

**FM 4-20.41**  
**(FM 10-500-1)**

**AERIAL DELIVERY  
DISTRIBUTION IN THE  
THEATER OF OPERATIONS**

**AUGUST 2003**

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# Aerial Delivery Distribution in the Theater of Operations

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## Preface

This manual combines the three facets of aerial delivery, airdrop, airland, and sling load, in one overarching distribution-related manual. The references to airland operations included in this manual provide more complete information. Detailed information about airland operations can be found in the applicable joint and Army (Transportation Corps proponent) doctrinal manuals. This manual addresses the full scope of the three related and commingled facets of aerial delivery doctrine.

This is an umbrella manual for the maneuver unit commander. It addresses the basic principles of aerial delivery distribution, the advantages and disadvantages of each facet, specific airland/airdrop related units, request procedures, and recovery and evacuation of aerial delivery equipment. However, the scope will be limited to aerial delivery as it relates to sustainment, not the operational use of aerial delivery assets for personnel/unit moves.

This manual documents current aerial delivery doctrine and broadens the scope to address aerial delivery distribution as it applies to, and operates within, the overall Army distribution system. It amplifies the flexibility, agility, and force multiplier potential added to the Army distribution system by aerial delivery.

This manual recognizes the ongoing Army Transformation and addresses how aerial delivery will be affected by these changes. It also highlights new equipment and forthcoming technologies that will enhance aerial delivery capability. Finally, this manual addresses major changes that must occur within the aerial delivery system to allow it to reach its full potential within the framework of the new environment.

The proponent of this publication is U.S. Army Training and Doctrine Command (TRADOC). Send comments and recommendations on DA Form 2028 (*Recommended Changes to Publications and Blank Forms*) directly to the Commander, U.S. Army Combined Support Command, ATTN: ATCL-Q, Fort Lee, Virginia 23801-5036.

## **Chapter 1**

# **Aerial Delivery Distribution on the Battlefield**

Today's aerial delivery includes airdrop, airland, and sling-load operations. Airdrop and airland distribution are joint (Army and U.S. Air Force [USAF]) operations that require large fixed-wing aircraft; sling-load operations are usually unilateral using rotary-wing aircraft. Historically, U.S. military forces have been called on to execute aerial delivery operations in support of unilateral and allied force combat operations or humanitarian relief efforts throughout the world. Since the fall of the Soviet Bloc, the threat environment has become far more uncertain than before; the forecast is that it will become even more ambiguous and dangerous in the future. The September 11, 2001, World Trade Center and Pentagon tragedy, the bombing of the USS Cole, and numerous other recent terrorist-related actions serve to reinforce this belief. It follows that future operations will require a smaller, continental United States (CONUS)-based, force projection Army, capable of conducting full-spectrum combat operations. Therefore, aerial delivery will continue to play an increasingly vital role in the supporting distribution system necessary to meet the requirements of the force.

### **SERVICE-SPECIFIC, JOINT, COMBINED OPERATIONS**

1-1. Sling-load operations are generally service-specific operations; airdrop and airland operations are almost always joint operations involving the Army and the USAF. The Army has most of the available lift (or utility helicopters); therefore, as aerial delivery becomes more accepted as the mode of choice, sling load could become a standard joint mission and, therefore, the Army will become the transporter for the other services. Combined operations rarely involve aerial delivery because it is normally considered a national responsibility; however, this doctrine could be applied to the needs of a combined command based on the combatant commander's directive(s).

### **THREAT/BATTLEFIELD ENVIRONMENT**

1-2. Current battlefields have very large areas of operations (AOs); future battlefields will have even greater AOs. Combat organizations will operate within a box as large as 1,000 kilometers x 1,000 kilometers (see figure 1-1). Further, they will operate in a non-contiguous/non-linear battlespace with large unsecured areas. Units will have increasingly smaller logistics footprints and, therefore, require more responsive and efficient delivery systems. In addition, the lines of communications (LOC) will be longer with a large proportion of the support provided by intermediate staging bases

(ISBs) that could be hundreds of miles away. In this environment, aerial delivery will play an ever-increasing role in the total distribution system; to be effective, friendly forces must control airspace throughout the AO and enemy ground-based air defenses must be neutralized. Improved airdrop procedures and equipment currently being developed will somewhat mitigate the man-portable air defense system (MANPADS) threat to delivery aircraft and cargo.

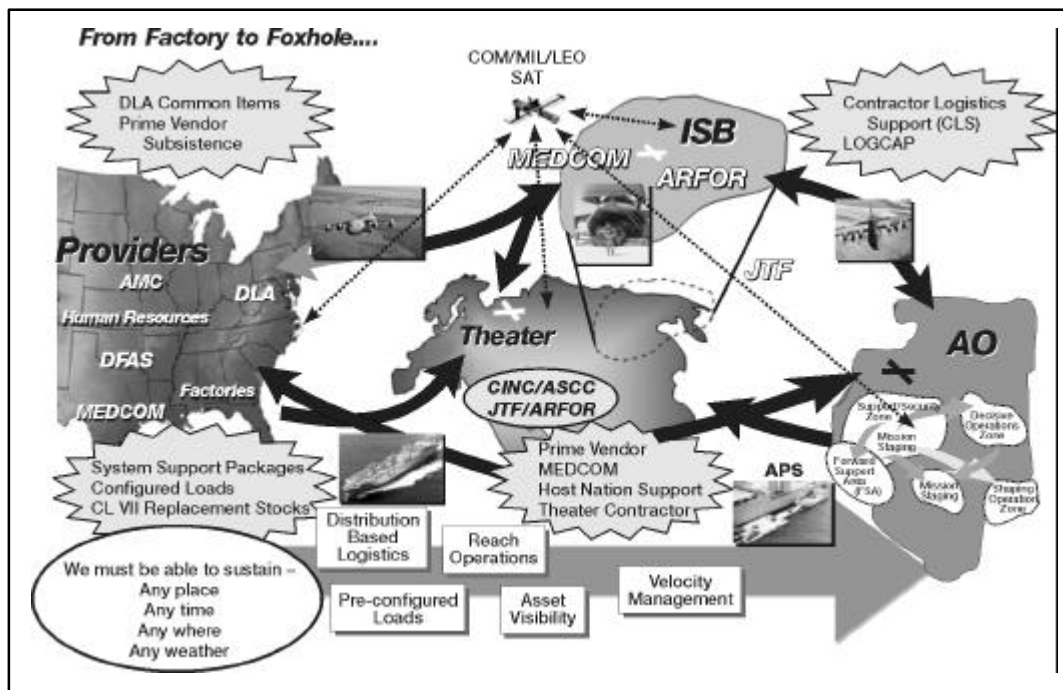


Figure 1-1. Battlefield Environment

## CURRENT DOCTRINE AND FUTURE CONCEPTS

1-3. Aerial delivery is a vital link in the battlefield distribution system. This became very clear when the Army realized it had to move from the Army of Excellence (AOE) structure and mind-set of the mid-1980s, and evolve to the Force Projection Army of the 21st century. The initial step of this evolution is Force XXI. Aerial delivery is no longer the *last resort*, but rather, through necessity, it is becoming a viable mode of distribution to support the fight against a very flexible, fluid, and ever-changing threat environment. This trend will continue as the Army moves forward with the interim force and objective force reorganization. This doctrinal process is driven by the Army Transformation; the goal is to give combat units a previously unknown freedom of movement by drastically reducing their dependence on logistical support. A primary objective of this transformation is to reduce the logistics footprint by substituting large, redundant supply bases with a distribution-based logistics system. In this system the "pipeline" becomes the supply base. To achieve this objective, the speed of the supplies moving through the pipeline must be increased and the source of supply must be much farther to

the rear. Army distribution is discussed in detail in FM 100-10-1 and FM 10-1. Aerial delivery provides necessary acceleration and CSS reach capabilities. This delivery method provides support without hampering maneuvers. As a result, aerial delivery, as a distribution enabler, is experiencing a renaissance. (These ideas surfaced after World War II and just before and during the Korean War.) This time the change in attitude, coupled with ongoing science and technology (S&T), will have far reaching effects on future doctrine and the structure of aerial distribution operational units.



## Chapter 2

# Fundamentals of Aerial Delivery Distribution Operations

Aerial delivery is becoming a viable distribution enabler not only in Force XXI, but for the foreseeable future; therefore, it is very important to understand the basic fundamentals of aerial delivery. Aerial delivery will play a role in every stage of future conflicts, from predeployment and sustainment through the redeployment of forces on every part of the battlefield. Exactly how the receiving unit gets the supplies depends, in large part, on the needs of the unit. These needs will drive the selection of aircraft, methods, and rigging equipment used. The decision process requires weighing the numerous aerial delivery advantages and disadvantages to determine whether airdrop, airland, or sling load best suits the situation.

### STAGES OF AERIAL DELIVERY DISTRIBUTION

2-1. Supply in aerial distribution can be classified into three stages: accompanying, follow-up, and demand supported.

#### ACCOMPANYING

2-2. In the accompanying stage, units begin the operation with the supplies currently on-hand. Each unit prepares its own accompanying supplies to support the tactical plan. Accompanying supplies are usually unit basic loads (UBLs) and selected supplies from Classes I, II, III, IV, V, VII, VIII, and IX. As a rule, accompanying supplies support the force for three to seven days, or until the follow-up supply flow can be established.

#### FOLLOW-UP

2-3. Follow-up operations are normally conducted in accordance with the applicable operations order (OPORD), tasked through G3/S3 channels, and executed/supervised through G4/S4 channels. The follow-up stage continues until demand supported operations can be established. The follow-up stage of resupply can be further subdivided into automatic, on-call, and emergency.

#### Automatic

2-4. Automatic is a scheduled method of aerial delivery to resupply the force. The force commander, along with his logistics staff elements, estimates the quantities and types of supplies that will be consumed each day. The automatic resupply plan is then developed using these estimates. Items are rigged by airdrop/support units and stored at either the CONUS deployment location, a forward operating base (FOB), or an ISB awaiting the planned

delivery. Then, at the prearranged date/time, the loads are placed on aircraft or prepared for sling load and delivered to the specified units.

### **On-Call**

2-5. The on-call method of follow-up resupply is similar to the automatic method. It is an attempt to plan for the uncertainty of war. Logistics planners estimate, in advance, the supplies that may be required, depending on the situation. The supplies are prerigged and usually delivered to the same location where supplies designated for automatic delivery are stored. Call forward designations are commonly assigned to each load to clarify and simplify the call forward procedures. If the changing situation dictates, the needed supplies are loaded and delivered to the requesting units.

### **Emergency**

2-6. Emergency/urgent resupply is rendered when a unit needs mission-essential equipment and supplies quickly to restore its operational capability. Everything possible will be done to provide for the unit, including re-routing supplies already in the air and redistributing aircraft. This stage of resupply affects priorities; therefore, the G3/S3 operational channels very quickly begin working hand-in-hand with the support operations officer (SPO) to provide for this urgent need.

### **DEMAND SUPPORTED**

2-7. The demand supported supply stage is established as rapidly as the situation permits. Under demand supported operations, supplies are delivered through normal requisitioning and issue procedures. Normally, the ranking logistics operator (division support command [DISCOM] commander) will determine when the demand supported stage has been reached. At this time, most, if not all, on-call prerigged supplies are released for other missions.

## **TYPES AND METHODS OF AIRDROP**

2-8. There are three types and three methods of airdrop. The type and method used for a specific mission depends on what is to be dropped, how much accuracy is required, the threat situation, and airdrop equipment available.

### **TYPES OF AIRDROP**

2-9. Freedrop has been used infrequently in the past. Today, however, it is often the method preferred to deliver humanitarian daily rations (HDRs) and nonfragile items (such as the U.S. joint force delivered in Afghanistan). Parachutes or other devices that decrease the rate of descent of supplies are not used; however, in some cases, energy-dissipating material (such as honeycomb) may be placed around the supplies to lessen the shock when the load impacts with the ground. The load descends at a rate of 130 to 150 feet per second. Baled clothing, fortification, and barrier materials are other examples of non-fragile items that can be freedropped successfully.

2-10. High-velocity airdrop is used when threat conditions dictate that the aircraft remain at high altitudes to avoid hostile air defenses but, for accuracy, drift must be minimized. Here, a small parachute provides enough

drag to hold the load in an upright position while allowing a descent rate of 70 to 90 feet per second. The rapid rate of descent mitigates drift. Energy absorbing material is used to reduce the effect of the ground impact. Class I, Class III(P), and Class V are the most probable candidates for this type of delivery.

2-11. Low-velocity airdrop can be used for all supplies and equipment certified for airdrop and is the preferred type, all other factors being equal. Multiple parachutes can be used to achieve the desired rate of descent, no more than 28 feet per second. Many of the Army's light and medium tactical wheeled vehicle fleet and Class IX major assemblies are delivered using this method.

## METHODS OF AIRDROP

2-12. The methods of airdrop pertain to how loads exit the aircraft. The door-load method (figure 2-1) entails the bundle being pushed or skidded out the aircraft side doors, rather than from the rear ramp. This method is primarily used to drop supplies with the assault force itself. It is also used to deliver smaller paratroop door loads or bundles over limited or constricted drop zones (DZs) to Special Operations Forces (SOF), indigenous allied forces, and/or refugees.



Figure 2-1. Bundle at the Door of a C-130

2-13. The extraction method (shown in figure 2-2) involves the use of an extraction parachute to pull the load out the rear ramp/door of the aircraft paratroop cargo compartment. It is used for almost all large low-velocity loads, such as vehicles, containers, and pallets.



**Figure 2.2. Aerial Extraction Method of Aerial Delivery**

2-14. The gravity method (illustrated in figure 2-3) requires the aircraft to fly in a “nose-up” attitude of 6 to 8 degrees using the standard cargo delivery system (CDS), or 3.5 to 4.5 degrees for the C-17 using the dual row airdrop system (DRAS). Prior to release, the load is restrained by nylon webbing or logistics rail locks organic to certain types of aircraft (such as the newest Air Force cargo aircraft, the C-17). At the desired release point, the webbing is cut or the locks are released, allowing the containers or platforms to roll or slide out the rear of the aircraft. This method, in combination with CDS, can be used for either low- or high-velocity type loads.



**Figure 2-3. C-17 Airdrop of Pallets Using the Gravity Airdrop Method and DRAS**

2-15. The DRAS (illustrated in figure 2-4) is a recent innovation that allows more efficient use of the C-17; it optimizes the use of the cargo space available in the aircraft by allowing two rows, rather than a single row, of palletized cargo. This substantially reduces the equipment on the DZ. It also reduces the formation pass time over the DZ, which enhances the survivability of the aircraft. Currently, DRAS can be used only in the low-velocity type of airdrop.



**Figure 2-4. DRAS C-17 Internal View**

## **SLING-LOAD OPERATIONS AND EQUIPMENT**

2-16. Variables in sling-load operations include the type of helicopter, and the type of sling (bag or net) used to hold the cargo beneath the helicopter. As in airdrop, weather conditions, mission requirements, threat environment, and equipment to be delivered determine the equipment and type of aircraft used for the delivery.

## HELICOPTER CONSIDERATIONS

2-17. Helicopter considerations include the weight of the load and the time available; therefore, the number of sorties and the distance required to be flown to accomplish the move will have a large bearing on the helicopter used. Altitude, temperature, and air density have an impact on a helicopter's lift capacity. Wind can also affect the lift capacity of a helicopter, and its ability to hover.

## SLING-LOAD EQUIPMENT

2-18. The sling-load equipment used largely depends on what needs to be carried, the number of lift points, and the weight. Most specialized equipment is in the servicing support battalions at the division/brigade level and at echelons above division (EAD) support organizations. Brief descriptions of the most common sling-load equipment follows. For a more complete discussion, see FM 10-450-3.

2-19. Cargo nets can carry up to 10,000 pounds of loose cargo (crates of ammunition, cases of combat rations, or drums of petroleum, oil, and lubricant [POL] products) as illustrated in figure 2-5.



Figure 2-5. Sling-Load Cargo Net

2-20. The A-22 cargo bag (figure 2-6) is designed to carry up to 2,200 pounds of palletized loads, loose cargo, ammunition, drums, and other general cargo. This bag can also be used to airdrop supplies.



Figure 2-6. A-22 Cargo Bag



2-21. Cargo slings that can lift up to 25,000 pounds are usually used to move large or heavy types of equipment and supplies (such as artillery weapons, water, and Class III(B) stored in collapsible fabric drums and trucks) as shown in figure 2-7. Slings are also used to attach either the cargo net or A-22 bag to the helicopter cargo hooks.



**Figure 2-7. CH-53 Using Cargo Slings**

## **ADVANTAGES AND DISADVANTAGES OF AERIAL DELIVERY OPERATIONS**

2-22. The logistics planner measures many variables when selecting modes of aerial delivery (airdrop, airland, or sling load), or when deciding whether or not to use aerial delivery. Some advantages and disadvantages to be considered by the logistics planner during the planning process include the following.

2-23. Advantages of airdrop delivery include—

- Airdrop can be used when no other means for transporting supplies or equipment is available.
- Airdrop permits throughput of supplies from the corps and theater areas, and from the national level directly to the using unit, whether or not the unit is located in an isolated area.
- Airdrop reduces the need for forward airfields, landing zones (LZs), and materiel handling equipment (MHE), reducing the battlefield footprint.
- Airdrop permits greater dispersion of ground tactical forces.
- Airdrop 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.

2-24. Advantages of airland include—

- Airland allows equipment that is not air-droppable, such as tanks, some artillery, and helicopters, to be brought rapidly in-theater.
- Airland allows a greater degree of tactical integrity and the capability to rapidly employ units after landing.
- Airland exposes deploying personnel and equipment to less risk of injury or damage.
- Airland does not require specially trained personnel to prepare supplies for delivery.
- Airland permits the maximum utilization of aircraft loads (ACLs) by eliminating the volume and weight of preparing loads for airdrop deliveries.
- Airland allows aircraft to be used for backhaul or evacuation of personnel.
- Airland has a low cost per ton of cargo moved ratio.

2-25. Advantages of sling load include—

- Sling load provides for rapid movement of heavy, outsized cargo directly to the user, bypassing surface obstacles.
- Sling load allows the use of multiple flight routes and landing sites, enhancing survivability of the aircraft and the flexibility afforded to the ground commander.
- Sling-load planning cycle time is reduced, thus providing a far more flexible and responsive asset.

2-26. Disadvantages of airdrop include—

- Airdrop leaves aircraft vulnerable to enemy air defense systems.
- Airdrop allows no backhaul capability.
- Airdrop creates a need to recover and retrograde airdrop equipment.
- Airdrop net payload is reduced because of the relatively heavy weight of the airdrop rigging equipment.
- Airdrop requires specially trained Army rigging personnel and Air Force flight crews.
- Airdrop DZs must be secured to prevent supplies from falling into enemy hands.
- Airdrop with the current available equipment is dependent on favorable wind conditions.
- Airdrop operations require an extensive planning effort and much longer cycle times.

2-27. Disadvantages of airland include—

- Airland requires moderately level, unobstructed LZs.
- Airland requires more time for delivery of a given size force than when delivery is by parachute, especially for a small, restricted LZ.
- Airland requires more support personnel and MHE.

- Airland exposes aircraft to prolonged air and ground attack because of the extended time on the ground at forward airfields.
  - Airland requires more engineer assets to maintain the airfield.
- 2-28. Disadvantages of sling load—
- Helicopter weight capacities are generally less than that of fixed-wing aircraft.
  - Sling load can cause the helicopter 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, helicopter lift capacity is affected by atmospheric pressure, altitude, temperature, humidity, and winds.
  - Limited number of helicopters currently available in the force may limit sling-load operations.
  - Sling-load 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 in accordance with FM 10-450-3.
  - Sling load increases aircraft detection because it must fly above “nap of the earth.”

## **Chapter 3**

# **Airland/Airdrop Distribution Organizations**

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

Airdrop as a concept and doctrine is both new and old. It is new in that airdrop has been widely used only since World War II, making it a relatively new method for sustainment distribution. Unfortunately, it is also old because there was no real change in unit structure from WWII until the mid-1980s. The unit structure was not changed in large part because it was believed that 100 percent of airdrop equipment would be returned and reused; in fact, less than 50 percent was properly retrograded. This failure to retrograde reduced the need for skilled riggers to classify and repair airdrop-related equipment but increased the supply-related tasks to replace the lost equipment. Therefore, adjustments were made in the military occupational specialty (MOS) structure of the rigger-related units from predominantly rigger to more supply-related MOSs. As the Army continues its transition from the legacy to the objective force, the additional demands of the non-linear, highly mobile concept of battle will make further modifications necessary. For example, instead of having large, very immobile company-size rigger units, smaller detachment-size organizations may be used as modular “plug-in/plug-out” assets spread throughout the force to increase flexibility and decrease the battlefield footprint.

## **ORGANIZATIONS**

3-1. There are major Army and Air Force organizations common to both airland and airdrop operations.

### **ARRIVAL/DEPARTURE AIRFIELD CONTROL GROUP**

3-2. The departure airfield control group (DACG) is a provisional Army organization established by the supported land component commander from

personnel that are not currently deploying. Its mission is to coordinate with the Air Force, and control the loading of Army supplies and personnel onto Air Force aircraft. In airland operations, the supported unit commander will also establish an arrival airfield control group (AACG). It will have the same mission as the DACG, but will concentrate on the unloading rather than the loading mission. In large operations, airfield control groups will have both the departure and arrival missions; these groups are referred to as arrival/departure airfield control groups (A/DACGs).

### **MOVEMENT CONTROL TEAM**

3-3. The movement control team (MCT) is an Army provisional unit. It works with the A/DACG but is under the control of the theater support command (TSC) materiel management center (MMC). This team documents and directs loading/unloading of Army equipment onto aircraft.

### **TERMINAL TRANSFER UNITS**

3-4. Army corps or theater level transportation assets provide terminal transfer units. They load and unload aircraft, move the supplies to and from a marshalling area, and provide onward movement of the cargo. They unload and reconfigure cargo from one of several modes that could involve wheel, fixed-wing and/or rotary-wing assets and reload the reconfigured cargo on the appropriate mode of transportation.

### **THEATER AIRLIFT CONTROL ELEMENT**

3-5. The theater airlift control element (TALCE) is an Air Force composite organization whose mission is to organize and support Air Force airlift assets at the arrival and/or departure airfield. It serves as the Army's sole Air Force point of contact.

### **COMBAT CONTROL TEAM**

3-6. The combat control team (CCT) is an Air Force asset whose mission is to rapidly establish LZs in austere environments. This includes placing initial en route and terminal navigational aides, and establishing air traffic control and communications. If necessary, Army Pathfinders can operate in place of CCTs.

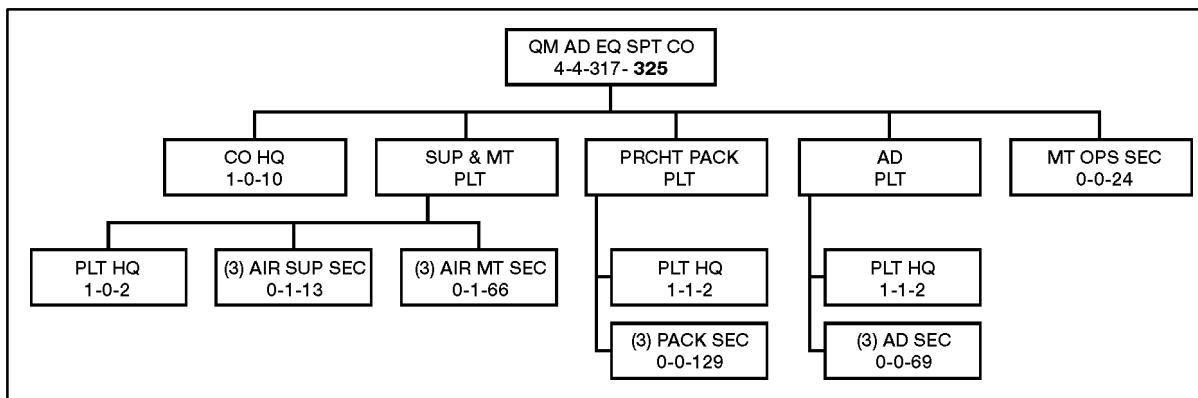
### **AIRDROP-RELATED ORGANIZATIONS**

3-7. There are six types of Army airdrop-related organizations in the inventory today. Four are used in the airborne division/airborne corps and non-airborne corps, with one of these units organic to the airborne division. Non-airborne divisions have no organic airdrop support.

3-8. There are three types of detachments that generally provide augmentation to the established airdrop organizations. Within the SOF, the special forces organizations have rigger sections assigned to their respective support companies/battalions; however, the Ranger battalions rely on table of distribution and allowances (TDA) support at home station but have no organic support when deployed. The following airdrop units are currently in the force.

**DIVISION SUPPORT**

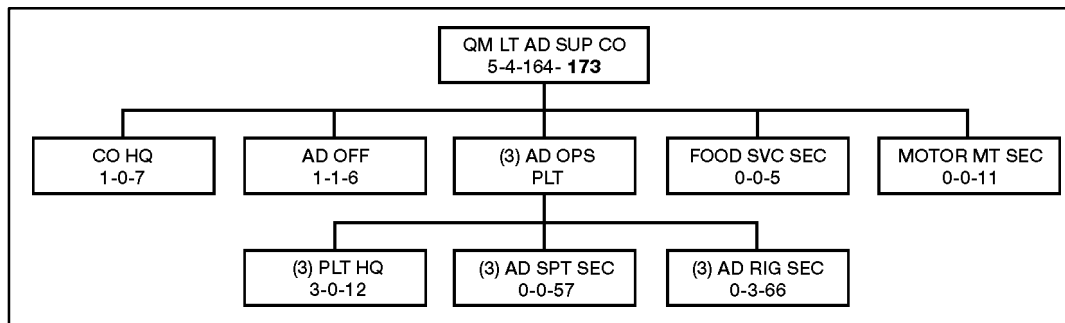
3-9. One Quartermaster (QM) airdrop equipment and support company (table of organization and equipment [TOE] 10337L) (airborne division only) is allocated to the airborne DISCOM. Figure 3-1 depicts this type of organization. It provides parachute packing services and airdrop sustainment support for as much as 200 short tons per day, ranging from supply bundles weighing 250 pounds or less, up to equipment platform loads weighing up to 42,000 pounds. Further, it supports the deployment needs of 13,335 soldiers.



**Figure 3-1. QM Airdrop Equipment and Support Company, TOE 10337L**

**CORPS SUPPORT**

3-10. One QM airdrop supply company (light) (TOE 10443L) (both airborne and non-airborne corps) is provided to a corps and usually assigned to a supply and services (S&S) battalion within the corps support command (COSCOM) rear corps support group (CSG). It is designed to rig airdrop supply containers weighing up to 2,200 pounds each, handling a total of 120 short tons per day. Figure 3-2 shows this type of unit organizational structure.



**Figure 3-2. QM Airdrop Supply Company (Light), TOE 10443L**

3-11. The QM airdrop equipment repair and supply company (TOE 10449L) (airborne corps) is structured as shown in figure 3-3 and assigned to the airborne corps, usually as part of an S&S battalion of the COSCOM rear CSG. It provides direct support (DS) and general support (GS) maintenance on all airdrop equipment within the airborne corps. It also operates an airdrop equipment DS supply point.

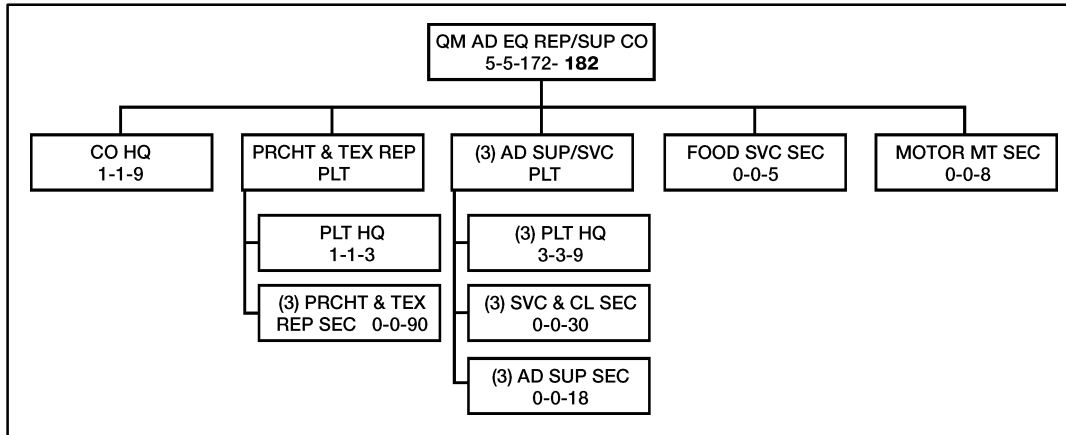


Figure 3-3. QM Airdrop Equipment Repair and Supply Company, TOE 10449L

3-12. One QM airdrop equipment support company (TOE 10437L) (airborne corps only), as shown in figure 3-4, is assigned to an airborne corps normally in an S&S battalion of the COSCOM in the rear CSG. It was specifically added to the airborne corps structure to provide DS to airborne assets of the corps, meaning the unit receives, stores, and issues airdrop equipment to supported corps rather than divisional units. It can also provide up to 200 short tons of resupply per day and provide airborne deployment support for 8,316 soldiers.

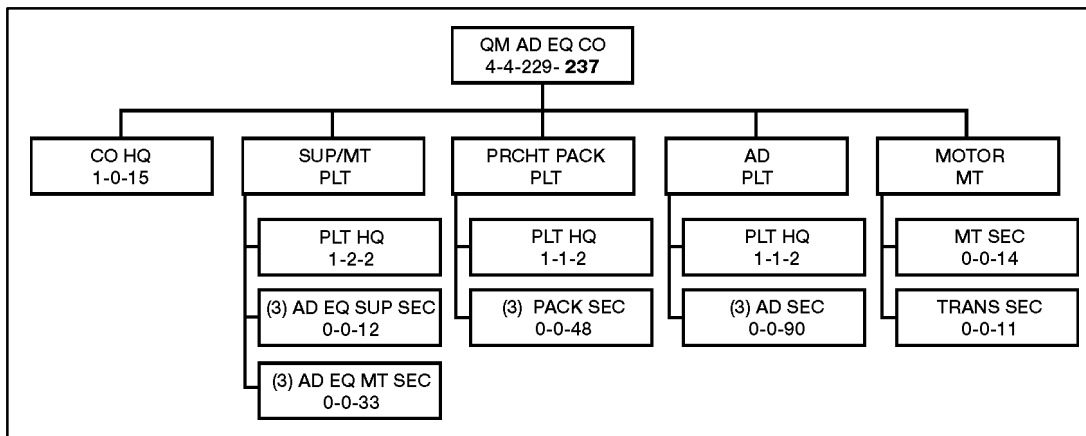
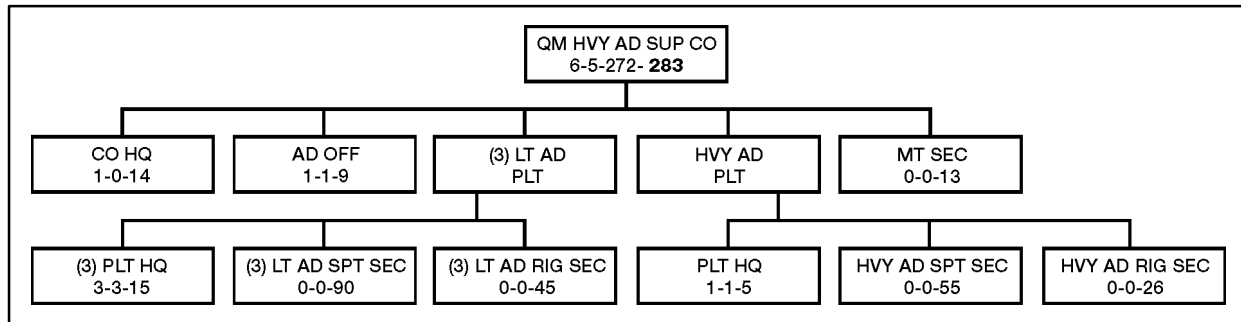


Figure 3-4. QM Airdrop Equipment Support, TOE 10437L

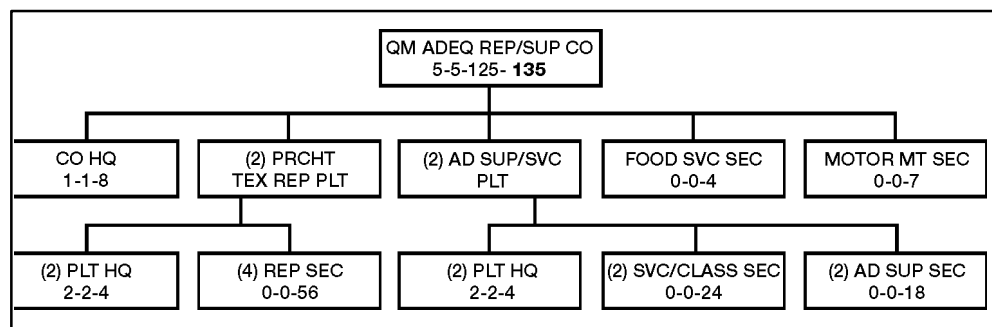
## THEATER SUPPORT

3-13. The QM airdrop supply company (heavy) (TOE 10643L) TSC is organized as shown in figure 3-5 and located in an S&S battalion of a TSC ASG. It provides reinforcing support to the light airdrop supply companies of the corps and is responsible for configuring the airdrop of heavier loads beyond the capabilities of the light companies, such as bridging and heavy barrier materiel. It can provide 200 short tons of supplies per day and furnish parachute-packing support for 450 personnel for 45 days.



**Figure 3-5. QM Airdrop Supply Company (Heavy), TOE 106431L**

3-14. The organization of the QM airdrop equipment repair and supply company (TOE 10649L) TSC is shown in figure 3-6. This unit is located in the TSC ASG S&S battalion and provides airdrop equipment repair, supplies, and DS/GS maintenance on airdrop equipment to the TSC heavy airdrop supply company and GS support to the corps light airdrop supply company.



**Figure 3-6. QM Airdrop Equipment Repair and Supply Company, TOE 10649L**

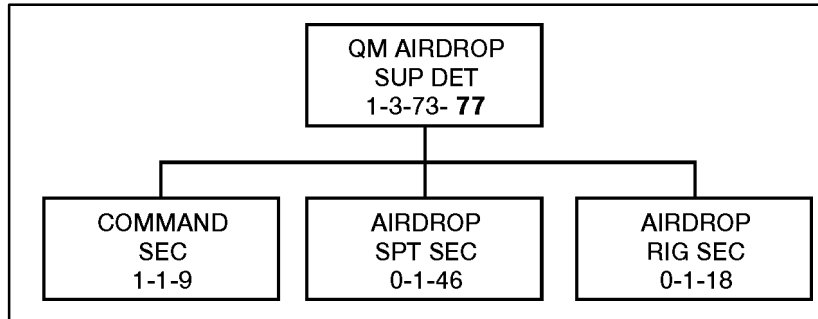
## AUGMENTATION SUPPORT

3-15. The following Army airdrop units provide Army airdrop support with a modular capability because they are assigned (as required) to, and supplement, other airdrop units.

3-16. The QM airdrop support detachment (TOE 10510LA) is the largest of the airdrop support detachments (figure 3-7). This unit may be anywhere



within a division, corps, or TSC, as needed. Its mission is to pack parachutes and temporarily store and prepare up to 50 tons of supplies per day for airdrop.



**Figure 3-7. QM Airdrop Support Detachment, TOE 10510LA**

3-17. The QM parachute packing/repair detachment (TOE 10510ILE) has nine assigned personnel. It augments other airdrop assets, as necessary, and may be anywhere in the division, corps, or TSC. This unit is organized to provide personnel parachute packing and DS/GS maintenance for 1,000 soldiers for 45 days.

3-18. The QM airdrop equipment repair and support detachment (TOE 10510ILC) has 21 assigned personnel. It may be anywhere in a division, corps, or TSC, augmenting the capabilities of current airdrop units. This unit is usually attached to an airdrop equipment and repair supply company to provide supply and DS/GS maintenance support to airdrop-related equipment. It is specifically designed to provide enough capacity to rig 50 short tons per day.

## SPECIAL OPERATIONS FORCE SUPPORT

3-19. The support company, special forces battalion and group (TOE 31808 and 31803 respectively) have assigned organic rigger sections. They provide personnel and cargo parachute packing, unit maintenance of air delivery items, and rigger support. These sections have only seven and eight (respectively) total personnel assigned (all have rigger-related skills), and can be quickly overwhelmed by airdrop requirements.

3-20. The headquarters and main support company, special operations support battalion (TOE 63906L000) has one airdrop platoon assigned. This unit has a total of 54 personnel, with a mixture of rigger, supply, ammunition, and petroleum specialties. The platoon can rig 50 tons of sustainment supplies daily for aerial resupply.

## Chapter 4

# Airland/Airdrop Distribution Operations

Under Force XXI and beyond, aerial delivery will, by necessity, be an equal partner with other forms of sustainment distribution. Therefore, logistics planning should reflect the habitual use of aerial delivery at the strategic, operational, and tactical levels. Clear command and control of aerial delivery begins with the proper mix of those units and organizations discussed in chapter 3. Those resources must be in place supporting the initial deployment at the CONUS embarkation points and be included in the theater force opening package (TFOP). A firm understanding and implementation of the responsibilities and request procedures discussed in this chapter must also be applied to establish an aerial distribution system that is both efficient and effective.



**Figure 4-1. C-17s Delivering Vital Supplies**

## AIRDROP RESPONSIBILITIES

4-1. At each echelon, responsibilities must be clearly understood to ensure that distribution support can be provided quickly to the requesting tactical commander. Generally, airdrop operations consist of a joint operation involving the Air Force and the Army. The Army provides the supplies, rigs them for airdrop, and delivers them to the departure airfield. Air Force personnel load the supplies onto the aircraft (usually with Army assistance) and fly the mission. Prior to takeoff, there will be a joint Army/Air Force load inspection.

4-2. In most cases, the Army will control the DZ. The joint force commander, coordinating with the Air Force component commander (AFCC), 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.

4-3. Designated DZs should have no trees, power lines, fences, buildings, and so forth. The terrain should not be prohibitively hard-surfaced (rocky) or deviate more than 300 feet in elevation. DZs should be near the existing road network to assist in the clearing/removal of supplies.

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

4-5. A high-velocity airdrop method could require a DZ smaller than a low-velocity drop procedure requires because it is affected less by wind draft.

4-6. An extensive DZ is required when there are large numbers of loads to be dropped that result in a long dispersion pattern. For example, a small DZ crisscrossed with power lines with high winds and surrounded by threat air defense artillery (ADA) would not be a good DZ if delivery of the load required multiple passes using low-velocity drop procedures.

4-7. In the CONUS, airlift requests are coordinated between the Army Materiel Command (AMC) and U.S. Transportation Command (USTRANSCOM). In theater, the TSC support operations supply and maintenance directorate manages theater-level aerial delivery in close coordination with the transportation directorate and the Air Force theater air operations center (AOC).

4-8. At echelons above brigade (EAB), the assistant chief of staff (ACofS) G4 has overall responsibility for logistics planning and the G3 sets priorities. Within the respective support command, the SPO determines if airdrop is the most suitable mode of shipment and, if it is, coordinates ground transportation to move supplies to the rigging site, the actual rigging of supplies, movement of supplies to the departure airfield and requests Air Force airlift support. This staff element 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 (JMC) and, ultimately, to the joint air operations center (JAOC) and identified air crews.

4-9. The receiving unit, usually the supporting forward support battalion (FSB), must select the center of mass eight-digit grid coordinates of the desired DZ. They also mark and secure the DZ, prepare the DZ, remove supplies from the DZ, and retrograde airdrop equipment. The unit requests

the necessary Pathfinder assets through the G3. Under Force XXI, unit distribution is the norm; therefore, the supporting FSB receives the supplies at the DZ and delivers them to the unit. JP 3-17 and FM 10-27 contain further information concerning DZs.

4-10. In combined operations, aerial resupply is normally a national responsibility; however, the supreme allied commander can direct aerial delivery support for allies when operationally necessary. JP 3-17 and JP 4-01.1 contain detailed explanations of specific responsibilities at the joint and theater levels.

## **AIRLAND RESPONSIBILITIES**

4-11. Airland responsibilities are similar to airdrop operations in terms of coordination; airland is also a joint operation between the Air Force and Army and the objective—deploying and sustaining the force—is the same. However, there are some differences. As discussed in chapter 3, the arrival LZ of airland requires an AACG and airlift control element (ALCE), combined with associated units and MHE that would normally be at the departure airfield. There is coordination between the Army and Air Force over the LZ selection but, in airland, the Air Force makes the final decision. This decision is based on information gathered from a landing area study that highlights not only large, modern facilities, but also areas suitable for only take-offs and landings and austere airfields similar to the one used by a C-17. (Figure 4-2 depicts the C-130 and figure 4-3 depicts the C-17.) Each identified site will be classified as to suitability in terms of type of aircraft, numbers of aircraft, and support facilities available and/or required. Any required LZ physical improvements are the responsibility of the ranking Army engineer. Desirable characteristics of LZs are ease of identification from the air; a straight, unobstructed, secure approach for aircraft; and close proximity to ground objectives/units. LZs to be developed into more sophisticated facilities should possess the following additional characteristics:

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



**Figure 4-2. C-130 at a Tactical LZ**



**Figure 4-3. C-17 at an Austere Airstrip**

## **REQUEST PROCEDURES**

4-12. As the Army transitions toward the objective force, aerial delivery will become part of the mainstream logistics transportation system. Therefore, logisticians will determine the optimal delivery method based on mission, enemy, troops, terrain and weather, troops and support available, time available, civil considerations (METT-TC), and the analysis derived from the logistics preparation of the theater (LPT). Aerial delivery can be used to add a large measure of flexibility in the decisionmaking process. This is a major departure from the AOE doctrine in which the requesting unit determined if

aerial delivery was the appropriate mode to be used to transport supplies. Also, the mindset of the AOE was that aerial delivery is highly specialized and emergency oriented. Aerial delivery of supplies or services, like any other mode of delivery, consists of requests for the necessary supplies or services, and a request for delivery assets. In this case, delivery assets would be airplanes or helicopters; whereas with the ground mode of delivery, the request would be for the supply or service and trucks. This paradigm change will come easier if one considers air assets as vehicle platforms with wings. Currently, there are two types of air asset requests: preplanned and immediate/emergency.

## **PREPLANNED**

4-13. This is a programmed event. Aircraft are allocated or projected in advance within the operational lead-time established by the AFCC. This lead-time varies depending on the scale of the request, available forces, and the theater air planning process. The per-unit allocation will normally be expressed in terms of sorties per day per unit, and will be determined based on priorities set by the G3, projected unit requirements, and available aircraft. All of this information can be found in the applicable OPLAN or OPORD.

## **IMMEDIATE/EMERGENCY**

4-14. Immediate/emergency air movement requirements are those requirements identified too late for the normal airdrop tasking cycle coordination. Once identified by the requesting service component (usually within operations channels) they are transmitted directly to the JAOC by the theater airlift liaison officer (TALO), normally located in the tactical operations center (TOC) of battalions and above. This allows the JAOC time to make preparations for the required mission while the actual request is staffed expeditiously through logistics channels. Because the theater airlift force is normally fully employed, the JMC may fill immediate requests by redirecting sorties supporting planned requests based on priorities established within G3 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.

4-15. As discussed in chapter 2, there are three primary stages of distribution: accompanying, follow-on, and demand-supported. Within the follow-on stage, there are three subcategories: automatic, on-call, and emergency.

4-16. The SPO has little involvement in the accompanying stage of distribution; these are stocks (such as various UBLs) that are moved with the unit as it deploys. The description could also apply to stocks carried by the various support units deploying with the combat force. The SPO will, however, know the status of all these assets and possibly their location.

4-17. SPO involvement during the follow-up stage will be situational dependent. For example, if the mission is proceeding as planned, procedures should have been established to deliver supplies and provide support in accordance with a predetermined schedule, requiring the SPO only to monitor the ongoing operations for compliance. However, if the uncertainty of war provides surprises, the SPO becomes heavily involved, rapidly

adjusting schedules and reconfiguring automatic and on-call plans based on new priorities and operational changes determined by the G3. When emergency resupply is required, the SPO and the G3 work hand-in-hand exploring every option to resolve the emergency. For example, the G3 may adjust the stated priority of support in the OPORD, which would then allow the SPO to divert inbound shipments from a unit of lesser priority to the unit in need. Further, the G3 may reassign the mission to another unit, thus relieving the pressure to provide for the unit in need on an emergency basis. Another option would be to use unprogrammed fixed-wing aircraft to deliver the supplies in a timely fashion. This requires the G3 to use the TALO to notify the Air Force at the JAOC of the emergency request. Depending on the extent of the emergency, the JAOC might even re-route airframes or deplane lesser priority loads to meet the need. Simultaneously, the SPO will adjust the logistics system, doing whatever is necessary to provide for the emergency within the parameters established by the G3, while assuring all actions remain synchronized so as not to disrupt the entire logistics system.

4-18. As the developing distribution system matures into the demand supported (chapter 2) stage, the SPO reverts to a caretaker role to stay abreast of the logistics and operational situation. By sharing the common operational picture (COP) with the G3 and supported units, the SPO can anticipate necessary adjustments required by an ever-changing operational situation. The more accurately the SPO anticipates future needs, the fewer occasions there will be for the supply system to react to emergency requirements, which are inherently inefficient and time-consuming. Realizing the expectations of the SPO and the entire logistics system have increased dramatically, the Army has made logistics automation/communications a high priority. This effort, in the not so distant future, will provide the Army logistician with several new tools to establish and maintain the situational understanding (SU) necessary to be proactive in the increasingly agile and flexible operational environment of Force XXI and beyond. Some of these initiatives are highlighted in chapter 7.

4-19. The following situations illustrate the expanded expectations of the SPO and the Force XXI logistics system.

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**Example 1.** A unit has an emergency need for an item. Under the AOE, such a request might make the logistics system automatically consider air assets. However, the SPO, having in-transit visibility/total asset visibility (ITV/TAV), may know that the required item is already on the way, will arrive, and can be delivered by wheeled assets within the required delivery timeframe. The SPO uses normal supply procedures to satisfy what was considered an emergency by the unit.

**Example 2.** A unit requests an item in a demand-supported environment, fully expecting the item within stated delivery timeframes; however, the SPO knows the item is not on-hand but is available at a higher or adjacent unit. The SPO arranges for release of the item from its current location and uses one of the allotted UH-60 sorties to sling load the item to the FSB supporting the unit, or to the unit itself.

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**Example 3.** A unit has an emergency need for an item and the SPO realizes that the need can only be fulfilled from the CONUS. If the G3 is not already involved, the SPO will get it involved, using the TALO to inform the JAOC of the urgent/emergency need for fixed-wing support. Simultaneously, the SPO continues to forward the request through logistics channels. The request ultimately reaches the JMC, where the formal aircraft tasking is sent to the JAOC.

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## AIRLAND/AIRDROP EQUIPMENT RETROGRADE

4-20. If the Air Force 463L pallet (with associated netting material) is broken down at the airfield, it should not leave the marshalling area. Therefore, it should be easy to retrieve and return to the distribution system. However, such equipment not broken down but used for throughput to forward units (such as Class IX air lines of communication [ALOC]) must be retrograded to the marshalling area. To provide the proper priority, this airland equipment must be incorporated into the overall theater flatrack management program. FM 10-27 contains further information on this program.

4-21. The return of aerial delivery equipment is critical because it is very expensive and in short supply. During past aerial sustainment operations, this type of equipment was nearly exhausted because return procedures were lacking or not enforced and the demand was very high. Basic salvage collection and classification procedures are the backbone of the retrograde operation. Retrograde begins when the receiving unit returns the equipment to its DS battalion. From there it is further evacuated. The goal is to return the equipment to a QM airdrop equipment repair and supply company, where it will be classified as serviceable or repaired. The equipment will then be returned to the supply system or classified as unserviceable/not-economically repairable, and enter Defense Reutilization and Marketing Office (DRMO) channels for proper disposal. Supporting SPOs throughout the theater coordinate retrograde operations. Evacuation of equipment may be by land, rail, water, or air. Innovative retrograde management is the key.



## Chapter 5

# Sling-Load Distribution Operations

Sling-load operations (figure 5-1), as opposed to airdrop operations, are usually service-specific rather than a joint function (involving USAF assets). Because sling load is service specific, it is simpler to plan and coordinate and requires less lead-time and, therefore, is more responsive to the needs of the commander. However, it can be limited by factors such as helicopter range, weather, and load weight. From an operational viewpoint, sling-load planning procedures and assets required are similar to those of airdrop/airland operations. Differences include—

- Type of aircraft and equipment.
- Supported unit, usually the supply support activity (SSA) from which the supplies are drawn.
- Designation of a PZ from which the load will be slung to the helicopter and delivered to the receiving unit at the LZ, rather than a DZ.

FM 10-450-3 contains a detailed discussion of general sling-load operations.



**Figure 5-1. CH-47 A-22 Bag and Cargo Net Sling Load**

## RESPONSIBILITIES

### SUPPLY SUPPORT ACTIVITY

5-1. The SSA must have adequate sling-load-trained and inspector-certified (by attending the Sling Load Inspector Certification Course [SLICC]) personnel and sling-load equipment on-hand. Equipment is authorized by the common table of allowances (CTA) 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. SSA personnel will rig and inspect loads and provide a hook-up team (signalman, static-wand person, and the hook-up person). Further, the SSA designates/configures an adequate PZ and certifies loads to be sling loaded by completing DA Form 7382-R prior to the arrival of supporting helicopters. In selecting this PZ, the SSA should coordinate with the supporting aviation unit and consider such requirements as security and concealment, convenience, size, obstacles, slope of surface, and air approaches to the landing site.

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

5-2. In summary, a good PZ is shielded from direct enemy observation by obstacles such as shrubbery, buildings, or hills; located close to main supply routes (MSRs); and large enough to host the numbers and types of expected helicopters. The PZ should be clear of trees and high-tension wires, have a surface that can support the weight of the type of helicopter expected, be as level as possible, and have clear approach and exit routes. When possible, approach and exit routes should be into the wind. Sling-load procedures, LZ/PZ preparation, load certification, and hook-up/receiving team procedures are taught by the Quartermaster School at Fort Lee, Virginia; the SLICC is available in resident or mobile training team (MTT) versions.

### **AVIATION UNIT**

5-3. The aviation unit will provide the aircraft and a trained crew at the proper time and place, and deliver the load to the receiving unit.

### **RECEIVING UNIT**

5-4. The receiving unit, normally the supporting FSB, in coordination with the tasked aviation unit, designates a LZ. The preferred characteristics of the LZ is identical to that of the PZ. The receiving unit must also have teams trained to de-sling, de-rig, remove the load from the LZ, and certify any back-hauls. The core of these teams must have been trained in accordance with the requirements in FM 10-450-3. Because unit distribution is the norm in Force XXI and beyond, if the delivery is not made directly to the using unit, the FSB will move the supplies to the using unit from the LZ, usually using wheel assets. (Under SSA/supported unit responsibilities, sling-load training is available either through resident or non-resident courses offered by the Quartermaster School at Fort Lee, Virginia.) *It is the receiving unit's responsibility to retrograde the sling-load equipment.* If the supported unit requested supplies are obtained at an FSB, the FSB will assume the role and responsibilities of an SSA.

### **SUPPORTED UNIT**

5-5. If supplies are delivered directly to the supported unit (usually a maneuver battalion or company) by helicopter, the unit also assumes the role and, therefore, the responsibilities of a receiving unit. The supported unit, once in possession of the requested supplies, is responsible for standard issue, handling, storage, and safeguarding practices.

### **REQUEST PROCEDURES**

5-6. Request procedures are the same as those used for airdrop (as discussed in chapter 4). The using unit requests supplies and the appropriate SPO determines the mode of delivery. When there is an urgent request, the G3 sets/adjusts priorities and ensures the requests for rotary-wing assets are forwarded simultaneously as the SPO forwards the request through logistics channels. Because sling-load aerial delivery operations are service-specific, neither the TALO or JAOC normally get involved.

### **SLING-LOAD EQUIPMENT RETROGRADE**

5-7. Sling-load equipment is returned to the supporting SSA rather than to an airdrop equipment repair and supply company. The equipment could be returned by a supporting aviation unit; by the receiving unit, using organic wheel assets; or by the salvage/collection and classification procedures used in returning airdrop equipment discussed in chapter 4. However it is accomplished, ensuring sling-load equipment is returned to the supply system remains a receiving unit responsibility.

## Chapter 6

# Aerial Delivery Planning Considerations

As the Army moves into the 21st century, the demands on the aerial delivery system will dramatically increase. The current system is very austere and, without careful planning, demands will quickly outstrip the ability of the aerial delivery system. For example, the vast majority of airdrop supply type units are in the Reserves or classified as Category 4 (un-resourced) units. Airland, airdrop, and sling-load equipment is in short supply and easily lost. This means that, for many years, planning aerial delivery will continue to be a critical task.

### AERIAL DELIVERY EQUIPMENT

6-1. The availability of aerial delivery equipment is limited. The FM 10-500-series manuals and applicable OPLANs/OPORDs 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. The most current available data predicts that only 32 percent of equipment used for airdrop resupply missions will be recovered. Of this, only 35 percent will return in serviceable condition and, of the non-serviceable, only 29 percent will be repairable. This data was based on Cold War battles in Europe; these battles were never fought. However, they were based on battles with conventional linear battle lines and a secure rear area. Current planning calls for non-contiguous battlespace and very large AOs (approaching 1,000 kilometers square) with many unsecured, unoccupied areas (white space) between units. Under these conditions, retrograde will be more difficult, resulting in less than published recovery rates. Therefore, the retrograde of this type of equipment should be a planning and operational priority. Unfortunately, there is no initial planning data for the recovery of airland or sling-load equipment.

### FORCE STRUCTURE

6-2. The logistics planner must understand that current doctrine does not match the current force structure intended for support. The most critical shortfall is in the SOF, especially the Rangers, who acquire most of their initial support from TDA assets and have no dedicated support when deployed. Knowing and understanding the impact of the time-phased force deployment list (TPFDL) is critical. Initial moves from the CONUS will be supported from home station using various types of configured loads until units dedicated to aerial delivery arrive in-theater. As shortfalls are identified, alternatives will be planned to minimize the impact on the

mission. For example, strategic prerigging/prepackaging 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 and certain POL products. If water is required, plans should be made to fill the prepositioned containers as the deployment is conducted. TDA and contractor resources, and prepacked/sealed parachutes, may be used to rig early-on replenishment requirements. This will allow TOE aerial delivery units to deploy earlier in the TPFDL and begin providing follow-on needs from the ISB or AO sooner.

## SAFETY

6-3. Safety of airland, airdrop, and sling-load operations is paramount. Failure to ensure safe operations places limited battlefield resources (including personnel) required for aerial distribution at risk. Training, rehearsals, and keeping the troops informed are key factors to a safe and secure work environment. Twenty-four-hour operations with no ease up of activity level during hours of darkness present safety concerns that must be considered. The following are key safety issues.

## RIGGING OPERATIONS

6-4. 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 LZ. The aircraft and, therefore, the aircrews are exposed to a greater risk of enemy air defenses during the extraction of loads from the aircraft.

6-5. Movement in the proximity of aircraft is inherently dangerous. The first fatality in Operation Desert Shield was an airman struck by a vehicle on the flight line.

- The flight line posted speed limit is 15 miles per hour; within 25 feet of the aircraft, the speed limit is 5 miles per hour or less.
- No vehicle within 10 feet of the aircraft (the circle of safety, figure 6-1) should be driven without benefit of a ground guide.
- No personnel should stand or walk directly in front of, or behind, aircraft engines (propeller or jet).
- 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.

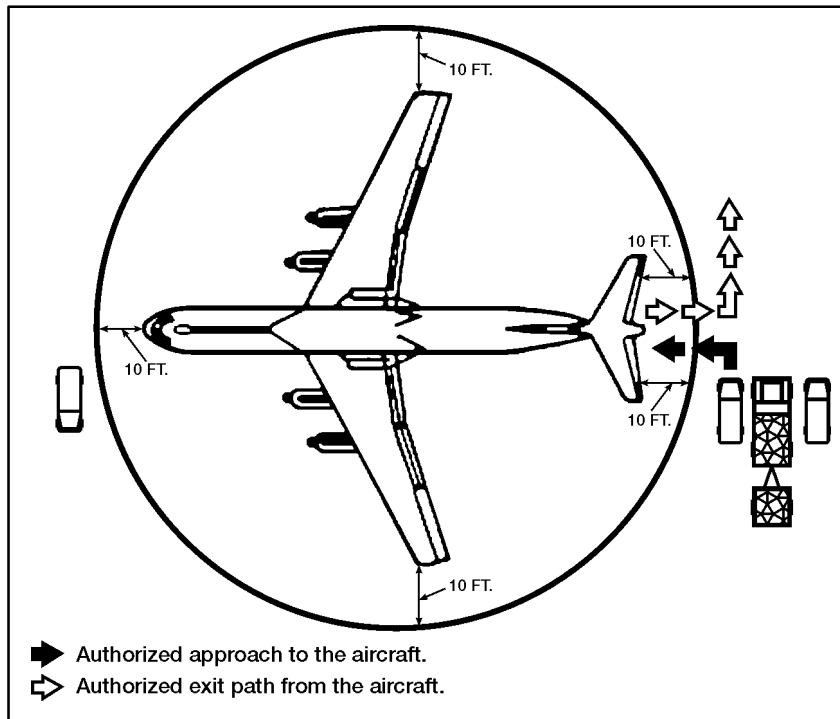


Figure 6-1. Circle of Safety

### SLING-LOAD OPERATIONS

6-6. Safe sling-load operations require that personnel adhere to strict safety protocol. As in airdrop operations, improper use of MHE is a concern in sling-load procedures. Helicopters generate and store static electricity during flight. Prior to load hookup, a grounded, static discharge wand connected to the cargo hook must discharge static electricity. The connection must remain in place until the hookup is completed. If contact is lost, hookup or release operations must stop until the wand to helicopter contact is re-established.

*Note.* 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.

**WARNING**

Large helicopters, such as the CH-47, can generate rotor wash in excess of 120 knots. Hookup/release teams should wear armored vests, helmets, and protective eyewear to avoid personal injury.

6-7. Helicopter rotor wash is high-velocity air movement around a helicopter that makes working near aircraft difficult. Rotor wash can move unsecured material; large helicopters, such as the CH-47, can generate rotor wash in excess of 120 knots. The danger can be so great that the hookup/release teams wear armored vests, helmets, and protective eyewear. The strongest rotor wash occurs between 20 and 60 feet outside the rotor disc. The LZ selection is also critical. Larger, dual rotor helicopters require bigger LZs. Multiple helicopter lifts and landings enlarge LZ requirements. Night operations will also expand LZ requirements. At a minimum, each LZ/PZ should have one designated emergency landing area for disabled aircraft and one rendezvous point for the hook-up/release personnel to report to in case of an emergency. Many SOPs require these personnel to report to a rendezvous point after completing every sling-load operation. Poor LZ selection and management can have catastrophic consequences for both personnel and helicopters. General LZ/PZ information is provided in chapter 5. FM 10-450-3 contains a more detailed explanation of LZ/PZ organization and selection.

## THREAT

6-8. Most airdrop support units will be located at ISBs in the corps/theater rear area. Modern threat capabilities and doctrine cause airdrop support units to be priority targets for attack. Therefore, these units should fully participate in the rear area security plan and train, at a minimum, to repel a level one threat.

6-9. Some SSAs will be in the ISB; others may be in the theater AO and FSBs supporting the individual maneuver brigades. All SSAs will be involved in sling-load operations and all will be prime targets. Therefore, as airdrop-related units, these organizations must be fully integrated in, and participate in, rear area security planning.

6-10. Airdrop/sling-load support units must provide as much NBC protection as possible for air delivery equipment. No decontamination procedures are available for nylon components of aerial delivery or sling-load equipment. If an area becomes contaminated, rigging operations should cease until the area has been decontaminated and rigging has been checked for contamination. Contaminated equipment will not normally be allowed on board an aircraft or used for sling-load operations.

## Chapter 7

# The Future of Aerial Delivery

For the objective force, precise and responsive aerial delivery will no longer be just a nice-to-have logistics resupply capability. By necessity, aerial delivery for the objective force will become a primary distribution platform. Aerial delivery assets must be seen as nothing more special than trucks in a motor pool, that is, aerial distribution vehicle platforms. The threat is no longer predictable or easily identified, and can no longer be constrained using a somewhat organized, linear engagement fought by CSS robust and strategically immobile units, further supported by a manpower intensive, inflexible logistics system. The events of September 11, 2001 serve to show the magnitude and stark reality of this new threat environment. The Army's futuristic objective force is being designed to meet this new threat environment and will require a very responsive, far reaching, flexible, and austere distribution system to support it. This significant change in military thinking has been referred to as a "revolution in military affairs (RMA)." Today's CSS structure is encumbering this objective force design. Therefore, the logistics community is transforming into a CSS system requiring a much reduced "logprint" with greatly increased capability.

7-1. Aerial delivery is a key enabler of this Transformation and S&T is an essential facilitator of the change. Aerial delivery will evolve into a very efficient means of resupply. Accuracy will improve using global positioning systems (GPS) and independent platform propulsion devices to deliver the load to within 100 meters (25 meters is envisioned) of the desired impact point. New rigging systems will allow more cargo to be rigged with less manpower and more cargo per aircraft. Para-foils and parachute systems are being developed to allow high-altitude, long standoff drops of cargo, which will reduce the risk of aircraft to enemy air defenses.

7-2. These efficiencies will, in turn, make aerial delivery more user-friendly; the result will be more common use of this resupply option and a higher density of these type assets in the force structure. The battlefield logprint will be decreased because these skills and associated equipment (such as MHE), in large part, will not be required forward of the ISB, hundreds or even thousands of miles from the maneuver force. Therefore, the ISB, which is considered critical to reducing the logprint, also becomes a major enabler of the objective force.



## EQUIPMENT ENHANCEMENTS

7-3. Current aerial delivery systems are labor-intensive, relatively inaccurate, and restricted during adverse weather conditions. Moreover, present equipment usually requires the aircraft to pass directly over the DZ at low altitudes, sometimes twice before actually executing the drop, exposing valuable aircrews and aircraft to great risk. However, ongoing S&T efforts are showing real progress in addressing these identified shortfalls. Capitalizing on advances in guidance and sensing technology (such as the GPS and wind-sensing precision aerial delivery systems) will allow loads to be dropped from altitudes of greater than 25,000 feet, with an offset of 15 to 50 kilometers from the desired impact point and accuracy ranges from 25 to 100 meters. Over time, these S&T efforts will also force rigger-related organizations to change because of their increased capacity and efficiency. The following highlights some of the emerging aerial delivery technology.

### PRECISION EXTENDED GLIDE AERIAL DELIVERY SYSTEM

7-4. The precision extended glide aerial delivery system (PEGASYS) is a para-foil system guided by a GPS and computer. (Figure 7-1 shows a PEGASYS load.) This system will allow loads of as much as 42,000 pounds to be released from high altitudes and long offset distances, and land within 100 meters of the designated target. SOF and United Kingdom personnel currently use a smaller version of this system. When the system is in the field, it will greatly increase aircraft survivability because the loads can be dropped at high altitudes and horizontal offset distances of 15 to 50 kilometers.



Figure 7-1. Precision Extended Glide Aerial Delivery System (PEGASYS)

## RAPID RIGGING AND DE-RIGGING AIRDROP SYSTEM

7-5. The rapid rigging and de-rigging airdrop system (RRDAS) will greatly reduce the time (by 40 percent), labor, and use of honeycomb material required to rig wheel-type equipment. (Figure 7-2 is an artist's conceptual drawing.) The RRDAS is scheduled to be type classified in the year 2005. This will allow the airdrop community to reorganize and reduce the size of the manpower intensive heavy airdrop supply companies currently in the force. It also fits the goal of an all-wheel (as opposed to track) force as conveyed by General Eric K. Shinseki in his Army Vision presentation.



**Figure 7-2. The Rapid Rigging and De-Rigging Airdrop System (RRDAS)**

## ENHANCED CONTAINER DELIVERY SYSTEM

7-6. The enhanced container delivery system (ECDS) will increase payloads from 2,200 pounds to 10,000 pounds by using larger skidboards/pallets and cargo containers. This will allow the consolidation of four of today's loads into one load. Combining loads will increase delivery accuracy by reducing the total number of loads dispersed across the DZ. The system is also sling loadable for further movement by helicopter, adding options and flexibility for the logistics planner. It also increases aircraft survivability/safety by allowing for release of the load at higher altitudes, out of reach of enemy air defense weapons.

## 500-FOOT LOW VELOCITY AIRDROP SYSTEM

7-7. The 500-foot low velocity airdrop system (LVADS) replaced the low altitude parachute extraction system (LAPES). (Figure 7-3 shows a load being released from a cargo aircraft using the LVADS.) The LVADS will allow loads of up to 22,000 pounds to be released at 500 feet, rather than at ground level. This, in turn, will increase not only aircraft survivability, but also the Army's ability to receive critical warfighting equipment in serviceable condition. It is scheduled to be type classified in 2004.

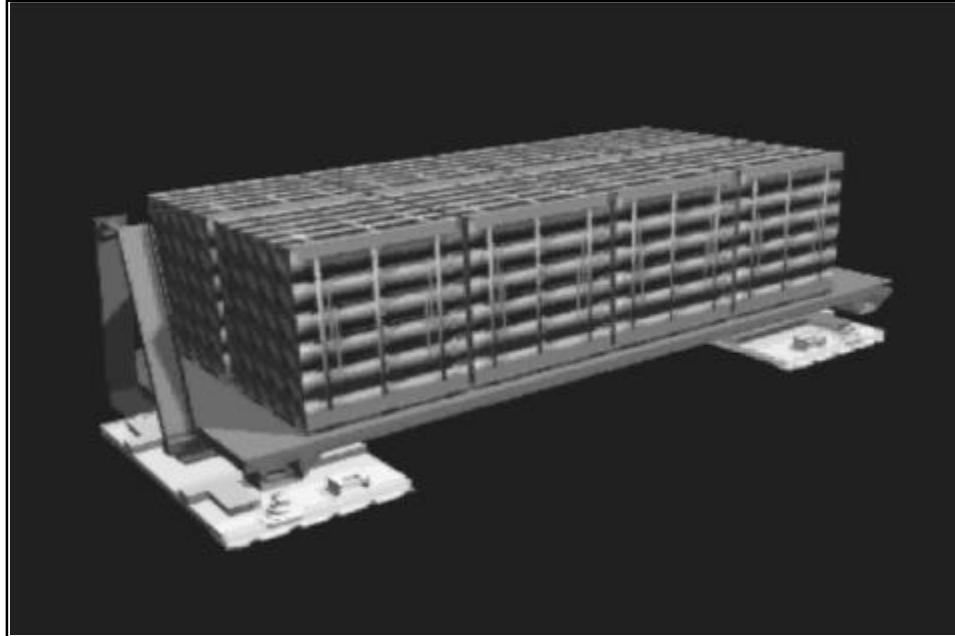


Figure 7-3. The 500-Foot Low Velocity Airdrop System (LVADS)

## PLS SHOE, SLIPPER, AND RPAD SYSTEMS

7-8. The PLS Shoe, Slipper, and roller platform for air delivery (RPAD) systems are being evaluated as possible ways to increase the efficiency of moving supplies and equipment in USAF cargo aircraft. Since the 1960s, the Air Force 463L pallet system has been used for this purpose. The heavy expandable mobility tactical truck-load handling system (HEMTT-LHS), using the container roll-in/out pallet system (CROPS), was chosen as the system to transport supplies and equipment for the Army Stryker brigade combat team (SBCT), which has some demanding deployment and mobility standards. The 463L system was inadequate in fulfilling the SBCT's needs; it required the Army to move supplies on trucks to the departure airfield, trans-load them onto 463L pallets for air shipment, then trans-load them back onto Army trucks for onward movement. This process requires a large investment in time, labor, and MHE. All three systems (PLS Shoe, Slipper, and RPAD) show improvement over the current 463L system. The "Shoe" and the "Slipper" are intended to replace the 463L system; the RPAD is designed to augment the 463L system. Currently the "Slipper" (figure 7-4) illustrates the best hardware solution; it doubles the load capacity of both the C-130 and C-17 and allows CROPS to be loaded directly onto a C-17

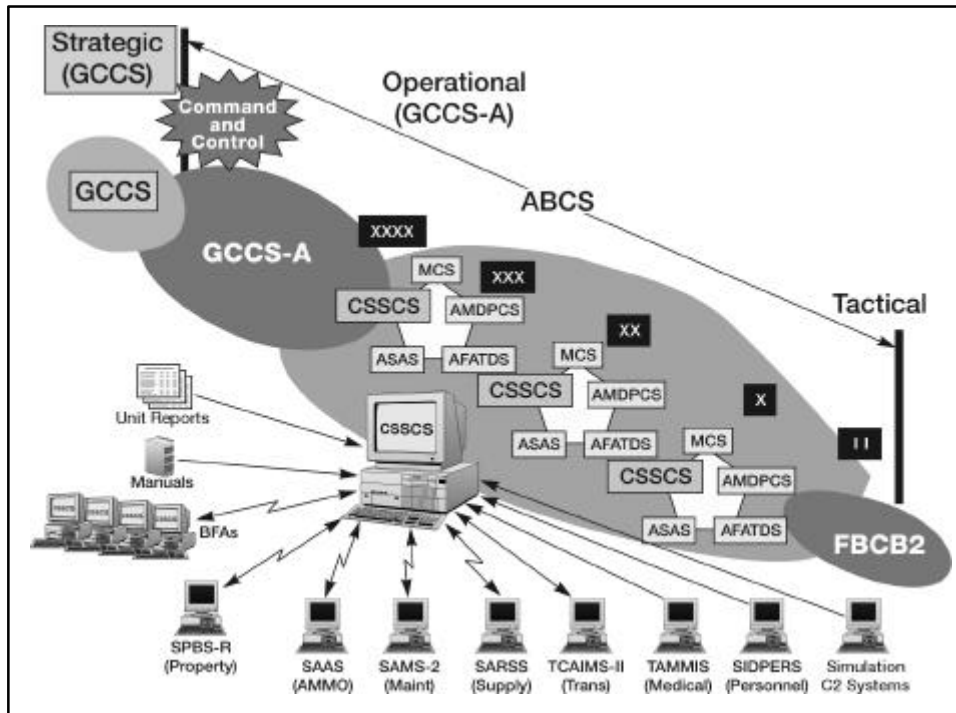
using a HEMTT-LHS truck with no MHE. This system consists of two short aluminum pallets equipped with rollers that fit under each end of the CROP. Currently, it is referred to as “CROP-aircraft interface kit (CAIK).”



**Figure 7-4. The “Slipper”**

## **AUTOMATION/COMMUNICATION ENHANCEMENTS**

7-9. The existing command, control, communications, computer, and intelligence (C4I) architecture of the Army and Department of Defense (DOD) (figure 7-5) is undergoing major revisions. The current standard Army management information system (STAMIS) provides the basic logistics data that feeds the combat service support control system (CSSCS), which is one of the five battlefield functional areas (BFA). These BFAs, in turn, make up the Army tactical command and control system (ATCCS). ATCCS provides the corps through battalion with automated command and control (C2). ATCCS, in combination with the Army global command and control system (AGCCS) and Force XXI battle command, brigade and below (FBCB2), are the three major C2 subsystems that make up the Army battle command system (ABCS), which is the ultimate Army automation/communication system providing C4I from echelons above corps (EAC) through brigade.



**Figure 7-5. Current AOE Army Battle Command System (ABCS)**

7-10. In the near future, the global combat service support-Army (GCSS-A) system will replace the STAMIS, which, because of its “stovepipe” structure, has been found insufficient for the requirements of Force XXI and beyond. The powerful GCSS-A system, when fully developed and combined with other enhancements, will give the SPO a COP and SU of the battlefield previously unimagined. Further, the in-transit visibility (ITV) and total asset visibility (TAV) will provide a picture of the distribution pipeline never anticipated under the STAMIS-AOE system. Such developments will give the SPO the information needed to react to the ever-changing, fast developing environment of the objective force. The flexible, fast acting aerial delivery system will, in turn, be a primary tool to enable the distribution-based logistics system to respond to the shifting battlefield situation.

## REQUIRED ENHANCEMENTS

7-11. Under current evolving logistics doctrine, the SPO has a distribution management center (DMC) added to the SPO organization. This addition puts both material management and transportation management under the control of the SPO, thus providing the synchronization and fusion required to perform efficient distribution operations.

7-12. Today’s airdrop supply units must undergo major design changes to support future expectations. There are too few of these units to support the current requirements; they will be totally inadequate to support the objective force. The SOF units, especially the Rangers, epitomize this shortfall. As previously mentioned, the Rangers have no TOE rigging capacity organic to their units. Secondly, present organizations are too manpower intensive,

contributing to an already overly large CSS force. Many small, capable modular and tailorable units spread throughout the force are needed. Such modularity and tailorability should provide for flexible “plug-in plug-out” configurations, allowing both localized and centralized operations to achieve higher productivity levels and optimize output.

7-13. Lastly, today’s request procedures are burdensome. These procedures must be streamlined and fully incorporated into the up-and-coming logistics automation systems if aerial delivery is to be the mode of choice in the objective force distribution system. The continued objective force evolution, with the recognition of the importance of aerial delivery to the concept, will force this necessary change.

7-14. This necessary change will begin with the current conversion of the Department of Army movement management system-redesign (DAMMS-R) to the transportation coordinator-automated information for movements system II (TC-AIMS II). This system is a DOD system designed for all services. It takes the best parts of each component transportation system and the unique needs of each service to create a joint transportation system. Automated functions include documenting transportation movement requests (TMRs), tasking mode operators, forecasting, and reporting container and cargo movements. The best feature of this system is that it will connect and feed data to the GCSS-A.

# Glossary

<b>AACG</b>	arrival airfield control group
<b>ABCS</b>	Army battle command system
<b>ACL</b>	aircraft loads
<b>ACofS</b>	assistant chief of staff
<b>AD</b>	airdrop (graphic)
<b>ADA</b>	air defense artillery, air defense activity
<b>A/DACG</b>	arrival/departure airfield control group
<b>AFCC</b>	Air Force component commander
<b>AFM</b>	Air Force manual
<b>AGCCS</b>	Army global command and control system
<b>ALC</b>	Army logistics command
<b>ALCE</b>	airlift control element
<b>ALOC</b>	air lines of communication
<b>AMC</b>	Army materiel command, (USAF) air mobility command
<b>AO</b>	area of operations
<b>AOC</b>	air operations center
<b>AOE</b>	Army of Excellence
<b>ASG</b>	area support group
<b>ATCCS</b>	Army tactical command and control system
<b>BFA</b>	battlefield functional area
<b>C4I</b>	command, control, communication, computer, and intelligence
<b>CAIK</b>	CROP-aircraft interface kit
<b>CCT</b>	combat control team
<b>CDS</b>	cargo delivery system
<b>co</b>	company
<b>CONUS</b>	continental United States
<b>COP</b>	common operational picture
<b>COSCOM</b>	corps support command
<b>CROPS</b>	container roll-in/out platform system
<b>CSG</b>	corps support group
<b>CSS</b>	combat service support
<b>CSSCS</b>	combat service support control system
<b>CTA</b>	common table of allowances
<b>DACG</b>	departure airfield control group
<b>DAMMS-R</b>	Department of Army movement management system-redesign
<b>det</b>	detachment

<b>DISCOM</b>	division support command
<b>DMC</b>	distribution management center
<b>DRAS</b>	duel row airdrop system
<b>DRMO</b>	Defense Reutilization and Marketing Office
<b>DS</b>	direct support
<b>DZ</b>	drop zone
<b>EAB</b>	echelons above brigade
<b>EAC</b>	echelons above corps
<b>EAD</b>	echelons above division
<b>ECDS</b>	enhanced container delivery system
<b>eq</b>	equipment
<b>FBCB2</b>	Force XXI battle command brigade and below
<b>FM</b>	field manual
<b>FOB</b>	forward operating base
<b>FSB</b>	forward support battalion
<b>G3</b>	Assistant Chief of Staff, Operations
<b>G4</b>	Assistant, Chief of Staff, Logistics
<b>GCSS-A</b>	global combat service support-Army
<b>GPS</b>	global positioning system
<b>GS</b>	general support
<b>HDR</b>	humanitarian daily ration
<b>HEMTT-LHS</b>	heavy expandable mobility tactical truck-load handling system
<b>HQ</b>	headquarters
<b>hvy</b>	heavy
<b>IBCT</b>	interim brigade combat team
<b>ISB</b>	intermediate staging base, intermediate supply base
<b>ITV</b>	in-transit visibility
<b>JAOC</b>	joint air operations center
<b>JMC</b>	joint movement control
<b>JP</b>	joint publication
<b>LAPES</b>	low altitude parachute extraction system
<b>LOC</b>	lines of communication
<b>LPT</b>	logistics preparation of the theater
<b>lt</b>	light
<b>LVADS</b>	low velocity airdrop system
<b>LZ</b>	landing zone
<b>MANPADS</b>	man portable air defense system
<b>MCT</b>	movement control team



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<b>METT-TC</b>	mission, enemy, terrain and weather, troops and support available, time available, civil considerations
<b>MHE</b>	materiel handling equipment
<b>MMC</b>	materiel management center
<b>MOOTW</b>	military operations other than war
<b>MOS</b>	military occupational specialty
<b>MSR</b>	main supply route
<b>mt</b>	maintenance (graphic)
<b>MTT</b>	mobile training team
<b>NBC</b>	nuclear, biological, and chemical
<b>off</b>	office/officer
<b>OPLAN</b>	operations plan
<b>OPORD</b>	operations order
<b>ops</b>	operations
<b>pack</b>	packing
<b>PEGASYS</b>	precision extended glide aerial delivery system
<b>PLS</b>	palletized loading system
<b>plt</b>	platoon
<b>POL</b>	petroleum, oil, and lubricant
<b>prcht</b>	parachute
<b>PZ</b>	pick-up zone
<b>QM</b>	Quartermaster
<b>rep</b>	repair
<b>rig</b>	rigging/rigger
<b>RMA</b>	revolution in military affairs
<b>RML</b>	revolution in military logistics
<b>RPAD</b>	roller platform for air delivery
<b>RRDAS</b>	rapid rigging and de-rigging airdrop system
<b>S&amp;S</b>	supply and services
<b>S&amp;T</b>	science and technology
<b>SBCT</b>	Stryker brigade combat team
<b>SCL</b>	strategic configured load
<b>sec</b>	section
<b>SLICC</b>	Sling Load Inspector Certification Course
<b>SOF</b>	Special Operations Forces
<b>SOP</b>	standing operating procedure
<b>SPO</b>	support operations officer
<b>spt</b>	support
<b>SSA</b>	supply support activity

<b>STAMIS</b>	standard Army management of information system
<b>SU</b>	situational understanding
<b>sup</b>	supply
<b>svc</b>	service
<b>TALCE</b>	theater airlift control element
<b>TALO</b>	theater airlift liaison officer
<b>TAV</b>	total asset visibility
<b>TC-AIMS II</b>	transportation coordinator—automated information for movements system II
<b>TDA</b>	table of distribution and allowances
<b>tex</b>	textile
<b>TFOP</b>	theater force opening package
<b>TMR</b>	transportation movement request
<b>TOC</b>	tactical operations center
<b>TPFDL</b>	time-phased force deployment list
<b>trans</b>	transportation
<b>TSC</b>	theater support command
<b>UBL</b>	unit basic load
<b>U.S.</b>	United States
<b>USAF</b>	United States Air Force
<b>USTRANSCOM</b>	U.S. Transportation Command

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By Order of the Secretary of the Army and the Air Force:

**PETER J. SCHOOMAKER**  
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