporting supply support activity rather than to an aerial delivery company. The equipment can be returned by a supporting aviation unit; by the receiving unit, using organic wheel assets; or by the salvage, collection and classification procedures used in returning airdrop equipment previously discussed.

Chapter 5

Aerial Delivery Organizations

This chapter discusses organizations within and outside of the Army that enable aerial delivery operations. To be successful, both airland and airdrop operations require extensive Army and USAF support structure working as a team with complementary skill-sets. The USAF controls aircraft loading and provides aircraft assets; the Army provides and orchestrates the preparation and rigging of Army sustainment requirements. Most of the support structure is common to both modes of aerial distribution and is generally not fixed. Rather, the support structure is comprised of provisional units organized and equipped to provide the required capabilities for the mission. The most notable exception is the Army airdrop-related units that properly rig cargo for airdrop.

ARMY SPECIFIC AERIAL DELIVERY ORGANIZATIONS

5-1. Aerial delivery support companies provide operational planning and task organization for aerial delivery operations. The unit packs and maintains the parachutes used for personnel and cargo airdrop, rigs platform loads and airdrop containers, maintains rigging equipment, and performs training and provides technical assistance to infantry brigade combat team (airborne) units. The unit is employed in the sustainment brigade area of operation. The table of organization and equipment (TOE) 10380R000 of this modular unit is made up of a company headquarters, aerial delivery office, and from two to five aerial delivery support platoons. The aerial delivery office may be organic to the company or may augment a sustainment brigade. Where platoons are co-located one aerial delivery office can provide the necessary support. When a platoon is geographically dispersed an aerial delivery office should be co-located with them. Figure 5-1 on page 5-2, depicts this formation. Each aerial delivery support platoon has the following capabilities:

- One platoon does either direct support to a BCT or area support for units operating in the division area. It cannot perform both missions concurrently.
- Limited receipt, storage and issue of airdrop items.
- Field level maintenance for organic mission-peculiar airdrop equipment.
- Inspection services and technical assistance for packing, rigging, and loading, supplies and equipment for an airdrop.
- Supervision and technical assistance in the recovery and evacuation of airdrop equipment after an airdrop.
- Inspection and packing of parachutes.
- Sustainment airdrop support to the BCT (containerized delivery system to type V heavy drop platforms).
- Sustainment support for personnel parachutes high altitude low opening (HALO), parachutes, cargo, and small extraction parachute pack.

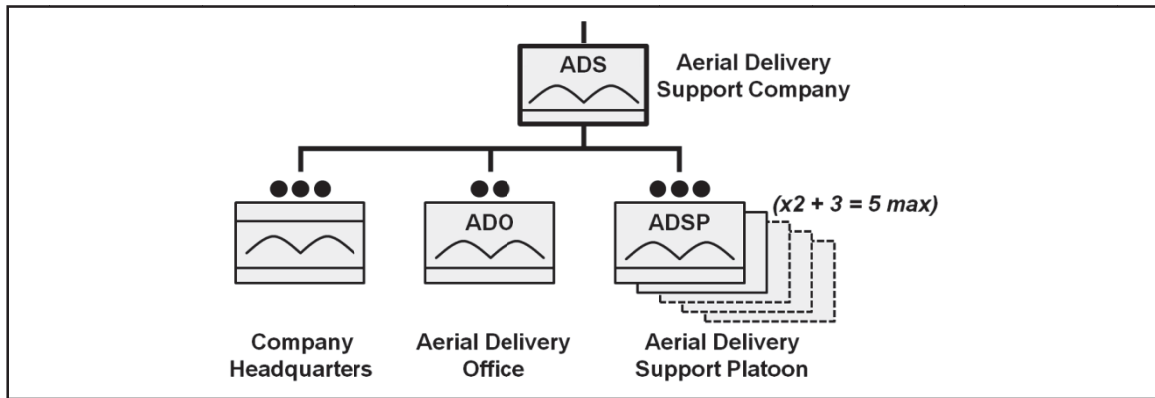


Figure 5-1. Aerial delivery support company table of organization and equipment (TOE) 10380R000

5-2. Theater aerial delivery companies (TOE 10649R000) pack parachutes and temporarily store and rig supplies and equipment for airdrop for Army, USAF or other services. Theater aerial delivery companies provide for field level maintenance and supply of airdrop equipment used by supported units. The unit's capabilities include the inspection, repair, fabrication, and salvage of airdrop equipment. The unit also provides limited sling-load capability. The unit is employed in a sustainment brigade area of operation with assignment to a combat sustainment support battalion. Allocation is based on the concept of support. Figure 5-2 depicts this formation. It also provides the following capabilities:

- Capable of packing personnel parachute systems (can support organic personnel; supported units should provide own personnel parachutes).
- Assists in loading supplies and equipment into aircraft and in release of supplies and equipment from aircraft or equipment in flight.
- Supplements the capabilities of other units engaged in parachute packing and airdrop support operations as required.
- Provides supervision, technical assistance, and advice in the recovery and evacuation of airdrop equipment.
- Provides direct exchange of personnel parachutes used by Army aircraft crews.
- Provides technical assistance to the Army's portion of joint airdrop inspection of loads.

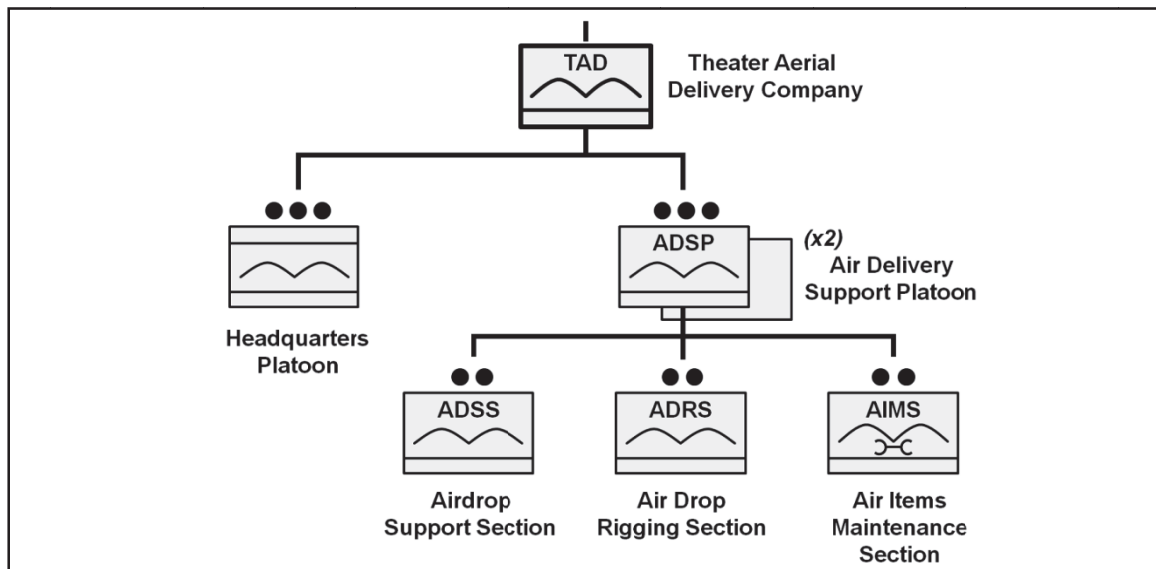


Figure 5-2. Theater aerial delivery company TOE 10649R000

5-3. Rigger support teams, TOE 10510RA00, are echelon above brigade units that provide direct support to long-range surveillance companies. Each rigger support team performs personnel and cargo parachute packing and field level maintenance on aerial delivery items. The rigger support team's capabilities include:

- Packing personnel parachute systems, to include high altitude low opening (HALO), cargo parachutes, and rigging field level maintenance on air items.
- Performing limited sling load missions.
- Assisting in loading supplies and equipment into aircraft and in release of supplies and equipment from aircraft of equipment in flight.
- Providing supervision, technical assistance, and advice in the recovery and evacuation of airdrop equipment.

SPECIAL OPERATIONS FORCE SUPPORT

5-4. ARSOF aerial delivery involves all types and methods of air-to-ground delivery of equipment and supplies. Special Forces, ranger, military information support operations, civil affairs and special operations aviation have varying levels of internal rigger support. These rigger formations are small and are tasked to support their respective formations. Special Forces' organic riggers can provide limited personnel parachute packing to ARSOF elements, unit-level maintenance of air delivery items, and limited air drop capability. The ability to accomplish both aerial delivery and parachute packing functions simultaneously does not exist or is limited (depending on the section). The group and battalion air delivery sections do not have the capability to conduct sustained airdrop support for Special Forces operations. All ARSOF formations may be required to provide rigger personnel augmentation to the joint special operations task force (JSOTF) and special operations task force (SOTF) aerial delivery element for sustainment. Theater of operations aerial delivery support is required when ARSOF organic capabilities are exceeded.

5-5. The sustainment brigade (special operations) airborne mission includes aerial delivery requirements such as establishing the staff aerial delivery officer within the JSOTF and SOTF J-4 or G-4. Using forward-stationed ARSOF liaison elements and deployable ARSOF support operations cells, the brigade ensures aerial delivery is integrated and synchronized with the Army service component command support plan to support projected sustained and high capacity sustainment aerial delivery requirements.

5-6. Every Special Forces group possess an organic group support battalion, which is a multifunctional, direct-support logistical organization with force structure and capabilities tailored to support the Special

Forces group. The group support battalion's aerial delivery element can provide all special operations force distinctive items for aerial delivery and limited logistical support. The battalion will normally deploy an aerial delivery support team but can deploy an entire Special Forces ground support battalion aerial delivery element when greater sustainment rates are required.

5-7. The ranger regiment consists of a regimental headquarters with a ranger support operations detachment, a regimental special troop's battalion, and three ranger battalions with organic ranger support companies. The ranger support operations detachment provides staff planning, supervision and coordination of aerial delivery logistics supporting all units assigned or attached. The regimental special troop's battalion provides ARSOF distinctive aerial delivery and limited sustainment through various methods of airdrop. The ranger support companies are multifunctional logistics companies within the regiment that provide organizational aerial delivery capabilities for initial entry, infiltration and strategic strikes and limited sustainment logistics capability. Theater, JSOTF or SOTF aerial delivery support is required to sustain logistical support

5-8. Special operations aviation regiment battalions have organic aerial delivery capability for initial entry, infiltration and strategic strikes only. Special operations aviation regiment aerial delivery elements are dependent upon other ARSOF sustainment elements, the theater support command, and the joint special operations air component to conduct sustained aerial delivery operations if required.

5-9. Military information support operations command forces have only limited unit-level aerial delivery capability and need to establish logistics support relationships early on prior to deployment, especially when assigned to a JSOTF or SOTF with ARSOF logistics elements. Military information support operations command elements will be supported through their task organization's field level support elements for sustained aerial delivery requirements.

5-10. ARSOF civil affairs have only limited unit-level aerial delivery capability and need to establish logistics support relationships early on prior to deployment, especially when assigned to a JSOTF or SOTF with ARSOF logistics elements. Civil affairs elements will be supported through their task organization's field level support elements for sustained aerial delivery requirements.

JOINT, MULTISERVICE, AND MULTINATIONAL SUPPORT

5-11. Aerial delivery support is available outside the Army. Marine, Navy and USAF all have formations capable of aerial delivery support. In some operations, multinational forces may be utilized to perform aerial delivery. In some areas of operation, contract aviation is available to augment aerial delivery operations.

U.S. MARINE CORPS

5-12. Marines attend the U.S. Army Quartermaster School for Aerial Delivery Parachute Rigger Course in order to obtain the military occupational specialty 0451. Marine Rigger personnel are attached to combat logistics battalions.

5-13. The Marine Corps field tiltrotor aircraft may at times be utilized to support Army units. The flexibility of tiltrotor aircraft allows them to conduct all three methods of aerial delivery: airlanding, airdrop and sling-load. Tiltrotor aircraft combine the vertical takeoff, hover, and vertical landing qualities of a rotary-wing aircraft with the long-range, fuel efficiency, and speed characteristics of a turboprop aircraft. Tiltrotor aircraft have both short take off and landing capability as well as the ability to take off and land vertically. This allows them to utilize smaller landing zones. Disadvantages of tiltrotor aircraft include noise, landing area and availability of aircraft.

U.S. NAVY

5-14. U.S. Navy expeditionary air cargo companies are embedded in both active duty and reserve component Navy cargo handling battalions. They may augment the USAF's aerial port operators or conduct independent aerial port operations. They interface with Navy fleet logistics and AMC's air operations.

U.S. AIR FORCE

5-15. The USAF has several formations trained to conduct rigging in support of aerial delivery operations. Aerial delivery flights prepare, rig, and inspect USAF supplies and equipment for AMC assigned airdrop missions. Aerial delivery flights inspect, repair, and repack unit assigned cargo parachutes and rigging equipment. The duties of an air transportation specialists assigned to aerial delivery duties include, but are not limited to the following: rigging USAF supplies and equipment for AMC assigned airdrop missions and unilateral airdrop training. These specialists assist USAF and joint service units in pre-joint airdrop inspections, planning, rigging, and training for mobility, air transportability or tactical airdrop missions. Unit representatives will correct all airdrop load discrepancies found during pre-joint airdrop inspections. Aircrew flight equipment section crew specialists perform the maintenance, inspection and repair of unit cargo parachutes and related fabric equipment as governed by technical orders.

5-16. The USAF also provides special operations forces support. USAF special operations forces are America's special operations air power. Their uniquely equipped fixed- and rotary-wing or tiltrotor aircraft provide precise multi-target firepower and support a wide spectrum of operations including resupply.

MULTINATIONAL

5-17. In multinational operations, aerial resupply is normally a national responsibility; however, the supreme allied commander can direct aerial delivery support for allies when operationally necessary. JP 3-17, *Air Mobility Operations*, contains detailed explanations of specific responsibilities at the joint and theater levels.

CONTRACT

5-18. During the conflicts in Iraq and Afghanistan significant use was made of both fixed and rotary wing contract aviation to meet supply demands. These aircraft were utilized for personnel movement, airland, airdrop, and sling-load operations. Contract rotary aircraft are normally only authorized to conduct operations at approved airports, rotary-wing aircraft landing zones, and DZs. See figure 5-3.

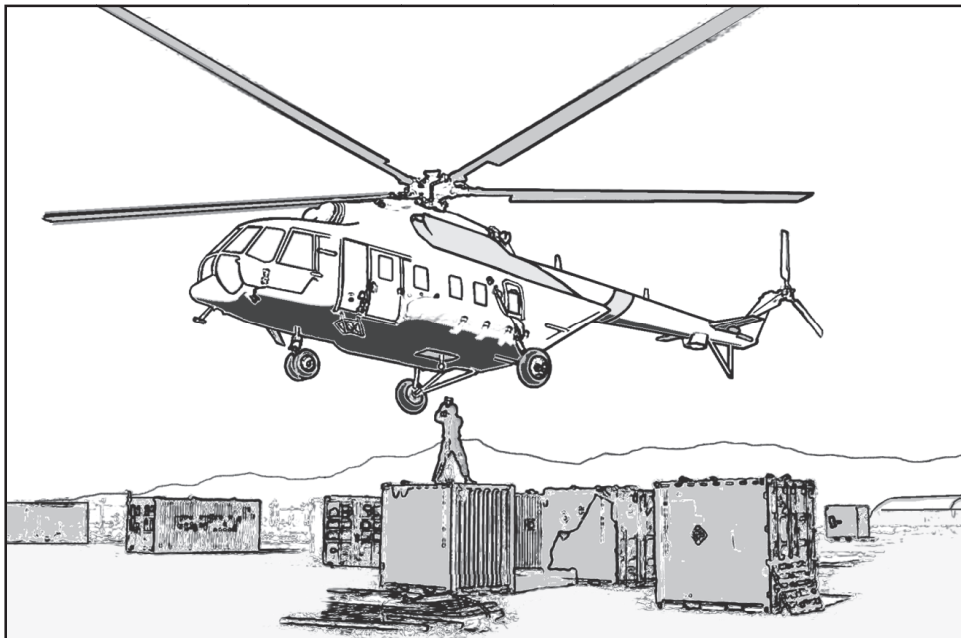


Figure 5-3. Contract rotary-wing aircraft conducting a sling-load operation

SECURITY

5-19. Security and chemical, biological, radiological, nuclear and high yield explosives (CBRNE) considerations apply to all three types of aerial delivery: airland, airdrop and sling-load. Protection of aerial delivery personnel, aircraft and equipment must be a priority planning consideration.

PHYSICAL SECURITY

5-20. Most airdrop support units will be located at an intermediate staging base. An intermediate staging base is a tailorable, temporary location used for staging forces, sustainment and extraction into and out of an operational area. Intermediate staging bases are established near but not in the joint operations area. For land forces an intermediate staging base may be located in the area of operations. Modern threat capabilities and doctrine cause airdrop support units to be priority targets for attack. Therefore, these units should fully participate in base security planning and training.

CHEMICAL, BIOLOGICAL, RADIOLOGICAL, NUCLEAR AND HIGH YIELD EXPLOSIVES (CBRNE)

5-21. Aerial delivery support units must provide as much CBRNE protection as possible for air delivery equipment. No decontamination procedures are available for nylon components of aerial delivery or sling-load equipment. If an area becomes contaminated, rigging operations should cease until the area has been decontaminated and rigging has been checked for contamination. Contaminated equipment will not normally be allowed on board an aircraft or used for sling-load operations.

5-22. Adversary use of CBRNE weapons against air mobility forces represents a significant threat. Although military aircrews are trained and equipped to operate in a contaminated environment, the contamination of aircraft may limit options for the sustainment of forces. Every precaution available needs to be taken to prevent the contamination of aircraft. Contingency plans must be developed to decontaminate aircraft that become compromised. See FM 3-11.5, *Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Decontamination*, for more information on aircraft decontamination.

Glossary

The glossary lists acronyms and terms with Army or joint definitions. Where Army and joint definitions differ, (Army) precedes the definition. The proponent publication for terms is listed in parentheses after the definition. This publication is not the proponent for any terms.

SECTION I – ACRONYMS AND ABBREVIATIONS

A/DACG	arrival/departure airfield control group
ADRP	Army doctrine reference publication
AMC	Air Mobility Command
APOD	aerial port of debarkation
ARSOF	Army special operations forces
ATP	Army techniques publication
BCT	brigade combat team
CBRNE	chemical, biological, radiological, and nuclear and high-yield explosives
DA	Department of the Army
DZ	drop zone
ESC	expeditionary sustainment command
FM	field manual
JP	joint publication
JPADS	joint precision airdrop system
JSOTF	joint special operations task force
LZ	landing zone
MHE	materials handling equipment
PZ	pickup zone
SOTF	special operations task force
SPO	support operations
TM	technical manual
TOE	table of organization and equipment
TSC	theater sustainment command
U.S.	United States
USAF	United States Air Force

SECTION II – TERMS

airdrop

The unloading of personnel or materiel from aircraft in flight. (JP 3-17)

airland

Move by air and disembark, or unload, after the aircraft has landed or while an aircraft is hovering. (JP 3-17)

air movement

Air transport of units, personnel, supplies, and equipment including airdrops and air landings. (JP 3-17)

distribution

The operational process of synchronizing all elements of the logistic system to deliver the “right things” to the “right place” at the “right time” to support the geographic combatant commander. (JP 4-0)

distribution management

The function of synchronizing and coordinating a complex of networks (physical, communications, information, and resources) and the sustainment functions (logistics, personnel services, and health service support) to achieve responsive support to operational requirements. (ADRP 1-02)

Intertheater airlift

The common-user airlift linking theaters to the continental United States and to other theaters as well as the airlift within the continental United States. (JP 3-17)

Inratheater airlift

Airlift conducted within a theater with assets assigned to a geographic combatant commander or attached to a subordinate joint force commander. (JP 3-17)

logistics

Planning and executing the movement and support of forces. (JP 4-0)

movement control

The planning, routing, scheduling, and control of personnel and cargo movements over lines of communications; includes maintaining in-transit visibility of forces and material through the deployment and/or redeployment process. (JP 4-01.5)

operational environment

A composite of the conditions, circumstances, and influences that affect the employment of capabilities and bear on the decisions of the commander. (JP 3-0)

retrograde

The process for the movement of non-unit equipment and materiel from a forward location to a reset (replenishment, repair, or recapitalization) program or to another directed area of operations to replenish unit stocks, or to satisfy stock requirements. (JP 4-09)

supply

The procurement, distribution, maintenance while in storage, and salvage of supplies, including the determination of kind and quantity of supplies. (JP 4-0)

sustainment warfighting function

The related tasks and systems that provide support and services to ensure freedom of action, extend operational reach, and prolong endurance. (ADRP 3-0)

theater distribution

The flow of personnel, equipment, and materiel within theater to meet the geographic combatant commander’s mission. (JP 4-09)

theater opening

The ability to establish and operate ports of debarkation (air, sea, and rail), establish a distribution system and sustainment bases, and to facilitate throughput for the reception, staging, and onward movement and integration of forces within a theater of operations. (ADRP 4-0)

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These documents must be available to intended users of this publication.

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None.

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