ATP 4-48

Aerial Delivery

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Contents

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Figures

Preface

ATP 4-48 provides doctrine for current aerial delivery operations and addresses aerial delivery distribution as it applies to the overall Army distribution system. Aerial delivery amplifies Army distribution flexibility and agility and is a force multiplier 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 armed conflict and the rules of engagement. (See FM 6-27/MCTP 11-10C.)

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 are 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 noted.

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Introduction

ATP 4-48 is the United States Army reference for aerial delivery operations. Its purpose is to provide guidance on all aspects of aerial delivery operations. This publication defines aerial delivery; discusses aerial delivery methods and options; describes the planning, preparation, and execution process; and identifies roles and responsibilities in the conduct of aerial delivery. The intent is to provide the reader with an understanding of the abilities, limitations, and techniques of aerial delivery.

ATP 4-48 contains five chapters and two appendices:

Chapter 1 addresses the basic principles of aerial delivery distribution, provides a general description of aerial delivery operations, and addresses general safety and security considerations. The chapter examines the advantages that aerial delivery offers in sustainment and distribution operations and also discusses aerial delivery in forcible entry operations and theater distribution. Finally, the chapter discusses planning considerations for the execution of aerial delivery operations.

Chapter 2 provides an overview of Army aerial delivery units. It discusses roles and responsibilities of aerial delivery organizations and their command and support relationships. In addition, it identifies aerial delivery capabilities in the special operations forces. Finally, the chapter discusses multinational aerial delivery support.

Chapter 3 discusses airland 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 4 discusses airdrop as an aerial delivery method and includes an updated section on aerial delivery facility management. The chapter identifies airdrop techniques, to include planning and responsibilities, and discusses the types and methods of airdrop. The chapter also identifies the advantages and disadvantages of airdrop and examines safety factors and equipment retrograde. The second part of the chapter provides an overview of the work performed by aerial delivery companies. The chapter concludes with a discussion on aerial delivery facility management, to include aerial delivery company support of work required to conduct facility operations. The chapter concludes with a discussion about aerial delivery rigging facilities.

Chapter 5 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.

Appendix A provides airdrop request considerations, including actions prior to submitting a request, submission, and actions required after submission of the request.

Appendix B describes future aerial delivery systems.

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Chapter 1
Aerial Delivery Overview

This chapter examines aerial delivery as an aspect of deployment, redeployment, sustainment operations, and theater distribution. It provides a definition of aerial delivery and covers the principles of aerial delivery to include general safety, security, and field service requirements. This chapter concludes with a description of the planning considerations for aerial delivery operations.

AERIAL DELIVERY DESCRIPTION

1-1. ***Aerial delivery*** **is the air transport of cargo, equipment and/or personnel to a desired location on the ground by aircraft.** Strategic and theater aerial delivery operations include fixed-wing and rotary-wing aircraft that may be military, contracted, or commercial.

1-2. As a field service, aerial delivery is a vital link in the sustainment and distribution system. It is a force multiplier that provides an alternative to transport by land or sea in support of all military forces and sustainment. The ground threat to transportation and distribution operations is reduced through aerial delivery operations. Aerial delivery eliminates the need for clearance of a ground route to deliver cargo or personnel. Aerial delivery also reduces the handling requirements for cargo and the overall transport time for both cargo and personnel.

1-3. Aerial delivery is employed based on the mission and conditions in the theater of operations. Its flexibility and effectiveness make it a responsive capability. Aerial delivery operations characteristics—speed, flexibility, range, responsiveness, and survivability—complement other Army movement assets.

1-4. Aerial delivery operations can be performed using three methods: airdrop, airland, and sling load. *Airdrop* is the unloading of personnel or materiel from aircraft in flight (JP 3-36). Airdrop and airland operations may require a joint effort between the Army and United States Air Force (USAF), other Services, or contracted air if there is a requirement for fixed-wing aircraft. Sling load operations can be performed by the Army internally with rotary-wing aircraft or other Army or contracted assets, if applicable. These methods of aerial delivery are discussed in detail later in this publication.

1-5. Aerial delivery refers to personnel and equipment used to airdrop, airland, or sling load equipment and supplies. It also refers to the tactical insertion of personnel from either fixed-wing or rotary-wing aircraft. Aerial delivery supports forcible entry operations through support of airborne and air-assault operations. Airborne operations include static line and high altitude low opening parachute methods. Air assault methods include sling load, fast-rope insertion, and rappelling operations. Aerial delivery also supports multidomain operations to include humanitarian aid, routine sustainment, and joint operations. It also includes the transport of personnel and cargo from airfield to airfield through the airland method. *Airland* is movement by air and disembarkment, or unloading, on the ground after the aircraft has landed or while an aircraft is hovering (JP 3-36).

1-6. The aerial delivery mission includes ensuring the force has operational reach, freedom of action, and sustainability by enhancing transport capability and capacity. Aerial delivery operations can be used to extend all lines of communication. Air lines of communication are extremely important during the early stages of hostilities, as employing secure ground lines of communication takes time and support to establish. Aerial delivery is key as the combat intensity increases and the depth of the battlefield extends. Aerial delivery allows commanders to take the initiative while reducing the likelihood of overextending supply lines.

1-7. Aerial delivery can be the primary mode of delivery in situations where ground lines of communication are not viable. Aerial delivery can also be the mode for supplying isolated forward operating locations and

combat outposts. Aerial delivery offers its customers a high degree of speed, range, and flexibility. It also enables fast, precise delivery of cargo, supplies, and personnel to most battlefield locations by avoiding ground-based threats and obstacles. In addition, aerial delivery enables commanders to respond and operate in a wide variety of circumstances within time frames that would be impractical through other modes of transportation.

1-8. In joint doctrine, airlift operations can be used to describe aerial delivery operations. Airlift operations transport and deliver personnel and materiel through the air in support of strategic, operational, or tactical objectives, and are defined by the nature of the mission rather than the type of aircraft used.

PRINCIPLES OF AERIAL DELIVERY

1-9. Aerial delivery can be executed worldwide. At the strategic level, it can be initiated in the United States (U.S.) and deployed to support any theater or operation. At the operational level, it can support the nesting of the strategic aim and the tactical mission to meet combatant command operational requirements. At the tactical level, aerial delivery supports intratheater air transportation requirements.

1-10. *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 3-36). *Intratheater airlift* is airlift conducted within a theater with forces assigned to a combatant commander or attached to a subordinate joint force commander (JP 3-36). Intratheater airlift provides air movement of resources, personnel, and material within an area of operations (AO) and supports deployment and redeployment of personnel, cargo, and equipment. Intratheater airlift capabilities also provide for limited transport of time-sensitive or mission-critical cargo and key personnel to forward-deployed Army units in a joint operations area.

1-11. The lack of available airframe assets can make the planning and execution of aerial delivery challenging. Aerial delivery operations require that all agencies involved in the process communicate effectively for unified action.

1-12. Techniques to provide aerial delivery must not negatively affect the supported unit's ability to perform its missions. Each decision to conduct aerial delivery operations should be nested to fully, effectively, and efficiently execute support of operations.

AERIAL DELIVERY FIELD SERVICE

1-13. Aerial delivery is classified as a primary field service. It is a vital link in the distribution system and provides the capability of supplying the force, even when lines of communication have been disrupted or terrain is unfavorable for ground travel. Field services maintain the force by providing life support, which improves the quality of life for Soldiers and increases combat effectiveness. During large-scale combat operations, personnel must be prepared for constant enemy observation and all forms of enemy contact. Aerial delivery can be used to maintain the life support function of field services and enable Soldiers to withstand the stressors of large-scale combat operations in various operational environments across a multidomain spectrum (FM 3-0).

1-14. Aerial delivery supports the supply activities related to the sustainability and survivability of the force, as well as the redistribution of combat power across the AO or between multiple AOs. It encompasses the distribution of clothing, fuel, rations, water, ammunition, barrier material, major end items, and systems that support the fighting force. Therefore, it must be carefully considered by field service and transportation planners. It is extremely important during the early stages of hostilities because land lines of communication and forward supply points will be priority threat targets.

1-15. Conducting aerial delivery field services consists of airdrop, airland, and sling load resupply. Field services support includes parachute packing, aerial delivery equipment repair (ADER), external sling load, rigging equipment and supplies for airdrop, and the provision of aerial delivery equipment and systems. Procedures for employing aerial delivery equipment and supplies must be considered as a part of the application of aerial delivery. The following is a brief summary of each area of aerial delivery support listed above:

- **Parachute packing** includes packing support for airdrop and airborne operations. The functions of parachute packing include—

- Packing personnel and cargo parachutes.
- Performing inspections according to the appropriate technical manual (TM) series for each parachute.
- Tagging and returning unserviceable parachutes to the supply and ADER platoon for repairs.
- Sending serviceable packed parachutes to the supply and receive and issue section for storage.
- Preparing reports on their activities and forwarding the reports to the appropriate agency.
- Accompanying supported units during airborne operations to provide technical assistance in recovery and evacuation of airdrop items.
- Providing advice on storing airdrop items before they are evacuated to the supply and maintenance section.

- **ADER** includes—
  - Unit maintenance on airland, airdrop, and sling load equipment.
  - Maintenance program management and inspections by the unit parachute maintenance officer.
  - Field and sustainment-level support maintenance on aerial delivery equipment.
  - Recording deficiencies.
  - Inspecting repairs.
  - Procedures for making repairs are listed in the TM series maintenance allocation charts.
- **External sling load** consists of supplies or equipment properly rigged with one or more slings, cargo bags, or cargo nets. Sling load operations consists of a ground crew team (both hookup and receiving teams), the cargo and equipment supply personnel, and the air crew.
- **Rigging of equipment and supplies** includes the receipt, storage, rigging, and issuing of supplies and equipment. It includes the preparation of loads to be airdropped. Rigging supplies are grouped by aircraft loads and transported to the aircraft loading area. Cargo bags, cargo parachutes, and other items required for rigging operations are provided by the support section. The 4-48 series of TMs provide detailed procedures on rigging.

1-16. The airdrop of supplies and equipment can be a joint Army and USAF effort, or in some cases can be accomplished by internal Army rotary-wing assets. Army elements provide the required supplies, rig them for airdrop, and deliver them to the departure airfield. When using USAF fixed-wing assets, USAF personnel load the supplies onto the airdrop aircraft and fly the mission in accordance with Department of the Air Force Manual (DAFMAN) 13-217. Trained and certified Army personnel are authorized to control drop zones (DZs) supporting airdrops from USAF fixed-wing aircraft. A *drop zone* is a specific area upon which airborne troops, equipment, or supplies are airdropped (JP 3-36). If USAF combat control team personnel are available, they may provide navigational assistance to the airdrop aircraft.

1-17. The Army typically owns or contracts for the supplies and equipment to be rigged for airdrop, along with special rigging equipment (parachutes, platforms, and containers). The work is completed by parachute riggers—specialized personnel with the military occupational specialty 92R. See STP 10-92R14-SM-TG for additional information on military occupational specialty 92R responsibilities and duty descriptions.

1-18. Parachute riggers specialize in skills and knowledge required to inspect, pack, rig, recover, store and maintain aerial delivery equipment. All supplies and equipment to be airdropped are rigged according to relevant Army, joint, and multiservice manuals. Once the supplies and equipment are rigged for airdrop, they are moved to the departure airfield aboard Army transportation. When using USAF fixed-wing assets, the rigged supplies and equipment are then placed in a temporary holding location run by the USAF or transloaded onto USAF K-loaders or other materials handling equipment (MHE) used to load cargo aircraft. Loading the rigged loads aboard USAF aircraft is an USAF responsibility; however, Army personnel routinely assist the USAF.

1-19. The USAF requires a specially trained crew for each type of airdrop mission being flown. Several types of Army-owned aircraft can be used for airdrop missions. However, their range and carrying capacity severely limit their use.

1-20. Airland supplies and equipment employment is similar to the guidelines applicable to airdrop. Airland operations generally require less specialized rigging of materiel and minimal specialized training and equipment for transported personnel. However, MHE may be required at the destination airfield to facilitate download operations.

1-21. In sling load operations, the supported unit is responsible for acquiring the supplies and rigging the equipment in accordance with appropriate sling load manuals. Externally sourced equipment and specialized personnel are discussed later in this chapter.

AERIAL DELIVERY DISTRIBUTION

1-22. Aerial delivery supports the concept of a distribution-based logistics system by reducing the logistics footprint. This is accomplished by increasing the speed at which supplies move through the distribution pipeline. This reduces the amount of time supplies remain in the pipeline and allows increased distances between supply bases. Aerial resupply packages must be maximized to achieve the right quantities of supply, to the right locations, at the right time in theater in order to leverage aerial delivery in distribution-based logistics.

1-23. Supply in aerial distribution can be classified into three stages: accompanying, follow-up, and demand supported.

- Aerial delivery can be used to support transport of accompanying supplies in airborne and air assault units deploying to locations by forcible entry, or other units that lack the capability to transport basic loads with organic assets. Accompanying supplies are usually basic loads selected from all classes of supply. A unit's basic load is generally what the unit is capable of transporting with its organic assets. Units deploy with the supplies on hand to support them for three to seven days. Accompanying supplies also include force supplies and reserve supplies. Force supplies are bulk supplies retained at battalion or brigade level that back up the supported units. Reserve supplies are additional supplies brought into the airhead under the appropriate sustainment brigade or division sustainment brigade (DSB) control. These supplies normally consist of the airborne force reserve of Classes I, III, and V and selected items of Classes II, IV, and IX.
- Follow-up supply will be used to accommodate requirements after the accompanying supplies are exhausted. Follow-up aerial delivery supported operations are normally conducted in accordance with the applicable operations order, tasked through the assistant chief of staff, operations (G-3) or the battalion or brigade operations staff officer (S-3), and executed and supervised through support operations (SPO) and assistant chief of staff, logistics (G-4) or battalion or brigade logistics staff officer (S-4) channels. This stage continues until demand-supported operations can be established. These stages can also be subdivided into automatic, on-call, and emergency immediate resupply. These subdivided categories require special coordination for availability and priority of air transport assets, rigging teams, and supply managers to execute aerial delivery packages of needed supplies:
  - Automatic. This is a scheduled airdrop resupply to the assault force. The force commander, along with logistics staff elements, estimates the quantities of supplies that will be consumed each day. The staff then computes the quantities needed to build up the reserve requirement. The automatic resupply plan is developed from these running estimates. Items are rigged by an airdrop support unit and stored at the airdrop unit or departure airfield until the delivery date.
  - On-call. On-call is similar to automatic resupply. Logistics planners determine in advance the supplies that may be required, depending on the situation. These supplies are then delivered to the airdrop support unit. They are then rigged for airdrop or held in bulk until needed. Since the supplies could be called for on short notice, it is preferable to rig them in advance. Assignment of load-unique numbers will facilitate the request procedures. Some light forces and special operations forces (SOF) now have pre-rigged supplies held in the U.S. for direct delivery to an operational area. These supplies have load-unique numbers that are known by the storage activity and the units authorized to request the supplies.
  - Emergency. Emergency resupply will be used to deliver mission-essential equipment and supplies needed to restore the operational capability and survivability of a forward element

and its indigenous force. Everything possible is done to provide for the unit, including re-routing supplies already in the air and redistributing aircraft. An emergency resupply is delivered when radio contact has not been established between the deployed element and its higher headquarters within a predesignated time after infiltration, or when the deployed element fails to make a predetermined consecutive number of scheduled radio contacts.

- The demand-supported stage is established as rapidly as the situation permits. Under demand-supported operations, supplies are delivered through normal requisitioning and issue procedures. Normally, the senior sustainment commander in theater decides when demand- supported resupply deliveries should begin. To conduct aerial delivery in demand-supported operations, logistics operators of supported units must be able to forecast requirements in enough time to allow coordination and execution between air transport elements, rigging teams, and supporting supply managers.

FORCIBLE ENTRY OPERATIONS

1-24. Aerial delivery is the key enabler for both airborne and air assault forcible entry operations. *Forcible entry* is the seizing and holding of a military lodgment in the face of armed opposition or forcing access into a denied area to allow movement and maneuver to accomplish the mission (JP 3-18). A forcible entry operation is conducted to gain entry into the territory of an enemy by seizing a lodgment as rapidly as possible to enable the conduct of follow-on operations or to conduct a singular operation. An *airborne operation* is an operation involving the air movement into an objective area of combat forces and their logistic support for execution of a tactical, operational, or strategic mission (JP 3-18). *Air movement* is the air transport of units, personnel, supplies, and equipment, including airdrops and air landings (JP 3-36). An *air assault operation* is an operation in which assault forces, using the mobility of rotary-wing or tiltrotor aircraft and the total integration of available fires, maneuver under the control of a ground or air maneuver commander to engage enemy forces or to seize and hold key terrain (JP 3-18). An *air assault* is the movement of friendly assault forces by rotary-wing or tiltrotor aircraft to engage and destroy enemy forces or to seize and hold key terrain (JP 3-18). For more on forcible entry operations see JP 3-18.

1-25. Adversaries are projected to further develop and use anti-access strategies to deny joint forces entry into the theater of operations. Aerial delivery capabilities allow U.S. forces to rapidly project combat power throughout the depth of an operational area, overcoming anti-access actions and the effects of terrain.

1-26. In order for aerial delivery to be effective, friendly forces must achieve air superiority, and enemy ground-based air defenses must be mitigated. The joint force command air component should be organized for coordinated action through unity of command, using the air capabilities of the joint force. The joint force commander (JFC) provides direction and guidance to subordinate commanders and command relationships to enable effective span of control, tactical flexibility, and protection of air assets supporting aerial delivery operations. For further information on command and control of air operations to support aerial delivery, see JP 3-30.

MODES OF AERIAL DELIVERY

1-27. Aerial delivery operations include two modes of delivery available to the planner: fixed-wing or rotary-wing. The other modes of distribution for sustainment include wheeled ground platforms and sea-based platforms. The mission, environment, and the resources available determine the mode of delivery the aerial delivery planners should select.

1-28. There are advantages and limitations to both fixed-wing and rotary-wing that must be considered:

- Rotary-wing advantages include—
  - Greater air movement flexibility than fixed-wing.
  - Fewer landing zone (LZ) requirements than fixed-wing.
  - The ability to bypass surface obstacles.
  - Less cargo rigging and loading manpower than fixed-wing.
  - Multiple landing sites supporting ground units.
- Rotary-wing aircraft limitations include—

  - Weight of load is restricted to the aircraft's capacity.
  - Load instability during flight may restrict aircraft speed and maneuvering.
  - Adverse weather may limit operations (for example, fog or low visibility).
  - Atmospheric conditions affect the lift capacity.
  - Limited number of helicopters available for operations.
  - Transportability of multiple items or packages per flight is less than fixed-wing.
- Fixed-wing advantages include—
  - Having more range than rotary-wing aircraft.
  - Usually faster than rotary-wing aircraft.
  - Having greater cargo capacity.
  - Less vulnerable to anti-air defenses than rotary-wing.
- Fixed-wing aircraft limitations include—
  - Requirement for increased LZ/DZ area to deliver cargo.
  - Requirements for more specially trained personnel to execute.
  - Increased planning and coordination required for execution.
  - Joint operations typically depend on USAF assets.
  - Aircraft have limited mobility on ground and are vulnerable to enemy attack.
  - Limited number of fixed-wing assets available for operations.

GENERAL SAFETY

1-29. Safety of airland, airdrop, and sling load operations is paramount. Failure to ensure safe operations places limited battlefield resources, including personnel, at risk. Training, rehearsals, and communication are key factors to a safe and secure work environment. Twenty-four-hour operations with no consideration for activity level during hours of darkness present safety concerns.

1-30. Personnel involved with aerial delivery operations at all levels must make safety a top priority to prevent mishaps, hazards, and accidents. This is accomplished through awareness and execution of established policies and procedures. Safety procedures and shared understanding of duties and responsibilities between the flight crew and ground crew must be established with all parties involved in the operation.

1-31. Risk management must be conducted and employed prior to any aerial delivery operation to identify mission hazards and develop and implement controls to mitigate the risk. Risks are mitigated based on the mission, situation, and availability and capabilities of rigging personnel and equipment, aircraft, and aircrew.

1-32. Ensure inspections of aircraft loads are conducted by qualified representatives from the rigging element or transported force and the supporting airlift representative.

1-33. Airspace coordinating measures must be employed to provide safeguards for friendly forces and facilitate the efficient use of airspace. Fire support coordination measures should be employed to simultaneously provide safeguards for aircraft and friendly forces.

RIGGING OPERATIONS

1-34. The proper employment of rigging equipment and materials enables loads to be safely transported from aircraft and provides protection of the cargo being delivered.

1-35. Inspect, repair, and repack all cargo parachutes, sling load equipment, and rigging equipment in accordance with appropriate technical manuals and regulations. Ensure all equipment and material being used for the operation is serviceable and appropriate for the operation.

1-36. Improper use of MHE while loads are being palletized or containerized and loaded on the aircraft is a major danger to rigging operations. Vehicles and other cargo on aircraft must be loaded with the highest diligence. All personnel must continuously be aware of the dangers encountered as loads exit the aircraft.

Personnel must avoid injury as the loads impact and are moved from the DZ or LZ. Due to low drop altitudes and airspeeds, aircraft and aircrews are exposed to a greater risk of enemy air defenses during the extraction of loads from the aircraft.

1-37. When rigging items, ensure bundles or loads are configured to the space on the aircraft. If the bundles or loads are not rigged to properly fit on the aircraft, some of the cargo may not be able to be transported in the designated aircraft. This may delay or prevent delivery to the supported unit. Special attention should be paid to aircraft weight and balance and asymmetric loading.

1-38. Planners and supervisors of personnel conducting rigging operations must accurately project rigging efforts. Failure to do so could result in mishaps or incidents detrimental to airdrop operations or fatal to Soldiers. Man-hours and man-days must be calculated based on precise estimates of outputs and must consider the effects of fatigue and operational environments.

1-39. Planners must be aware of, and actively plan for, rigging and recovery operations that occur during adverse weather conditions and extreme temperatures. For example, parachute packing and rigging operations that fall within areas exposed to extreme cold weather in austere arctic conditions have a higher likelihood of failure due to environmental conditions. Special considerations are necessary to protect riggers and air items from system failure and damage. The use of a separate heating storage tent is recommended to keep sensitive equipment in a functional state.

Physical Security

1-40. *Physical security* is that part of security concerned with physical measures designed to safeguard personnel; to prevent unauthorized access to equipment, installations, material, and documents; and to safeguard them against espionage, sabotage, damage, and theft (JP 3-0). These measures include, but are not limited to—

- Security guards.
- Military working dogs.
- Physical barriers.
- Badging systems.
- Secure containers.
- Locking devices.
- Intrusion detection systems.
- Security lighting.
- Assessment or surveillance systems.
- Access control devices.
- Facility hardening.

1-41. 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/or extraction into and out of an operational area (JP 3-35). 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 AO. Modern threat capabilities and doctrine make airdrop support units priority targets for attack. Therefore, these units should fully participate in base operational area security planning and training.

1-42. The level of physical security of equipment and supplies is dependent on the class of supply and the equipment classification level. See DA PAM 190-51 to develop specific requirements. Aircraft have a certain security standard that varies from other equipment.

1-43. Security of the rigging facility, cargo, supplies, and equipment must by planned for prior to construction. Rigging facilities must meet the secure storage structure requirements in AR 190-51. Arms, ammunition, and explosives storage must meet the physical security requirements in AR 190-11.

Chemical, Biological, Radiological, and Nuclear

1-44. Chemical, biological, radiological, and nuclear (CBRN) security considerations apply to all three methods of aerial delivery: airland, airdrop, and sling load. Protection of aerial delivery personnel, aircraft and equipment must be a priority planning consideration. Protection planning considerations include preventative measures such as ensuring personnel wear proper personal protective equipment, covering equipment, and conducting rapid decontamination if attacked. Procedures should also be established to replace contaminated supplies which cannot be decontaminated.

1-45. Safeguarding and physical security of Army property is required in accordance with AR 190-51. Pre-rigged loads, rigging facilities, and other aerial delivery assets must be protected from damage, misuse, theft, sabotage, and other mission adversities.

1-46. Aerial delivery support units must protect air delivery and other mission essential equipment from CBRN effects. Nylon components of aerial delivery or sling load equipment absorb chemical contamination and cannot be decontaminated. 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. When conducting airdrops into areas that are suspected to be contaminated, it is recommended to use low cost aerial delivery systems (LCADS).

1-47. Adversary employment of CBRN represents a significant threat to air mobility forces. Although military aircrews are trained and equipped to operate in a contaminated environment, the contamination of aircraft may limit options for the support of forces. Every precautionary effort needs to be taken to prevent the contamination of aircraft. Contingency plans must be developed to decontaminate contaminated aircraft. See ATP 3-11.32 for more information on aircraft decontamination.

REQUESTING AERIAL DELIVERY SUPPORT

1-48. Airlift request procedures must be responsive and flexible to accommodate deliberate and rapidly changing situations. Planners must direct their efforts toward optimum use of scarce and vital airlift assets.

1-49. The JFC apportions theater airlift through a prioritization process. The component commanders state priorities for airlift use, such as insertion and resupply. The JFC then validates submitted requests and aligns them with theater priorities. The JFC then tasks the air component commander to execute the mission to fulfill the requirements. The JFC may also establish a joint transportation board made up of representatives from each Service component to resolve conflicts in airlift requests.

1-50. Ground force requirements for airlift normally originate as requests for transportation or resupply support. When requesting airlift for combat support air movements, the G-3/S-3 develops the requirement for airlift and coordinates its use. Airborne brigade combat teams (BCTs) coordinate airdrop operations through logistics channels. Non-airborne BCTs coordinate airdrop operations through a theater sustainment command (TSC), expeditionary sustainment command (ESC), or a sustainment brigade or DSB that is task organized to provide theater distribution. The SPO officer will request and coordinate airdrop operations through the SPO in the TSC, ESC, sustainment brigade, or DSB. The SPO will send the information to the senior parachute rigger. The senior parachute rigger will submit the request to the rigger detachment in a sustainment brigade or DSB.

1-51. Validation is a step in the transportation request process which includes a review of the feasibility of the request made by an individual or agency. The review considers competing transportation requirements, the transportation priorities established by the commander, and the demands of the operational situation. At the theater level, the joint forces command is responsible for validating airlift requests. At corps, preplanned airlift requests are validated at the movement control center. In a division, the division transportation officer is normally responsible for validating preplanned airlift requests. In a brigade, the brigade SPO officer is responsible for validating preplanned airlift requests. G-3 staff personnel may be given the responsibility for validating immediate airlift requests arising from the operational situation. Authority to validate immediate requests may be given to coordinating or special staff agencies in order to facilitate the request process.

1-52. The procedures for requesting aerial delivery support may vary depending on the standard operating procedures established, the type of cargo being transported, and the method of delivery. When initiating planning for aerial delivery support, the procedures must be clearly set prior to any operation.

1-53. Transportation requests are considered validated when forwarded through designated channels to the next command echelon for subsequent validation or to the transportation unit for execution.

1-54. There is normally one validating authority established at each echelon of command. It may be necessary to provide alternate validating authorities to ensure rapid validation of immediate airlift transportation requests of an emergency nature, and to provide a continuous and redundant validating capability during rapidly changing operational situations.

1-55. Units requesting airlift transportation must be notified of the status of the requests in a timely manner in order to adjust pending operational plans.

1-56. Requests for aerial delivery resupply are either preplanned or immediate. Preplanned requests are based on a scheduled time and date, normally through the G-4/S-4 channels. Immediate requests are processed through the G-3/S-3 channels and are usually dependent on mission or operational variables. Immediate requests requiring USAF airlift are forwarded to the theater USAF airlift support, allowing time for the airlift control center to identify aircraft for that mission.

1-57. Requests from SOF for external aerial delivery support beyond their capability are normally addressed by a special operations command and control element to a liaison within the Army forces, and possibly with the theater Army. This request is usually issued as a task to a sustainment brigade in the theater or area.

Preplanned Requests

1-58. Preplanned requests are conducted to provide rapid, dependable airlift of personnel, cargo, mail, and courier materiel on a regular basis. These airlift missions are based on known or projected requirements and are programmed in advance. Tactical operations and special missions use preplanned airlift support when sufficient time is available to schedule necessary assets. Preplanned requests are submitted and tracked through the G-4/S-4 channels. Figure 1-1 on page 1-10 shows how the preplanned request process typically works in theater.

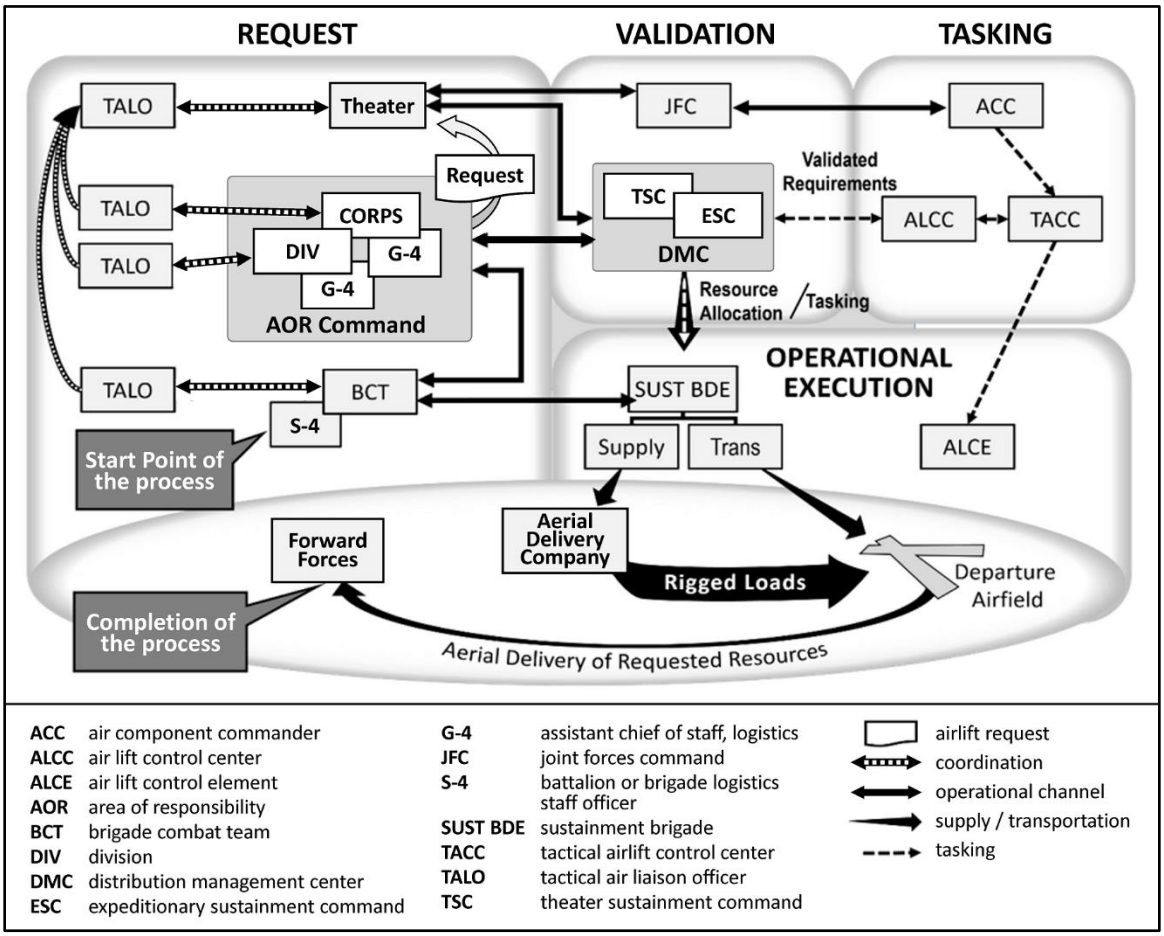

Figure 1-1. Preplanned airlift request process

1-59. Theater-specific standard operating procedures may differ from the process listed above.

1-60. Aircraft for preplanned requests 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, operational requirements, available airlift 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 operations officer, projected unit requirements, and available aircraft. All of this information should be located in the applicable operations plan or operations order.

1-61. The JFC's agent validates the request, assigns a priority, and then sends it to the USAF airlift control center or theater aviation command for execution. A theater aviation command provides air traffic service, airfield management, aeromedical evacuation, theater aviation support, and coordination of aviation staging and onward movement that support corps, Army, or joint operations in theater. The theater aviation command establishes a senior aviation commander responsible for all theater-level aviation missions who reports directly to the theater headquarters. The USAF airlift control center or theater aviation command directs the USAF actions.

Immediate and Emergency Requests

1-62. Immediate airlift missions result from unanticipated, urgent, or priority requirements. To meet these requirements, the airlift control center may provide aircraft on a quick-reaction basis at designated on-load locations. Immediate airlift requests may be filled by diverting or canceling preplanned missions or by generating a standby sortie. A sortie is a specific mission conducted by one or more aircraft. An airlift mission of an emergency nature may use a preplanned airlift sortie, but it is usually filled by an immediate mission

using the highest priority established by the theater-level commander. Airlift missions of an emergency nature are those critical to the accomplishment of the tactical mission or the survival of a unit.

1-63. When a unit requests an immediate airdrop, a support request is transmitted directly to the air mobility liaison officer (commonly referred to as AMLO). This allows the joint air operations center time to prepare 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 operations staff 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. See DAFMAN 13-217 for more information on the air mobility liaison officer's role in Army aerial delivery operations. Figure 1-2 shows how the immediate request process typically works in theater.

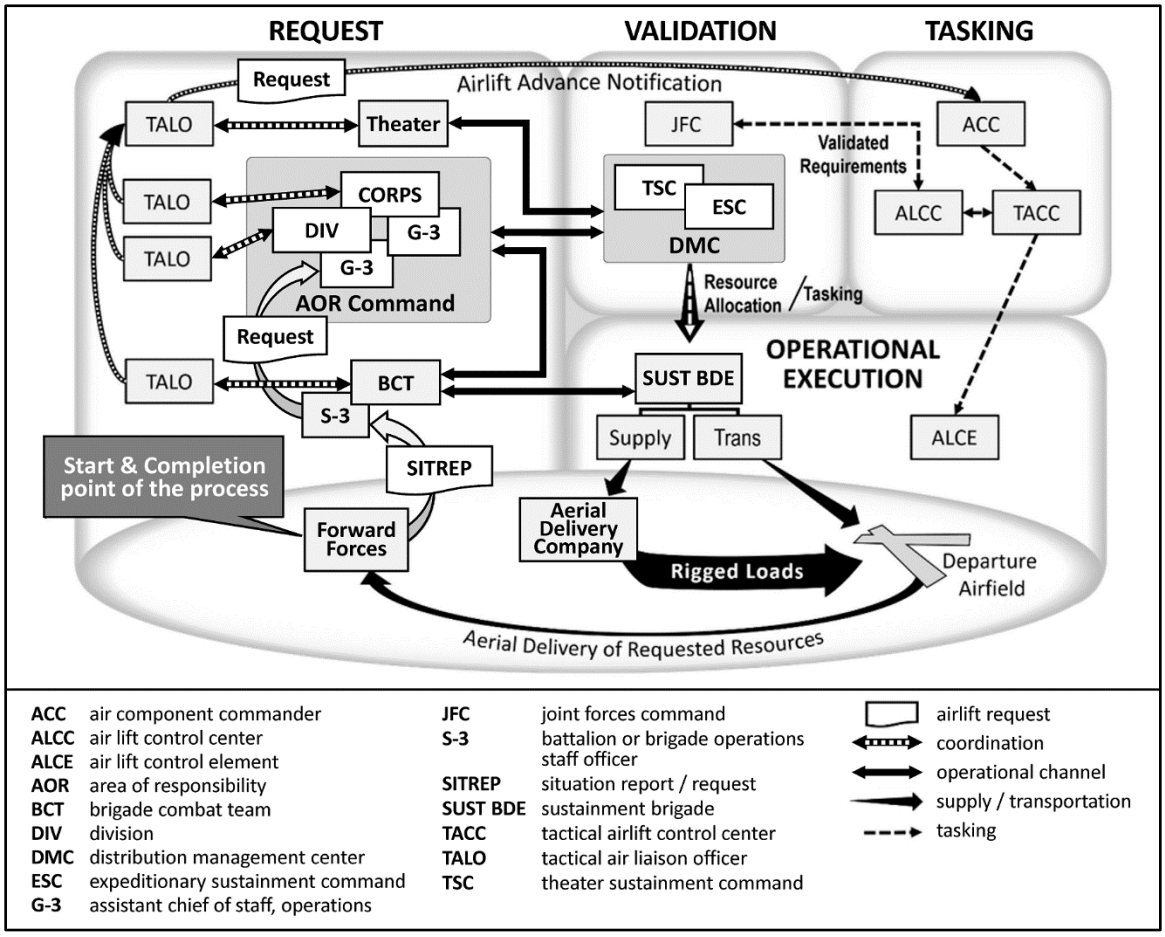

Figure 1-2. Immediate airlift request

1-64. Theater-specific standard operating procedures may differ from the process listed above.

1-65. Formats for airlift requests must be established by joint agreement between the Services and between the U.S. and its allies. A tactical airlift request should be developed and tailored to the operation and mission. Normally, the information outlined in this format is the minimum essential required to thoroughly plan an airlift mission. A list of criteria that should be in a joint tactical airlift request is addressed in Appendix A.

AERIAL DELIVERY SUPPORTING SUSTAINMENT OPERATIONS

1-66. Aerial delivery is a vital link in the sustainment and distribution system, providing the option of an aerial method of transportation and the capability of supplying the force, even when land lines of

communications have been disrupted or terrain is too hostile or impassable. In nonlinear operations, sustaining functions may depend on aerial delivery.

1-67. Aerial delivery is used for routine and urgent deliveries of sustainment. When applied together with surface distribution operations, aerial delivery enables maneuver forces to engage in operations that are not restricted by geography, supply routes, tactical situations, or operational pauses for logistics support. The goal is to provide combat units freedom of movement by drastically reducing their dependence on surface logistical support. Aerial delivery routine sustainment involves movement of materiel and personnel to reinforce or resupply forces already deployed or employed in operations. Aerial delivery routine sustainment also includes missions flown in support of military and nonmilitary organizations involved in humanitarian relief operations.

1-68. Although movement by ground allows greater quantities to be transported, the incorporation of aerial delivery as a sustainment function adds flexibility, increased speed, and operational reach. When planned and coordinated effectively, aerial delivery significantly enhances the distribution network and reduces the chance of deficient logistical support to the Service member.

PLANNING AERIAL DELIVERY SUSTAINMENT AND DISTRIBUTION

1-69. Aerial delivery planning and coordination must be continuous so that sustainment supplies and equipment are available for the supported units. Equally important is the distribution system. It must allow the timely delivery of the supplies and equipment. When possible, supplies and equipment are delivered directly to the using unit or close by to save the unit time. In addition, field service and transportation planners must synchronize efforts to carefully plan and execute aerial delivery missions.

1-70. Planners should not limit the possibilities aerial delivery can provide in theater. The sustainment functions aerial delivery can support and deliver include all classes of supply and many unique load requests. Aerial delivery can support health service support through delivery of medical supplies and transport of patients. Aerial delivery can also provide morale and welfare items, as well as postal items to supported units in theater. Aerial delivery planners determine the optimal delivery method (airdrop, airland, or sling load) based on mission variables.

1-71. When planning or conducting aerial delivery in multinational operations, commanders use the allied or most appropriate doctrine according to the situation. Aerial delivery sustainment planners must be familiar with FM 3-16 to understand multinational operations. AJP-01 establishes the capstone doctrine for North Atlantic Treaty Organization (NATO) military operations. Commanders, staffs, and subordinates ensure that their decisions and actions comply with all applicable U.S., international, and host-nation laws and regulations, and all applicable international treaties and agreements.

1-72. Multinational operations complicate logistics support and reduce the degree of flexibility inherent in a host-nation logistics system. Although responsible for logistics support of their national forces, not all nations have deployable logistics capabilities. Such nations depend on other nations for all or part of their support. In these cases, the multinational force provides deployment and sustainment to military and civilian organizations. For deployment, close liaison with theater airlift command and control helps coordinate approval and facilitate airlift once approved. When support is required, close liaison ensures clear funding lines. See FM 3-16 for additional information on multinational operations.

1-73. Aerial delivery can be used to add flexibility in the military decision-making process. Supply and route overlays and airfield assessments are helpful in making running estimates. See ADP 5-0 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.

1-74. The TSC and ESC SPO officers advise the commander on aerial delivery to support a theater of operations. The SPO officer at the brigade is the commander's advisor for aerial delivery support. The SPO officer will brief the command on the brigade's aerial delivery capabilities to support units in a theater environment and advises the commander on aerial delivery to support a BCT.

1-75. Aerial delivery officers at the sustainment brigade and DSB level plan and determine aerial delivery support for their area of support based on command guidance. The aerial delivery officer in select units at

echelons above brigade is the chief planner for aerial delivery. The aerial delivery officer must always get clear guidance from the command prior to planning any aerial delivery supply.

1-76. The receiving unit selects grid coordinates of the desired DZ. It also marks and secure the DZ, prepares the DZ, removes supplies from the DZ, and retrogrades aerial delivery equipment. When the situation dictates, the receiving unit may become responsible for the destruction of aerial delivery equipment. This should be carried out in accordance with TM 43-0002-1 and as trained on specific system requirements by members of the aerial delivery support unit. The unit requests the necessary pathfinder assets through the G-3.

SPECIAL OPERATIONS FORCES AERIAL DELIVERY

1-77. Army special operations forces (ARSOF) operating and logistics structures differ vastly from Army conventional forces. The special forces groups (SFGs) are the only units within ARSOF that have any type of organic field-level support capabilities. The group support battalion (GSB) within the SFG provides field-level support to the SFG or combined joint special operations task force (CJSOTF) elements when directed by the theater special operations command (TSOC). Sustainment-level aerial delivery support to ARSOF units will be provided on an area basis by the Army Service component commands. United States Army Special Operations Command (USASOC) transformed ARSOF logistics organizations and activities in concert with the Army's concept of modularity and force projection. The new structures enable ARSOF to operate for extended periods of time by allowing them to integrate organic logistics formations into the theater support structures provided by the regional Army Service component commands. They provide for a more relevant expeditionary aerial delivery logistics capability.

1-78. ARSOF are not normally logistically self-sufficient. ARSOF units rely upon regional or geographic combatant command theater infrastructure for virtually all of their support above their organic capabilities. 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 in accordance with AR 56-4.

1-79. Most ARSOF aerial delivery missions must be a prime consideration in the functions of ARSOF and theater logistics units. Logistics resources and priorities must be tailored to the changing ARSOF environment to provide support across the range of military operations. ARSOF aerial delivery logistics units must be flexible and responsive enough to operate from any support-base arrangement. They must be able to operate, survive in hostile environments, and accomplish their missions.

1-80. For additional information on ARSOF aerial delivery capabilities see ATP 3-18.10, ATP 3-75, ATP 3-05.40, and TM 4-48.04.

AERIAL DELIVERY IN THEATER DISTRIBUTION

1-81. Theater distribution is the flow of personnel, equipment, and materiel within theater to meet the geographic combatant commander's missions. Army theater distribution consists of organizations and processes for providing materiel to Army forces, other Services, and multinational partners across a theater of operations.

1-82. Aerial delivery in theater distribution is a complex joint process involving the geographic combatant command and its Service component commands, as well as strategic partners such as the Defense Logistics Agency, United States Transportation Command, and Air Mobility Command. Theater opening requires a seamless strategic-to-operational interface and unity of effort among various commands. *Theater opening* is the ability to establish and operate ports of debarkation (air, sea, and rail), to establish a distribution system and sustainment bases, and to facilitate throughput for the reception, staging, and onward movement of forces within a theater of operations (ADP 4-0). Aerial delivery operations supporting theater distribution must remain seamless to provide for continuous and maximized tactical operations.

1-83. Command and control for theater opening and distribution is performed by either the TSC or ESC. Attached sustainment brigades are normally tasked with theater opening and distribution.

1-84. At the theater level, support is either airlift support or rigging support. Airlift support is normally a USAF function. Rigging support is normally an Army function.

THEATER OPENING

1-85. Theater distribution operations begin with theater opening. In an area 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. Normally, the USAF supports the deployment of Army with air transport of personnel, cargo, and some equipment. The Army arrival/departure airfield control group (A/DACG) assists the Air Mobility Command and deploying unit with receiving, processing, and loading or unloading personnel and equipment.

1-86. Theater opening includes communications, personnel protection, intelligence, civil affairs operations, human resources, financial management, Army Health System support, engineering, movement (air, land, water transport, and terminal operations), materiel management, maintenance, and operational contract support. Theater opening must support the ability for combat forces to get into the fight rapidly.

1-87. Aerial delivery operations in theater opening involve the strategic process of allocating air assets to stage the theater onward movement and sustainment operations. The critical tasks at the theater opening stage include theater reception support, staging and onward movement, distribution management, and initial theater sustainment. Aerial delivery support is a valuable tool in accomplishing theater opening functions. *Distribution management* synchronizes and optimizes transportation, its networks, and materiel management with the warfighting functions to move personnel and materiel from origins to the point of need in accordance with the supported commander's priorities. (ADP 4-0).

1-88. Theater opening functions set the conditions for effective support and lay the groundwork for subsequent expansion of the theater distribution system. As a joint interdependent force, the Army plays a crucial role in opening the theater. Preparing for theater opening operations requires unity of effort among the various commands and a seamless strategic-to-tactical interface. Throughput is an example of this unity of effort and interface. Throughput is the average quantity of cargo and passengers that can pass through a terminal, port, or anchorage on a daily basis. Throughput is usually expressed in measurement tons, short tons, or passengers. Aerial delivery is a key tool for the sustainer and should be integrated into the theater opening plan.

DEFENSE SUPPORT OF CIVIL AUTHORITIES

1-89. Department of Defense (DOD) support to civil authorities may involve aerial delivery. Aerial delivery support may be used in all facets of the defense support of civil authorities mission, including support of national special security events, natural and manmade disasters, civil disturbances, counterdrug operations, humanitarian assistance, or countering transnational threats.

1-90. Aerial delivery support is an important factor in the planning for defense support of civil authorities. Many missions take place in areas where the infrastructure is devastated by a disaster and ground lines of communication are broken. Aerial delivery in defense support of civil authorities can provide logistics support to move supplies to remote areas, extract or evacuate victims, and conduct direct medical support operations. For additional information on Defense Support of Civil Authorities, see ATP 3-28.1.

AERIAL PORTS

1-91. An *aerial port* is an airfield that has been designated for the sustained air movement of personnel and materiel, as well as an authorized port for entrance into or departure from the country where located (JP 3-36). Aerial ports are further designated as either an aerial port of embarkation for departing forces and sustainment, or as an aerial port of debarkation (APOD) for arriving forces and sustainment.

1-92. Air Mobility Command 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.

1-93. The USAF provides lift capabilities to quickly move Army forces across strategic lines of communication to theaters of operations. The USAF, through the Air Mobility Command, provides worldwide cargo and passenger airlift and landing, air refueling, and aeromedical evacuation. Air Mobility Command also provides contingency response elements that provide en route ground support for airlift and airlanding operations.

1-94. During the planning phase of deployment, it is important to identify aerial ports to note aircraft capacity in theater and as an option for sustainment. Reception at the APOD is coordinated by the senior logistics commander and executed by a USAF contingency response group or element and an 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.

1-95. 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

1-96. 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 TM 4-48.09 for information on performing helicopter sling load missions ashore or aboard ship.

THEATER DISTRIBUTION AND SUSTAINMENT

1-97. Theater airlift and airdrop should be planned for in theater and the combatant commander should consider the allocation of air assets for logistics air movement operations within the theater. The sustainment command will determine allocations for airlift based on command priorities. Theater logistics planners must plan for the use of intra-theater aerial delivery support to leverage the commander's ability to anticipate, plan, and execute transitions utilizing the smallest element possible when making initial contact.

1-98. 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 TSC or ESC in coordination with all other elements involved in distribution management. The sustainment plan is an integral part of the operation plan and operation order and assists the commander in designating, weighting, and sustaining the main effort. 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 an operational environment. An *operational environment* is the aggregate of the conditions, circumstances, and influences that affect the employment of capabilities and bear on the decisions of the commander (JP 3-0).

1-99. Distribution managers ensure visibility of theater distribution assets to include aerial delivery platforms and related equipment. This visibility is important in order to continuously consolidate gains and manage the effects of operations on units and Soldiers.

1-100. The theater air distribution channels typically fly missions on set or routine schedules to ensure the logistics pipeline is continuous. Aerial delivery operations assist in providing unrestricted access to keep those logistics channels open. The Air Mobility Command develops integrated aerial distribution route structures based on the needs of the combatant commanders to ensure timely performance through all segments of the joint distribution pipeline.

1-101. Distribution nodes must be strategically placed in theater in order to ensure operational reach and freedom of movement anywhere in theater. A node is a location in a mobility system where a movement requirement is originated, processed for onward movement, or terminated. APODs are nodes of distribution that are critical in support of aerial delivery in theater, although for sling load, pick-up zones may be used in lieu of APODs.

1-102. Multidomain operations require a highly mobile logistics support capability to sustain maneuver brigades. Commanders and logisticians must be prepared to integrate aerial delivery operations into their sustainment plans to provide additional choices to assist commanders in exploiting relative physical, information, and human advantages in pursuit of decision dominance while imposing multiple dilemmas on the enemy. For additional information on theater distribution, see ADP 4-0.

PLANNING CONSIDERATIONS

1-103. Most military operations require the transportation of cargo, personnel, and equipment. Aerial delivery must be incorporated as part of the joint operation planning process and the military decision-making process. Aerial delivery should also be factored in the Army design methodology when constructing an operational approach to solve transport problems. The joint operation planning process is described in JP 5-0. The Army's military decision-making process is described in ADP 5-0. Army organizations conducting multidomain operations should be prepared to receive sustainment by aerial delivery.

1-104. Planning considerations for employment of aerial delivery in deployment and redeployment operations, theater distribution, sustainment operations, and other movement operations are essential to amplify the flexibility, agility, and force multiplier potential in our Army. The execution of aerial delivery must address the operational requirements versus the assets available in support of the mission. Request procedures, recovery and evacuation of equipment, tasks to units, and advantages and disadvantages must be considered in the planning process.

1-105. Planning is essential for a smooth and safe operation, including the coordination of plans with the aviation liaison officer. During the planning phase, planners review the mission, aircraft limitations and requirements, landing site selection, personnel, cargo and cargo weight, air delivery workload, rigging teams, equipment, and recovery rates. Geographic location can also be an aerial delivery planning factor.

1-106. Air lines of communications must be considered in planning aerial delivery support of operations in theater. Intratheater air lines of communications are required to maintain flexibility and effective distribution operations. A campaign or major operation should never depend on a single air line of communications for distribution. A line of communications is a route, either land, water, and/or air, that connects an operating military force with a base of operations and along which supplies and military forces move. Security for air lines of communications is particularly important.

1-107. The amount of cargo and supplies to be transported per mission using aerial delivery is determined by the requesting unit requirements, the priority of support, and the availability of air assets. Planners must synchronize planning efforts to achieve the most effective execution of aerial delivery operations to meet objectives and satisfy mission requirements.

1-108. Planners review the mission, aircraft limitations, landing site selection, cargo, and cargo weight. The aviation liaison officer is responsible for advising and educating ground commanders on all aspects of air operations. The aviation liaison officer plans, coordinates, and requests air assets for the support of aerial delivery operations.

1-109. Planners for aerial delivery operations should consider the employment of pathfinders. Pathfinders provide navigational aid and advisory services to military aircraft in areas designated by supported units. The pathfinders' mission includes providing advice and limited aid to units planning air assault or airdrop operations. They also provide navigational aid and air traffic advisories for fixed and rotary-wing aircraft. This occurs at any phase of an air assault or ground operation that requires sustained support by Army aircraft.

1-110. Aerial delivery request procedures must be clearly established and disseminated to all supported and supporting units in theater prior to operations. Request procedures should be standardized within each theater of operations.

1-111. When planning for aerial delivery operations in theater, capacity is an important consideration that must be addressed and incorporated. Capacity includes the measure of personnel and materiel that can move through the distribution system, and the capability of the infrastructure to support a two-way flow of forces and materiel. The number and sizes of aerial ports available and serviceable in theater also affects the capacity of aerial delivery operations. Availability of transportation assets, MHE, and air and ground transportation determines the capacity of the distribution system to deliver and accept materiel.

1-112. Logisticians performing theater distribution functions define requirements, less capabilities, and identify shortfalls. Aerial delivery equipment stores at all levels, and the health of their associated supply lines, should be prime considerations when assessing the viability of outposts resupplied mainly by aerial delivery.

1-113. The method and mode of delivery must be a consideration when planning any aerial delivery operation. There are many factors that must be incorporated into the delivery method and mode. Methods of aerial delivery are further discussed in chapters 3, 4, and 5 of this publication. Modes of delivery are further discussed in paragraph 1-27 of this publication.

PRE-RIGGED LOADS

1-114. When planning for aerial delivery operations, the pre-rigging of loads should be used where applicable. When conducting automatic or on-call types of aerial delivery for resupply, consider pre-rigging loads. In cases of limited rigging personnel, pre-rigging loads should be considered to prevent burnout of personnel during increased operating tempo. In addition, airborne and special operations organizations that can be designated to deploy on short notice should consider pre-rigged loads for faster delivery of resupply demands.

1-115. 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) should be pre-rigged?** 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 of what other planners have developed.
- **What air delivery equipment and supplies are needed to rig the supplies?** Is rigging equipment not used for existing operations available to supplement the pre-rigging requirement? 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 (if temperature/humidity-controlled environments are not used, airdrop loads may be damaged by environmental conditions, rendering them unable to airdrop). A supply manager will be responsible for maintaining the storage area and pre-rigged supplies. Pre-rigged supplies and equipment must be inventoried for accountability purposes. Each load should be given a unique number. In addition, pre-rigged supplies should be protected and secured to prevent tampering or pilferage.
- **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. Clear lines of authority and execution responsibilities are established early on to prevent the premature release of critical supplies that may cause shortfalls in times of urgent need.
- **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.

- **What about high-risk theaters?** Another planning alternative is to arrange issue of aerial delivery 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 aerial delivery equipment. This makes the unit lighter and more deployable. It also reduces the early transportation requirement for aerial delivery equipment.
- **Who should build pre-rigged loads?** Coordinate use of U.S.-based parachute riggers to build pre-rigged loads.

AIRLAND PLANNING

1-116. The use of airland operations should be weighed and scheduled judiciously. 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.

1-117. 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 this case, cargo is delivered as far forward as feasible for further movement by Army or contract rotary-wing aircraft, or by ground transportation.

1-118. The minimum considerations when planning airland operations are listed below:

- The tactical situation and threat of enemy air defense systems.
- The expected conventional and nonconventional threats throughout the mission.
- Countries granting overflight 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.
- Distances of lines of communication between suitable airfields, APODs, bases, and remote base camps.
- Airspace considerations, including 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 capacity.

AIRDROP PLANNING

1-119. At echelons above brigade, the logistics officer has overall responsibility for logistics planning and the operations officer sets priorities. Within the respective support command, the SPO officer determines if airdrop is the most suitable method of shipment. If the decision is made to use airdrop, the SPO officer and the aerial delivery officer coordinate this activity. 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 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.

1-120. The airdrop systems technician or senior enlisted parachute rigger serves as the subject matter expert at the battalion and brigade level. These subject matter experts work directly with the SPO officer and aerial delivery officer to advise the command on what they can airdrop, how the equipment should be airdropped, and how to set up and support an aerial delivery mission.

1-121. The airdrop systems technician at the company and facility 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. To ensure equipment is rigged in time to support ground units, there must be secure and open lines of communication between the facility or company level and the brigade or battalion level. Senior airdrop operations noncommissioned officer (NCO) duties are performed at the TSC or ESC level, where the senior airdrop systems technician directs the planning and coordination of aerial delivery in support of airdrop resupply. The senior enlisted parachute rigger serves as the link to the airdrop rigger shed to ensure the required enlisted personnel are available.

ARMY SPECIAL OPERATIONS PLANNING CONSIDERATIONS

1-122. In support of the United States Special Operations Command and United States Army Special Operations Command's future concepts for initial entry, surgical strike, or unconventional warfare, planners must plan for non-organic aerial delivery equipment requirements, such as heavy airdrop (Type V platform loads in a low-velocity or precision airdrop configuration) as soon as possible. *Unconventional warfare* consists of activities conducted to enable a resistance movement or insurgency to coerce, disrupt, or overthrow a government or occupying power by operating through or with an underground, auxiliary, and guerrilla force in a denied area (JP 3-05). The expeditious requirement to deploy a special operations task force (SOTF) aerial delivery element will challenge planners to meet high-capacity airdrop and non-organic aerial delivery equipment requirements. Additionally, theater aerial delivery support is required for SOF sustained or high-capacity aerial delivery requirements. As such, TSOCs should routinely call upon the theater aerial delivery company (TADC) in training to enhance contingency readiness.

1-123. Placement of ARSOF aerial delivery subject matter experts in key staff positions within the joint special operations task force (JSOTF), CJSOTF, and TSOC as aerial delivery officers will greatly enhance effectiveness and efficiency of SOF aerial delivery under expeditionary or sustained conditions. ARSOF aerial delivery subject matter experts are the most proficient in executing integrated and synchronized aerial delivery logistics because of their experience and institutional knowledge of SOF aerial delivery.

1-124. When planning the logistical requirements generated from operational plans, all ARSOF aerial delivery elements must ensure they consider the integrated logistics aerial resupply concepts outlined in AR 56-4. This is especially valid for the SOF sustainment brigade Army logistics element and SPO.

1-125. Given ARSOF's mission, retrograde of aerial delivery equipment is projected at zero percent. When practical, retrograde of aerial delivery equipment will be practiced. Low cost or expendable aerial delivery equipment is preferred for the SOF aerial delivery environment.

OTHER CONSIDERATIONS

1-126. Forecasting assets and demand of supplies, to include cargo and personnel movements in theater, helps determine the number of deliveries and movements required to support the demands. The demand determines the preplanned flow of cargo and personnel and mode of transportation. If air is assigned as the mode of transportation, plans must be made to fill demand based on available aerial delivery assets.

1-127. The availability of aerial delivery equipment is limited. The 4-48 series technical manuals and applicable operation plans or orders can be used to determine the amount and types of equipment required. Planners must anticipate the equipment that will be returned to ensure there is enough equipment on hand for

follow-on missions or to plan for alternatives. However, they must assume that some of the equipment used for airdrop operations will not be recovered and serviceable for follow-on missions. Planning for aerial delivery operations must include the likely chance of low equipment recovery rates. Retrograde of low-cost aerial delivery equipment is typically assumed to be zero.

1-128. Enemy activity and threat levels must be a planning consideration in all aspects of operations in a theater of operations. Security of the airdrop support unit's AO must be considered to repel threats. The aerial threat, such as enemy ground-to-air attacks or aerial attacks, must be considered in selecting the method or mode of delivery, the time of delivery, and the route.

1-129. Planners must understand the current force structure intended to support the maintenance and handling of personnel and cargo parachutes and associated equipment. Organizations with paid parachute positions have requirements to conduct personnel parachute operations and require support for the packing and maintenance of personnel parachute systems. Airborne units, SOF, and other supported units require airdrop, airland, and sling load support. Planners must ensure there are adequate personnel available to support airdrop, airland, and sling load requirements, and that the force structure facilities support all echelons. Units conducting aerial delivery support must ensure they are aware of all units they could potentially support in a theater of operations.

1-130. As shortfalls are identified, alternatives will be planned to minimize the impact on the mission. For example, strategic pre-rigging or pre-packaging may be used to solve the early-on shortfall. However, dry, secure, and possibly environmentally controlled storage facilities must be acquired, preferably close to the departure airfield. Scheduled in-storage inspections need to be performed, especially for supplies having limited shelf lives such as Class I, Class III, and certain petroleum, oil, and lubricant products. If water is required, plans should be made to fill the prepositioned containers as the deployment is conducted.

Chapter 2
Aerial Delivery Organizations and Roles

The aerial delivery force structure is highly specialized, and it should be in place and ready to support when hostilities first erupt. This chapter discusses Army aerial delivery organizations and roles within and outside of the Army that enable aerial delivery operations. It also examines Army command and support relationships and discusses SOF and multinational support.

ARMY AERIAL DELIVERY ORGANIZATIONS

2-1. Army aerial delivery organizations are responsible for providing personnel parachute packing support, cargo parachute pack for heavy drop, rigging support, and ADER. This support is provided at the theater, corps, division, and BCT levels. To be successful, airland and airdrop operations require extensive Army and USAF support structure, working as a team with complementary skill sets. Most of the support structure is common to both modes of aerial distribution and is generally not fixed to a specific location. Rather, the support structure is comprised of provisional units organized and equipped to provide the required capabilities for the mission.

2-2. Each organization is designed to support both personnel parachute packing requirements and cargo heavy drop. At the theater level, aerial delivery units provide area operations support to Army, USAF, and other Services and organizations operating in theater. At the corps level, aerial delivery units provide aerial resupply and support airborne operations for those units operating in the corps AO. At the division level, aerial delivery units provide support to the airborne division and other division level organizations requiring aerial delivery support. At the BCT level, aerial delivery organizations support the airborne BCT.

2-3. The companies and airdrop advisor staff cells plan, manage, supervise, and administer aerial delivery support during deployments. The corps, division, and brigade parachute offices are the airdrop advisor staff cells at each level. The parachute office provides technical oversight for aerial delivery operations.

2-4. Each level (theater, corps, division, and brigade) of airborne organization has required capabilities that must be employed to be mission effective. These required capabilities are divided into three categories: personnel parachute, cargo rigging/cargo pack, and ADER.

2-5. Army aviation organizations support aerial delivery by providing rotary-wing aircraft for sling load, airborne, air assault, and certain airdrop operations.

2-6. Other organizations related to aerial delivery are the materiel system suppliers and capability developers. Although these organizations do not directly affect operations in theater, the aerial delivery systems acquired by these organizations affect capabilities and operations in theater. These organizations must receive feedback from the aerial delivery and U.S. forces in theater to enhance and maximize those capabilities and systems.

THEATER SUPPORT

2-7. Army Service component commands must ensure adequate theater airlift and airdrop force structure is in place to ensure that current airdrop doctrine is identified in order to support theater aerial delivery requirements and to fill unit shortfalls.

2-8. It is important for senior aerial delivery organizations and personnel to advise higher and subordinate commands on available aerial delivery capabilities, as well as to identify those capabilities to supported units. This advice includes all aspects of airdrop, airland, and sling load operations.

2-9. The following paragraphs identify Army and DOD organizations at all levels that support the accomplishment of aerial delivery operations in theater.

UNITED STATES ARMY MATERIEL COMMAND

2-10. United States Army Materiel Command (USAMC) monitors cargo and personnel parachute systems, parachute recovery, and airdrop systems and support. USAMC provides depot support, supply and maintenance, and customer assistance for all cargo and personnel parachute systems, parachute recovery, and airdrop systems.

2-11. In addition, USAMC ensures sustained proficiency of all technicians performing depot maintenance, inspection of cargo and personnel parachute systems, parachute recovery, and airdrop systems.

U.S. ARMY TANK-AUTOMOTIVE AND ARMAMENTS COMMAND

2-12. The U.S. Army Tank-Automotive and Armaments Command provides logistical functions for all cargo and personnel parachute systems, parachute recovery, airdrop systems, and related components, except for cartridge-actuated device/propellant- actuated device components. These are prescribed in AR 70-47, AR 700-127, and AR 750-1.

2-13. This organization also develops and publishes the required supply, operational maintenance, and safety instructions pertinent to the operations and maintenance of cargo and personnel parachute systems, parachute recovery, airdrop systems, and related components (except for cartridge actuated-devices or propellant-actuated devices [unless granted by exception]).

ARMY FIELD SUPPORT BRIGADE

2-14. The Army field support brigade and its subordinate units provide tactical, operational, and strategic-level support throughout the region. This support includes acquisition, logistics, and technology-related sustainment support to Army, joint, and multinational forces. The Army field support brigade also provides support to other government agencies as directed by Army Sustainment Command, USAMC, or supported senior commanders. It ensures an adequate supply of all munitions, components of cargo and personnel parachute systems, parachute recovery, airdrop systems, and related components. It also prepares publications detailing the required supply, maintenance, disposal, and safety instructions pertinent to munitions, components of cargo and personnel parachute systems, parachute recovery, airdrop systems, and related components. In addition, the Army field support brigade maintains records of all malfunction investigations involving munitions. These are reported in accordance with AR 59-4.

DEFENSE LOGISTICS AGENCY

2-15. The Defense Logistics Agency Distribution's mission is to provide distribution services to enhance the readiness of the DOD. This is accomplished through effective and efficient receipt, storage, control, shipment, and disposal of materiel. The Defense Logistics Agency also coordinates material management and distribution of aerial delivery equipment, optimizing all resources with a focus on safety, quality, and continuous process improvement.

THEATER SUSTAINMENT COMMAND AND EXPEDITIONARY SUSTAINMENT COMMAND

2-16. The TSC is responsible for planning, resourcing, monitoring, and analyzing transportation operations and providing field service support to deployed Army forces.

2-17. In theater, the TSC and ESC manage theater-level aerial delivery in close coordination with the transportation directorate and the USAF theater air operations center. The transportation operations section of the distribution management center has a senior airdrop systems technician and operations NCO.

2-18. The senior airdrop technician for the TSC is the senior airborne and airdrop advisor for theater. The senior airdrop systems technician is responsible for providing guidance to commanders and staff with the mission of conducting and receiving airborne and airdrop operations. In addition, the senior airdrop technician recommends and writes maintenance, storage, supply, and other technical policies for the theater

of operations and aids commanders and staff sections in the effective use of integrated logistics aerial resupply. The senior airdrop systems technician also serves as the primary aerial delivery subject matter expert for installation-level safety investigation boards.

2-19. The senior airdrop operations NCO for the TSC advises on airborne operational matters and performs liaison between commanders, staff, and supporting and supported personnel, including USAF support. The senior airdrop operations NCO also supervises operations of organizations performing airborne and airdrop missions.

2-20. The TSC is responsible for managing the visibility of aerial delivery platforms, as well as the synchronization and support of retrograde aerial delivery platforms. In addition, the TSC is responsible for evaluating and ensuring airdrop and aerial delivery equipment stock availability in supply support activities (SSAs), Army pre-positioned stocks, and war reserve storage in areas of operation. This ensures supplies and equipment are available in storage in support of operations in theater.

SUSTAINMENT BRIGADE AND DIVISION SUSTAINMENT BRIGADE

2-21. The sustainment brigade or DSB aerial delivery section is responsible for planning, managing, and advising on all aerial delivery operations in its AO. The aerial delivery section in each of these formations is normally under the SPO field services section.

2-22. The sustainment brigade or DSB aerial delivery section provides oversight of aerial delivery operations to subordinate aerial delivery units by inspecting facilities, equipment, and manpower. Subordinate aerial delivery units are normally attached to a combat sustainment support battalion (CSSB) or a division sustainment support battalion (DSSB).

2-23. The aerial delivery section in the sustainment brigade or DSB SPO staff normally has an aerial delivery officer and a senior airdrop systems technician. The aerial delivery officer and senior airdrop systems technician advise the commander on all aerial delivery-related activities, both for internal and external support, capabilities, readiness, and safety.

2-24. The senior airdrop technician for the sustainment brigade or DSB is the senior airdrop advisor for the brigade AO. The senior airdrop systems technician is responsible for providing guidance to commanders and staff with the mission of conducting and receiving airborne and airdrop operations. Additionally, the senior airdrop technician may supervise airdrop rigging activities, ADER activities, and packing and inspecting of parachutes, and maintain compliance standards and criteria for life support systems and other aerial delivery equipment.

2-25. The senior airdrop operations NCO for the sustainment brigade or DSB advises on aerial delivery operational matters and performs liaison between commanders, staff, and supporting and supported personnel, including USAF support. The senior airdrop operations NCO also supervises operations of organizations performing airborne and resupply by airdrop missions.

2-26. The sustainment brigade or DSB is responsible for managing the visibility of aerial delivery platforms as well as synchronizing and supporting retrograde operations of aerial delivery platforms.

COMBAT SUSTAINMENT SUPPORT BATTALION AND DIVISION SUSTAINMENT SUPPORT BATTALION

2-27. The CSSB and DSSB (Airborne) (light) provide aerial delivery support to their AO through subordinate aerial delivery companies. Aerial delivery companies are normally associated with the supply and services function of the CSSB or DSB as a field service.

2-28. The CSSB or DSB normally provides religious, legal, Army Health System, financial management, and supplemental transportation support and personnel and administrative services to subordinate aerial delivery companies.

2-29. The aerial delivery 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, performs training, and provides technical assistance to airborne units.

THEATER AERIAL DELIVERY COMPANY

2-30. The TADC provides personnel pack, ADER, cargo rigging, and cargo packing support for the theater area. It provides personnel pack, ADER, rigging platform loads, and airdrop containers for support to the theater of up to 40 short tons per day and 1,200 parachutes per month in a deployed environment. The TADC consists of a company headquarters platoon, a personnel pack/ADER platoon, and a cargo pack and rigging platoon.

2-31. The company commander provides information and status on company operations to higher headquarters staff. The company headquarters provides command and control, unit level administration, supply, CBRN defense support to unit personnel, and supervision of the technical operation of the company and its platoons. Figure 2-1 depicts the organization of the TADC.

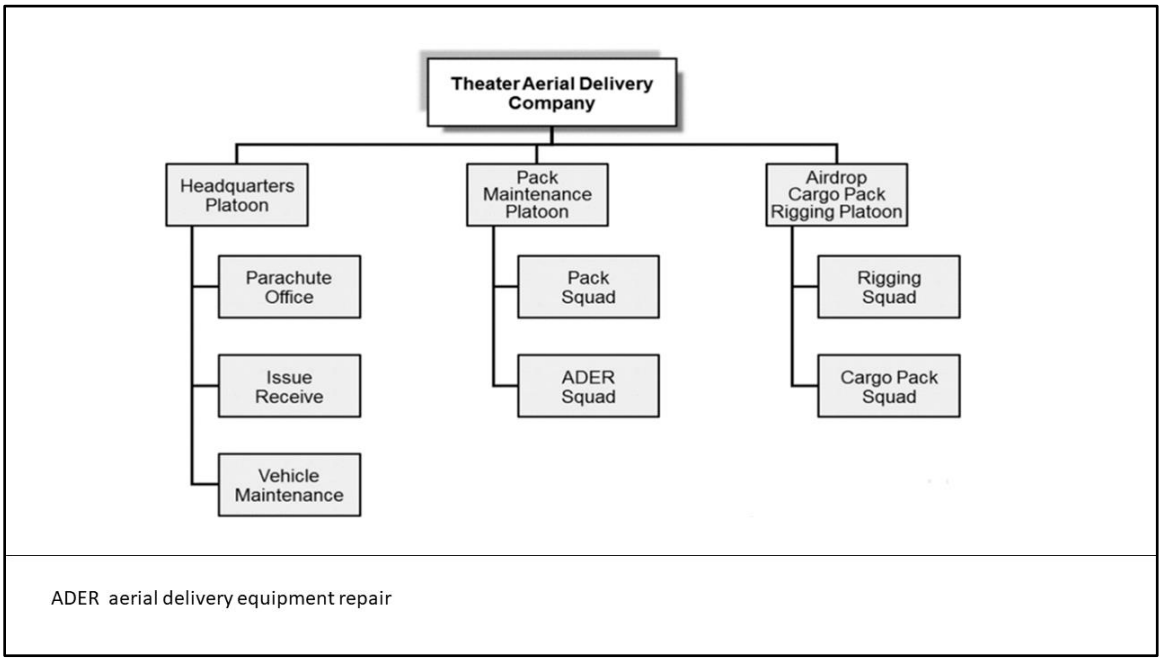

Figure 2-1. Theater aerial delivery company

2-32. Within the company headquarters, the parachute office provides operational planning and task execution supervision for all aerial delivery operations. Also in the headquarters, the issue/receive section provides required in-storage and ready-for-issue inspections storage of all parachutes packed by the personnel and cargo pack squads. The section also issues personnel parachutes to all supported units and provides cargo parachutes used for cargo rigging. They also receive parachutes after airborne operations, and conduct shakeout tower operations in preparation for repacking by the personnel or cargo pack squads.

2-33. The personnel pack/ADER platoon consists of a platoon headquarters, a personnel pack squad and an ADER squad. The platoon headquarters provides leadership, planning, supervision, and technical guidance to the squads and maintains airborne and parachute rigger training records for personnel. The platoon headquarters also supports limited requisitioning, receipt, storage, and issue of aerial delivery equipment. The personnel pack squad provides personnel parachute packing and in-process inspection. The ADER squad performs inspection, repair, and fabrication of all aerial delivery equipment, including personnel parachutes and cargo parachutes.

2-34. The rigging/cargo pack platoon consists of a platoon headquarters, a rigging squad, and a cargo pack squad. The headquarters platoon provides leadership, planning, supervision, and technical guidance to the squads and maintains airborne and parachute rigger training records for personnel. The platoon headquarters

also supports limited requisitioning, receipt, storage, and issue of aerial delivery equipment. The rigging squad rigs aerial delivery platform loads and airdrop containers for airdrop assaults. The squad also provides training and technical assistance in preparing supplies and equipment for delivery by airdrop to the theater area. The squad can also provide limited movement of equipment and supplies that are rigged for airdrop. The cargo pack squad provides cargo parachute packing and in-process inspections for large and small parachutes.

AIRBORNE CORPS AND DIVISION SUPPORT

2-35. The corps parachute office is an airdrop advisor staff cell, responsible for all corps and division area static line parachuting initiatives and policy updates, as the lead for conventional airborne forces. The corps parachute office is staffed by a senior airdrop officer, a master airdrop advisor, and airdrop operations personnel. The corps parachute office serves as the technical representative for all aerial delivery operations to the airborne corps. This corps parachute office is normally located at the headquarters and headquarters battalion of an airborne corps.

2-36. The division parachute office is an airdrop advisor staff cell, responsible for airdrop planning for the global response force. The division parachute office is staffed by an airdrop officer, senior airdrop advisor, and senior airdrop operations NCO. The division parachute office serves as the senior airdrop planner and advisor to the airborne division and is the key technical advisor for the commander. The division parachute office is located with the airborne division DSB staff.

2-37. The corps aerial delivery company (CADC) provides airborne corps support for cargo rigging, cargo pack support, and personnel parachute packing support.

2-38. The division aerial delivery company (DADC) and division personnel pack company (DPPC) provide cargo rigging, cargo pack support, and personnel parachute packing support to an airborne division.

Corps Aerial Delivery Company

2-39. The CADC provides support to the airborne corps. The CADC is normally assigned to an ESC in support of an airborne corps. The CADC is dependent upon appropriate elements of the ESC, sustainment brigade, DSB, DSSB, or CSSB for religious, legal, Army Health System, financial management, and supplemental transportation support and personnel and administrative services. Figure 2-2 on page 2-6 depicts the organization of the CADC.

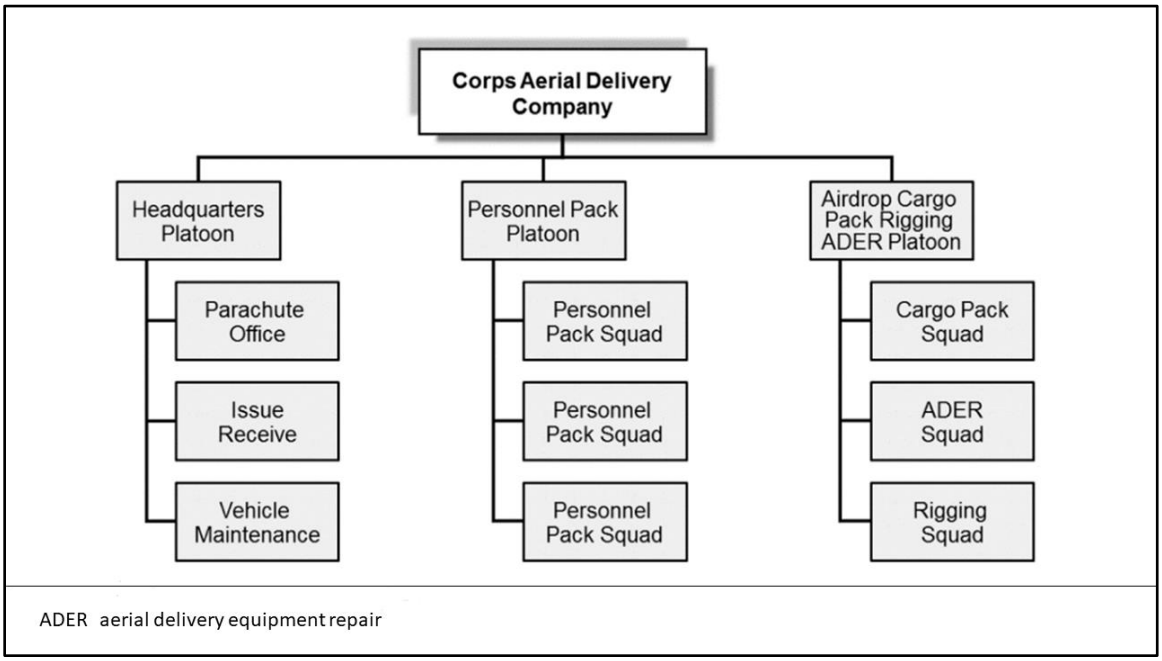

Figure 2-2. Corps aerial delivery company

2-40. The CADC rigs aerial delivery platform loads and airdrop containers for an airborne corps or theater area of up to 40 short tons per day and 3,600 parachutes per month in a deployed environment. The CADC consists of a company headquarters, a personnel pack platoon, and a cargo rigging platoon.

2-41. The company commander provides information and status on company operations to higher headquarters staff. The company headquarters provides command and control, unit level administration, supply, and CBRN defense support to unit personnel. It also provides field-level maintenance on organic unit equipment and supervision of the technical operation of the company and its platoons.

2-42. Within the company headquarters, the parachute office provides operational planning and task execution supervision for all aerial delivery operations. The issue/receive section provides storage of all parachutes packed by the personnel and cargo pack squads. The section issues personnel parachutes to all supported units and provides cargo parachutes to be used for cargo rigging. The section also receives parachutes after airborne operations and conducts shakeout tower operations in preparation for repacking by the personnel or cargo pack squad.

2-43. The personnel pack platoon consists of a platoon headquarters and three pack sections. The platoon headquarters provides leadership, planning, supervision, and technical guidance to the squads assigned to the platoon. The personnel pack platoon has three squads who provide personnel parachute packing and in-process inspection.

2-44. The cargo/rigging platoon consists of a platoon headquarters, a rigging squad, a cargo pack squad, and an ADER squad. The headquarters platoon provides leadership, planning, supervision, and technical guidance to the squads assigned to the platoon. The platoon also supports limited requisitioning, receipt, storage, and issue of aerial delivery equipment.

2-45. Within the platoon, the rigging squad rigs aerial delivery platform loads and airdrop containers for airdrop assaults. This squad also provides training and technical assistance to the airborne corps and theater area in preparation for delivery of supplies and equipment by aerial delivery. The rigging squad also provides limited movement of equipment and supplies that have been rigged for airdrop. The cargo pack squad provides cargo parachute packing and in-process inspections for large and small parachutes. The ADER squad performs inspection, repair, and fabrication of all aerial delivery equipment, including personnel parachutes and cargo parachutes.

Division Aerial Delivery Company

2-46. The DADC is assigned to the DSSB (Airborne) (light). The DADC is dependent upon appropriate elements of the DSSB (Airborne) (light) for religious, legal, Army Health System, financial management, and supplemental transportation support and personnel and administrative services. An approved aerial delivery force design update adjusted the two division aerial delivery companies currently assigned to the airborne division, making them organic to the division. This adjustment resulted in the companies changing from a numerical unit to a lettered unit and closed the potential aerial delivery gap for the airborne division.

2-47. The DADC provides ADER and rigging of platform loads and airdrop containers in support of an airborne division of up to 200 short tons per day in a deployed environment. The DADC consists of a company headquarters, an ADER platoon, and two cargo pack platoons.

2-48. The company headquarters provides information and status on company operations to the DSSB commander and staff. The company headquarters provides command and control, unit-level administration, supply, and CBRN defense support to unit personnel, field level maintenance on organic unit equipment, and supervision of the technical operation of the company and its platoons. Figure 2-3 depicts the organization of the DADC.

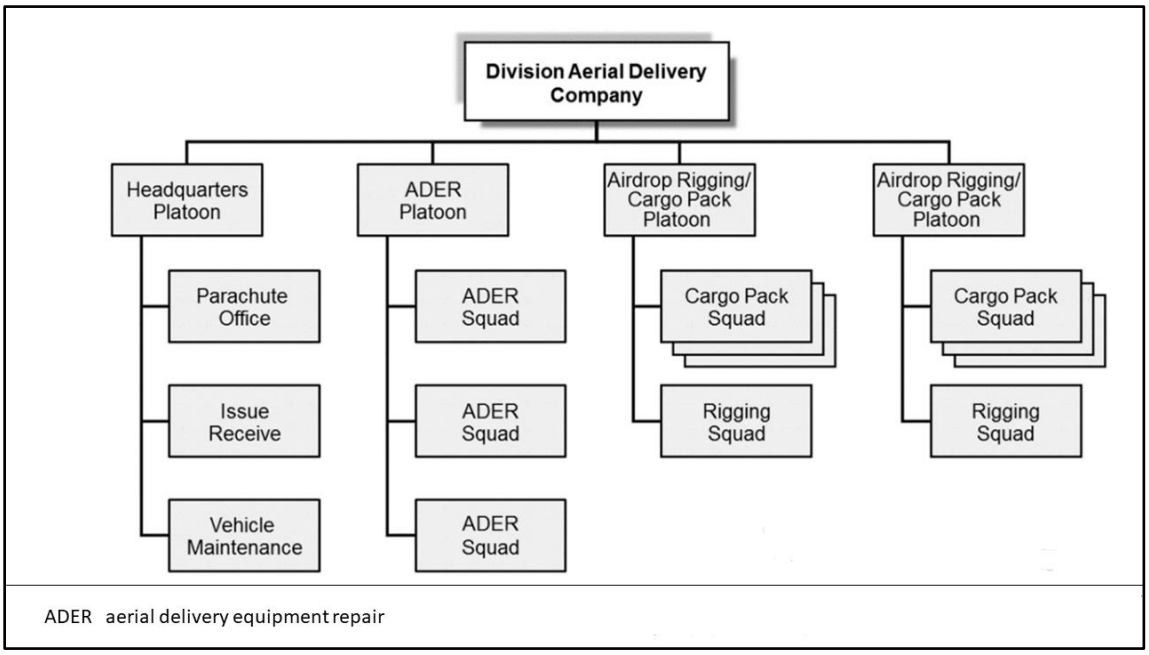

Figure 2-3. Division aerial delivery company

2-49. Within the company headquarters platoon, the parachute office provides operational planning and task execution supervision for all aerial delivery operations. The issue/receive section provides storage of all parachutes packed by the cargo pack squads. This section provides 24-hour operations and provides parachutes to be used for cargo rigging. This section receives parachutes after airborne operations and conducts shakeout tower operations in preparation for repacking by the cargo pack squad.

2-50. The ADER platoon consists of a headquarters platoon and three ADER squads. The headquarters provides leadership, planning, supervision, and technical guidance to the squads assigned to the platoon. The platoon headquarters also supports limited requisitioning, receipt, storage, and issue of aerial delivery equipment. The three ADER squads perform inspection, repair, and fabrication of all aerial delivery equipment, to include cargo parachutes.

2-51. The two airdrop cargo/rigging platoons consist of a platoon headquarters, one rigging squad, and three cargo pack squads. The headquarters provides leadership, planning, supervision, and technical guidance to the squads assigned to the platoon. The rigging squad rigs platform loads and airdrop containers for airdrop assaults. The squad provides training and technical assistance to an airborne division in preparation for

delivery of supplies and equipment by aerial delivery, and limited movement of equipment and supplies that have been rigged for airdrop. The cargo pack squads provide cargo parachute packing and in-process inspections for large and small parachutes.

Division Personnel Pack Company

2-52. The DPPC is normally assigned to a DSSB (Airborne) (light) in support of an airborne division. The DPPC depends upon appropriate elements of the DSSB (Airborne) (light) for religious, legal, Army Health System, financial management, and supplemental transportation support and personnel and administrative services.

2-53. The DPPC provides personnel packs of up to 13,500 personnel parachutes per month for an airborne division in a deployed environment. The DPPC consists of a company headquarters and three identical personnel pack platoons.

2-54. The company headquarters provides information and status on company operations to the DSSB commander and staff. The company headquarters provides command and control, unit level administration, supply, CBRN defense support to unit personnel, field-level maintenance on organic unit equipment, and supervision of the technical operation of the company and its platoons. Figure 2-4 depicts the organization of the DPPC.

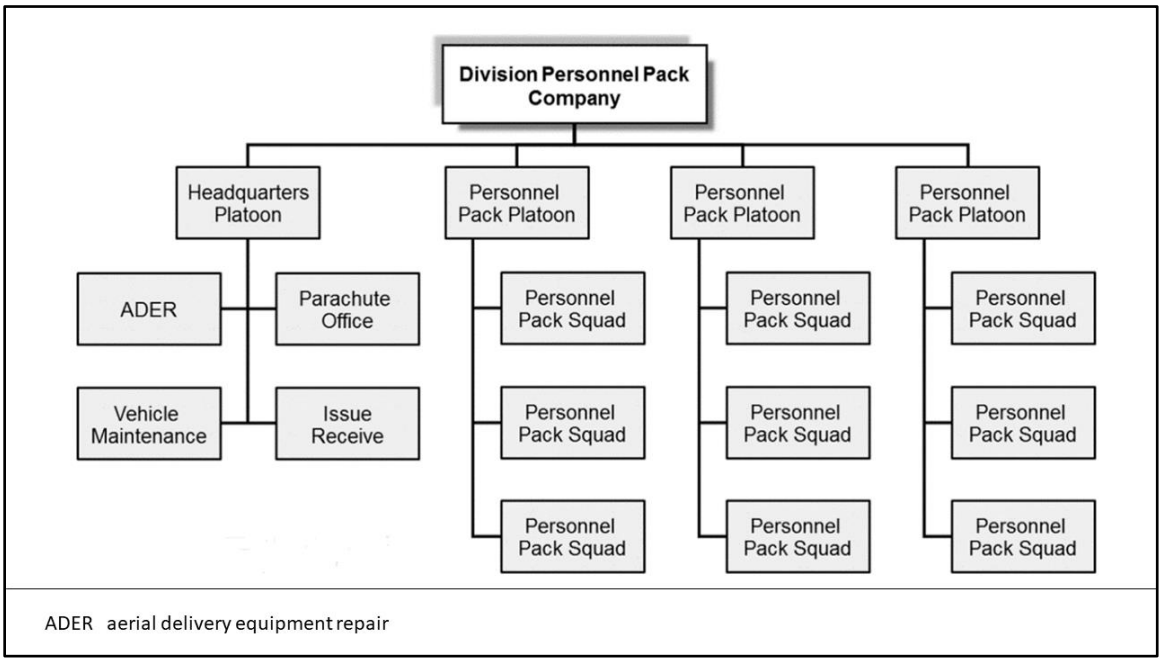

Figure 2-4. Division personnel pack company

2-55. Within the company headquarters, the parachute office provides operational planning and task execution supervision for all aerial delivery operations. The ADER section performs limited inspection, repair, and fabrication of all aerial delivery equipment, including personnel parachutes and cargo parachutes. The issue/receive section provides storage of all parachutes packed by the personnel pack platoons. Issue/receive personnel provide 24-hour operations and issue parachutes to all supported units. This section also receives parachutes after airborne operations and conducts shakeout tower operations in preparation for repacking by the personnel pack squad.

2-56. Each of the three personnel pack platoons consists of a platoon headquarters and three pack squads. The platoon headquarters provides leadership, planning, supervision, and technical guidance to the squads.

2-57. The personnel pack squads pack parachutes and conduct in-process and final pack inspections.

BRIGADE COMBAT TEAM (AIRBORNE)

2-58. The brigade parachute office is the airdrop advisor staff cell planner for all aerial delivery operations and serves as the key technical advisor to the commander. The brigade parachute office is staffed by a senior airdrop systems technician and airdrop operations NCO. The brigade parachute office is only located in the brigade support battalion (BSB) (Airborne) in separate airborne infantry BCTs.

2-59. The BSB (Airborne) provides aerial delivery support to the infantry BCT (Airborne) through the brigade aerial delivery support company (BADSC). The BADSC provides personnel packing support in the brigade area. The BSB SPO manages and oversees the BADSC.

BRIGADE AERIAL DELIVERY SUPPORT COMPANY

2-60. The BADSC is assigned to an infantry BCT (Airborne). The BADSC depends upon appropriate elements of the BSB for religious, legal, Army Health System, financial management, and supplemental transportation support and personnel and administrative services.

2-61. The BADSC provides personnel pack, ADER, cargo rigging, and packing support for an infantry BCT (Airborne). The BADSC provides cargo pack support for up to 67 short tons per day and 3,500 personnel parachutes per month in a deployed environment. The BADSC consists of a headquarters platoon, a pack/ADER platoon, and a cargo pack/rigging platoon.

2-62. The company headquarters provides information and status on company operations to the brigade commander and staff. The company headquarters provides command and control, unit-level administration, supply, and CBRN defense support to unit personnel. It also conducts field-level maintenance on organic unit equipment and supervises the technical operation of the company and platoons. Figure 2-5 depicts the organization of the BADSC.

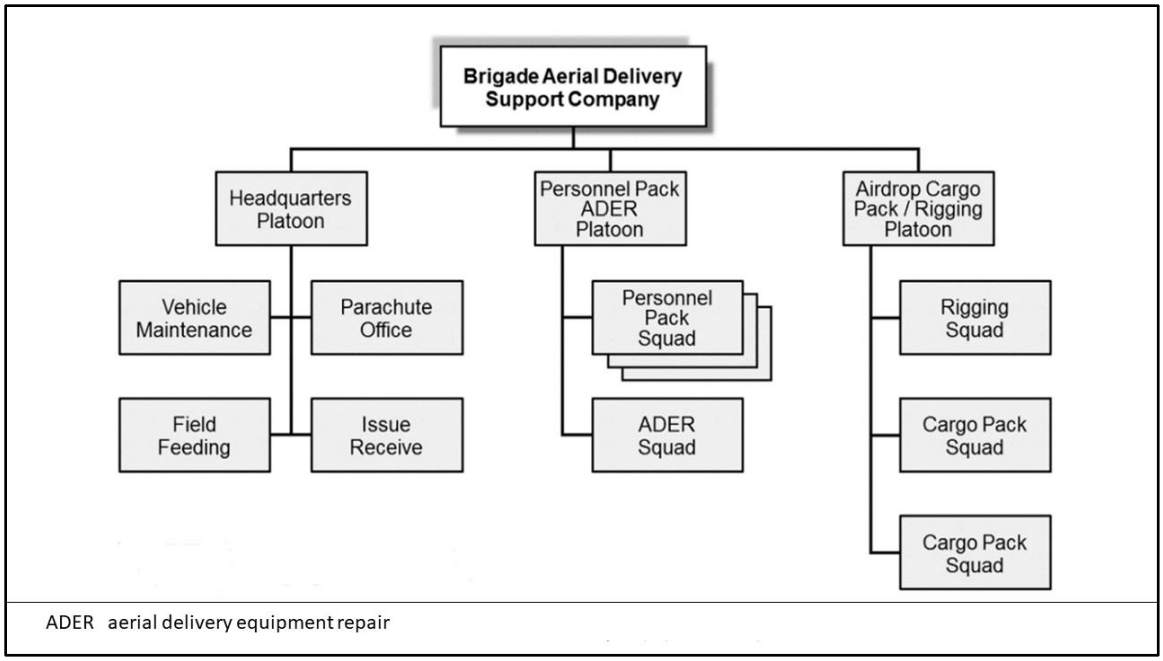

Figure 2-5. Brigade aerial delivery support company

2-63. Within the company headquarters, the parachute office provides operational planning and task execution supervision for all aerial delivery operations. The issue/receive section provides storage of all parachutes packed by the personnel and cargo pack squads. This section provides 24-hour operations, issues personnel parachutes to all supported units, and provides cargo parachutes to be used for cargo rigging. The issue/receive section also receives parachutes after airborne operations and conducts shakeout tower operations in preparation for repacking by the personnel or cargo pack squads.

2-64. The pack/ADER platoon consists of a platoon headquarters, three pack squads, and an ADER squad. The platoon headquarters provides leadership, planning, supervision, and technical guidance to the squads assigned to the platoon. The platoon headquarters also supports limited requisitioning, receipt, storage, and issue of aerial delivery equipment. The personnel pack squads provide personnel parachute packing and in-process inspections. The ADER squad performs inspection, repair, and fabrication of all aerial delivery equipment, including personnel and cargo parachutes.

2-65. The cargo/rigging pack platoon consists of a platoon headquarters, two cargo pack squads, and a rigging squad. The platoon headquarters provides leadership, planning, supervision, and technical guidance to the squads assigned to the platoon. The platoon headquarters also supports limited requisitioning, receipt, storage, and issue of aerial delivery equipment.

2-66. The two cargo pack squads provide cargo parachute packing and in-process inspections for large and small parachutes. The rigging squad rigs platform loads and airdrop containers for airdrop assaults. The squad also provides training and technical assistance to supported units in order to prepare for aerial delivery of supplies and equipment. It also provides limited movement of equipment and supplies that have been rigged for airdrop.

RIGGER SUPPORT TEAM

2-67. Rigger support teams are echelon above brigade units that provide support to National Guard SOFs. Each rigger support team performs personnel and cargo parachute packing and field-level maintenance on aerial delivery equipment. Rigger support teams capabilities include:

- Packing personnel parachute systems (including military free fall parachute systems), cargo parachutes, and cargo rigging.
- Conducting joint inspection of supplies and equipment loaded in aircraft for airdrop.
- Providing supervision, technical assistance, and advice in the recovery and evacuation of aerial delivery equipment.

ARMY COMMAND AND SUPPORT RELATIONSHIPS

2-68. Command and support relationships are designated in appropriate operation orders, but they may change due to mission or operational variables. Command relationships define command responsibility and authority. Support relationships define the desired purpose, scope, and effect when one capability supports another.

COMMAND RELATIONSHIPS

2-69. Aerial delivery organizations are usually assigned to a TSC in support of Army airborne units in theater.

2-70. In airdrop operations, the JFC makes the decision to continue, cancel, or postpone airdrop operations based on the recommendations of the ground and air component commanders. The airborne force commander and airlift mission commander should coordinate with each other throughout aerial delivery planning and mission execution.

2-71. The airlift mission commander should also coordinate with the supported force commander before determining the tactics to employ. Many factors influence this decision, including the size of DZs, surrounding terrain features, tactical scheme of maneuver, enemy air defenses, and en route and objective area weather.

SUPPORT RELATIONSHIPS

2-72. Sustainment command organizations are responsible for providing aerial delivery support (minus the air transportation support) to the theater. The USAF and Army aviation units provide air transportation support to all units in theater. Sustainment commanders task organize sustainment battalions based on the mission, demand, and size of the supported force. This task organization includes aerial delivery companies at various levels in theater.

2-73. Airdrop resupply is a joint action between the USAF and the component being supported. Supported components are responsible for providing required supplies, rigging them for airdrop, and delivering them to the departure airfield. The supported component is also responsible for loading the supplies onto the airdrop aircraft under supervision of USAF personnel.

SPECIAL OPERATIONS FORCES SUPPORT

2-74. Forward-deployed ARSOF units usually operate in isolated and austere locations. Supply and distribution are vital considerations. Aerial delivery provides essential capabilities for resupply, distribution, and airborne operations to ARSOF organizations. ARSOF units possess only limited organic airdrop resupply capability. The theater commander is responsible for tasking aerial delivery organizations at various levels to support SOF in theater.

2-75. ARSOF aerial delivery involves all types and methods of air-to-ground delivery of equipment and supplies. Special forces, Ranger, 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. SOF riggers can provide limited personnel parachute packing to ARSOF elements, unit-level maintenance of air delivery items, and limited airdrop capability. The ability to accomplish both aerial delivery and parachute packing functions simultaneously either does not exist or is limited (depending on the section). The group and battalion aerial delivery sections do not have the capability to conduct sustained airdrop support for special forces operations. ARSOF formations may be required to provide rigger personnel augmentation to the JSOTF and SOTF aerial delivery elements for sustainment. Theater aerial delivery support is required when ARSOF organic capabilities are exceeded.

528TH SUSTAINMENT BRIGADE (SPECIAL OPERATIONS) (AIRBORNE)

2-76. The mission of the 528th Sustainment Brigade (Special Operations) (Airborne) is to establish the operational-level logistics conditions needed to enable ARSOF missions. This includes aerial delivery requirements such as establishing the staff aerial delivery officer within the JSOTF and SOTF logistics staffs. Using forward-stationed logistics elements as well as modular and deployable SPO cells, the 528th Sustainment Brigade ensures logistical requirements generated from operational plans developed at the TSOC are integrated and synchronized with the Army Service component command's support plan. These considerations include the ability to support projected sustained and high capacity common-user logistics (CUL) aerial delivery requirements.

2-77. The 528th Sustainment Brigade's special troops company is an Army National Guard organization designed to augment and round out the sustainment brigade. The special troops company provides limited aerial delivery capability.

2-78. SOTF aerial delivery is dependent on the 528th Sustainment Brigade's coordination of ARSOF elements forming the SOTF aerial delivery element to ensure all non-organic requirements are met. The brigade must establish lines of requisition to reorder aerial delivery equipment and related expendables. In addition, the 528th Sustainment Brigade must be capable of bridging the aerial delivery gap between their arrival and long-term aerial delivery support. This support must be capable of all forms of ARSOF personnel and resupply aerial delivery methods until long-term aerial delivery support is established by the GSB or SOTF.

SPECIAL FORCES GROUP (AIRBORNE) GROUP SUPPORT BATTALION

2-79. The SFG (Airborne) GSB is a multifunctional, direct-support logistics organization organic to the SFG with force structure and capabilities tailored to support the SFG. The GSB is the cornerstone of tactical ARSOF logistics formations. The SFG GSB plans, coordinates, and executes sustainment operations for the SFGs and, when directed, supports the forces task-organized with the SFG that form the JSOTF or SOTF. The SFG aerial delivery element can provide all SOF-peculiar items for aerial delivery and limited CUL. The deployment of an entire SFG GSB aerial delivery element can sustain up to 80 short tons daily using the traditional container delivery system (CDS), or up to 160 short tons daily of LCADS. However, both aerial delivery equipment systems will require replenishment.

2-80. Each GSB has a sustainment and distribution company. Within the sustainment and distribution company there is an airborne support platoon. The airborne support platoon has three sections responsible for aerial delivery operations, personnel pack, and equipment repair. The platoon is capable of supervising unit preparation of up to ten tons of general supplies and equipment per day for aerial resupply loads up to 2,000 pounds. It provides all levels of maintenance of aerial delivery items.

2-81. The SFG GSB will normally deploy an aerial delivery support team consisting of approximately 18 parachute riggers. This team can sustain up to 26 short tons daily of traditional CDS or up to 55 short tons daily of LCADS However, both systems will require replenishment of aerial delivery equipment. Theater aerial delivery support is required to sustain CUL for SOF when either of these configurations or capabilities are exceeded. Theater aerial delivery support is also required for heavy airdrop (Type V platform loads) in a low-velocity or precision airdrop configuration.

RANGER REGIMENT

2-82. The Ranger Regiment's mission is to plan and conduct special operations against strategic and operational targets in pursuit of national or theater objectives. The Ranger Regiment consists of a regimental headquarters with Ranger support operations detachment, a regimental special troops battalion, and three Ranger battalions, each with its own organic Ranger support company.

2-83. The Ranger support operations detachment within the regimental headquarters provides staff planning, supervision and coordination of aerial delivery logistics for the support of all units assigned or attached. The Regimental Special Troops Battalion provides SOF-specific aerial delivery and limited CUL through various methods of airdrop.

2-84. The Ranger support companies are multifunctional logistics companies that are organic to each Ranger battalion within the Ranger Regiment. The Ranger support company provides organizational aerial delivery capabilities for initial entry and infiltration, strategic strikes, and limited CUL capability. Theater or JSOTF/SOTF aerial delivery support is required to sustain CUL. Theater aerial delivery support is also required for heavy airdrop (Type V platform loads) in a low-velocity or precision airdrop configuration. Ranger support companies may be required to provide rigger personnel augmentation to the JSOTF/SOTF aerial delivery element for sustain CUL.

ARMY SPECIAL OPERATIONS AVIATION COMMAND (ARSOAC) 160TH SPECIAL OPERATIONS AVIATION REGIMENT (AIRBORNE)

2-85. The 160th Special Operations Aviation Regiment (160th SOAR) mission is to plan and conduct special air operations by clandestinely penetrating hostile and denied airspace against strategic and operational targets in pursuit of national or theater objectives. The special operations aviation regiment deploys forces worldwide in support of contingency missions, the joint task force (JTF) commander, and the geographic combatant commander. Special operations aviation regiment battalions have organic aerial delivery capability for initial entry and infiltration and strategic strikes only. Special operations aviation regiment aerial delivery elements depend upon other ARSOF sustainment elements, the TSC, and the joint special operations air component to conduct sustained aerial delivery operations if required. A special operations aviation regiment may be required to provide rigger personnel augmentation to the JSOTF/SOTF aerial delivery element for sustaining CUL.

AERIAL DELIVERY SUPPORT ACTIVITY

2-86. ARSOF aerial delivery elements typically operate in a joint environment, and sometimes combined with other nations. The SOTF aerial delivery support activity (rigger facility) is also called the JSOTF or the CJSOTF aerial delivery facility or rigger facility. The SFG GSB aerial delivery support team previously described is the core element of an operationally deployed SOTF aerial delivery support activity. On the modern battlefield, it is rare to encounter a pure Army SOTF. It is not uncommon for the supporting JSOTF/ CJSOTF aerial delivery element to use joint or combined SOF rigger personnel in support of the SOF aerial delivery mission. These personnel must fall under ARSOF aerial delivery command to ensure continuity and efficiency of action. Normally staffed, an aerial delivery support team as previously described can sustain up to 26 short tons of traditional CDS or up to 55 short tons of LCADS daily. It will require replenishment of

aerial delivery equipment to sustain airdrop capability. The unit's capabilities can expand based on augmentation, joint, or combined configurations. Theater aerial delivery support is required when a high volume of sustained CUL is required for the SOF operational environment. Theater aerial delivery support is also required for heavy airdrop (Type V platform loads) in a low-velocity or precision airdrop configuration. Theater aerial delivery support capabilities will be structured to meet sustained and high-capacity CUL aerial delivery requirements. The theater airdrop support element is vital under these circumstances.

2-87. For more information on the internal aerial delivery capabilities and force structure of the SOF sustainment brigade, group, aviation command, and Ranger Regiment, refer to ATP 3-05.40.

JOINT SUPPORT

2-88. A JTF is a force composed of assigned or attached elements of the Army, Navy, Marine Corps, and USAF, or two or more of these Services. A JTF is constituted and so designated by the Secretary of Defense or the commander of a unified command, a specified command, or an existing JTF.

2-89. Normally, the JFC establishes the relationship between the Army aerial delivery support units and the USAF airlift command to ensure aerial delivery operations are executable.

2-90. USAF organizations control aircraft loading and provide aircraft assets for transporting cargo and personnel in support of aerial delivery operations. The USAF has personnel responsible for the joint airdrop inspection of loads for airdrop operations. The commander of the USAF unit or the aviation unit specifies the cargo load allowed for the type of aircraft used.

MULTINATIONAL SUPPORT

2-91. A combined operation is conducted by forces of two or more allied nations acting together for the accomplishment of a single mission. Headquarters commands at echelons above corps may be combined commands (a mixture of U.S. and allied forces). At corps level and below, command organizations are usually national; therefore, airdrop resupply (including LCADS) is normally a national responsibility. Each country will have its own airdrop capability, if required.

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Chapter 3
Airland

This chapter discusses the airland method of aerial delivery operations. It begins by describing airland techniques and planning considerations. It then examines advantages and disadvantages of the airland method, to include discussing airland safety and equipment retrograde.

AIRLAND TECHNIQUES

3-1. Airland encompasses all situations where personnel and cargo are offloaded. Airland is the preferred method of aerial delivery because it is the most efficient and cost-effective method. It permits delivery of larger loads with less risk of cargo loss or damage than airdrop or sling load methods. It is also desirable because it makes the most efficient use of available cargo space. Airland exists primarily as a rear-echelon capability. Although crews normally accomplish offloading from a stationary aircraft with engines shut down, there are procedures to load and offload with engines running when necessary to reduce ground time. Procedures exist to use the combat offload method from a moving aircraft in a higher threat environment or when sufficient MHE is unavailable. This delivery method can be conducted at well-established airbases or may involve tactical deliveries to unimproved dirt strip assault LZs.

3-2. Airland is normally a joint operation between the USAF and Army, with the objective of deploying and sustaining the force. The theater airlift control element is a 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.

AIRCRAFT CONSIDERATIONS

3-3. Both fixed-wing and rotary-wing aircraft can perform airland missions. However, fixed-wing aircraft are more commonly used to deliver cargo due to their ability to fly faster, for longer ranges, carrying heavier loads, and at higher altitudes than rotary-wing aircraft.

3-4. Units should seek specialized airland training for selected members to ensure personnel safety and prevent damage to aircraft and loaded equipment.

AIRLAND PLANNING CONSIDERATIONS

3-5. Planning for airland operations should take into account the following:

- Duration and location of the operation.
- Type and amount of cargo or passengers.
- Expected threats during the mission.
- LZ capabilities, including—
  - Available MHE.
  - Petroleum, oil, and lubricants storage and dispensing capacity.
  - Aircraft servicing, maintenance, and damage repair capabilities.

LANDING ZONE CONSIDERATIONS

3-6. The arrival LZ may require additional support, including USAF special tactics airfield control, explosive ordnance disposal, MHE, an A/DACG, and a theater airlift control element, combined with

associated units and MHE that would normally be at the departure airfield. There is coordination between the Army and USAF over the LZ selection but, in airland, the USAF makes the final decision.

3-7. USAF airland LZ selection is based upon many factors, including runway surface type, dimensions, and condition; aircraft parking capability; threat location; ability to marshal and disperse cargo from arriving aircraft; and existing support infrastructure. Depending upon the aircraft type employed, the type of airfield selected can vary from a large established airfield to an austere unprepared airstrip.

3-8. Depending upon mission requirements, some LZs may be developed into more sophisticated facilities. Army engineers are often responsible for initial LZ improvements as part of forcible and early entry operations. Combat or general engineers may provide support depending on the operational environment. For additional information, see FM 3-34 and JP 3-34.

3-9. A rotary-wing-only LZ, also called a heliport, is approved and marked off by Army personnel. The only USAF 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.

3-10. LZ or airstrip approval can be completed by either Army or USAF-trained personnel. The Service that owns the aircraft can make a determination to accept another Service's evaluation. If available, Army pathfinders are trained and equipped to select, mark, improve, and control LZs. Desirable characteristics of LZs include—

- Ease of identification from the air.
- Suitable airfield capabilities.
- A straight, unobstructed, secure approach for aircraft.
- Close proximity to ground objectives and units.

LZs intended 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.

3-11. A USAF special tactics combat control team may be deployed when USAF aircraft use austere LZs. Austere LZs are normally unsophisticated airfields, usually with a short runway, that are limited in one or more accommodations (buildings, installations, or equipment). The combat controllers are a small task-organized team of parachute-qualified personnel who are 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 and provides 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 command and control, 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 ordnance with demolitions. If authorized by the USAF, Army pathfinders can operate an austere LZ in place of a tactical air control party.

3-12. The existence of sub-munitions during airfield clearance is likely and should be a planning consideration. Explosive ordnance may be present because of the amount of ordnance that may have been dropped or projected onto an airfield or into the surrounding area. Explosive ordnance disposal teams should be positioned with the airfield seizure forces to immediately begin clearing the airfield and the surrounding area. For additional information on explosive ordnance disposal see ATP 4-32, ATP 4-32.1, and ATP 4-32.3.

3-13. For additional information on selecting LZs for fixed or rotary-wing aircraft see JP 3-36, FM 3-21.38, TM 3-34.48-1, and TM 3-34.48-2. For additional discussion regarding airspace control planning considerations for USAF and Army responsibilities, see FM 3-52.

ADVANTAGES AND DISADVANTAGES OF AIRLAND

3-14. There are several advantages and disadvantages of airland operations as they relate to airdrop and sling load operations. Consider the advantages and disadvantages carefully when planning to incorporate the airland method as a means of aerial delivery.

ADVANTAGES OF AIRLAND

3-15. Airland delivery is usually the most efficient delivery method for moving equipment, personnel, and supplies, because it allows equipment that is not air-droppable, such as tanks, some artillery, and rotary-wing aircraft, to be brought rapidly in theater. Other advantages of airland delivery include—

- 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 use 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 for cargo.
- Seldom requires special rigging materiel.
- Troops moved by airland delivery do not require specialized training.

DISADVANTAGES OF AIRLAND

3-16. Airland delivery disadvantages revolve around landing area requirements, aircraft vulnerability, and lack of facilities. Disadvantages include the following:

- May require landing strip improvements to ensure a moderately level, unobstructed LZ.
- More time required for delivery of an equivalent-size force than when delivery is by airdrop, especially if using a small, restricted LZ.
- Greater number of support personnel and MHE required on the LZ.
- Exposure of aircraft to air and ground attack due to extended time on the ground at forward airfields.
- Engineer assets may be required to maintain the airfield based on the physical composition of the LZ and weight of the cargo aircraft.
- Specialty trained personnel are required to supervise, prepare, and inspect supply loads.
- Potential requirement for refueling at the LZ due to the reduced range of cargo aircraft carrying heavy loads.

AIRLAND SAFETY

3-17. Airland operations may put aircraft at greater risk of enemy fire. Because the aircraft is on the ground during unloading operations, the aircraft presents an easier target. Time on station and time of day; weather; security; quality, size, and location of airfield or LZ; MHE resources; and level of expertise involved are all factors to be considered when conducting airland operations.

3-18. 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 conducted by trained personnel observing all safety measures.

3-19. Always use TM 38-250 when load planning and packing hazardous materials for airland missions.

3-20. Circles of safety for aircraft extend ten feet beyond the aircraft for fixed-wing aircraft. Figure 3-1 depicts the typical circle of safety for fixed-wing aircraft.

3-21. Circles of safety for rotary-wing aircraft extend beyond the danger zone. For large dual rotary aircraft, the danger zone extends at least 35 meters. Figure 3-2 depicts the circle of safety for dual rotary-wing aircraft using a CH-47. For single rotor rotary-wing aircraft, the danger area extends 30 meters. Figure 3-3 depicts the circle of safety for single rotor rotary-wing aircraft using a UH-60.

3-22. Movement in the proximity of aircraft is inherently dangerous. Therefore, the following precautions should be taken:

- Typical flight line speed limit is 15 miles per hour. Within 25 feet of the aircraft, the speed limit is five miles per hour or less.
- No vehicles are allowed within the circle of safety unless they are to be loaded or used to service the aircraft.
- Do not move vehicles towards the aircraft without spotters and guides.
- No personnel should stand or walk directly in front of or behind aircraft engines (propeller or jet).
- No personnel should stand or walk directly in front of or behind vehicles during on and off-loading procedures.
- Do not remove restraints or start a vehicle until told to do so by the loadmaster or boom operator.
- 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 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 signals that it is safe to approach.

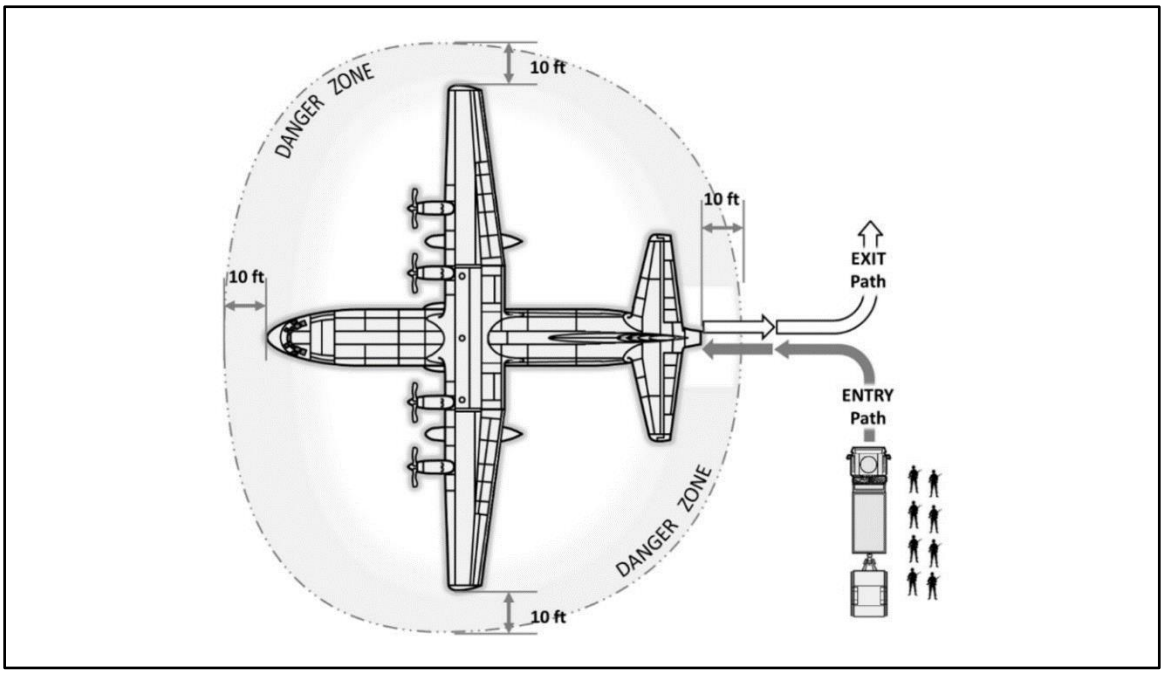

Figure 3-1. Fixed-wing circle of safety

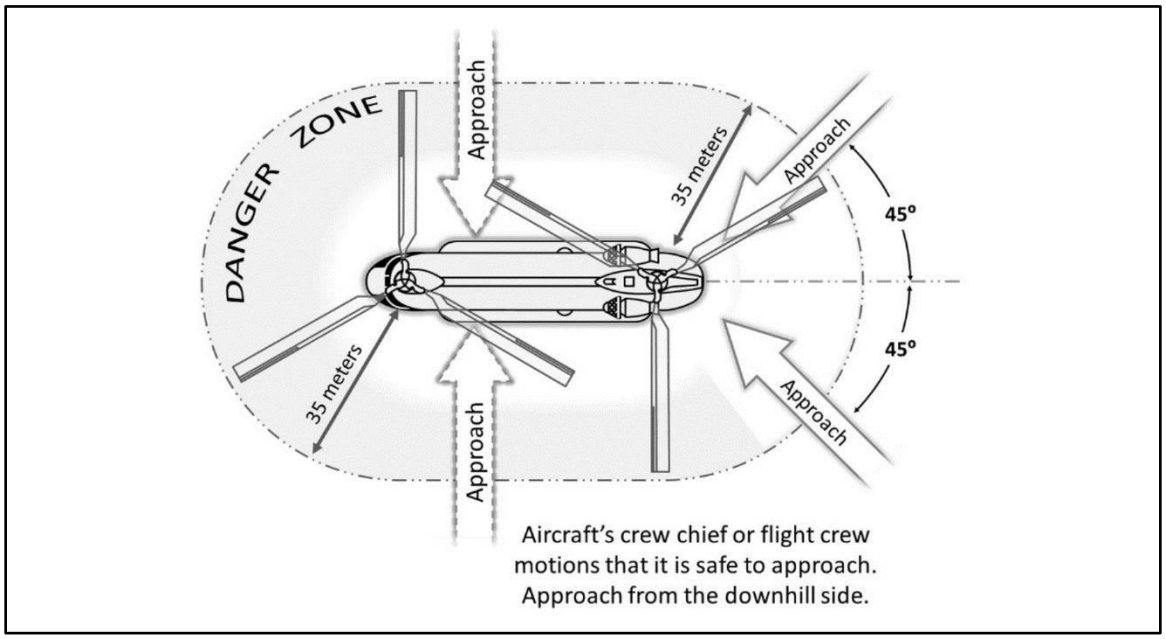

Figure 3-2. Dual rotary-wing circle of safety

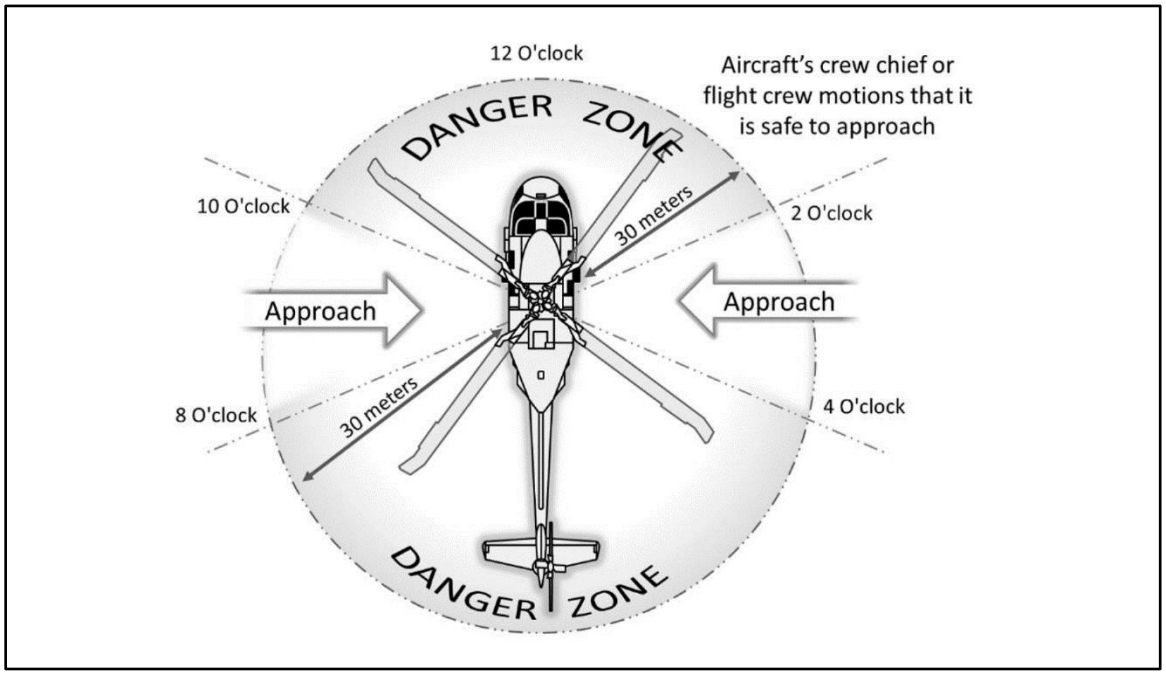

Figure 3-3. Single rotary-wing circle of safety

AIRLAND EQUIPMENT RETROGRADE

3-23. 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.

3-24. USAF aerial port personnel on each site maintain overall control of all pallets with the pallet's netting. The aerial port personnel work closely with the local movement control team and A/DACG to expedite the return of assets from customer units. 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. To provide the proper priority, pallets must be incorporated into a theater pallet management and control program in accordance with AR 56-4 and ATP 4-12. When these pallets are used for throughput to forward units, they must be retrograded to the marshalling area.

Chapter 4
Airdrop

This chapter describes aerial delivery using the airdrop method. It discusses the techniques for airdrop, including DZ selection, inspections, advantages and disadvantages, equipment and systems, and airdrop safety. This chapter concludes with a discussion on aerial delivery facility management, to include aerial delivery company support of facility operations.

SECTION I – AIRDROP TECHNIQUES

4-1. This section provides guidance for organizations concerned with airdrop in a theater of operations. It discusses the techniques for airdrop, including DZ selection, inspections, advantages and disadvantages, equipment and systems, and methods and types of airdrop. Airdrop can be a joint operation involving the USAF and the Army, or it may be conducted using Army internal air assets. The Army provides the supplies or materiel, rigs them for airdrop, and delivers them to the departure airfield. USAF personnel load the rigged supplies onto the aircraft (usually with Army assistance) and fly the mission. Airdrop operations provide the ability to distribute cargo by releasing supplies and equipment from an aircraft while in flight using parachutes or cushioned packaging.

AIRDROP TECHNIQUES

4-2. Airdrop systems have a mix of delivery capabilities to support operations, ranging from wide-area free drop distribution to low altitude ballistic parachute drops to high altitude Global Positioning System (GPS) guided systems with substantial stand-off capability. The system and type of aircraft used for delivery are determined by mission variables and the supplies and cargo to be delivered.

4-3. Airdrop operations and techniques support the landing and air movement plans of an airborne assault operation. The landing plan includes DZ and LZ locations; sequence, method, time, and location of delivery; and assembly plan. The air movement plan includes departure airfields; number of aircraft by type, configuration, and location; flight times; formations; routes; drop headings and altitudes; en route communications capabilities with emergency call signs and frequencies; and a comprehensive abort plan.

4-4. There are six elements of an airdrop operation that must be determined early in the planning phase:

- Airfield (length, strength, capacity, and location).
- Aircraft (selected based on availability and capability).
- Aerial delivery equipment (examples include parachutes and platforms).
- Riggers and unspecialized manpower.
- DZ (primary or alternate).
- Special load considerations (hazardous materials and retrograde planning).

4-5. The airborne/airdrop commander must appoint a departure airfield control officer (also called DACO) and a DZ safety officer (also called a DZSO) prior to the operation. The departure airfield control officer is responsible for the coordination and control of the loading of personnel, equipment, and supplies into the aircraft. The departure airfield control officer is located at the departure airfield and serves as the primary point of contact for updated aircraft information (to include load times, parking locations, and tail numbers) for Army joint airdrop inspectors and loading or unloading work details.

4-6. The departure airfield control officer requirements and responsibilities include the following:

- Must be an officer, warrant officer, or NCO (E-5 or above).

- Must have observed or assisted a current departure airfield control officer.
- Must be a current jumpmaster.
- Must conduct coordination with the airlift control element, airfield safety, the DZ safety officer, and any other parties involved in the operation.
- Must receive, account for, and turn in Army-owned equipment left on board aircraft following airdrop operations.

DROP ZONE SELECTION

4-7. In most cases, the Army will control the DZ. The JFC, 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.

4-8. Designated DZs should have no trees, power lines, fences, buildings, or other obstructions. 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.

4-9. The DZ should not be close to enemy locations, especially enemy anti-aircraft positions.

4-10. 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.

4-11. DZ size requirements are based on drop altitude, container weight, and aircraft delivery method. These requirements are found in FM 3-21.38.

4-12. An extensive DZ is required when there are large numbers of loads to be dropped because this often results in a long and wide dispersion pattern. For example, a small DZ crisscrossed with power lines, under high wind conditions and a significant air defensive threat, is not an ideal DZ, since delivery of the loads requires multiple passes using low-velocity airdrop procedures.

4-13. 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 aerial delivery equipment. Units must have trained personnel who can execute DZ duties. If the unit lacks trained personnel, they can request support through operations channels. Requirements and responsibilities for a DZ safety officer include the following:

- Must be an officer or NCO in the pay grade of E5 or above.
- Must be USASOC jumpmaster certified for Verbally Initiated Release System (VIRS) and Ground Marking Release System (GMRS) or pathfinder qualified.
- Must have previously observed the DZ safety officer on a personnel jump.
- Must have performed the duties of assistant DZ safety officer at least once.
- Must attend pre-mission briefings and coordinate with USAF combat control team, if required.
- Must have the DZ fully operational one hour prior to the drop time.
- Must conduct ground or aerial recon of DZ prior to drop time.
- Must establish communications with departure airfield control officer one hour prior to drop time.
- Must co-locate with the USAF combat control team one hour prior to drop time.
- Must monitor surface winds from the point of impact. The assistant DZ safety officer (if required) will monitor surface winds from highest point of elevation on the DZ or the trail end of the DZ.
- Must establish a 10-minute window no later than 12 minutes prior to the scheduled drop time. Must give a GO or NO GO based on wind limitations for the type of drop as published in DAFMAN 13-217 or as constrained by local standard operating procedures.
- Must control all ground and air medical evacuation.
- Must ensure that the no drop communication signal is relayed to the aircraft when—
  - Surface winds exceed knots for a personnel drop, in accordance with safety regulations and unit standard operating procedures.
  - Any unsafe act is observed either on the ground or in the air.

- Must mark the DZ for day or night.
- Must operate all visual acquisition aids.
- Must submit post-mission reports properly.

ADVANTAGES AND DISADVANTAGES OF AIRDROP

4-14. The following are advantages of airdrop:

- Can be used when no other means for transporting supplies or equipment is available.
- Permits throughput of supplies from the corps and theater areas, or from the U.S. directly to the using unit in theater, regardless of the unit's location.
- 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 airland, enables a shorter turnaround time for non-landing aircraft and reduces risks to the aircraft, increasing aircraft availability and survivability.
- Provides a key advantage in forcible entry operations.

4-15. The following are disadvantages of airdrop:

- Aircraft remains vulnerable to enemy air defense systems based on drop level.
- Allows no backhaul capability.
- Creates a need to recover and retrograde aerial delivery equipment unless low-cost expendable equipment is used.
- The net payload is reduced due to 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 weather conditions.
- Airdrop operations require an extensive planning effort and much longer cycle times.
- Increased requirement for rigging materials and special aerial delivery equipment.

AERIAL DELIVERY EQUIPMENT

4-16. Aerial delivery equipment is applied to materials, devices, hardware, and other items used to prepare loads for airdrop. The availability of aerial delivery equipment is limited. Certain types of airdrop also consume large amounts of fortification and barrier materials. The 4-48 series technical manuals and applicable operation plans and orders can be used to determine the amount and types of equipment required and the classes of supply suitable for airdrop missions.

4-17. Aerial delivery equipment can be divided into three major classifications:

- **Rigging items**. These items include airdrop containers, platform and platform assemblies, cushioning and energy-dissipating materials, and other supplies and equipment used to prepare loads for airdrop. Specific items are cargo slings, airdrop bags, and platform assemblies. Detailed descriptions on the use and employment of these are contained in the TM 4-48 series of manuals.
- **Parachute assemblies**. These include personnel and cargo parachutes. The principal personnel parachutes are the T-11, MC-6, and RA-1 worn by paratroopers for static line and military free-fall operations. The main cargo parachutes are the G-12E and G-15, used singly for loads up to 2,200 pounds, and the G-11B/C/D and G-16, used singly for loads with a minimum weight of 2,250 pounds, or in clusters for airdrop loads weighing up to 42,000 pounds. There are also extraction and pilot parachutes. Detailed descriptions of these parachutes and their use and maintenance are contained in the TM 10-1670 series of manuals.
- **Equipment repair items**. These include parachute packing and inspection tables, parachute line separators, parachute packing weights, fans, and other specialized tooling.

4-18. In addition to aerial delivery equipment, units involved in airdrop operations are provided with general-purpose equipment such as light-medium-heavy duty sewing machines, general industrial sewing machines,

bar tack machines, and zig-zag machines. They are also equipped with forklift trucks, warehouse tractors, general cargo trucks and trailers, and, in some instances, cranes for handling supplies.

CATEGORIZATION AND CERTIFICATION OF LOADS AND METHODS OF AIRDROP

4-19. Airdrop loads are classified as either standard or nonstandard loads:

- Standard loads include all loads that are detailed in an associated technical publication.
- Nonstandard loads may include approved loads for USAF aircraft without an associated technical publication or loads that will be dropped in accordance with associated technical publication with a variance in the drop altitude, speed of aircraft, or presence of hazardous material.
- Other nonstandard loads are determined by—
  - The weight of the load.
  - The type of aircraft it is loaded on.
  - Class of supply.
  - Whether it is composed of explosive or hazardous material.

4-20. The United States Army Combat Capabilities Development Command (DEVCOM) is the Army certification agency for airdrop. Typically, three successful airdrop tests are required per airdrop configuration for non-munition items. In some instances, DEVCOM will certify an item by analogy instead of conducting a full battery of tests. Munition items further require a post-drop test fire to determine if any degradation in reliability occurred. After successful testing, the item is certified for airdrop. DEVCOM issues the airdrop certification memorandum. The U.S. Quartermaster Center and School, Aerial Delivery and Field Services Department publishes the validated airdrop rigging procedures in the appropriate TMs.

TYPES OF AIRDROP AND METHODS OF RELEASE

4-21. There are four standard types of airdrop and three methods of release. The types of airdrop are freedrop, high-velocity, medium-velocity, and low-velocity. Figure 4-1 depicts each type of airdrop. Airdrop types are categorized based on the load's rate of descent. The methods of release for airdrop are manual, extraction, and gravity. Airdrop methods pertain to how loads exit the aircraft. These types and methods often use common components and systems.

FOUR TYPES OF AIRDROP

4-22. 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, and fortification and barrier materials are examples of non-fragile freedrop items.

4-23. High-velocity airdrop is used when threat conditions dictate that the aircraft remain at high altitudes to avoid hostile air defenses but must minimize drift for accuracy. 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.

4-24. Medium-velocity airdrop may be used to conduct resupply activities in all operational environments and in all types of weather. This type of airdrop uses the extracted high/low speed CDS (also called the EH/LSCDS). Loads of 701 to 2,200 pounds descend at a rate of 40 feet per second, allowing delivery of semi-fragile items rigged in a CDS.

4-25. 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 airdrop containers or by lashing them to airdrop platforms.

Multiple parachutes can be used to achieve the desired rate of descent. Much of the Army's light and medium tactical wheeled vehicle fleet, along with repair parts and major assemblies, can be delivered using this method.

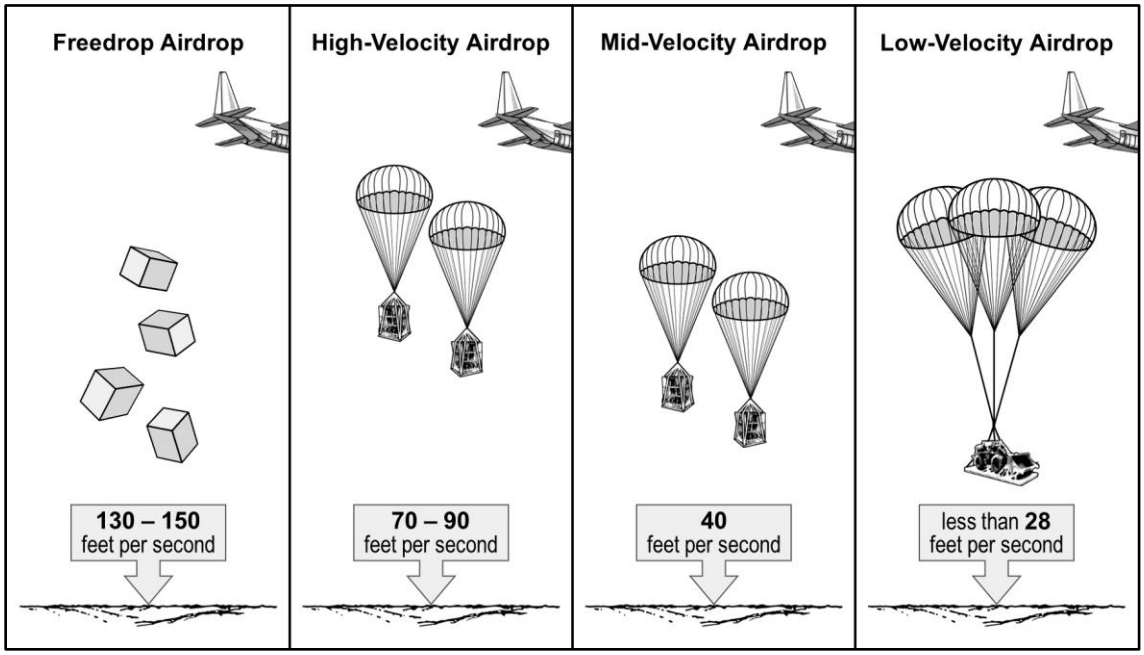

Figure 4-1. Types of airdrop

METHODS OF RELEASE

4-26. The door-load method entails personnel sliding or pushing bundles out of the aircraft side doors or rear ramp. Figure 4-2 on page 4-6 depicts a bundle in the door of the aircraft in preparation for distribution using the door load method. 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 an airborne or air assault operation, or to deliver smaller loads or bundles over limited or constricted DZs to conventional forces, SOF, allied forces, and refugees. Door bundles do not exceed 499 pounds total rigged weight, and current Army jumpmasters are authorized to rig the loads.

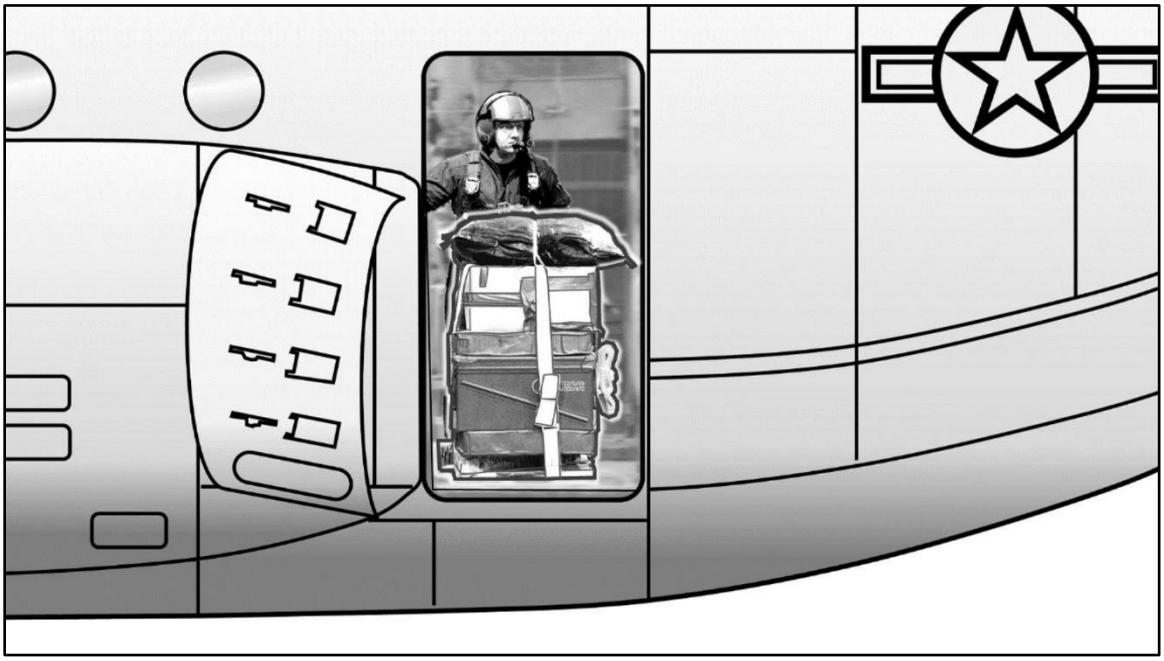

Figure 4-2. Bundle at the door of aircraft

4-27. The extraction method involves the use of an extraction parachute to pull the load out of the rear ramp of the aircraft cargo compartment. It is used for large, low-velocity loads. This method is used for such items as artillery pieces, vehicles, special-purpose equipment, bulk ammunition, and supplies rigged on airdrop platforms.

4-28. Figure 4-3 depicts the Type V method of extraction from a C-130 aircraft. The first step (#1) shows the load at the ready position awaiting deployment. The second step (#2) shows the deployment of the extraction parachute, which is used to pull the load out of the rear of the aircraft. Step three (#3) illustrates the load fully extracted from the aircraft.

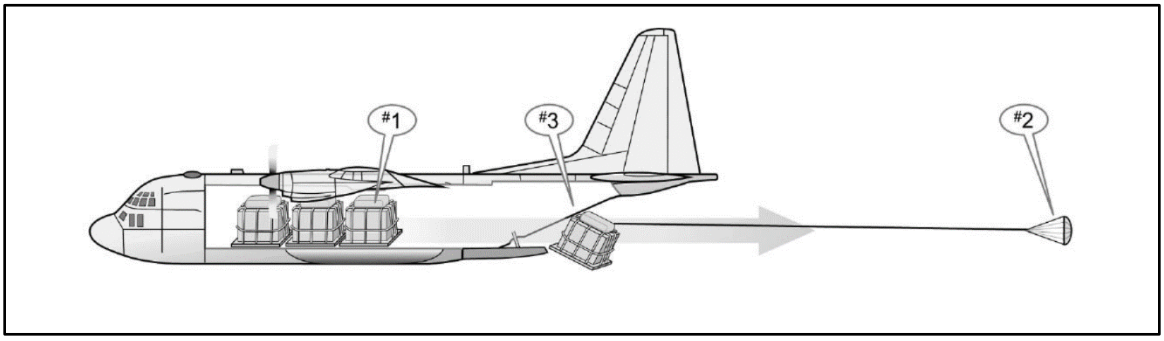

Figure 4-3. Type V extraction method

4-29. The gravity method requires the aircraft to fly in a nose-up attitude. Figure 4-4 depicts the gravity extraction method from a C-130 aircraft. Prior to release, the load is restrained by nylon webbing or logistics rail locks. At the desired release point, the webbing is cut or released and the locks are released, allowing the containers or platforms to roll off the tailgate of the aircraft. This method can be used for either low-velocity or high-velocity type loads.

4-30. In figure 4-4, the first step (#1) shows the load releasing out of the rear of the aircraft as the pilot tilts the nose up to deploy the load. Steps two and three (#2, #3) show the deployment of the load and the parachute

using the static line method to deploy the parachute. Steps four and five (#4, #5) illustrate the deployment of the main parachute as it exits the aircraft.

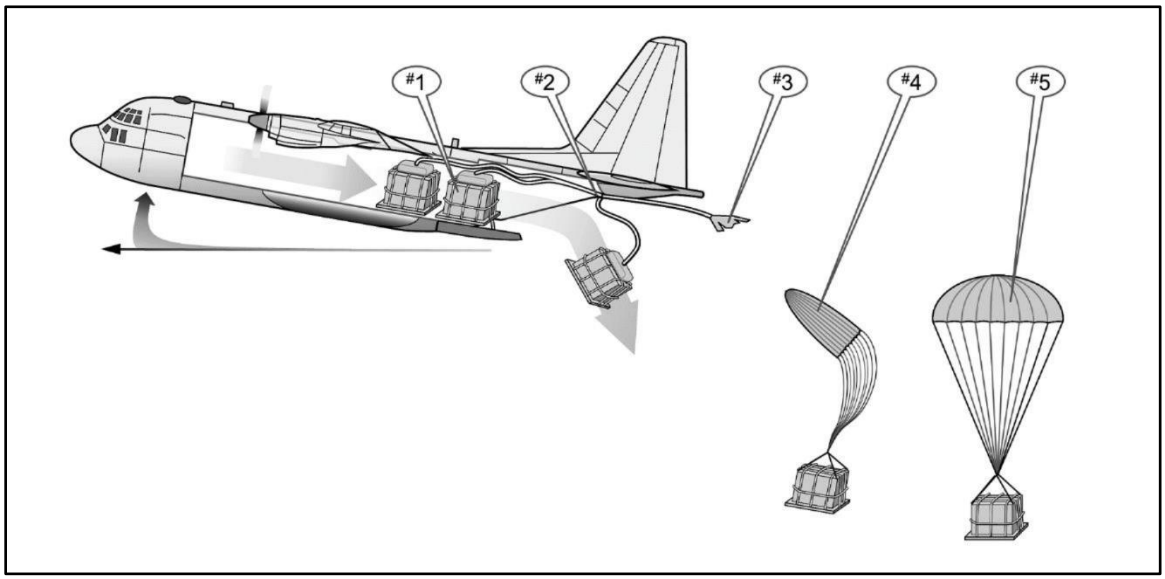

Figure 4-4. Airdrop using the gravity airdrop method

ARMY SPECIAL FORCES METHODS AND TYPES OF AERIAL DELIVERY

4-31. ARSOF aerial delivery involves all types and methods of air-to-ground delivery of equipment and supplies. Airdrop is one of the best and fastest means of resupply to ARSOF. In some cases, it may be the only means of resupply available to the SOTF commander due to the uniqueness of the unconventional warfare environment and strategic strike objectives.

4-32. The type and method of aerial delivery depends on the specific needs of the SOF mission. A variety of special operations, conventional, foreign military, and nonstandard/contract aircraft are used by SOF for aerial delivery. There are rigging and dispatching techniques and concepts associated with these various aircraft that are used in combat. However, risks are mitigated based on the mission, situation, availability, and capability of the aircraft and aircrew. Some methods, types, and resupply considerations for SOF aerial delivery can be found in ATP 3-18.10, ATP 3-05.40, ATP 3-18.11, ATP 3-18.14, and TC 18-11.

AIRDROP COMPONENTS AND SYSTEMS

4-33. The Type V airdrop platform is a modular component assembly constructed of aluminum extrusions used for airdropping loads ranging from 2,520 pounds to 42,000 pounds. The Type V is primarily used in cargo and vehicle low-velocity airdrops. Type V minimum platforms range in size from 8 feet to 32 feet in length. Platforms are normally airdropped by parachute extraction. The Type V minimum platform drop altitude ranges from 700 to 1,300 feet above ground level depending on the number of parachutes required. Some components of the Type V platform are also used in the dual row airdrop system. TM 4-48.05 and TM 4-48.12 provide examples of Type V airdrop platform rigging.

4-34. The combat expendable platform is a one-time-use platform built by the user. It can be used to airdrop items like combat rubber raiding craft, motorcycles, and four wheeled quad runners. See TM 4-48.04 for more information regarding rigging combat expendable platforms, including special operations combat expendable platforms.

4-35. Container loads 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 and type of canopy used. 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 to 2,200 pounds. CDS loads are employed in both low and high-velocity type drops using the gravity or extraction method. TM 4-48.03 contains information regarding rigging container loads.

4-36. The low-cost aerial delivery system is an expendable, stand-alone container airdrop system. It consists of a modular suite of low-cost airdrop items comprised of parachutes, containers, platforms, and other air items configured for high-velocity and low-velocity drops that use the gravity extraction method. It is capable of delivering loads from 501 to 2,200 pounds at 800 to over 10,000 feet above ground level, depending on the low-cost aerial delivery system canopy used, aircraft type, and weight of bundle.

4-37. The low-cost low-altitude, also called LCLA, aerial delivery system is a subset of the low-cost aerial delivery system designed as a one-time use expendable item. It is capable of delivering loads from 80 to 1,000 pounds. Low-cost low-altitude aerial delivery system loads weighing 500 pounds or less will be inspected by a parachute rigger, jumpmaster, or a low-cost low-altitude aerial delivery system-certified Soldier. It can be dropped from a variety of aircraft (including Army rotary-wing aircraft) as low as 150 to 500 feet above ground level, depending on aircraft type and weight of bundle. Figure 4-5 depicts a low-cost low-altitude airdrop.

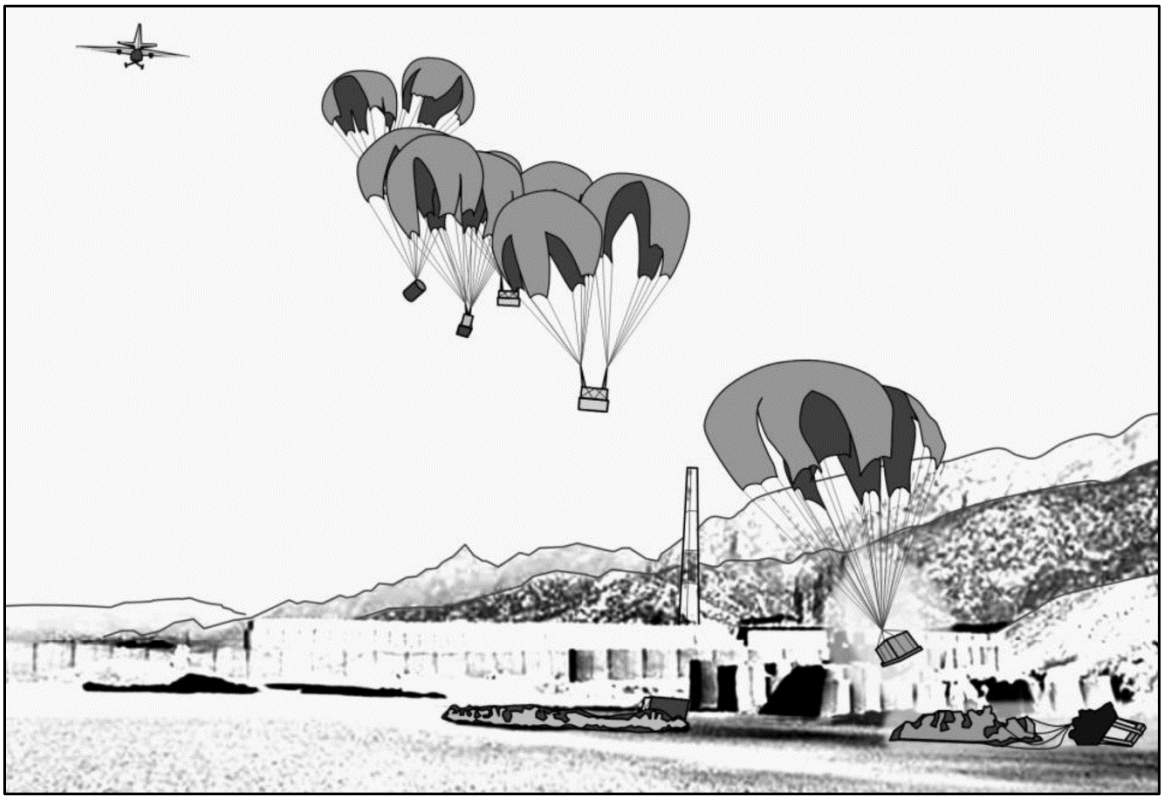

Figure 4-5. Low-cost low-altitude airdrop

4-38. The extracted CDS provides robust point-of-need aerial delivery below threat detection and at high ingress/egress speeds. Extracted CDS uses the extraction of the bundles to reduce variability in exit time and increase accuracy. This method also reduces dispersion on the DZ while improving flight performance during airdrop. The extracted CDS method uses an aircraft's maximum designed ramp open speed to provide the ability to conduct very low-altitude, fast, accurate resupply to small combat units.

4-39. Extracted CDS refers to CDS aerial delivery using a drogue parachute to extract CDS bundles at airspeeds above 150 knots indicated airspeed. The increased airspeed minimizes threat exposure to aircraft and crew while improving aircraft defensive capabilities inside a potential weapons engagement zone. Decreased dispersion on the DZ aids in rapid recovery and provides a potentially more secure DZ for ground

combatants. Extracted CDS can be used by a single aircraft in a single pass or multiple aircraft in a single pass. Extracted CDS decreases aircraft time over the DZ and ground combatants' post-airdrop recovery time without significant impact to routine aerial delivery quantities.

4-40. The high-speed-low-level aerial delivery system is an adjustable container made of an A-21 (nylon) cargo cover and other airdrop items. The assembled items are rigged to ensure that the container will withstand the shock of the parachute opening when airdropped at high speeds. The system requires a specialized aircraft and extraction equipment. When a container is rigged for delivery, the rigged weight divided by the largest surface area (measured in square feet) must be a minimum of 35 pounds per square foot. The dimensions of the load base are typically on a 30-inch by 48-inch skid board; height is limited to material restrictions as outlined in the rigging manual. The size may change to fit other supply loads.

4-41. The dual row airdrop system maximizes the cargo space of the C-17 for airdrop by permitting 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 with the C-17 cargo aircraft, and capable weight of cargo 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 the dual row airdrop system is a gravity-extracted system. Information regarding rigging the dual row airdrop system is found in TM 4-48.05.

4-42. The joint precision airdrop system (JPADS) is a high-altitude, precision-guided airdrop system that provides increased control of the canopy, allowing for increased accuracy from a high-altitude deployment. The system is available in a 2,200-pound (2K) CDS size capacity and a 10,000-pound (10K) total rigged weight capacity. 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, and the 2K system requires a minimum 150-meter circular DZ while the 10K system requires a minimum 250-meter circular DZ. 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 to navigate to the DZ. Figure 4-6 on page 4-10 depicts a JPADS utilizing a steerable ram-air parachute and GPS technology from one aircraft that is able to deliver bundles to multiple DZs from one release point.

4-43. The ultra-light weight (also called ULW) JPADS is an aircraft-deployed, steerable canopy system that is capable of safely and effectively delivering cargo loads of 250 to 699 pounds rigged weight from 4,500 to 24,500 feet mean sea level through hardware, software altitude control, and glide management of system descent and landing. It satisfies high-priority air delivery requirements of low volume items for precision delivery locations and times. It is particularly valuable for troops in contact as an emergency resupply bundle of mission-essential equipment and supplies to restore or supplement the operational capability and survivability of the element. Ultra-light weight can also supplement essential items required for military freefall clandestine infiltrations by being dropped in combination (same time) with the military freefall parachutist at the on-set of the mission. In general, an ultra-light weight bundle is similar in size to an A-21 bundle system. Ultra-light weight is a valuable aerial delivery resupply method for small DOD elements requiring precision and clandestine airdrop.

4-44. The USAF cargo aircraft mission planner software enables aircrews to plan and initiate load release at a precisely 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. The mission planner software must be recovered and returned.

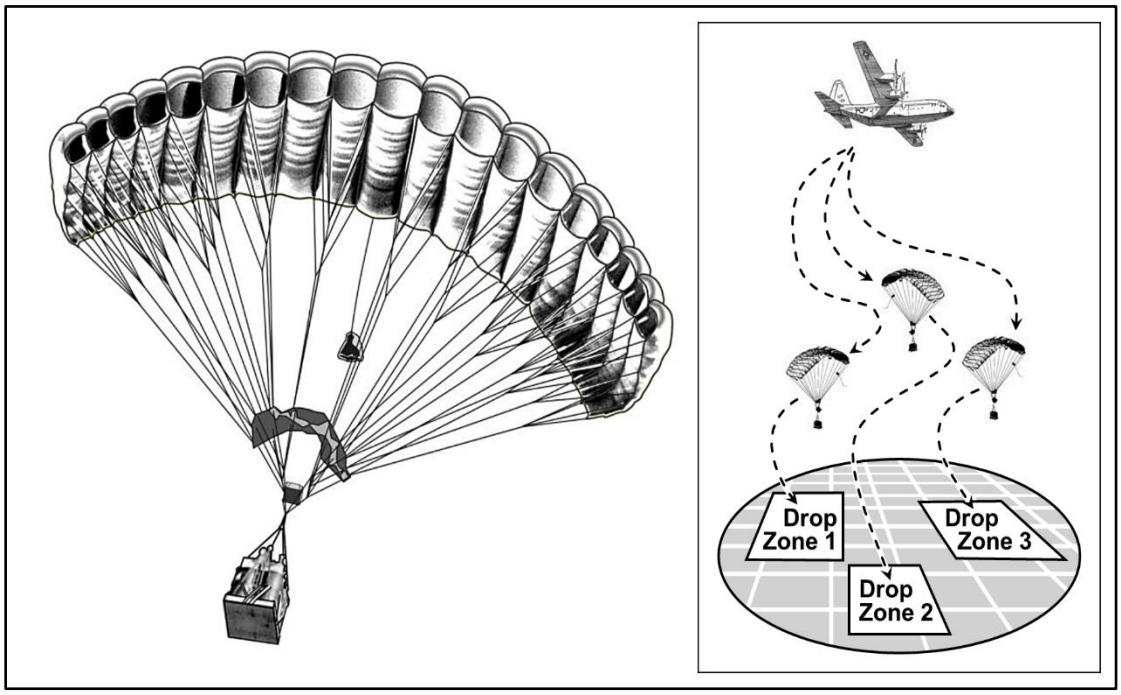

Figure 4-6. Joint precision airdrop system

AIRDROP SAFETY

4-45. 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 TM. Airdrop carries the additional caution that all personnel must continuously be aware of the dangers encountered as loads exit the aircraft. Aircrews 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. Ground personnel must ensure they are out of the landing radius of the load as it descends and be on constant lookout for falling debris that has separated during extraction or deployment.

4-46. Only trained and qualified personnel are permitted to conduct airdrop operations. Personnel involved in airdrop operations must adhere to the safety-related responsibilities found in AR 750-32.

4-47. The aircraft commander is responsible for the safety of the aircraft. This responsibility includes ensuring that loads are not in excess of lift capacity; are properly placed, lashed, and secured; and that the aircraft is safe for flight.

4-48. All procedures, techniques, and means must be implemented to prevent malfunctions and incidents. However, in the event of a malfunction or incident occurring, an investigation must be conducted, and a safety report must be complete in accordance with AR 59-4 and AR 385-10. Malfunction/incident investigations cover two areas: personnel parachute malfunctions/incidents and airdrop load malfunctions/incidents.

AERIAL DELIVERY EQUIPMENT RECOVERY AND RETROGRADE

4-49. Airdropped loads are derigged as dictated by the enemy threat on the DZ, but as soon as possible after landing. Derigging must be done rapidly to prevent loss or pilferage of supplies by enemy forces and to minimize damage to aerial delivery equipment. Every effort must be made to recover and evacuate the aerial delivery equipment used to deliver the load.

4-50. Recovery procedures are designed to ensure, in the interest of supply discipline, the maximum recovery of parachutes and related aerial delivery equipment used to deliver personnel, supplies, and equipment during

airborne operations. Upon recovery of aerial delivery equipment, units must synchronize retrograde support operations and establish return of priority items such as JPADS, parachutes, aerial delivery platforms, and other airdrop-related equipment in accordance with theater guidance.

4-51. The commander of the receiving/supported unit is responsible for appointing a recovery officer and recovery teams from within the unit. The recovery officer plans and supervises the operation and organizes the required teams to recover and evaluate parachutes and related aerial delivery equipment. Rigger personnel may be sent to assist the recovery officer by providing technical assistance and supervision. However, the receiving unit should be able to make the recovery without any external support. If riggers are assigned to help retrieve the equipment, they report to the recovery officer. The riggers may assist in recovering and evacuating the aerial delivery equipment and in preparing reports, and they may also accompany the equipment as it is evacuated. However, they will not accept custody of the air items until after they have been shaken, cleaned, and configured for turn-in and outstanding hand receipts have been cleared.

4-52. Recovery procedures should be rehearsed and practiced by recovery teams to ensure all personnel are proficient in recovery execution. This will ensure recovery is accomplished safely in the least time required. Recovery procedures are addressed in detail in TM 4-48.02 and TB 43-0002-43.

SECTION II – AERIAL DELIVERY FACILITY MANAGEMENT

4-53. This section provides an overview of the work performed by aerial delivery companies. Aerial delivery companies execute aerial delivery facility operations to ensure airdrop operations are equipped with the required materials and loads required for mission execution. Aerial delivery facility operations support forcible entry, deployment, resupply, sustainment, and special operations missions. Aerial delivery rigging facilities and assembly line rigging considerations are applicable to the TADC, CADC, DADC, DPPC, and BADSC.

AERIAL DELIVERY SUPPORT OPERATIONS

4-54. Aerial delivery support, operated by the parachute office, maintains a close liaison with its designated supporting sustainment command, theater airlift command, and commanders of supported units. This office ensures that the company support capability for the types and quantities of rigged loads and aerial delivery equipment and supplies is adequate to meet the needs of the combat situation. It is normally located near the center of the operational area. About 2,000 square feet (180 square meters) of office space is needed for its operational setup. Suitable buildings, if available, should be used to house the airdrop office; if not, a medium general-purpose tent may be used. The company airdrop officer is collocated in the parachute office with the main communications node.

4-55. The parachute office coordinates procedures for airdrop with the supporting sustainment command, theater airlift command, SOF airdrop support, the operating platoons, other company elements, and supported units. Further, it ensures that emergency stocks of supplies and equipment are pre-rigged and ready for airdrop when required. The office also directs bench stock and property book items.

4-56. The parachute office receives requests from the combat units through the supporting sustainment command for airdrop of supplies and equipment. Immediate coordination is made with the airfield's base operations personnel upon receipt of a request for an airdrop. Airdrop requests are categorized as either preplanned or emergency.

COORDINATING AIRDROP REQUIREMENTS

4-57. The parachute office provides direction and guidance in the preparation of supplies and equipment for airdrop. Some of the other functions of the parachute office are—

- Coordinating with USAF and Army aviation elements.
- Coordinating with SOF organizations for airdrop support.
- Assisting operating platoons in scheduling and resolving aircraft support requirements.
- Coordinating transportation and loading operations.
- Coordinating the inspection of airdrop supplies.

- Preparing inspection records and sending completed forms to the operating platoons.
- Coordinating loading times and locations with the supporting airfield control groups that direct loading of supplies scheduled for airdrop.
- Preparing airdrop cargo manifests showing the exact quantities of aerial delivery equipment and supplies loaded on each aircraft, the aircraft number, and customer address.

RECEIVING AND PREPARING SUPPLIES FOR AIRDROP

4-58. When supplies are being handled for an air delivery mission, the parachute office serves as the coordinator between the sustainment command and the operating platoons. The parachute office alerts the operating platoon via secure network or radio upon notification of receipt of supplies for a requested mission. Additional rigging supplies and equipment are arranged for by the sustainment command.

4-59. The sustainment command tells the supply activity to ship the supplies to the aerial delivery company and tells the theater airlift command or movement control command to provide the transportation to support the airdrop mission. When the sustainment command receives an airdrop request, it arranges for the supplies and transportation needed.

4-60. The aerial delivery company receives the request from the sustainment command and coordinates with the operating platoon for rigging and loading operations.

REORDERING SUPPLIES

4-61. In a tactical situation, replenishing stock is an automatic function of the sustainment command. The parachute office should check with the sustainment command to ensure that reordering is timely, so the operating platoons can plan their work efficiently and arrange for the necessary personnel and equipment to handle the shipments.

CONTROLLING STOCK ACTIVITIES

4-62. Parachute office personnel check postings of receipt and issue transactions for accuracy and completeness. Status cards are kept for each item of aerial delivery equipment in the company inventory. Each card shows the document number, date of receipt, and number of items received. All receipts, issues, turn-ins, and other actions must be recorded and a running balance must be kept.

PREPARING REQUESTS

4-63. Aerial delivery items are requested as needed for mission and training operations. Requests to replace unit supplies are prepared on a regular schedule. The automated logistics specialist in charge makes frequent checks to ensure speed and accuracy in the operation. The automated logistics specialist ensures supply requests are properly prepared, all data are verified, and requests are communicated to the sustainment command.

REPORTS

4-64. The parachute office checks reports for completeness and accuracy. The office also consolidates operating platoon status reports. The reports are then sent to the higher headquarters as required. All classified materials are safeguarded as specified in Army regulations. Information on reports is outlined in AR 220-1 and AR 380-5.

4-65. The parachute office completes and forwards reports as required. The most significant of these reports are the airdrop malfunction report and the monthly airdrop summary report:

- All malfunctions of personnel parachutes and cargo air loads must be reported promptly. DD Form 1748-2 (*Airdrop Malfunction Report [Personnel-Cargo])* is used for reporting purposes. It is also used in reporting fatalities. DD Form 1748 (*Joint Airdrop Inspection Record [Platforms])*, accompanies DD Form 1748-2 in the event of an airdrop load malfunction. See AR 59-4 for additional information on airdrop inspection and malfunction reporting procedures.

- Military units involved in the airdrop of personnel, supplies, and equipment must report all airdrop activities on DD Form 1748-3 (*Joint Airdrop Summary Report)*. Procedures are in AR 59-4.

REPLENISHING THE AUTHORIZED SUPPLY LIST

4-66. The parachute office ensures that authorized supply list requests are prepared and sent to the supporting SSA. Document registers are kept according to AR 710-2 and receipt documents are checked and posted to the document register.

MAINTAINING STOCK RECORDS

4-67. The automated stock and accounting records are prepared, posted, and maintained. DA PAM 710-2-1 and current directives. Unit standard operating procedures cover these procedures as they apply to authorized supply list items. The parachute office ensures that accounting records are accurately posted when issue is made to the operating platoons, and when replacement or replenishment stocks are received from the supporting SSA. Parachute office personnel should coordinate with their supporting sustainment automation support management office to maintain operational readiness of sustainment automation systems.

STORING SUPPLIES

4-68. The parachute office coordinates with the operating platoon to receive and store supplies and equipment used for rigging. Storage procedures are outlined in AR 710-2. When supplies and equipment are received for storage, office personnel make sure the quantities received are checked against the shipping document.

4-69. Errors must be noted on the receipt document, and the document must be returned to the SSA. Selected items are pre-rigged and placed in storage, ensuring that stocks are available for mission requirements. The pre-rigged items are covered with tarpaulins or are stored in tents or warehouses for protection against bad weather and pilferage.

PROVIDING COMMUNICATIONS SUPPORT

4-70. The parachute office is responsible for directing aerial delivery company communications and establishing communication links with the company operating platoons. There are a variety of communication methods employed depending on the situation and mission. Communication methods include internet via the SECRET Internet Protocol Router Network, using secure telephones, radio, and face-to-face exchange of information. Establishing a primary, alternate, contingency, and emergency communications plan is a key requirement for operations in a contested environment. These plans provide prioritized options for redundant means of communication to ensure effective command and control and operability. See FM 6-02 for additional information on developing primary, alternate, contingency, and emergency communications plans.

PARACHUTE PACKING FACILITY OPERATIONS

4-71. Parachute packing facility operations consist of the packing, inspection, and repair of personnel and cargo parachutes. The various types of parachutes are discussed in the aerial delivery equipment section of this chapter.

4-72. An adequate site must be selected for facility operations to occur. Details on site selection are covered in the aerial delivery rigging facilities section of this chapter.

4-73. Personnel and cargo parachute pack squads, sections, and platoons are responsible for executing the facility operations for parachute packing. The personnel strength and capabilities of the parachute pack element are based on the level each organization is designated to support (theater, corps, division, or brigade). These personnel may be required to jump with airborne assault personnel and provide technical assistance to supported units recovering and evacuating aerial delivery equipment.

4-74. Parachute packing sections are required to provide packing support for theater aerial delivery to include airborne corps, division, or brigade AOs.

4-75. Functions of section personnel include—

- Packing personnel and cargo parachutes.
- Performing inspections according to the appropriate TM for that parachute.
- Tagging and returning unserviceable parachutes to the supply and maintenance platoon for repairs.
- Sending serviceable packed parachutes to the supply and maintenance platoon for storage.
- Preparing reports on their activities and sending them to platoon headquarters, where they are consolidated for submission to higher headquarters.
- Accompanying supported units during airborne operations to provide technical assistance in recovery and evacuation of airdrop items.
- Providing advice on storing airdrop items before the items are evacuated to the supply and maintenance platoon.

4-76. Figure 4-7 shows the typical layout of a parachute packing process. This process may vary based on unit standard operating procedures designed to best support the mission.

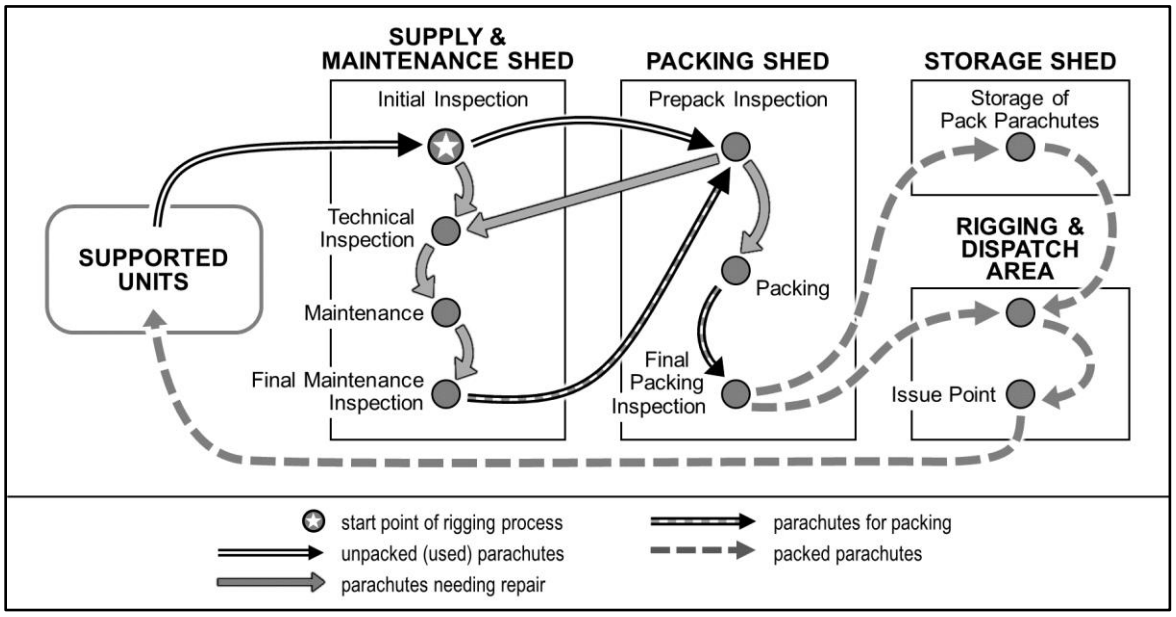

Figure 4-7. Typical parachute packing process

PARACHUTE MANAGEMENT

4-77. Management of parachute operations consists of receiving and issuing procedures, shakeout and drying, quality control, damaged parachutes, maintenance, inspections, and modification work order procedures. It is important to have the applicable technical manual present during these operations. Parachute packing is designated as a maintenance function in accordance with the technical manual. Parachute repair is a subset of that maintenance function.

4-78. The initial step is the receipt of the parachute. The supported unit must ensure all parachutes are returned to the aerial delivery company through the airdrop office. Proper accountability must be conducted to ensure the transfer of all parachute systems occurs. The proper supply transaction must be conducted in accordance with DA PAM 710-2-1 during the transfer. Parachutes not recovered during the mission by the supported unit due to loss are subject to administrative procedures under DA PAM 735-5.

4-79. Shakeout and drying of the parachutes must take place before packing. Establish priorities on parachutes (by type) to be completed based on mission demands. Shakeout and drying procedures can be found in the appropriate technical manual for the parachute. If a dedicated shakeout area is not available, use the field expedient method—cable and rope. Drying can be accomplished in any area large enough; however, caution should be given to extended drying time.

4-80. Packing procedures must take into consideration the experience level of the person conducting the packing, the intensity of the operation, the layout, and the task allocation. The experience level of the person conducting the packing will determine how many chutes can be packed in a workday. The intensity of the operation may require more than one person per table to increase flow. The task allocation determines the number of personnel (packers, inspectors, and final inspectors) assigned for the operation. It is important to have the applicable technical manual present during these operations.

4-81. Quality control consists of rigger checks during packing, supervision skills, random sampling, and training of new personnel. Rigger checks are required, and there is no deviation from the standard and method established. The in-process and final inspectors are the supervisors of the packing operation. They must be subject matter experts on packing and inspection procedures. Unit standard operating procedures should include a program to develop new personnel to ensure they become well-versed in packing procedures. Quality control also includes conducting random sampling of parachutes as an additional performance check.

4-82. Damaged parachutes must be identified during shakeout, and the maintenance level must be identified. Damaged parachutes must be segregated from serviceable parachutes. Repair and turn-in of damaged parachutes must be conducted at the appropriate level.

4-83. Maintenance of parachutes must be accomplished in accordance with the appropriate technical manual to ensure serviceability and maximize use throughout their intended service life. It is important to have the applicable technical manual present for reference. Ground precautionary action, safety of use, maintenance action, and maintenance information messages, along with modification work orders, are all commonly used to direct changes to maintenance and employment procedures for aerial delivery equipment.

4-84. The issuing of parachutes should be controlled to ensure the proper type of parachutes are issued and the proper administrative transactions are complete. Care should be taken to provide physical security and protection from damage to parachutes during shipping between maintenance and storage activities and using units. Whenever the packed parachutes are in transit and in use away from the originating custodial rigger facility, follow the security, property management, and accountability procedures outlined in AR 190-51, AR 710-2, AR 735-5, and DA PAM 710-2-1. Parachute packing personnel will send a report to the parachute office after issuance and use of parachutes.

RIGGING FACILITY OPERATIONS

4-85. The rigging/cargo pack element receives, temporarily stores, and rigs platform loads. This element is responsible for maintaining temporary locations for items and loads not being rigged or immediately being moved to airdrop aircraft.

4-86. The parachute office issues worksheets to the rigging/cargo pack element showing what supplies and equipment are to be rigged in platform loads and their priority. Items are rigged, inspected, and transported to the airfield for loading and airdrop. MHE is used for transporting supplies and rigged airdrop loads. Rigged loads not immediately scheduled for airdrop are temporarily placed in the storage area for future missions. All ammunition rigged for airdrop is inspected by a qualified ammunition inspector. Material storage and handling specialists of the rigging sections provide technical assistance in the rigging of petroleum, oil, and lubricants and other hazardous materials. A before and after-loading inspection is conducted by qualified Army and USAF personnel. Platform loads are rigged by type and method of airdrop. Loads are rigged and inspected in accordance with appropriate 4-48 series technical manuals for platform loads and various equipment. These technical manuals should be present during operations.

4-87. The airdrop systems technician, assisted by the airdrop supervisor, supervises rigging operations and inspections of the rigged loads. The airdrop systems technician assigns personnel to assist in inspecting the loads for proper rigging. The inspection must be made by a qualified rigger before the rigged loads are transported to the storage area or to the aircraft for loading.

4-88. The rigging/cargo pack element may be asked to provide other types of assistance. Section riggers may have to give both technical and recovery assistance. Recovered aerial delivery equipment that is returned to the section is either repaired as soon as possible or turned in for salvage. See TM 4-48.02 for details on airdrop derigging, recovery, and evacuation of air items.

4-89. Inspections are required throughout all aspects of rigging procedures. Rigging is a highly technical profession. Mishaps and malfunctions can be detrimental to the mission and combat power. Inspections are conducted to mitigate the risk of mishaps and malfunctions. AR 750-32 covers information on supervision and inspection requirements. The applicable TM series should be on hand during inspections. The types of inspections required are discussed below.

- **Technical/rigger-type inspection.** This is a complete inspection of an airdrop item including its components. This type of inspection is performed by a qualified parachute rigger according to procedures in the appropriate TM series. The inspection is concerned with completeness of the item and its parts; operational adequacy of the item; illegible markings; faded or missing labels; and worn, peeling, or chipped paint. The inspection is also concerned with determining damage caused by dirt, grease, mildew, moisture, rust, tears, or breaks in fabric or other materials, and any other defects.
- **Rigging in-process inspections**. These inspections are conducted at specified points during rigging operations. The inspections are made by qualified parachute riggers (other than the person rigging the load) to ensure that only authorized procedures are followed according to applicable 4-48 series technical manuals.
- **Routine inspections**. These are visual checks performed on an item, including all its visible components. The inspections are conducted on all items that can be seen without opening the parachute pack or bag or derigging a load. Rigger personnel must inspect aerial delivery equipment before issue, and cargo parachutes are inspected routinely before being placed in ready-for-issue storage. Routine inspection should be conducted according to the applicable TM series every 30 calendar days or more frequently if prescribed by the local unit commander.
- **In-storage inspection**. This is a random sampling of aerial delivery equipment to ensure that the equipment is ready for issue. Such inspections are usually held every six months. They may occur more frequently if prescribed by the unit's airdrop systems technician. Inspection intervals may vary because of climate or the manner of storage. Inspections are conducted according to the applicable TM series by parachute rigger personnel designated by the ADER supervisor.

AERIAL DELIVERY EQUIPMENT REPAIR FACILITY OPERATIONS

4-90. The ADER element performs maintenance on all aerial delivery equipment and parachutes. Airdrop items are inspected by the inspector-testers. Items that are inspected and found to be serviceable are placed in storage. Items found to be unserviceable but economically repairable, as determined by TB 43-0002-43, are repaired by the ADER specialists and inspected again by inspector-testers. Items that are unserviceable and found to be economically unrepairable are placed in salvage according to higher headquarters, sustainment brigade, or DSB instructions. The air items equipment repair supervisors direct the maintenance activities of support section personnel. Organizational maintenance includes a number of operations.

4-91. A log record of all maintenance actions should be provided per air item. This historical record documents the maintenance throughout the period of service of the individual assembly. For additional requirements of maintenance actions, see AR 750-1.

4-92. A historical maintenance record should accompany the parachute throughout the period of service of the individual assembly. The log record should provide a means of recording maintenance actions performed on a parachute.

4-93. Unit personnel should tag damaged or deficient items as specified in DA PAM 738-751 before turn-in to the aerial delivery equipment facility. A report of items turned in should be sent to the parachute office. The report identifies the unit turning in the items and the type and number of items turned in. The company then adjusts its property records. The items turned in are inspected for the type of repair required and are tagged and separated.

4-94. Detailed procedures for making repairs are listed in maintenance allocation charts in the appropriate TM series. Responsibilities of each maintenance level and the concepts of equipment classification are defined in AR 750-1. Authorized repairs include, but are not limited to—

- Stitching parachute canopies and other items made from cloth, canvas, and webbing.
- Darning using the appropriate sewing machine.

- Repairing items through use of splicing procedures; securing cord, tape, or webbing materials.
- Fabricating items to replace airdrop components damaged beyond repair.
- Repairing snap fastener assemblies used to secure flaps and tabs on parachute packs and harnesses.

4-95. Items returned from the maintenance facility are checked by a qualified rigger for completeness and adequacy of repairs as specified in TM series and AR 750-32. The items are tagged and then returned to service.

4-96. Quality control inspections of ADER are a very important aspect of the maintenance function. The people who perform the inspections must be highly skilled, experienced repair specialists who are able to diagnose deficiencies in airdrop items, prescribe necessary repairs, and determine whether repairs have been made correctly. ADERs are inspected before, during, and after repair.

PARACHUTE AND TEXTILE REPAIR

4-97. The ADER squad performs all levels of maintenance support on parachutes and textile components of aerial delivery equipment. This squad does all the actual maintenance and repair on cargo parachutes, personnel parachutes, airdrop containers, harnesses, slings, and other textile airdrop items. Specific functions of the squad involve both production planning and actual equipment repair and inspection.

4-98. The work area for parachute and textile repair should be in a separate building or in a separate section of a building. The repaired items must be kept in covered facilities before, during, and after repair. In addition, the work area has sewing machines, tables, and bins. All sewing machines, except one in the special machines area, are near worktables. A table in the work area is used for setting grommets and other light hardware repairs. Equipment items awaiting final inspection are placed in permanent bins.

AIRDROP ITEMS REPAIR AND MAINTENANCE

4-99. The ADER squad inspects and classifies aerial delivery equipment turned in by supported units. It determines the extent of repair needed for repairable items (other than textile items) and disposes of unserviceable aerial delivery equipment.

4-100. The work area should be similar to the work area discussed in the parachute and textile repair section above. Items that will not be damaged by exposure to the weather can be stored in open areas. The advantages of using production lines should be kept in mind when planning for classification, inspection, and repair areas. Supply areas may require security aids such as fences, protective lighting, and alarm and communications systems.

4-101. Platforms and other non-textile items should be sent to a separate area for inspection and repair. Qualified parachute riggers inspect the equipment and indicate the repairs needed. Items awaiting inspection and repair may be stored in open or covered areas. They are repaired in covered areas by the ADER specialists assigned to the section. After the repairs are completed, the parachute riggers check to make sure the work has been done properly. The items having passed inspection are ready for issue to supported units and are moved to open or covered storage areas.

SUPPLY AND STORAGE

4-102. Supply operations can be classified as organizational supply, facility supply, and technical supply. Organizational supply includes the operations concerned with obtaining and replenishing individual and organizational supplies and equipment. Facility supply includes all the functions required to receive and store material the company needs to perform its repair (maintenance) mission. Technical supply is the receipt, storage, and issue of airdrop items required by supported units.

4-103. Personnel of the airdrop supply section must be familiar with Army storage procedures. Time and space-saving methods must be used. Procedures for storage are contained in AR 740-1. Inspections of stored items must be made frequently to reveal and correct supply deterioration, faulty warehousing, fire hazards, and other deficiencies.

4-104. Parachutes should be stored in climate-controlled areas out of direct sunlight.

AERIAL DELIVERY RIGGING FACILITIES

4-105. Desirable characteristics of rigging facilities can vary based on the particular airdrop missions being supported and are discussed in detail in the following paragraphs. It is important to note that the proximity of the rigging activity to sources of supply, key airfields, and operational areas impact flexibility and responsiveness. In instances where sufficient facilities do not exist to support entire elements, it may be necessary to employ capabilities in a modular manner at smaller operating areas across the AO.

4-106. Activities supporting aerial delivery such as inspecting, packing, and repairing parachutes and rigging supplies and equipment for airdrop are performed according to standard operating procedures developed in accordance with approved techniques. There are, however, certain activities which must be adapted to specific situations and requirements imposed by local conditions. For these activities, which include the selection of rigging areas and layout, only the broadest guidance can be provided. The experience of airdrop systems technicians and parachute rigger senior NCOs should be leveraged to assess and designate suitable operating sites.

SELECTING OPERATING SITES

4-107. The higher command (usually a TSC, ESC, sustainment brigade, or DSB) to which the aerial delivery company is assigned or attached designates the general area in which the rigging operations will occur. Within this general area, the unit will select a suitable operating site in consideration of the mission, level of support, available facility options or construction considerations, and location of supply installations and air terminals, road networks, and transportation. Unless tactical considerations or directives from higher command prevent it, rigging operations should be performed at or near the departure airfield. Such a location has the following advantages:

- It eliminates multiple handlings.
- It reduces the requirement to have MHE available at the rigging area and at the terminals.
- It reduces the amount and size of transportation required to move the rigged supplies.

4-108. Some form of shelter should be provided for operations requiring protection from the weather. Temporary buildings should be erected when permanent buildings are not available. If buildings are not available, tents should be requisitioned to provide necessary shelter. Space must be considered for appropriate fencing requirements or other effective security control requirements. Security control measures must be established for the control of casual or systematic pilferage from storage or other critical operating areas. Figure 4-8 shows a typical layout of the area for an aerial delivery company. This includes rigging and supply operations, ADER, storage, and a load staging area.

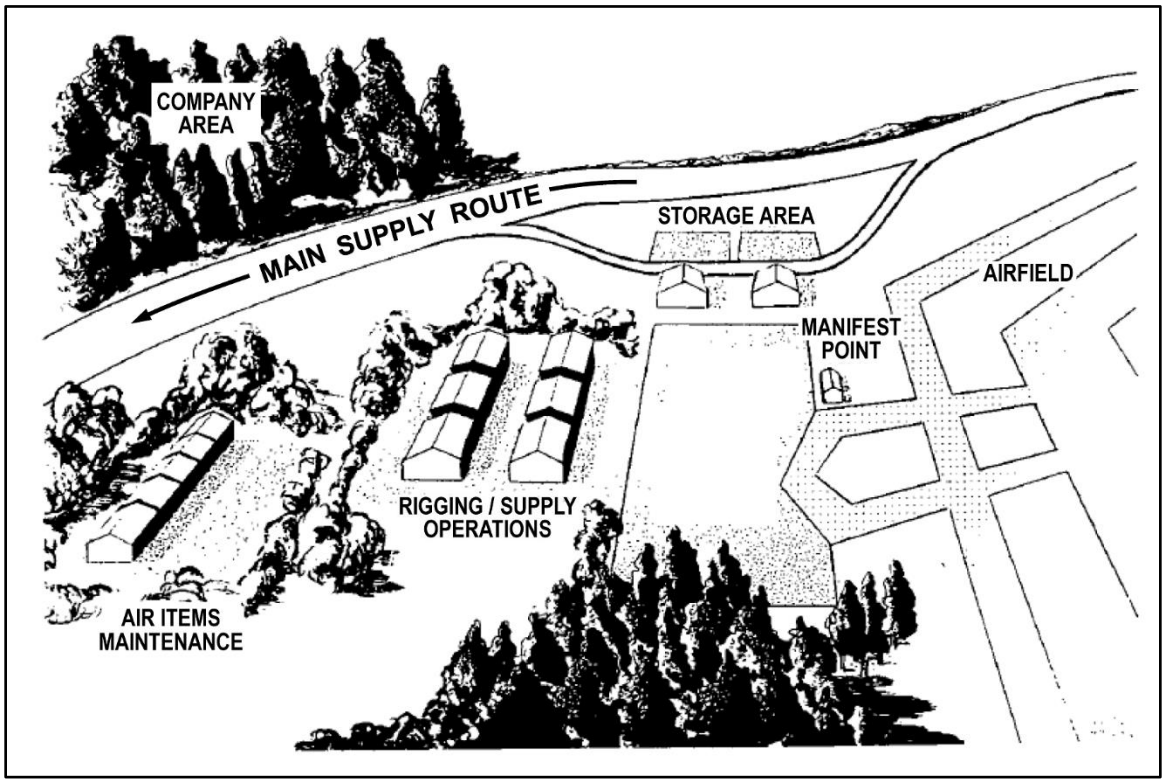

Figure 4-8. Typical layout of an aerial delivery company

4-109. The site should be reasonably high, with slopes affording good drainage. Gravel should be used, if possible, to cover paths and roadways. Even the best terrain may become muddy under heavy traffic in rainy weather. In cold weather, the site should be located in an area in which natural protection is provided against wind and cold. In hot weather, the location selected should permit as much air circulation as possible.

4-110. The layout of the headquarters area should include the unit supply area, orderly room, living quarters, dining area, automotive maintenance, and parking area. Maintenance and packing operations will require considerable floor space for packing tables arranged in lengths of 48 or 60 feet. Large cargo parachutes are normally packed on the floor; sufficient floor space must therefore be made available for these packing operations. Airdrop operations will require protective covered space for select organizational equipment and operating supplies. In addition, outside space is required for rigging operations and the receipt and storage of air droppable supplies not requiring indoor storage. A manifest shed or tent should be erected near the dispatching area and loading strip.

4-111. Selecting a site for rigging operations would be extremely difficult without conducting some sort of reconnaissance or site survey to ensure the location is suitable for operations. Sources of information for selecting a site for a rigger facility include—

- Aerial photographs and maps.
- Recon reports.
- Infrastructure plans.
- Operational plans.
- First-hand knowledge.
- Host-nation support.

4-112. When selecting a site, there are many other considerations that must be addressed before executing the occupation of the site. These considerations should be conducted in sequence as follows:

1. Personnel selecting the site must determine throughput and sequencing of troops, equipment and resources, supplies, and aerial delivery loads and configurations. Determining the throughput and sequencing allows planners to determine the space required and area layout.
2. Available transportation modes must be determined to identify how traffic routes will be used, how supplies and equipment will be transported, and to identify stockpile sites for supplies based on transportation constraints.
3. The areas required for various functions must be identified:
   - Rigging areas for heavy loads or CDS.
   - Crane emplacement, if necessary.
   - Storage area for unit supplies and equipment.
   - Call forward area and chalk assembly area.
   - Aerial delivery storage area.
   - Retrograde turn-in and reset.
   - Administrative areas.
   - Trash and recycling (can be resource-intensive, depending on mission type).
   - Attached elements, if applicable.
4. The location of other elements or units supporting aerial delivery operations is important for ease of accessibility. These elements include Army aviation, airfield element support, communications, airlift control element, and the A/DACG.
5. Road networks are important to ensure there is an uninterrupted flow of ground transportation. Determine serviceability of existing roads and their connection to main supply routes.
6. Determine locations for key elements such as the headquarters for command and control, and the best areas for rigging operations (covered areas, hard standing ground, and adequate MHE maneuverability).
7. The operational flow must be optimized, efficient and organized (capability and capacity).
8. Security of rigged loads (sensitive items and cargo).

PARACHUTE PACKING

4-113. Space must be allocated for a shakeout area and drying tower. A shakeout area is required to clean debris from parachutes. It is a specialized building area requiring a clear height of 60 to 100 feet (18.3 to 30.5 meters). A drying tower requires a height of 60 to 100 feet (18.3 to 30.5 meters), with additional environmental controls to aid in drying parachutes.

4-114. Normally, the packing sections will require buildings with a total floor space of approximately 48,000 square feet when the company is operating in a single location. Most of the floor space will be occupied by packing tables. Some of the additional floor space will be occupied by cargo parachutes.

4-115. The layout plan for parachute packing depends on the monthly demand of the parachute packing element and the task allocation of personnel. The layout should allow enough space for inspection tables for parachute canopies and the actual parachute packing lanes. It takes six packing table sections to make a parachute packing lane.

4-116. The parachute packing layout includes tables for the inspection of parachutes and loose items. A copy of the operating procedure for final inspection should be attached to each table. Loose items that have received final inspection should be sent to storage. A suggested layout for a packing shed is shown in figure 4-9.

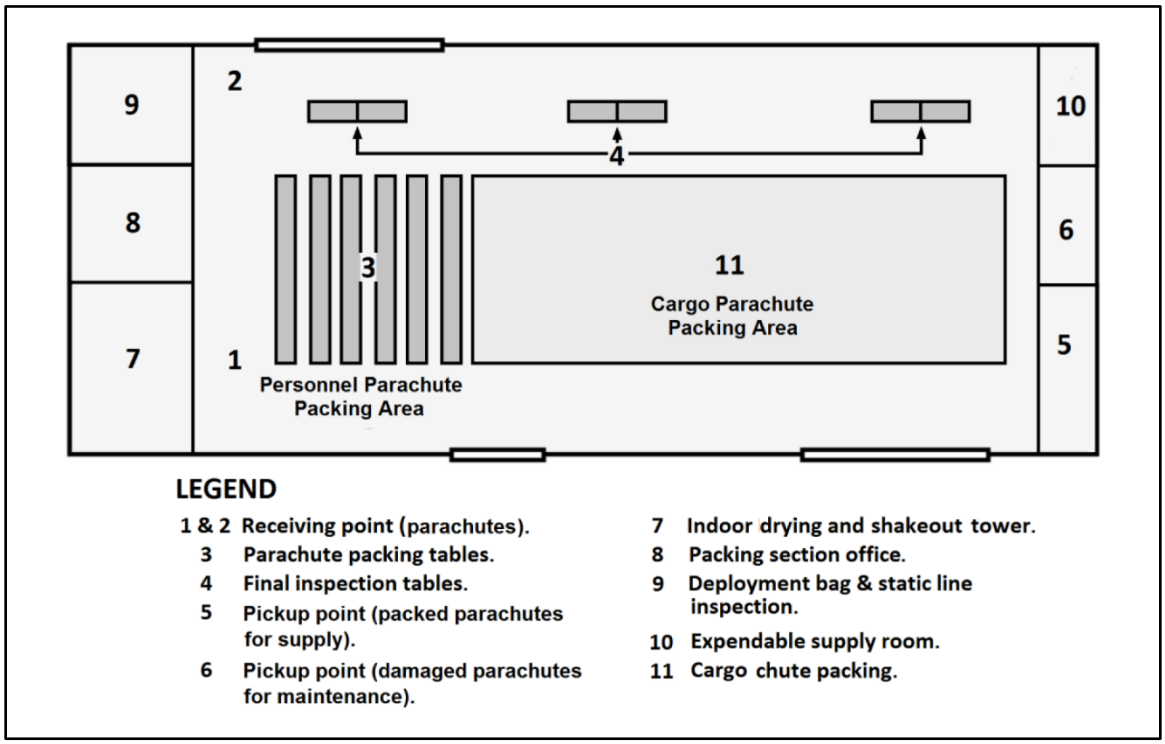

Figure 4-9. Suggested layout for a parachute packing shed

RIGGING SECTION SETUP

4-117. The rigging of platform loads is conducted in buildings such as large warehouse facilities (for example, USAF hangers) or in common table-of-allowance-authorized maintenance tents. These operations require about 80,000 square feet (7,459 square meters) of covered space for rigging operations, maintaining organizational equipment, and providing a protected storage area for supplies. An additional 200,000 square feet (18,888 square meters) is used for a dispatching area. A manifest tent or shed is located near the dispatching area and the loading airstrip where the rigged supplies are grouped into aircraft loads. About 19,000 square feet (1,687 square meters) are required for the storage of pre-rigged loads awaiting airdrop requests. These loads may require storage overnight or longer depending on the weather, tactical conditions, and logistical requirements. This storage should provide protection against weather, vermin, theft, sabotage, fire, and CBRN hazards.

ASSEMBLY LINE RIGGING

4-118. Rigging is a general term used to describe the processes and procedures by which a specific item or load of supplies is prepared for airdrop. It includes the assembly, loading, and marking of airdrop containers, platforms and platform assemblies, and the attachment of parachutes to prepared loads. Many different types of loads may be rigged using the assembly line method. Airdrop of supplies and equipment rigging procedures are discussed in detail in TM 4-48 series publications.

4-119. The preparation of platform loads for airdrop is part of the overall marshalling plan. ***Assembly line rigging*** **is a method of mass rigging designed to get the maximum amount of equipment rigged for airdrop in a minimum amount of time.** The assembly line is organized by stations. Each step in the rigging procedure is done at a separate station. Each station has the items necessary to rig the load. The number of stations required depends upon the type of loads to be rigged.

4-120. Assembly line rigging is the most effective technique for rigging large numbers of similar loads. A clear understanding of the concept and of the layout required to meet a mission requirement will assist in the planning, execution, and management of the assembly line rigging operation.

4-121. There are requirements for assembly line rigging that must be considered for successful operations. Requirements are basically the same whether rigging a container load (such as an A22 container) or rigging for heavy drop. However, a smaller area is sufficient and fewer stations are needed if only A22 containers are to be rigged. A suitable area must be selected that contains the minimum size (at least 30 ft. wide by 200 ft. long) firm and level surface, adequate access, and proper overhead cover for protection against inclement weather. Other requirements include a roller conveyor, lift equipment, and sufficient personnel.

4-122. Assembly line rigging requires fewer skilled, technical personnel. At least one skilled rigger may be necessary for each station on the assembly line. The rigger supervises and is responsible for the operation of a specific station. Unskilled personnel performing their specific job on the assembly line become more efficient as the assembly line operation progresses. Minimum personnel requirements are based on the size of loads to be rigged, the number of hours per day required for operations, and other factors that may affect performance such as temperature or other obligations. The minimum personnel requirement to be functional is—

- One rigger at each station.
- One NCO in charge for each active rigging lane.
- One NCO in charge of the overall operation.
- Joint airdrop inspection qualified personnel, as required.
- Rigging detail, as required (plan at least three per station).

4-123. The layout for platform assembly line rigging will contain a number of stations to support the flow of the process of the rigging operation. The number of stations established on an assembly line will depend on manpower, items being rigged, and other factors. There will typically be seven stations, but there may be five or fewer. A seven-station assembly line has the following stations:

- Inspecting and preparing platform.
- Preparing and positioning honeycomb stacks.
- Preparing and positioning vehicles or equipment.
- Installing lashings.
- Installing release systems.
- Stowing cargo parachutes and extraction systems.
- Inspecting the rigged load.

4-124. Aerial delivery equipment and supplies are required at the various stations in the process in order to conduct assembly line operations (airdrop supplies and equipment are discussed earlier in this chapter). Assembly line rigging requires fewer lifting devices to complete the operation because equipment is centrally located. The equipment necessary to rig out a unit is based upon the type and quantities of items to be rigged. Conveyors, small hand tools, and MHE will be needed. The specific items listed in the TMs for each item to be rigged are also required. If forklift trucks, trucks with winches, or other standard lifting devices are not available, it may be necessary to use field expedients or contracted support. See ATP 4-10 for information regarding operational contract support.

4-125. Under ideal conditions, the airdrop supervisor will be informed that a mass airdrop will take place with sufficient time to enable an assembly line operation plan to be fully developed. More than one assembly line may be necessary to out load the unit, depending on the type and quantity of equipment to be rigged. All like items should be rigged on one assembly line for ease and effectiveness of flow.

4-126. The type and number of vehicles required to transport items to the assembly line area and to transport rigged loads to the airfield should be determined at the outset in order to effectively to support the air movement plan. Determination should also be made of the type of lifting devices required. If forklift trucks, trucks with winches, or other standard lifting devices are not available, it will be necessary to use a field expedient such as the A-frame. The A-frame consists of two uprights and a cross member. Figure 4-10 shows the dimensions of the A-frame, which may be constructed locally from scrap material. It is used in conjunction with a suitable hoisting device such as a chain hoist or block and tackle. For ease in handling

heavy-drop loads, the A-frame should be used in pairs. Identifying the limits of this method (height and weight) during planning will prevent insufficient lift capability during rigging operations.

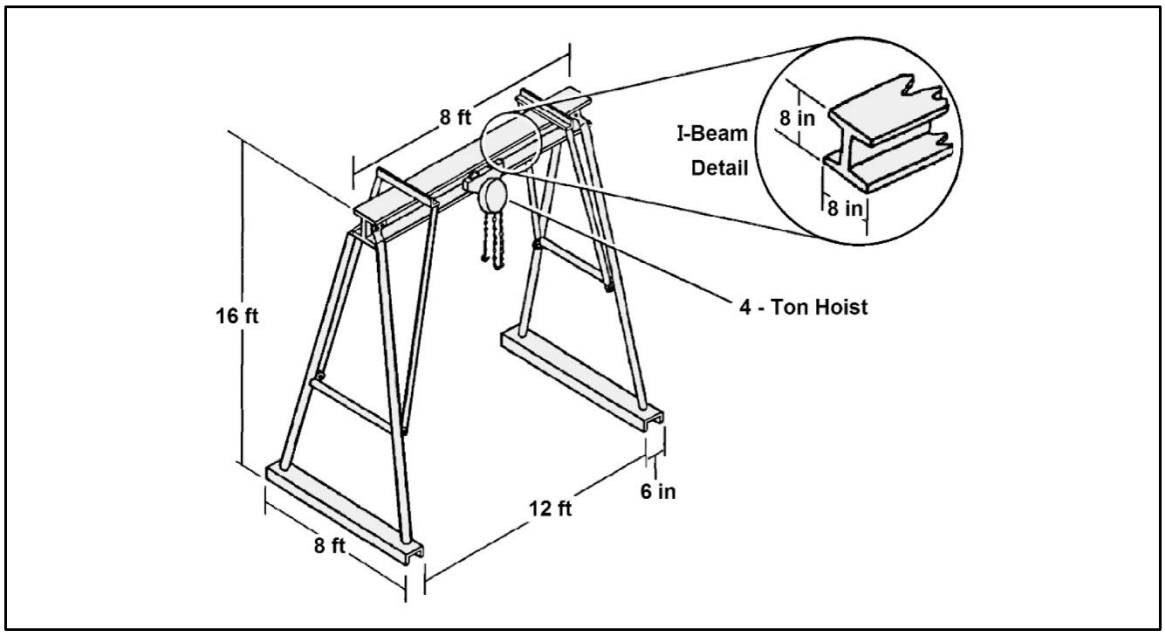

Figure 4-10. A-frame construction

4-127. The number of personnel required for assembly line rigging must be addressed during planning. Personnel requirements vary with the type and quantity of loads to be rigged and the time available. The number of personnel at each station may also vary depending on the job to be done at each station. A qualified rigger should be in charge of each station and is responsible for ensuring that all rigging tasks are correctly performed and that all aerial delivery equipment used remains serviceable throughout the rigging process.

4-128. The assembly line should be laid out in two parallel rows of roller conveyors forming a straight line, with the distance between rows determined by the width of the platforms or skidboards being rigged. The placement of stations should be identified using some sort of marking. The space required between stations depends on the type of loads to be rigged and the amount of supplies and equipment required to rig the loads. The airdrop supervisor may make changes in the order or the number of stations depending on the type and number of loads to be rigged.

4-129. Other considerations for assembly line operations include the preassembly and prepositioning of aerial delivery equipment and supplies, such as the precutting of honeycomb and energy dissipating material. Compiling a load and priority list, preparing vehicles and equipment for inspection and use, selecting rigging personnel, and performing required administrative tasks must also be executed.

SETTING UP THE ASSEMBLY LINE

4-130. Setting up the assembly line is one of the most important aspects of assembly line operations. Certain procedures should be accomplished before the operation begins. This is necessary to keep the loads flowing smoothly without bottlenecks in the process. First, the process must be clearly understood from start to finish, and each station's work must be completed and inspected by the station rigger prior to progressing to the next station. Assembly line set up for rigging out should be based on unit demand. Non-value-added or wasteful steps or procedures should be eliminated during the planning process. As the assembly line is flowing, the airdrop systems technician or airdrop supervisor should evaluate the process and implement improvements to increase efficiency without compromising safety.

Assembling Equipment

4-131. Items listed in the equipment list of the pertinent TM should be assembled. It should be noted that the equipment lists in the 4-48 series technical manuals do not include the equipment necessary to rig the accompanying loads. These items can be assembled in kits for each piece of equipment to be rigged. The kits should be delivered to the assembly line area prior to the beginning of the operation. Equipment may be placed on one or both sides of the assembly line, depending on the type and quantity of equipment to be rigged and space available at the specific location.

Constructing or Assembling Platforms

4-132. Combat expendable platforms, if used, should be constructed before being sent to the assembly line if there is sufficient time for construction. When modular or Type V platforms are used, assembling them in advance facilitates movement along the assembly line. These tasks can be accomplished before the unit is outloaded.

Preparing Honeycomb

4-133. Honeycomb should be cut to required sizes, and honeycomb stacks should be glued together according to instructions in the pertinent TMs before delivery to the assembly line.

Setting Up the Stations

4-134. An example of a typical assembly line for vehicles or heavy equipment is shown in figure 4-11 and is outlined as follows:

- Station 1 – Platforms are inspected for serviceability and prepared for rigging.
- Station 2 – Honeycomb stacks are prepared and positioned on the platform.
- Station 3 – Loads are prepared for rigging and positioned on the platform.
- Station 4 – Lashings are installed, securing the vehicle to the platform.
- Station 5 – The release assembly is prepared and installed on the load. Data tag and extraction parachute are placed on the load.
- Station 6 – Cargo parachutes are installed. Riser extensions are installed, and the parachute is positioned and secured to the load.
- Station 7 – The load is completely inspected. Discrepancies are corrected, and the load is moved to storage area or aircraft.

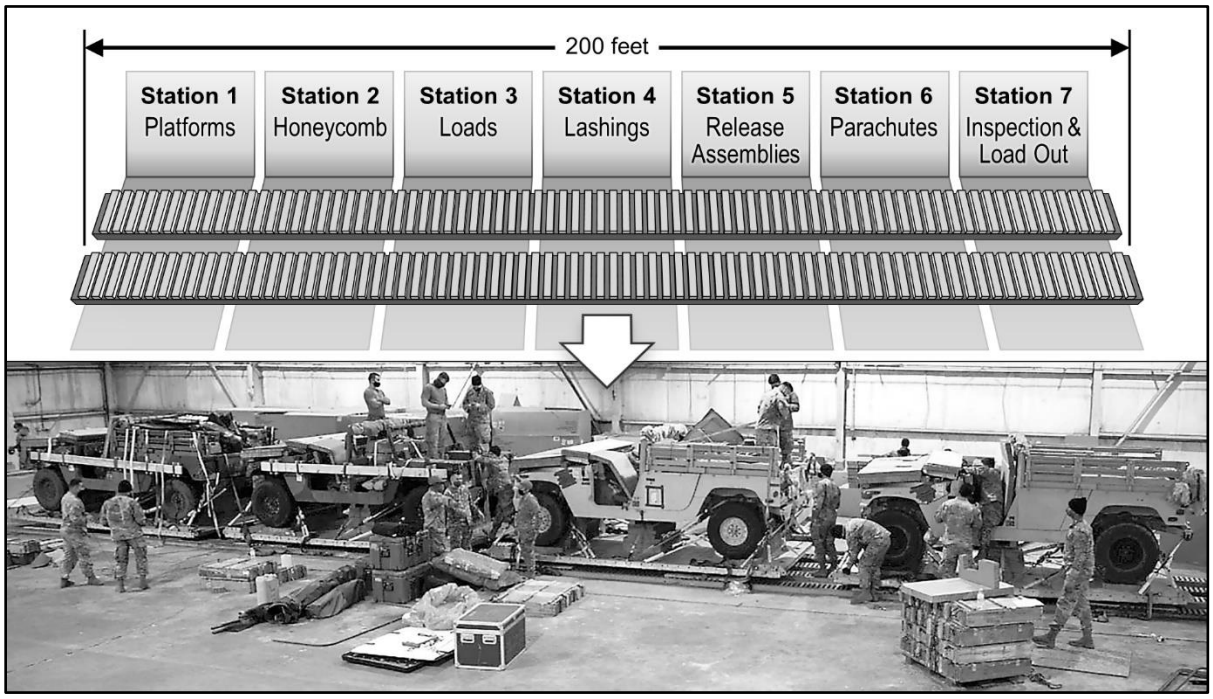

Figure 4-11. Assembly line rigging layout

4-135. In some instances, it may be more advantageous to change the order of stations. For example, preparation of the vehicle is sometimes accomplished at station 1, and the vehicle is moved down the line with the platform until it is positioned at station 3. At other times, preparation of the vehicle is accomplished off the assembly line, and the vehicle is delivered to station 3 ready for positioning. Other variations may include the addition of separate stations for positioning the vehicle and stowing the accompanying load, or combining two of the stations, such as preparing the platform and positioning honeycomb.

4-136. Suspension slings may be installed when a vehicle is prepared; however, if the load is platform-suspended, it may be better to wait until a later station so that the slings will not be dragged along the assembly line. If modification of the vehicle is necessary, it would normally be done at the time of preparation.

Assigning Personnel

4-137. The outloaded unit should provide personnel who are used for and assigned to specific stations on the assembly line. Each person is trained on and assigned a specific task, requiring a relatively equal amount of time to complete, in order to keep the assembly line operation moving at a uniform rate and prevent bottlenecks.

Army and Joint Inspections

4-138. Three inspections are conducted after the load is rigged and before it is dropped. Joint airdrop inspections are required and conducted by representatives of each of the Services participating in the airdrop mission:

- A final facility inspection is performed before the load leaves the facility.
- As equipment airdrop loads arrive at the departure airfield, USAF loadmasters and Army riggers perform a joint before-load inspection. This ensures that all procedures have been accomplished so that dropped items will be serviceable after landing.
- To further minimize the possibility of malfunctions, a second joint loadmaster-rigger inspection is conducted after loading. This joint inspection is referred to as an after-load inspection.
- For more detail on these inspections see AR 59-4 and TM 4-48.02.

RIGGING A-22 CONTAINERS

4-139. The purpose of describing the assembly line rigging of A-22 containers versus heavy drop is to note the reduced number of stations and smaller area required to conduct the operation.

Note: The rigging procedure for A-22 containers is to be used if ONLY A-22 containers are being rigged. If any other items are rigged, the stations, area required, and procedure will be altered.

Assembling Equipment

4-140. Assemble and place the equipment necessary to rig the A-22 container loads on one or both sides of the assembly line. Determine the type and number of vehicles necessary to transport equipment to the assembly line area and to transport rigged loads to the airfield.

Setting Up the Stations

4-141. The number of stations required will be determined by the airdrop supervisor. An example of a typical assembly line for rigging A-22 containers is outlined as follows:

- Station 1 – Place appropriate skid board with pre-routed skid board ties attached on line. Proper honeycomb stack is placed. Components of A-22 cargo bag are laid out.
- Station 2 – Position honeycomb and cargo bag on skid board.
- Station 3 – Load is positioned on cargo bay or sling assembly.
- Station 4 – Ensure proper static line configuration is chosen for mission. Parachute assembly is positioned and secured to top of load.
- Station 5 – Parachute is positioned and secured to top of load (and pilot parachute attached as necessary). Static line configured for breakaway or non-breakaway airdrop.
- Station 6 – Load is inspected and then outloaded to storage or aircraft.

Chapter 5
Sling Load

This chapter discusses sling load operations, techniques, and planning considerations. It also examines load classifications and methods of sling loading. The chapter concludes with a discussion on sling load safety and equipment retrograde. The rotary-wing aircraft sling load method of carrying cargo and equipment overcomes many of the obstacles that hinder other methods 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 across operational areas, vertical replenishment of forward units, and firepower emplacement.

SLING LOAD TECHNIQUES

5-1. Air assault and Army air movement operations are two distinct missions that use sling load techniques. *Air assault* is the movement of friendly assault forces by rotary-wing or tiltrotor aircraft to engage and destroy enemy forces or to seize and hold key terrain (JP 3-18). *Air movements* are the air transport of units, personnel, supplies, and equipment, including airdrops and air landings (JP 3-36). Army air movements include all operations involving the use of utility and cargo rotary-wing aircraft for other than air assaults. These operations are conducted to move Soldiers and equipment, and to transport ammunition, fuel, and other high-value supplies. The same general considerations that apply to air assaults also apply to air movements.

5-2. A sling load is an external load carried beneath a utility or cargo rotary-wing aircraft held in place by one or more slings, cargo bags, or cargo nets. As in airdrop operations, 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

5-3. As opposed to airdrop operations, sling load operations are usually Service-specific rather than joint. Because sling load operations are Service-specific, they are easier to plan and coordinate, require less lead time, and are more responsive to the needs of the commander. However, they 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.
- The weight of the load.
- Supported unit (usually the SSA 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

5-4. 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 commonly used for sling load missions. 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. Geographic location, including altitude, may prohibit sling load operations. Factors that affect how much weight a rotary-wing aircraft can carry include—

- 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. Rotary-wing aircraft lift performance decreases as the relative humidity increases.
- 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. 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 seven 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. See FM 3-99 for additional information on specific rotary-wing aircraft characteristics and planning considerations.

SLING LOAD RESPONSIBILITIES

5-5. There are normally three elements involved in sling load operations: 1) the supporting unit that is providing the supplies requested for the mission, 2) the aviation unit that provides the aircraft, and 3) the unit that receives the cargo. The supporting unit may sometimes also be the receiving unit, such as during unit relocation and air assaults.

5-6. Request procedures are the same as those used for airdrop. The receiving unit requests supplies from the supporting unit, and the appropriate level SPO officer determines the method of delivery. When there is an urgent request, the operations officer sets or adjusts priorities and forwards the request for rotary-wing assets. The SPO officer simultaneously forwards the supply 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.

Supporting Unit

5-7. 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 hookup 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 (rather than the superseded FM 4-20.197 cited on the form) prior to the arrival of supporting rotary-wing aircraft.

5-8. 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 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, fences, and towers. Other factors that should be avoided are not so apparent—for example, 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. 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 parallel to the slope rather than upslope or downslope.

- The PZ approach and exit flight paths should be clear of obstacles and allow the aircraft to fly into the wind for both takeoffs and landings.

5-9. 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).

5-10. 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. The aviation unit should consult FM 3-99 and contact the receiving unit as soon as possible. Parallel planning efforts will increase efficiency and aid in mission success. For additional information on choosing LZ and PZ for sling load operations, see FM 3-99.

Aviation Unit

5-11. 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.
- Establishing safety procedures and understanding of duties and responsibilities between the flight crew and ground crew.

5-12. The liaison officers and experts from the supporting, 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

5-13. 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, and remove the load from the LZ and certify any backhauls. The core of these teams must be trained in accordance with the requirements in TM 4-48.09. The receiving unit is responsible for—

- Selecting, preparing, and controlling the landing site (to include communications).
- Receiving and de-rigging the load.
- Ensuring proper supervision of the de-rigging 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.

5-14. 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, safeguarding practices, and other supply transactions.

CLASSIFICATION OF LOADS AND METHODS OF SLING LOADING

5-15. 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

5-16. Certified loads are those items of equipment which have completed the evaluation and testing required by DEVCOM. The center is the Army certification agency for sling load certification. 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 the appropriate sling load manual is a recommendation and not a restriction, unless so stated.
- Changes or modifications to load characteristics (including weight, model, national stock number, accompanying load, and structure of items) create a unique load.

5-17. Changes to load characteristics require additional sling load equipment. A list of sling load equipment, with national stock numbers, can be found at the Aerial Delivery and Field Services Department (ADFSD) web site. The link to the site is located in the references section under Websites.

5-18. 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 that DEVCOM considers to be proven safe.

5-19. Unique loads include 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.

5-20. Petroleum, oils, lubricants, rations, and ammunition and munitions are normally flown by helicopters in cargo nets or bags. Helicopter sling load certification and testing are not required for cargo net and bag loads.

METHODS OF SLING LOADING

5-21. 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. Figure 5-1 depicts a single-point sling load carried by a CH-47.

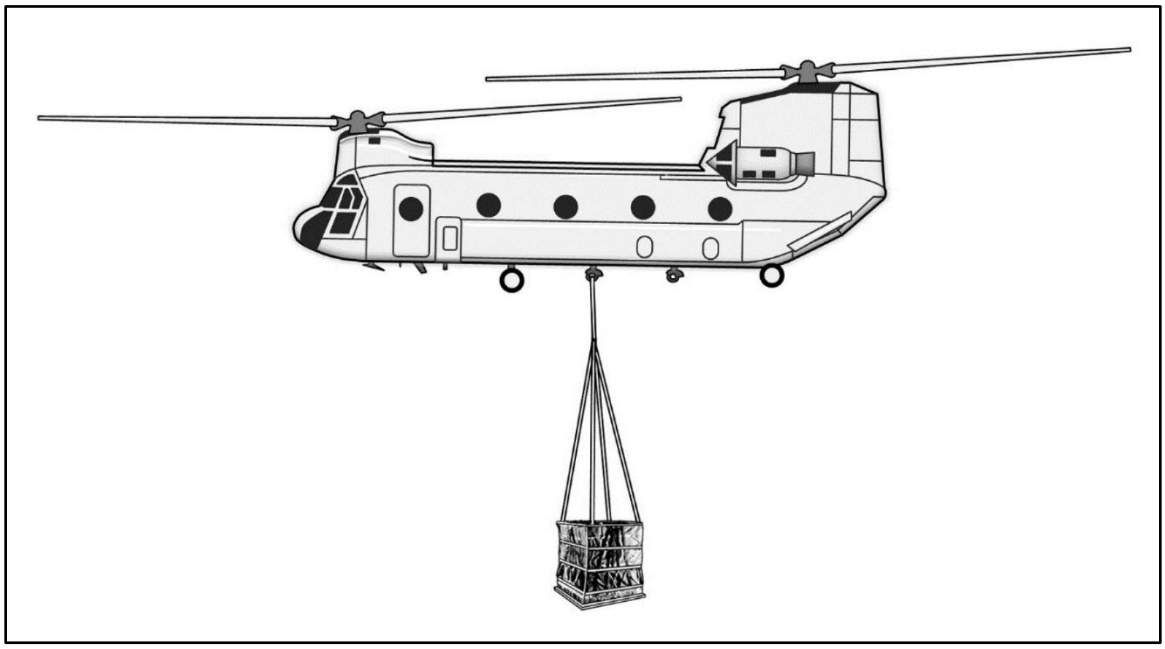

Figure 5-1. Single-point sling load

- Dual-point loads use two aircraft cargo hooks on one rigged load during flight. Figure 5-2 depicts a dual-point sling load carried by a CH-47.

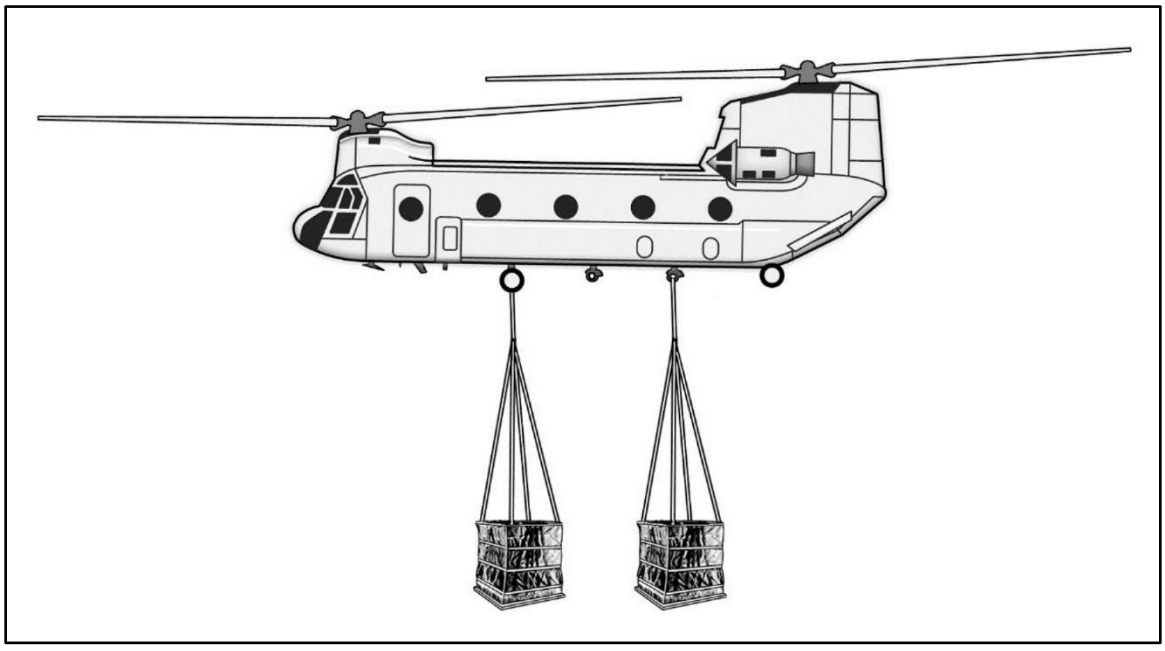

Figure 5-2. Dual-point sling load

- Tandem loads use two aircraft cargo hooks on two rigged loads (one in front of the other) during flight. Figure 5-3 on page 5-6 depicts a tandem load carried by a CH-47.

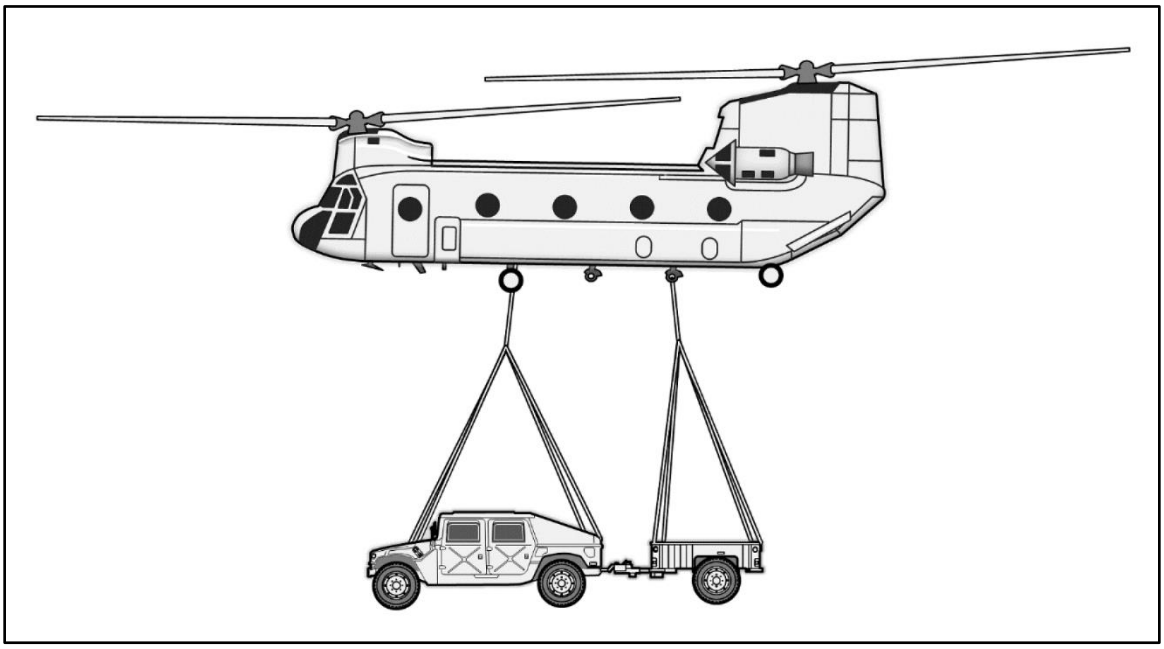

Figure 5-3. Tandem load

- Side-by-side (often referred to as shotgun) loads use one or two aircraft cargo hooks on two rigged loads, one beside the other during flight. Figure 5-4 depicts a side-by-side (shotgun) sling load carried by a CH-47.

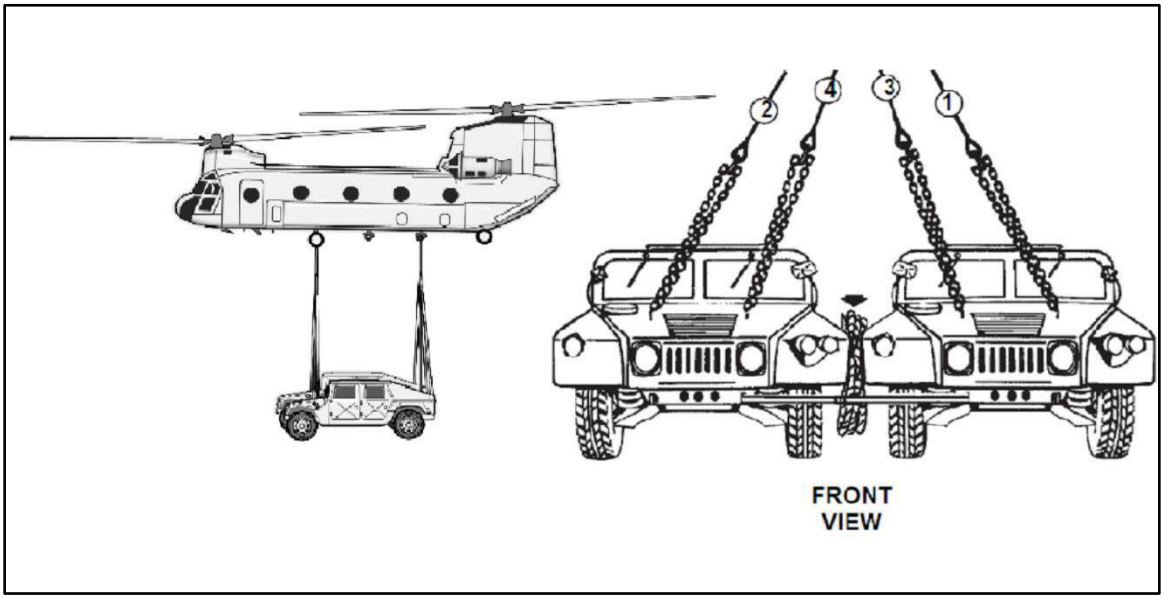

Figure 5-4. Side-by-side (shotgun) sling load

SLING LOAD SAFETY

5-22. Safe sling load operations require that personnel adhere to strict safety protocol.

5-23. Rotary-wing aircraft generate and store static electricity during flight. When the 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 connect a grounded static discharge wand 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 operation must stop until the wand-to-aircraft contact is reestablished. 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.

5-24. Ground crew personnel must 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.

5-25. 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, protective eyewear, and hearing protection. The strongest rotor wash occurs between 20 and 60 feet outside the rotor disc.

5-26. LZ selection is also critical. Larger, dual-rotor aircraft require bigger LZs. Multiple 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 hookup and release personnel to report to in case of an emergency. Many standard operating procedures 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 aircraft. For more information on LZ and PZ organization and selection see JP 3-36.

5-27. Proper use of MHE is a concern in sling load procedures. As in airdrop operations, personnel must be trained on the operation and safety concerns associated with operating MHE.

SLING LOAD EQUIPMENT RETROGRADE

5-28. The receiving unit is responsible for ensuring that sling load equipment is returned to the supply system. Sling load equipment is returned to the supporting SSA rather than to an aerial delivery company. The equipment can be returned by a supporting aviation unit, the receiving unit via its organic wheeled assets, or by the salvage, collection, and classification procedures used in returning aerial delivery equipment previously discussed.

ADVANTAGES AND DISADVANTAGES OF SLING LOAD

5-29. Advantages of sling load include—

- Rapid movement of heavy, outsized cargo directly to the user while bypassing surface obstacles.
- Allowing the use of multiple flight routes and landing sites, enhancing survivability of the aircraft and affording flexibility to the ground commander.
- Provides a flexible and responsive asset in instances that are non-permissive for ground-based delivery of cargo.
- Positioning combat and support assets without MHE or the need for onward movement.

5-30. Disadvantages of sling load include the following:

- Rotary-wing aircraft weight capacities are generally less than that of fixed-wing aircraft.
- It 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.
- The limited number of rotary-wing aircraft available, and priority of sling load missions 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”.
- Flight time and distance are restricted due to increased fuel consumption rate.

Appendix A

Airdrop Request Considerations

This appendix covers the information that should be presented when requesting joint airlift support. It discusses unit responsibilities prior to submitting the request, submitting the request, and actions to take after the request has been submitted. The request should cover all information necessary to support the airlift request for the theater of operations it supports.

PRIOR TO SUBMISSION

A-1. The unit requesting airdrop resupply has several important responsibilities. These responsibilities are reflected in actions that the requesting unit must take before submitting its request. Prior to submitting its request, the unit must determine what personnel, supplies, and equipment are needed, and where and when they should be dropped.

A-2. The requesting unit must also consider—

- Its capacity to receive and store the cargo requested.
- The days of supply required.
- Personnel required to conduct the aerial delivery operation.
- The mission hazards that could hinder quantity delivered, location of delivery, type and method of delivery, or timeliness of delivery.

A-3. The theater air assets available to the requesting unit and the unit's priority of support determine how and what information should be submitted for the airlift request.

SUBMITTING THE REQUEST

A-4. Planners must first determine whether the operation is preplanned, immediate, or emergency. The type of request determines the channel it must be submitted through and may alter request format depending upon theater or area standard operating procedures. The request can then be submitted once all required information is gathered.

A-5. The development of the information required for the airlift request should be a joint effort between the USAF and the U.S. Army. The following information should be provided when submitting the request:

- Requesting unit name, call sign, unit identification code, unit level.
- Communications criteria, including frequency and network information.
- Mission supported.
- Mission type (for example: airdrop, airland, air evacuation, or personnel drop).
- Quantity of supplies, equipment, and personnel to be delivered.
- General cargo information—type of equipment or supplies, weight, largest single item, hazardous materials, or UL explosives.
- Number of vehicles by type and weight.
- Special cargo information.
- Date and time of requested aerial delivery.
- Location of delivery by eight-digit grid.
- Contact information.
- Other pertinent information in accordance with theater and unit standard operating procedures.

AFTER SUBMISSION

A-6. After submitting its request, the unit must prepare to receive the resupply. The DZ must be prepared, secured, and controlled; provisions must also be made for recovery and retrograde of supplies and equipment.

A-7. The unit must consider the time it takes for the request to go through the appropriate channels for approval. This duration, and any theater-specific request procedures, determines how far in advance to submit the request.

Appendix B

Future Aerial Delivery Systems

Challenges to conducting contested large-scale multidomain operations require units to operate in environments characterized by high degrees of volatility and uncertainty. Precision logistics to deliver sustainment to the point of need, in the quantities required, throughout the operational environment is required to facilitate high operational pace and tempo. This challenges the force to reduce reliance on legacy processes and systems through the continued development and implementation of new technologies and capabilities. Employing new capabilities reduces demands and allows for more independent operations to support dynamic operational environments against great power competitors.

NEED FOR AUTONOMOUS DISTRIBUTION

B-1. The ability to operate more independently in evolving operational environments requires a focus on developing and exploiting autonomous distribution capabilities. Autonomous distribution consists of a mix of ground, aerial, and afloat autonomous and semi-autonomous systems. These systems provide more options to move over various domains and increase distances and number of turns to provide support to congested lines of communication. The desired end state is to sustain commanders while presenting dilemmas for our adversaries. This appendix covers information on emerging sling load and airdrop systems in development and planned for approved use by the force within the next five years.

SLING LOAD EQUIPMENT

B-2. The Rapid Rigging De-Rigging and Sustainment Aerial Delivery Equipment and Sling Load are both Headquarters, Department of the Army approved requirements currently in development with the Product Manager, Force Sustainment Systems. The sustainment aerial delivery equipment and sling load capabilities are designed as standalone components or used as part of a larger aerial delivery system that will augment or replace current systems. Often sling load equipment is not recovered in a deployed environment or during disaster and humanitarian relief missions. The development of improved sling sets and low-cost cargo nets reduces the cost of sling load equipment.

B-3. The payload stabilization device will improve helicopter flight safety by reducing the rotation and swing of inherently unstable loads. Reducing the rotation allows the helicopter to increase its forward airspeed and reduces the risk of having to jettison the slung load.

B-4. The enhanced speed bag is a rapid equipping initiative that quickly developed an improved helicopter resupply method to replace ad-hoc methods. It efficiently delivers small, highly survivable, and easily portable bundles from a low hovering helicopter. The enhanced speed bag is already in limited use. It will have a full safety release at the end of operational testing. See Figure B-1 on page B-2 for depictions of future sling load systems.

B-5. Following is a short description of the Sustainment Aerial Delivery Equipment and Sling Load components:

- **Improved Sling Sets.** Sling sets using advanced materials with the same load bearing capability of current slings in the standard weight categories of 10,000 and 25,000-pounds capacity with a minimum 25% unit cost reduction over current slings.
- **Low-Cost Cargo Nets.** Cargo nets with the same suspended weight capability in the standard categories of 5,000 and 10,000-pound capacity that decreases unit cost by up to 75% over the

current nylon cargo nets. The materiel being used is similar to the low-cost container design utilized in low velocity airdrop.

- **Payload Stabilization Device**. A simple fabric device attached by to the sling legs that increases the stability (swing and spin) of the payload thus allowing an increase of the helicopters forward airspeed.
- **Enhanced Speed Bag**. An improved resupply system deployed from a hovering helicopter utilizing a lowering device that can deliver a 125 to 150-pound (adjustable) load from 25 feet to 100 feet above ground level.

Figure B-1. Future sling load systems

LOW VELOCITY AIRDROP EQUIPMENT

B-6. The Rapid Rigging and De-Rigging Airdrop System is the final capability in the overarching Advanced Low Velocity Airdrop System requirements document currently in development. The system's key capability is to quickly de-rig equipment on the DZ putting airdropped combat systems, especially direct and indirect fire weapons platforms into operation faster upon arrival. Speed is critical to the seizure of objectives and mission accomplishment. Rapid Rigging and De-Rigging Airdrop Systems reduces the reliance on energy–dissipating material (honeycomb), thereby reducing labor-intensive rigging and de-rigging requirements. This leads to a decrease in borrowed military manpower and materiel required to rig loads. The Product Manger Force Sustainment Systems separated the program into 3 phases. Phase I 22,000-pound capability, 20-foot adjustable platform will start operational testing in 3QFY23. Phase II, Dual Row Airdrop and Phase III, 42,000-pound capability start development in FY24 and FY25 respectively. See figure B-2 for depictions of future low velocity airdrop equipment.

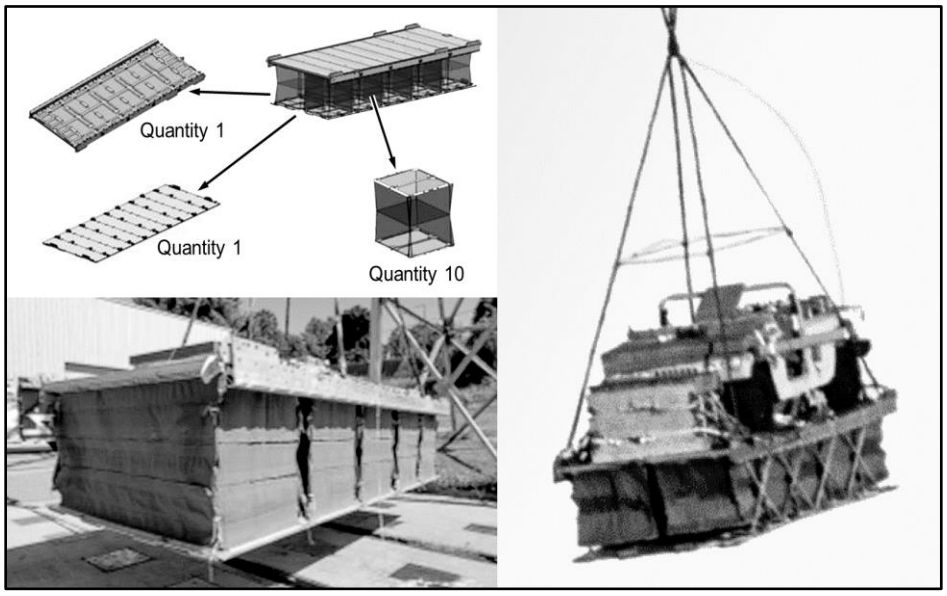

Figure B-2. Low velocity airdrop equipment

JOINT PRECISION AIR DROP SYSTEM VERSION 4

B-7. The JPADS Version 4 utilizes a ram air main canopy for the entirety of the descent and is controlled by the Modular Autonomous Guidance Unit to accurately land the system on the programmed impact point. JPADS provides high accuracy, high offset, high altitude, and allows for a soft impact with a 90% accuracy within 100 meters and 99% accuracy within 400 meters. The system is designed for operation up to 24,500 feet mean sea level, an offset up to 25 km from the target, provides a high standoff delivery and air carrier survivability in contested logistics environments. JPADS version 4 builds on the JPADS version 3. A daytime camera adds a suite of sensors that will include a combination of M-code (a military signal used in the L1 and L2 GPS bands), infrared camera, anti-jam, and military GPS for navigation in GPS-denied environments. Version 4 allows JPADS to not only accurately land in a GPS denied environment during the day with version 3 technology, but also allows for GPS denied environments at nighttime and in all weather conditions. These include conditions such as over the clouds or over the ocean environments. JPADS version 4 technology being developed is a platform agnostic joint effort and will be compatible to multiple future flying systems that have a need for a GPS denied capability.

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Glossary

The glossary lists acronyms and terms with Army or joint definitions. For terms where Army and joint definitions differ, (Army) precedes the definition. Terms for which ATP 4-48 is the proponent are marked with an asterisk (*). The proponent publication for terms is listed in parentheses after the definition.

SECTION I – ACRONYMS AND ABBREVIATIONS

A/DACG	arrival/departure airfield control group
ADER	aerial delivery equipment repair
ADP	Army doctrine publication
AJP	Allied joint publication
AO	area of operations
APOD	aerial port of debarkation
ARSOF	Army special operations forces
ATP	Army techniques publication
BADSC	brigade aerial delivery support company
BCT	brigade combat team
BSB	brigade support battalion
CADC	corps aerial delivery company
CBRN	chemical, biological, radiological, and nuclear
CDS	container delivery system
CJSOTF	combined joint special operations task force
CSSB	combat sustainment support battalion
CUL	common-user logistics
DADC	division aerial delivery company
DAFMAN	Department of the Air Force Manual
DEVCOM	United States Army Combat Capabilities Development Command
DOD	Department of Defense
DPPC	division personnel pack company
DSB	division sustainment brigade
DSSB	division sustainment support battalion
DZ	drop zone
ESC	expeditionary sustainment command
FM	field manual
G-3	assistant chief of staff, operations
G-4	assistant chief of staff, logistics
GPS	Global Positioning System
GSB	group support battalion

JFC	joint force commander
JP	joint publication
JPADS	joint precision airdrop system
JSOTF	joint special operations task force
JTF	joint task force
LCADS	low cost aerial delivery systems
LZ	landing zone
MHE	materials handling equipment
NCO	noncommissioned officer
PZ	pickup zone
S-3	battalion or brigade operations staff officer
S-4	battalion or brigade logistics staff officer
SFG	special forces group
SOF	special operations forces
SOTF	special operations task force
SPO	support operations
SSA	supply support activity
TADC	theater aerial delivery company
TSC	theater sustainment command
TSOC	theater special operations command
U.S.	United States
USAF	United States Air Force
USAMC	United States Army Materiel Command

SECTION II – TERMS

***aerial delivery**

The air transport of cargo, equipment and/or personnel to a desired location on the ground by aircraft.

aerial port

An airfield that has been designated for the sustained air movement of personnel and materiel, as well as an authorized port for entrance into or departure from the country where located. (JP 3-36)

air assault

The movement of friendly assault forces by rotary-wing or tiltrotor aircraft to engage and destroy enemy forces or to seize and hold key terrain. (JP 3-18)

air assault operation

An operation in which assault forces, using the mobility of rotary-wing or tiltrotor aircraft and the total integration of available fires, maneuver under the control of a ground or air maneuver commander to engage enemy forces or to seize and hold key terrain. (JP 3-18)

airborne operation

An operation involving the air movement into an objective area of combat forces and their logistic support for execution of a tactical, operational, or strategic mission. (JP 3-18)

airdrop

The unloading of personnel or materiel from aircraft in flight. (JP 3-36)

airland

Movement by air and disembarkment, or unloading, on the ground after the aircraft has landed or while an aircraft is hovering. (JP 3-36)

air movement

Air transport of units, personnel, supplies, and equipment, including airdrops and air landings. (JP 3-36)

***assembly line rigging**

A method of mass rigging designed to get the maximum amount of equipment rigged for airdrop in a minimum amount of time.

distribution management

Synchronizes and optimizes transportation, its networks, and materiel management with the warfighting functions to move personnel and materiel from origins to the point of need in accordance with the supported commander's priorities. (ADP 4-0)

drop zone

A specific area upon which airborne troops, equipment, or supplies are airdropped. (JP 3-36)

forcible entry

Seizing and holding of a military lodgment in the face of armed opposition or forcing access into a denied area to allow movement and maneuver to accomplish the mission. (JP 3-18)

intermediate staging base

A tailorable, temporary location used for staging forces, sustainment, and/or extraction into and out of an operational area. (JP 3-35)

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 3-36)

intratheater airlift

Airlift conducted within a theater with forces assigned to a combatant commander or attached to a subordinate joint force commander. (JP 3-36)

multidomain operations

The combined arms employment of joint and Army capabilities to create and exploit relative advantages to achieve objectives, defeat enemy forces, and consolidate gains on behalf of joint force commanders. (FM 3-0)

operational environment

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

physical security

That part of security concerned with physical measures designed to safeguard personnel; to prevent unauthorized access to equipment, installations, material, and documents; and to safeguard them against espionage, sabotage, damage, and theft. (JP 3-0)

supply

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

theater opening

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

unconventional warfare

Activities conducted to enable a resistance movement or insurgency to coerce, disrupt, or overthrow a government or occupying power by operating through or with an underground, auxiliary, and guerrilla force in a denied area. (JP 3-05)

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JP 3-05. *Joint Doctrine for Special Operations*. 22 September 2020.

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Index

Entries are by paragraph number.

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ATP 4-48
28 August 2023

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