APPENDIX A
AIRLIFT OPERATIONS

Airlift operations provide the means by which contingency forces rapidly enter a hostile or nonhostile AO under any conditions of the operational continuum. The initial airlift priority will probably go to an opposed-entry-capable division (airborne); it will then shift to other light forces that will expand operations. If opposed entry is not required, initial airlift priority may go to any specified light contingency division.

This appendix discusses all the elements of airlift planning, including opposed-entry planning considerations. Because resupply may be by air to support any given operation, airlift planners in contingency divisions must be familiar with some opposed-entry procedures, such as LVAD and low altitude parachute extraction system (LAPES).

PLANNING

Four plans are developed for the execution of airlift operations-the ground tactical plan, the landing plan, the air movement plan, and the marshaling plan. These plans are developed primarily by Army planners in coordination with the USAF. A reverse planning sequence is used beginning with the ground tactical plan.

Opposed-entry operations are based on a detailed ground tactical plan. The landing plan, air movement plan, and marshaling plan are based on requirements to support the success of the ground tactical plan. Airland forces require a secure airfield; therefore, they do not require a ground tactical plan and landing plan that are as detailed as those for an opposed-entry capable force. Air movement and marshaling plans are required by any contingency force.

Ground Tactical Plan. The ground tactical plan is developed from analysis of the mission, enemy, terrain, weather, forces available, and the start time and duration of the operation. The ground tactical plan, as a minimum, contains—

- An airhead line.
- Assault objectives.
- Combat outposts.
- Reconnaissance and security forces.
- Boundaries.
- Assault task organizations.
- Reserves.

Once terrain has been analyzed for offensive operations, it must be considered for defensive operations. Terrain that must be retained or controlled is identified. Enemy avenues of approach into the operational area are analyzed. BPs that offer good cover and concealment and long-range fields of fires are planned along avenues of approach. Natural obstacles that can be extended or improved are also important.

Weather in the objective area must be checked. With the exception of high winds or thunderstorms in the objective area and less than minimum acceptable weather conditions at departure airfields, weather has only a limited effect on delivery of an airborne force. Precipitation does not affect parachute operations. Wet soil conditions, however, can prevent airlanding operations on unimproved runways. Limited visibility caused by rain or fog can hamper delivery of supplies and equipment by the LAPES and can limit CAS.

The degree of visibility in the objective area during an airborne assault influences the conduct of the operation. Deployment at night enhances mission accomplishment. Periods of reduced visibility conceal the airborne assault, add the element of surprise, and exploit night vision capabilities.

Sufficient airlift capability must be available to deliver the division to the objective area. When there are too few aircraft to deliver the assault echelon in a single lift or in multiple lifts over a short time, risk to the force could be unacceptable. Airlift must be available not only to deliver the force, but also to sustain it until completion of operations. The ground tactical plan serves as the basis for the other three plans in this area.

Landing Plan. The landing plan contains the sequence and method of delivery into selected DZ and LZ in the AO. The landing plan is the link between the air movement plan and the ground tactical plan. It contains the following information:

- Locations of DZs, LZs, and LAPES extraction zones.
- Sequence in which the zones will be used.
- Method of delivery.
- Parachute hour (P-Hour).

Air Movement Plan. The air movement plan is prepared jointly as an annex to the OPORD. It covers all actions from the time units load aircraft until they arrive at the AO (P-Hour). It supports the landing plan and contains the flight route diagram to the DZs and the air movement table. The flight route diagram contains—

- The flight route.
- The location and directional orientation of the DZs and landing strips.

The air movement table contains—

- Departure airfield(s) for each serial.
- The number and type of aircraft in each serial.
- The aircraft parking diagram.
- Names of USAF unit commanders.
- Aircraft designated for personnel, heavy drop, or LAPES.
- Station and takeoff times.
- P-Hour for lead aircraft in each serial (if airdrop).

Marshaling Plan. The marshaling plan provides for the assembly of personnel, equipment, and supplies to be employed in the execution of the airborne operation. It includes everything from the issuance of the WO to the loading of aircraft. The timeline to be executed during the marshaling phase and the necessary actions deploying units must exercise (ammunition issue, contingency stocks of combat items) are usually outlined in the unit readiness SOP. Specifically, the marshaling plan covers—

- Rigging of equipment and personnel for airborne assault.
- Marshaling, preparing, and inspecting vehicles and equipment for air movement/airland.
- Movement plan to personnel holding areas.
- Administration and legal requirements.
- Execution of troop-leading procedures.
- Staff-to-commander backbriefs.
- Concurrent planning.

ORGANIZATION

The division is organized into two echelons for an airborne operation—assault and follow-on.

The assault echelon consists of units required in the initial stages of the operation to seize assault objectives, including battalion, brigade, and division TAC CP and assault CPs. The assault CPs are tailored based on mission requirements identified in the predeployment or crisis action phase. The assault CP performs the same function as a TAC CP; however, it is almost completely dismounted. Vehicles and personnel in the follow-on echelon augment the assault CPs to form TAC CPs.

The follow-on echelon includes selected outsized loads and additional support assets. This echelon contains those units or elements that give the division the ability to conduct sustained combat within organizational limitations.

The airborne division organizes for combat in the same way as other divisions, with one major difference: units normally OPCON or DS to a brigade (for example, armor, artillery, engineer, and air defense) are attached for the deployment and initial combat phase of the operation. Attachment provides for C2 until parent units are established within the division airhead. Brigade attachments normally include, one light armor company, one light field artillery battalion, an ADA battery, an engineer company, an MP platoon, a forward area signal center platoon, the FSB, and USAF TACP. These units normally revert to DS and continue to support the brigade after control is centralized at division.

The sequence of unit arrival in the airhead is determined by the mission assigned. Brigade elements land on or near assault objectives. This is done to ensure early securing of assault objectives by surprise. Air Force combat control teams (CCT) and the elements of the airborne division's long-range R&S detachment deploy simultaneously to the AO. They are inserted prior to the airborne assault to collect human intelligence (HUMINT) and to conduct pathfinder operations to support the airborne assault. USAF FAC accompany the lead brigades.

Personnel and equipment are cross loaded on aircraft within a serial. Crossloading permits personnel and equipment to exit the aircraft in a sequence that facilitates assembly. Recovery of heavy-drop items is expedited through the use of crossloading and distinctive equipment markings according to local SOP. Heavy equipment and supplies may be brought into the airhead by any combination of three different delivery means:

- Airland.
- LVAD.
- LAPES.

During airland operations, aircraft land on available runways in a secure area to deliver cargo. They land, quickly dispense their cargo, and take off immediately. The airland method ensures negligible damage to materiel; delivers vehicles ready for immediate driveaway; delivers crews with their weapons and vehicles; and provides for the backhaul of casualties, EPW, and damaged equipment. Airland operations have the disadvantages of requiring LZs and more time for delivering loads than the other two methods. Additionally, aircraft and units are extremely vulnerable to enemy direct and indirect fires during landing and unloading.

All combat equipment and supplies of the airborne division can be delivered by LVAD and LAPES with or without airland facilities available.

During a LAPES operation (C-130 only), aircraft approach an identified cargo delivery strip flying several feet above the ground. An extraction parachute is deployed by the flight crew; the cargo is pulled out of the aircraft, hits the ground, and slides to a halt. The

aircraft then regains altitude and leaves the area. A secure LZ and USAF control teams are usually required at the site. Wet soil conditions hinder LAPES operations. LAPES requires less preparation time, personnel, and equipment support than LVAD. LAPES is a pinpoint delivery system for large items of equipment; however, materiel is more susceptible to damage when the LAPES method is used as compared to the airland method. Additionally, the LAPES zone may require a significant amount of preparation.

LVAD operations (C-130, C-141, C-17) are used during the initial assault and during follow-on delivery of cargo. During LVAD operations, the delivering aircraft eject cargo with the aid of an extraction parachute from the minimum height necessary to fully deploy cargo parachutes needed to suspend the specific cargo they are carrying (usually 500 to 1,500 feet above ground level [AGL]). Cargo used in the assault (such as light armor and artillery) is dropped minutes before assault troops parachute into the area. Assualt troops then link up with the delivered cargo on the ground. In some cases, based on the commander's guidance, crews assigned to combat vehicles or systems may exit the same aircraft and follow their assigned airdropped cargo to the ground to ensure linkup and reduce derigging time (C-130 only). LVAD delivers the most cargo in the least amount of time and is usually the prime method of delivery during initial assaults.

The adverse weather aerial delivery system (AWADS) on the C-130 and station keeping equipment (SISE) on the C-141 provide all-weather delivery capability for both troops and equipment.

The CDS delivers smaller bundles of supplies via airdrop. This system provides the assault force a high assurance of accurate parachute delivery of follow-on material.

Helicopters are deployed by flying them to the airhead and/or by USAF airland aircraft. While flying them to the airhead is preferred, this may not be possible because of refueling requirements en route.

OPERATIONS

The airborne division will be committed to combat by airborne assault, airland operations, or a combination of the two methods.

Airborne Assault. Normally, airborne operations are initiated by airborne assault. LZs are not required, and security of DZs is not as critical. When used, airland aircraft follow aircraft delivering parachute units. A time interval between serials permits parachute units to clear the landing area of enemy forces and to remove parachutes, equipment, heavy-drop loads, and obstacles from available landing strips.

The deployment and initial combat phase begin with the landing of the division in the airhead and terminates when assault objectives are seized. For this phase, the division commander assigns objectives and zones to the brigades, sets priority of fires, and provides the necessary forces to each brigade according to its mission. He also designates the size of the reserve and determines where it is to be located. During the assault, brigade units land in their assigned zones. Units composing the division reserve and other units not attached to brigades land in prescribed DZs and LZs. Command groups move with different serials to prevent loss of an entire command group due to enemy action or aborted aircraft mission.

Brigades assign assault objectives and zones to battalions. DZs and LZs are located on or close to assault objectives to exploit the advantage of surprise. Ground organization of forces is accomplished in assembly areas near DZs.

When assembly areas are not located on assault objectives, the brigade attacks to seize assault objectives in the same manner as the infantry brigade. After assault objectives have been seized, FA units displace within the brigade sectors to support security forces. When security forces withdraw, the artillery displaces to preselected positions.

Air defense batteries enter the airhead early to provide air defense for DZs, LZs, rearming and refueling points, and other critical division installations. Insertion of air defense units may be by LVAD, airlanding, or LAPES. Stinger missiles can be attached to and jumped in with air defense personnel in the assault echelon to provide immediate air defense coverage in the airhead. Batteries initially operate independently under brigade control until the ADA battalion is able to assume operations.

When the engineer battalion headquarters becomes operational in the AO, its companies revert to battalion control and operate in DS of the brigades. Due to the engineer battalion's limited construction assets, engineers will need to be augmented if they are tasked to construct landing facilities or to rehabilitate existing airfields.

Brigade security forces are positioned after assault objectives are seized or simultaneously with the seizure of the airhead in the case of an airborne assault. Although the brigade is responsible for the security force, the division may specify its general location. The division may also designate specific roadblocks or OPs for brigades to man.

The division reserve enters the AO as part of the assault echelon. It is organized—

- To seize an assault objective previously assigned to another unit.
- To reinforce a brigade.
- To block or counterattack an enemy force that has penetrated the security force and is threatening the success of the operation.

Airland Operations. Units can be airlanded on airfields near the LC or in the enemy's rear. Airland operations may be undertaken—

- When local air superiority exists.
- When enemy ADA weapons are suppressed.
- When LZs are secure.
- When unit integrity is important.

Airland forces are introduced into the objective areas as early as possible, consistent with security and availability of LZs. Units are landed on or close to the area in which they are to be employed. Since all elements cannot be transported to the AO in the same aircraft, some reorganization of forces is required prior to initiation of operations. Units must be careful not to present a lucrative target during reorganization. Selection of covered and concealed assembly areas minimizes unit vulnerability. Once assembled, airlanded forces operate like infantry forces as previously described.

LOAD SHORING

Shoring is lumber, planking, plywood, or any other similar material. It serves many purposes. It protects the aircraft cargo floor or 463L pallet surfaces, decreases the approach angle of aircraft ramps, protects airport tarmacs, spreads weight over a larger area, and keeps 463L pallets off the ground.

Shoring is used during airland operations; it is not required for LVAD or LAPES operations. Modem cargo aircraft can carry considerable weight; however, shoring is necessary, particularly for tracked vehicles, to protect the aluminum cargo floors of the aircraft. The organization offering cargo for air shipment must provide shoring.

Not all military airlift command (MAC) aircraft have the same floor pressure tolerances. Consult the applicable aircraft loading technical order for specific limitations. Items that require shoring on one aircraft may not require shoring on another. USAF aircraft loadmasters will ensure the proper amount of shoring is used.

Light armor units must determine shoring requirements and maintain sufficient stockage on hand. Units must include the following in their logistical planning process:

- Specific amounts of shoring needed for the operation based on number of deploying vehicles and type of aircraft.
- Disposition/storage of the shoring once the aircraft lands at the AO.
- Shoring needed for redeployment and plans to acquire it.

Size and Condition of Shoring. Every planned aircraft load will probably need shoring. The load configuration and weight determine the thickness and width of the shoring to be used. Lengths of shoring can be cut to meet specific needs. For ease of handling, however, the length of shoring should not exceed 12 feet. Plywood also makes good shoring. Four-by-eight foot sheets are ideal for loading tracked vehicles.

All dimensions (thickness, length, and width) must be actual size. Commercial-size lumber may not satisfy this requirement. Inspect shoring before use to ensure that it is clean, sound, free of roils, and fit for its intended use. The aircraft loadmaster may reject dirty or badly warped lumber, delaying the loading of the aircraft.

Transporting the Shoring. When shoring is required to load cargo, it will also be needed to unload. If shoring is not available at the destination, it must be transported with the load. Include the weight of the shoring with the weight of the cargo to accurately determine the center of gravity of the load. For tracked vehicles, simply place the shoring on top of the vehicle when it is weighed.

Types of Shoring. There are five types of shoring—rolling, parking, bridge, sleeper, and approach.

Rolling Shoring. Use rolling shoring to protect airport parking ramps and the cargo floor and loading ramps of cargo aircraft from damage (see Figure A-1). This type of shoring is used to protect surfaces from damage when moving a vehicle across them. Most wheeled vehicles do not require rolling shoring, but tracked vehicles do. The minimum thickness will be 3/4 inch; however, some aircraft may require thicker amounts of shoring than others. Refer to applicable USAF technical orders.

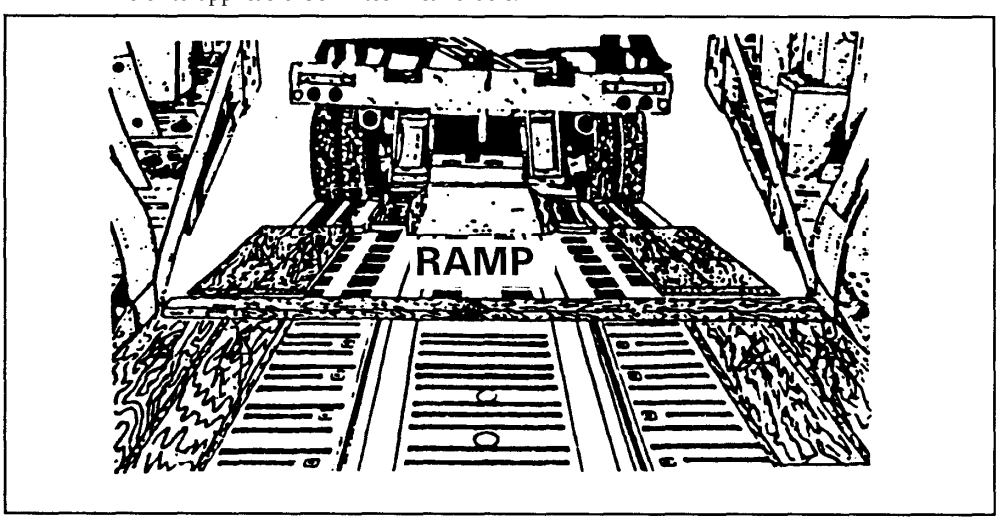

Figure A-1. Example of rolling shoring.

Parking Shoring. Use parking shoring to protect the aircraft floor from damage during flight (see Figure A-2). Any vehicle requiring rolling shoring also requires parking shoring. Each aircraft has specific floor weight limitation that apply to wheeled and nonwheeled cargo. Some general factors regarding parking shoring should be considered when planning an airlift movement:

- The minimum thickness of parking shoring is 3/4 inch.
- Use parking shoring to protect the aircraft floor or aircraft loading ramps from concentrated contact, such as steel wheels and trailer tongue supports and wheels.
- Most pneumatic tires do not require parking shoring.
- Always use parking shoring when rolling shoring is required.

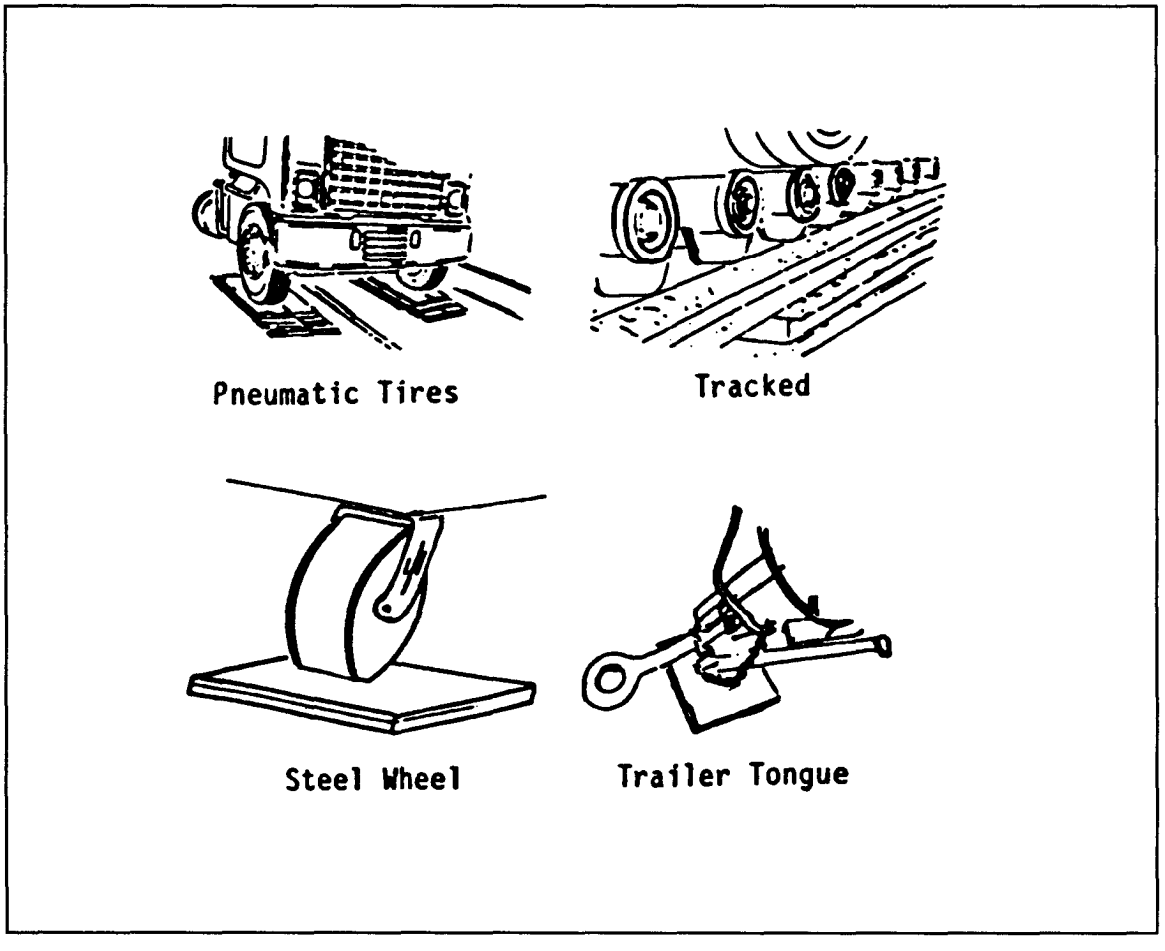

Figure A-2. Example of parking shoring.

Bridge Shoring. Use bridge shoring to take advantage of the greater strength of the vehicle treadways of the aircraft cargo floor. It allows the heavy cargo to be positioned between the treadways without overloading the center of the floor area. Shoring is first placed lengthwise, nose-to-tail, or laterally on the treadways. Planks or beams are positioned on top of the shoring planks and form the bridge (see Figure A-3).

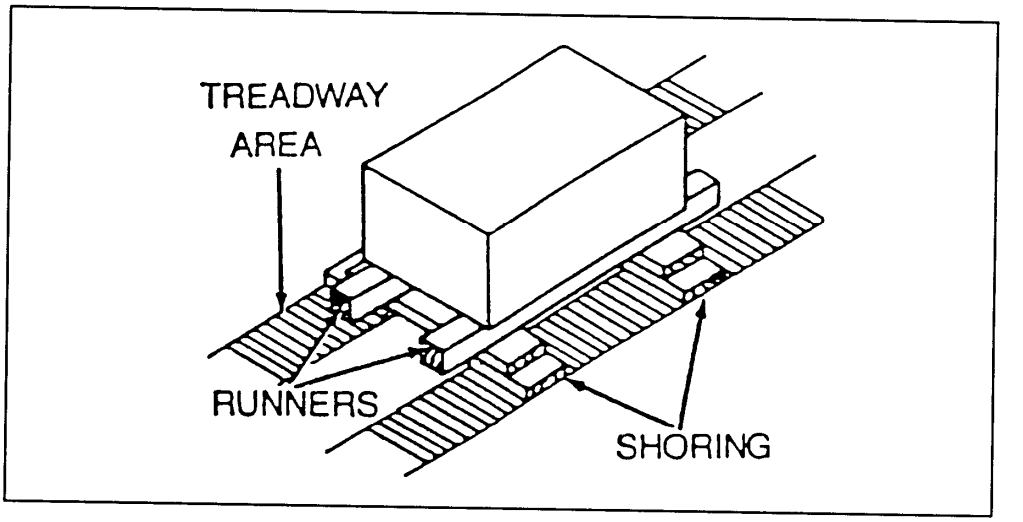

Figure A-3. Example of bridge shoring.

Sleeper Shoring. Use sleeper shoring under the frame or axle of any special-purpose vehicle (such as a forklift, scoop loader, or grader) that weighs over 20,000 pounds and has tires that are not designed for highway travel. Sleeper shoring is placed between the aircraft floor and a structured part of the vehicle, such as the frame or axle (see Figure A-4). This type of shoring prevents the vehicle from bouncing up and down and possibly pulling the tie-down rings out of the aircraft floor.

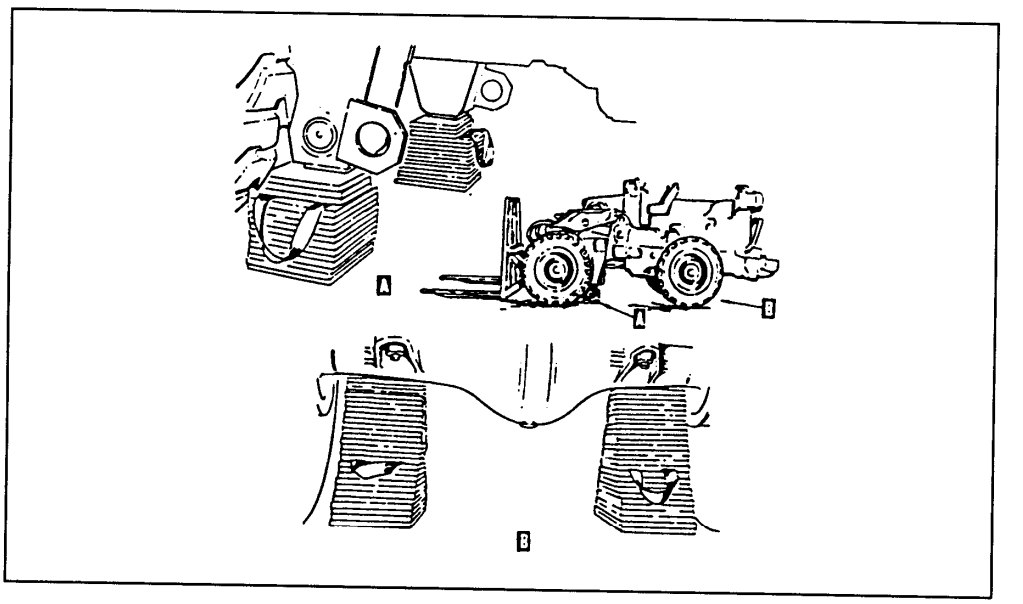

Figure A-4. Example of sleeper shoring.

Approach Shoring. Approach shoring, like dunnage, has specific applications. Use approach shoring to decrease the approach angle of the aircraft loading ramps (see Figure A-5). Some items of cargo will strike the aircraft or ground during loading/off-loading operations. For example, a tow pintle on a tank may strike the tarmac as the vehicle is off-loaded. Plan to transport any required approach shoring aboard the same aircraft as the item that requires the shoring.

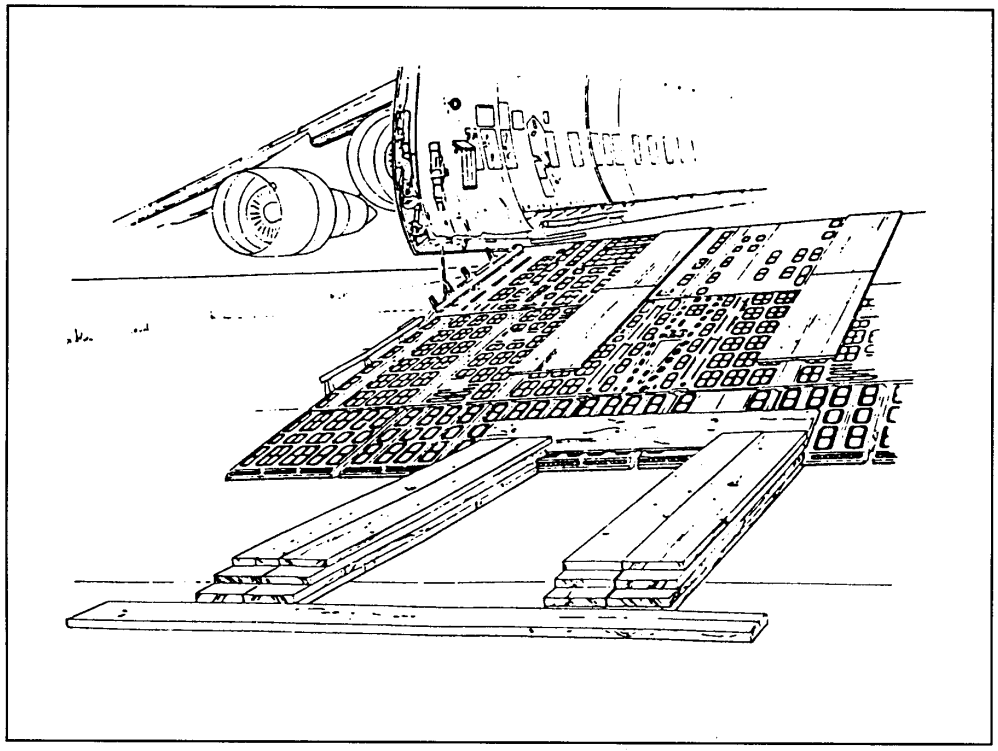

Figure A-5. Example of approach shoring.

UNIT LOAD PLANNING PERSONNEL

S3-Air. The unit S3-Air officer and NCO are the primary load planners at the battalion level. They should be school trained in air movement operations from a DA approved air movement operations course. The course encompasses manual load planning and loading of cargo onto aircraft and the certification of hazardous cargo.

Unit Air Movement Officer. Companies will have air movement officers and/or noncommissioned officers identified as the unit air movement officer (AMO). The unit AMOS work under the guidance of the S3-Air during deployments and are responsible for the proper outloading of the equipment being deployed from their unit. Unit AMOs should also be school trained in air movement operations and must be school trained to certify hazardous cargo.

BASICS OF AIRCRAFT LOAD PLANNING

The following basic principles of load planning apply to any type aircraft. Load planning—

- Identifies the type aircraft needed to carry a load.
- Identifies the exact number of aircraft needed to accomplish a particular mission.
- Identifies in advance any additional required loading aids to ensure availability at the equipment load time.
- Helps the unit prioritize the movement of their cargo and personnel.

Many factors must be considered in the load planning process. Primarily, the load planner must ensure the safe and efficient use of the aircraft. The load planner must comply with aircraft safety, weight, and balance, and floor load restrictions. The load must be within an acceptable center of balance condition for takeoff, flight, and landing (if not LVAD or LAPES). Computer automation has replaced much of the manual system of load planning; however, AMOs must understand the methodology of load planning. The load planner must keep other factors in mind, such as ease of on-load, and offloading, coordinating for the rigging of cargo which will be air-dropped, and the support in both manpower and logistics for outload. Improper planning can result in excessive loading or off-loading time or structural failure of the aircraft in flight or on landing.

There are two distinct phases in air movement. The first is the load planning phase. During this phase, the unit identifies aircraft requirements in terms of equipment and personnel. The unit also identifies how many aircraft and which type are required to move the unit. This phase may be repeated many times to refine the movement or to reduce the total aircraft requirement.

The second phase of movement planning is manifesting. During this phase, load planners complete the final load plans and cargo manifests. The final load plans may differ from the preplanned ones due to changes in unit movement priorities, aircraft scheduling, and actual vehicle weights at deployment time. Preliminary plans identify the overall requirement in terms of unit equipment and number and type of aircraft. During execution, the unit prioritizes movement requirements based on operational conditions at the time of the movement and on the deploying TF commander's guidance.

TYPES OF LOADS (AIRLAND)

Aircraft loading is generally categorized into two types-concentrated loading and palletized loading. Table A-1 summarized USAF aircraft load data.

Concentrated Loading. Concentrated loads are very large or heavy items, such as tanks, vehicles, or construction equipment.

Palletized Loading. The entire aircraft load generally consists of preloaded 463L pallets, properly secured and ready for flight. The 463L restraint rail system positions and secures the pallets in the aircraft.

THE 463L CARGO SYSTEM

The 463L system encompasses all phases of cargo loading, including material-handling equipment, cargo-loading platforms, restraint equipment, and in-aircraft systems. The 463L system is the USAF standard for moving concentrated cargo to be airlanded. It comprises the following components:

- Dual-rail system. The dual-rail system is installed in all airlift or 463L-capable military aircraft. This system consists of rows of rollers that allow the palletized cargo to easily move into the aircraft. Many of these rollers are stowable to convert the cargo deck to a flat, clear loading surface for wheeled or tracked cargo. The side rails guide the pallets into the aircraft and provide lateral and vertical restraint. These rails are equipped with detent locks that hold the pallet securely in place once inside the aircraft. The locks also prevent the forward and aft movement of pallets during flight.
- 463L pallet. The 463L pallet is made of corrosion-resistant aluminum with a soft wood core and is framed on all sides by aluminum rails. The rails have 22 attached tie-down rings with six rings on each long side and five rings on each short side. Each ring has a 7,500-pound restraint capacity. The rails also have indents (notches) which are designed to accept the detent locks located on numerous types of material-handling equipment on all airlift-capable aircraft. The overall dimensions of the 463L pallet are 88 inches long by 108 inches wide by 2-1/4 inches thick. The usable dimensions of the surface area are 84 inches wide by 104 inches long. This allows two inches around the periphery of the pallet to attach straps, nets, or other restraint devices. An empty pallet weighs 290 pounds (355 pounds with nets) and has a maximum load capacity of 10,000 pounds.
- 463L pallet nets. There are three nets to a set: one top net (yellow) and two side nets (green). The side nets attach to the rings of the 463L pallet. The top net attaches by hooks to the rings on the side nets. The nets have multiple adjustment points and can be tightened to conform to loads of almost any shape. A complete set of 463L nets provides adequate restraint for a maximum of 10,000 pounds when properly attached to a 463L pallet. A complete set of nets weighs 65 pounds.

Table A-1. USAF aircraft data.

	C-130	C-141	C-17	C-5
Takeoff Gross Weight wartime (lb) peacetime	 173,700 153,700	 343,000 323,000	 580,000 580,000	 769,000 769,000
Runway Requirements takeoff (ft) landing	 2,600 2,700	 6,600 3,840	 7,600 3,000	 10,650 4,610
Maximum ACL (lb) wartime peacetime	 45,000 35,000	 72,900 45,000	 172,200 N/A	 204,904 100,000

Table A-1. USAF aircraft data (cont).

	C-130	C-141	C-17	C-5
Maximum 463L pallets	6	13	18	36
Maximum # soldiers				
wartime	92	200	N/A	340
peacetime	74	143	N/A	340
paratroopers				
wartime	80	180	102	73
in-flight rig	44	126	N/A	73
training	64	152	N/A	73
LVAD capable	yes	yes	yes	yes
LAPES capable	yes	no	no	no