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**CIVIL RESERVE AIR FLEET LOAD
PLANNING GUIDE**



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This volume implements AFD 24-2, Preparation and Movement of Air Force Materiel, and provides information needed to load plan a portion of the Civil Reserve Air Fleet (CRAF). Aircraft discussed are the wide-body B747, B767, B777, DC-10, MD-11, L-1011, A310, and the narrow-body B757 and DC-8. Provisions of this volume apply to Active Duty, National Guard, Military Reserve and other Governmental agency units when utilizing commercial aircraft during contingencies.

This volume of AMCP 24-2 is intended for use as a load planning guide. Equipment listed is dimensionally compatible with all aircraft and cargo areas discussed. However, final approval of the procedures in this publication ultimately rests with the individual contractor providing airlift services to the DOD. When new or additional information is received from the manufacturer, it will be provided as a change to this publication.

SUMMARY OF REVISIONS

This document is substantially revised and must be completely reviewed.

The information contained herein is identical to the information in the previous pamphlet (AMCP 24-2), but broken down into a more manageable file size. No data has changed. Users of this volume will have to print the Volume(s) that deal with their particular aircraft.

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CHAPTER 1

GENERAL LOADING INFORMATION (ADMINISTRATION)

1.1. General. The Civil Reserve Air Fleet (CRAF) represents approximately one-half of AMC's total strategic wartime airlift capability. This publication is designed to provide information necessary to more effectively use the CRAF's capability.

1.2. Purpose and Scope. The purpose of this publication is to provide basic guidance for load planning, aircraft preparation, ground handling, and transporting unit personnel and equipment on CRAF aircraft in support of general war planning. This pamphlet does not give specific guidance for cargo preparation or weight and balance of individual loads. This information is provided through separate courses and governed by other directives (See paragraph 2.3.). Information contained in this publication may also be used for civil airlift planning for peacetime exercises and special assignment airlift missions. Although the CRAF is composed of three segments, this publication is concerned with aircraft in the long range international (LRI) segment. For aircraft to qualify for this segment, they must be equipped and maintained with the navigation, communication, and survival equipment for worldwide extended over water operations in accordance with federal aviation regulation. The standard range capability for this segment is 3,500 nautical miles (NM) for both passenger and cargo aircraft with a productive payload.

1.3. Supplements. Changes or supplements to this publication by agencies other than AMC are prohibited. This does not preclude its use as a reference document for preparation of intra-agency instructional directives.

1.4. Revisions. Send recommendations for revisions and additions to this publication to HQ AMC/DOF, Scott AFB IL 62225-5302. (DSN 779-1751)

1.5. Distribution. Military units requiring this publication may make their request from the following addressees:

1.5.1. All Air Force units should make their requests through normal publications distribution office.

| | | |
|-------------------|--|---|
| Army: FORSCOM: | Commander, US Army Forces Command ATTN: Publications Stock Room Bldg 208 | Ft Gillem, Forest Park GA 30050-5000 |
| Army: EUCOM: | Commander, US Army Europe and Seventh Army ATTN: 1 st TMCA | APO New York 09403-5000 |
| Army: TRADOC: | Commander, US Army Training and Doctrine Command ATTN: ATPL-TT | Fort Monroe VA 23651-5000 |
| Army: WESTCOM: | Commander, US Army Western Command ATTN: APLG TR | Ft Shafter HI 96858-5100 |

| | | |
|-----------------------------|--|--------------------------|
| Marine Corps: | Commanding General Marine Corps Logistic Base MF: Publications Stock, Cd 876 | Albany GA 31704-5001 |
| Navy: Naval Air Terminal | Naval Air Terminal Bldg LP 84 Attn: Publications Distribution Office NAS | Norfolk VA 23511-6691 |
| National Guard Bureau | ATTN: NGB/DAP | Washington DC 20310-2500 |

NOTE: Units not included in above may make requests to HQ AMC/IMPPD, Scott AFB IL 62225-5001.

CHAPTER 2

BASIC POLICIES AND DEFINITIONS

2.1. Basic Policies. The CRAF is composed of US civil air carriers who have committed themselves by contract to provide operating and support personnel, equipment, and aircraft to AMC.

2.2. CRAF Aircraft. Planners need to realize that, unlike military cargo aircraft which are standardized, civilian airframes vary widely. It is not uncommon that notable variations occur between the same type, model, and series of civil aircraft, depending upon the needs of the carrier. Therefore, use the information in this publication for general planning purposes only. Specific information (such as the number of passenger seats) may not be known until a specific aircraft arrives at the onload station.

2.3. Additional Sources of Information. Further information regarding the CRAF may be found in:

| | |
|--------------------|---|
| AFP 10-1403 | Air Mobility Planning Factors |
| AMCR 55-8 | (To be changed to AMCI 10-402) Civil Reserve Air Fleet) |
| AMCI 24-201 | Commercial Airlift Management - Civil Air Carriers |
| AMWC 36-1 | AMC Affiliation Program Airlift Planners Course |
| TB 55-45/AFP 76-19 | Certification of Military Equipment for Transport in AMC/CRAF Aircraft (microfiche copy available). |

2.4. AMC Contract Administrators. AMC contract administrators are charged with the responsibility for the administration of individual airlift contracts within geographic areas. All users are reminded to make airlift requests through normal channels. Contract administrators are listed below:

Table 2.1. Contract Administrators.

| Contract Administrators: | Location: | DSN: | After duty hours: |
|--------------------------|----------------------------|--------------|---|
| HQAMC/DOYM | Scott AFB, Illinois | DSN 779-3771 | Contact HQ AMC/TACC, Eastern DSN 779-0355, Western DSN 779-0350 and ask for the airlift contract administrator. |
| (22AF) OL-G AMCAOS | McGuire AFB, New Jersey | DSN 440-2848 | Contact HQ AMC/TACC, Eastern DSN 779-0355, and ask for the airlift contract administrator. |

| Contract Administrators: | Location: | DSN: | After duty hours: |
|---|-----------------------------------|---|---|
| OL-A Det 4 AMCAOS 621 AMMSG/CK Unit 3305 | Ramstein AB, Germany | DSN 314-480-2379 or 314-480-5744 Cell: 011-49-171-216-242 8 | ask for the airlift contract administrator through the base operator. |
| OL-B Det 4 AMCAOS | Charleston AFB, South Carolina | DSN 673-3846 ATOC: 673-3213 or 673-3215 | ask for the airlift contract administrator through the base operator. |
| OL-F AMCOS (15AF) | Travis AFB, California | DSN 837-3281 Cell: 707 290-1060 | Contact HQ AMC/TACC, Western DSN 779-0350 and ask for the airlift contract administrator. |
| 632 AMSS/CCK | Elmendorf AFB, Alaska | DSN 317 552-3311 Commercial: (907) 552-3311 | ask for the airlift contract administrator through the base operator. |
| OL-B Det 5 AMCOS | Kadena AB, Japan | DSN 315 634-3671 or 1848. Commercial: 011 81 6117 34 3671 or 1848 | ask for the airlift contract administrator through the base operator. |
| OL-C Det 5 AMCOS 630 AMSS/CCK Unit 5114 | Yokota AB, Japan | DSN 225-4283 or 8574 Commercial: 090 1839 0659 | ask for the airlift contract administrator through the base operator. |

2.5. Excess Allowable Cabin Load (ACL) and Deficit Passengers and/or Cargo. (See AMCI 24-201):

2.5.1. When the government contracts for a civil aircraft, the government receives a guaranteed allowable cabin load (GACL). However, this GACL is viewed as a minimum the airline must provide.

2.5.2. Except for the movement of en route support, the government has first right to use any excess ACL space. If excess ACL is used, the contractor will be responsible for the excess cargo as well as passengers to the same extent as for cargo or passengers within the GACL, including, but not limited to, food service. The amount of space used over the GACL constituting excess ACL will be determined by the limits of the gross takeoff weight of the aircraft and by the pilot's judgment with respect to other operational limitations, including the mission's critical leg.

2.5.3. In the event an aircraft is provided which reduces the GACL by more than 10 percent, regardless of reason, the aircraft normally will be refused and the contractor will be required to obtain substitute service. All substitute service must be approved by a contracting officer. If an aircraft is accepted with less than 90 percent of GACL as being in the best interest of the Department of Defense

(DOD), the quality assurance evaluator will annotate the AMC Form 8, Civil Aircraft Certificate, and justify acceptance.

2.6. Contractor Responsibilities. The contractor is responsible for the safe loading of the aircraft according to Federal Aviation regulations (FARS) and individual aircraft loading specifications. By contract, the government (AMC) accepts certain responsibilities relative to the safe loading.

2.6.1. For cargo missions onloading at a military base, the contractor's representative or a crewmember will provide the AMC traffic representative with an appropriate form showing the planned load breakdown (aircraft capability) for each trip at least 4 hours prior to departure (6 hours for wide-body aircraft). The contractor will use the local station load planning form or contractor's form. Data furnished to the AMC representative will include:

- Trip number and date
- Type aircraft
- Palletized-nonpalletized
- ACL in pounds this leg
- ACL in pounds critical leg
- Cube allowable main and belly
- Compartment breakdown weight in pounds per cubic feet to assure a weight & balance center of gravity (CG) within aircraft limitations.

2.6.2. The government is responsible for the accuracy of the actual onload weights provided to the contractor and entered on the local station load summary or contractor's form by the loading supervisor. The contractor (captain or other designated crewmember) is responsible for visually checking the cargo load, its security, and tie-down so Federal Aviation Administration (FAA) requirements are met.

2.6.3. For passenger missions onloading at a military base, the contractor's representative or a crewmember will provide the traffic representative with the aircraft capability in both pounds and seats, based upon the critical leg of the mission, at least 3 hours prior to departure time. The contractor may use the station's local load summary form or contractor's form. As a minimum, the following will be shown:

- Trip number and date
- Type aircraft
- ACL in passenger seats or pounds for this leg
- ACL in passenger seats or pounds for the critical leg
- Cube allowable in belly compartments
- Belly compartment weights by compartment

For couriers, the contractor will provide two seats on cargo missions. Users should not plan on any additional seats regardless of aircraft seating configuration.

2.7. Contract Aircraft Ground Times. The following ground times are listed in the Joint Strategic Capabilities Plan (JSCP) for wartime planning, and have been coordinated with HQ USAF/DOFM HQ AMC/DOF (CRAF) and HQ AMC/DOY (Contract Airlift). It is important to note that these times are for planning purposes and may change if mutually agreed to between the government and the contractor based on carrier and mission requirements.

Table 2.2. Contract Carrier Ground Times.

| Type of Cargo Number of Pallets ⁴ | Concurrent Loading and Servicing ¹ | Enroute Stations | Off-load at Destination ² | Turnaround Stations ^{1 3} |
|--|---|------------------|--------------------------------------|------------------------------------|
| 1-7 pallets | 2+00 | 1+30 | +45 | 2+30 |
| 8-13 pallets | 2+00 | 1+30 | 1+00 | 2+30 |
| 14-18 pallets | 2+30 | 1+30 | 1+15 | 3+00 |
| 19 or more | 4+00 ⁵ | 1+30 | 3+00 | 5+00 ⁵ |

Oversize Cargo and Rolling Stock

| | | | | |
|-------------------------|-------------------|------|------|-------------------|
| 1-25 S/T ACL | 4+00 | 1+30 | 2+00 | 4+00 |
| 25 S/T or more | 5+00 ⁵ | 1+30 | 3+00 | 5+00 ⁵ |
| Passengers (pax) | | | | |
| 105-250 pax | 2+00 | 1+30 | 2+00 | 3+30 |
| 251 or more pax | 3+00 | 1+30 | 3+00 | 4+30 |

NOTES:

¹At stations where concurrent loading and servicing are not authorized, add one hour.

²No aircraft servicing planned.

³Turnaround stations are locations where aircraft offload or onload and servicing will take place.

⁴Assumes fully palletized cargo and that aircraft is properly configured for palletized loading.

⁵If subfloor must be installed, or removed, add 1 hour to the ground time.

2.8. Transportation of Hazardous Cargo.

2.8.1. Civil aircraft of the CRAF that are necessary to augment military operations maybe authorized to transport hazardous materials, normally restricted or forbidden, for the purpose of national security IAW Title 49CFR, 173.3.(b). This approval, applying to passenger and cargo aircraft, may only be used for the rapid and or sustained deployment of U.S. Armed Forces during declared national emergencies or defense crisis conditions. Specific authorization and limitations are contained in DOD 4500.9R, *Defense Transportation Regulation, Part III* and AFJMAN 24-204.

2.8.2. DOT has also approved DOT Exemption 7573 to CFR 49. This exemption authorizes the transportation of hazardous cargo according to AFJMAN 24-204 on civil aircraft under AMC contract for other than wartime operations.

2.9. Pallets:

2.9.1. The military pallet (HCU-6/E) is part of the 463L Materials Handling System, commonly referred to as the 463L pallet or Type I 463L pallet. It is 2 inches thick by 88 inches long by 108 inches wide. The usable area is 84 inches long by 104 inches wide after accounting for reductions of space for tie-down equipment. The pallet weighs 290 pounds or 354 pounds with restraining nets. Loaded to a design height of 96 inches, this pallet provides 485 cubic feet of usable space, including pallet.

2.9.2. For this publication, the commercial pallet measures 1-inch thick by 88 inches wide by 125 inches long. The usable area is 84 inches long by 121 inches wide after accounting for reductions of space for tie-down equipment. Loaded to a height of 96 inches, this pallet provides 564 cubic feet of usable loading space. Other dimensional commercial pallets are available. Commercial pallets are not normally used on military operations.

2.10. Determining Dimensional Restrictions for Cargo:

2.10.1. Cargo not transportable by air is any single piece of cargo that cannot be loaded on a C-5A/B, i.e., cargo that exceeds the dimensions of either of the following envelopes:

2.10.2. 1,465 inches long by 156 inches wide by 162 inches high

2.10.3. 1,465 inches long by 228 inches wide by 114 inches high

2.10.4. Outsized cargo is cargo that exceeds the capabilities of the C-130 and C-141B aircraft and requires the use of a C-5A/B or a C-17 aircraft. It is cargo that is 810 inches long by 117 inches wide by 105 inches high in any direction. Consult the Technical Order (TO) 1C-141B-9, Aircraft Loading Instructions, sections 4 or 6, to determine if the item can be transported.

2.10.5. Oversized cargo is any single item that exceeds any one of the following dimensions of a 463L pallet of 84 inches long, 104 inches wide, and 96 inches high but can be loaded on a C-141, C-130 or KC-10. (Note: KC-10s are limited to a double married pallet.)

2.10.6. Bulk cargo is cargo that can be loaded on a 463L pallet without exceeding any of its usable dimensions. In other words, it will not exceed the usable area of a Type I 463L pallet (104 inches wide by 84 inches long) and a height established by the cargo envelope of the particular model aircraft. For military aircraft, plan on building pallets to a maximum height of 96 inches. (Note: height may be increased from 96 inches to 100 inches using 463L nets for restraint but maximum weight is limited to 8,500 lb.) For CRAF aircraft, see individual aircraft sections of this publication.

2.11. Cargo Restraints. The following are minimum cargo restraint requirements for loading the aircraft listed in this publication. This is an accepted standard for most carriers. Certain carriers may have more restrictive requirements, which may not be known until the aircraft arrives for loading.

Forward Restraint 1.5 times the force of gravity (*g*)

| | |
|--------------------|------|
| Aft Restraint | 1.5g |
| Vertical Restraint | 2.0g |
| Lateral Restraint | 1.5g |

2.12. Load Planning. Using DD 2130 series aircraft cargo load plan forms for each type aircraft, along with AMC-approved equipment template forms may facilitate the load planning of equipment on CRAF aircraft. DODR 4500.9R, PART III, MOBILITY is the governing directive. The contracted carrier maintains final authority with regard to cargo load planned for their aircraft. Contact HQ AMC/DOF for the current telephone listing of specific carrier operations centers. Expertise and guidance for load planning and equipment is provided through these centers.

CHAPTER 3

SPECIALIZED LOADING SUPPORT EQUIPMENT

3.1. 316A/E Cochran Air Transportable Loader:

3.1.1. Description. The 316A/E Cochran loader is a self-propelled elevator designed to load cargo onto the main deck of wide-body aircraft. Due to aircraft fuselage curvature, it cannot be used to load wide-body lower lobes. It has a rollerized platform that can hold up to two 463L pallets (A model) or three 463L pallets (E model) at one time. With three layers of 3/4-inch plywood subfloor, the loader may be used to load wheeled or tracked vehicles.

3.1.2. 316A Model Loader Specifications.

3.1.2.1. Ground movement speed (self propelled):

| | |
|--------------------------------|-----------------------|
| Low, | 1 mile per hour (mph) |
| High, | 2.5 mph |
| Ground movement speed (towed): | 5 mph |

3.1.2.2. Dimensions: Fully assembled:

| | |
|--------|--------------------------------|
| Length | 288 inches long |
| Height | 252 inches high |
| Width | 183 inches wide |
| Weight | Fully assembled, 19,100 pounds |

3.1.2.3. Elevator platform specifications:

| | |
|-------------------|-----------------------------|
| Length | 252 inches long |
| Width | 128 inches wide by |
| Height (Minimum) | 19 inches |
| Height: (Maximum) | 217 inches |
| Maximum load: | 25,000 pounds on 2 pallets |
| Power: | Hydraulic (gasoline engine) |

3.1.2.4. Transportability. The 316A loader may be reduced for air shipment either in a commercial or a military configuration.

3.1.2.5. In the commercial configuration, this loader may be loaded into the lower lobe of the B747 using two commercial pallets (125 inches long by 88 inches wide) and one commercial LD3 container. The 316A is broken down into three sections: winch end, steering end, and power pack. Loading is accomplished by pushing each section straight into the lower lobe and then pushing the section straight back.

3.1.2.6. In the military configuration, the 316A can be loaded into C-5A/B, C-130, C-141B, KC-10A, DC-10, and B747 (side or nose) main decks. It breaks down into two sections; each carried on a double-married 463L pallet. It may also be loaded on single pallets.

3.1.2.7. Total length: 352 inches (includes the use of two double pallets).

3.1.2.8. Maximum height: 92 inches. The height has to include the height of the power pack when it is placed on top of one of the sections. If the power pack, however, is placed on another single pallet, the maximum height of the five pallets is 66 inches.

3.1.2.9. Shipping weight: 21,400 pounds, including pallets, straps, and dunnage.

3.1.3. 316E Model Loader Specifications (Figure 3.1).

3.1.3.1. Ground movement speed (self-propelled):

| | |
|--------------------------------|---------|
| Low | 1 mph |
| High | 2.5 mph |
| Ground movement speed (towed): | 5 mph. |

3.1.3.2. Dimensions: Fully assembled:

| | |
|---------|--------------------------------|
| Length | 296 inches long |
| Width | 237 inches wide |
| Height | 252 inches high |
| Weight: | Fully assembled, 19,500 pounds |

3.1.3.3. Elevator platform specifications:

| | |
|-----------------|----------------------------|
| Width | 128 inches wide |
| Length | 268 inches long |
| Minimum height: | 19 inches. |
| Maximum height: | 217 inches. |
| Maximum load: | 30,000 pounds on 3 pallets |
| Power: | Hydraulic (diesel engine). |

3.1.3.4. Use of the C-141 Auxiliary Ground Loading Ramps on the 316 series Loaders. (Figure 3.2.)

3.1.3.5. Transportability. The 316E may be reduced for air shipment in military configuration on a three pallet married train. It can be loaded into C-5A/B, C-130, C-141B, and B747 (side or nose) main decks. The 316E cannot be loaded in the lower lobes of commercial wide-body aircraft.

3.1.3.6. Additional Information: Contact HQ AMC/DOZE, DSN 779-4951 or commercial (618)229-4951.

3.2. CL-3 Wilson Air Transportable Loader. (Figure 3.3.):

3.2.1. Description. The CL-3 loader is a self-propelled elevator designed to load cargo onto the main deck of widebody aircraft. Due to aircraft fuselage curvature, it cannot be used to load wide-body lower lobes. It has a rollerized platform that is pitch or roll adjustable up to 4 inches and can hold up to a triple-married 463L pallet. The elevator platform roller trays can be turned over to permit the loading of wheeled or tracked vehicles without additional subflooring.

3.2.2. Loader Specifications:

3.2.2.1. Ground movement speed (self-propelled):

| | |
|--------------------------------|----------|
| Low: | 1 mph |
| High: | 2.5 mph. |
| Ground movement speed (towed): | 5 mph. |

3.2.2.2. Dimensions: Fully assembled:

| | |
|---------|---------------------------------|
| Length | 318 inches long |
| Width | 243 inches wide |
| Height | 279 inches high |
| Weight: | Fully assembled, 26,440 pounds. |

3.2.2.3. Elevator platform specifications:

| | |
|-----------------|----------------------------|
| Width | 125 inches wide |
| Length | 285 inches long |
| Minimum height: | 19 inches. |
| Maximum height: | 217 inches. |
| Maximum load: | 30,000 pounds on 3 pallets |
| Power: | Hydraulic (diesel engine). |

3.2.2.4. Transportability. The CL-3 may be loaded into C5A/B, C-130, and C-141B aircraft. The CL-3 was never tested or certified for transportation on civil aircraft in the three-pallet configuration.

3.2.2.5. Additional Information: Contact HQ AMC/DOZE, DSN 779-4951 or commercial (618) 229-4951.

3.3. TA-40b Air Cargo Loader. (Figure 3.4). The TA-40b is a self-propelled elevator designed to load cargo onto the main deck of wide-body aircraft, such as the B-747, DC10, and L-1011. In addition, it can, with the use of an adapter assembly attached to the front end of the loader platform, service the lower lobe of the B-747 and forward wide doors of the DC-10 aircraft. The loader has a lifting capacity of 40,000 pounds from a bed height of 20 inches up to 216 inches.

3.4. Halvorsen Loader. (25K). (Figure 3.6). (At print time the proposed name is pending approval by Chief of Staff) AMC's newest MHE acquisition is a self-propelled, diesel-powered, air- and surface-transportable, 25,000-pound (25K) capacity, loading/off-loading vehicle. It will augment and ultimately replace existing 25K loaders and the remaining wide body elevator loaders (WBELs) through attrition and will be part of the 463L materials handling system. The loader will transport cargo (463L pallets, airdrop platforms, rolling stock, and containers) and interface with the full spectrum of military and civilian cargo aircraft (e.g., C-130, C-141, C-17, C-5, KC-10, KC-135, MD-11 and B-747 main cargo deck and lower lobe deck) operating on airfields worldwide. It is transportable on aircraft (C-130, C-141, C-5 and C-17) without the use of a shoring kit for loading, and surface transportable by truck, rail and ship. The front of the loader is equipped with a retractable catwalk and rails and folding wings that allows for easy interface with lower lobes. The Halvorsen is worldwide deployable and can operate in forward operating locations for up to 60 days without base-level maintenance facilities.

3.5. Tunner Loader. (60K) (Figure 3.7). The Tunner is AMC's second largest acquisition program designed as a replacement for the aging 40K and wide body elevator loaders (WBEL). It provides an improved capability, maintainability, and reliability to the material handling equipment (MHE) fleet. The Tunner interfaces with all military and commercial cargo aircraft for loading and unloading cargo, including the B747, L-1011, MD-11, and DC-10. The cargo deck is capable of transporting and transferring up to 60,000 pounds of rolling stock, shipping containers, air drop platforms, or six 463L pallets. The loader is designed for drive-on/drive-off capability for aircraft transportability on C-141, C-5, and C-17 aircraft. There is a deck extension included with each loader that can be installed on the forward end that will allow platform access to the lower lobes of all commercial aircraft. Installation time with two people and a forklift is 10 to 30 minutes.

3.6. 40K Loader and Extender (Figure 3.8. and Figure 3.9). The 40K Loader is capable of lifting as many as 40,000 pounds on five 463L pallets to a maximum height of 156 in. This height is less than that of a wide body aircraft such as the B-747 and KC-10. A few "Extender platforms" (Figure 3.9.) are located at selected bases that can bridge the height gap between the Max height of the 40K and the floor height of the aircraft (approximately four feet). This extender is used as a primary or alternate method of loading or unloading wide-body aircraft. The extender is used as an elevator only and is not used to transport cargo (i.e. the 40K will not be moved if it is equipped with an extender and has cargo on it). When not in use, it doubles as a highline dock. The extender is locked into the bed of the 40K loader, enabling it to reach the main deck of wide-body aircraft. It is intended for handling loaded 108- x 88-inch pallets, up to a five-pallet train and can also be used to load rolling stock. The extender weighs approximately 10,000 pounds, thereby, decreasing the capability of the 40K loader by the same. This limits the capacity to 30,000 pounds. The extender is air-transportable and the 60-inch height enables the loader to reach a maximum height of 216 inches.

3.7. 9-Ton Hi-Lift. To increase the capability to handle wide-body aircraft, the 9-ton Hi-Lift has been added to the Air Force inventory. This unit is best suited to lift loose items and baggage to floor height but it can also be used to lift pallets to floor level. Maximum single pallet weight depends on the maker but is less than 5,000 lbs.

3.8. MHE Acceptability to Civil Aircraft. Table 3.1. provides general compatibility guidance of specified MHE for specific commercial aircraft.

3.9. Other Materials Handling Equipment. (MHE) . Selected characteristics of commonly used items of MHE are listed in **Table 3.2**. The intent of this list is to give the planner an idea of the types of equipment normally available at military installations and off-load locations. The list is not comprehensive since there are normally several models of each type of MHE, and the weights, dimensions, and capabilities may vary considerably from one model to another.

3.10. Power Requirements. Power requirements for civil aircraft vary greatly between type and model. **Table 3.3**. lists the most likely power and air requirements for selected aircraft. The information can be used as a guide when determining the availability and compatibility of military or commercial power equipment.

Figure 3.1. 316E Model Cochran Air Transportable Loader.

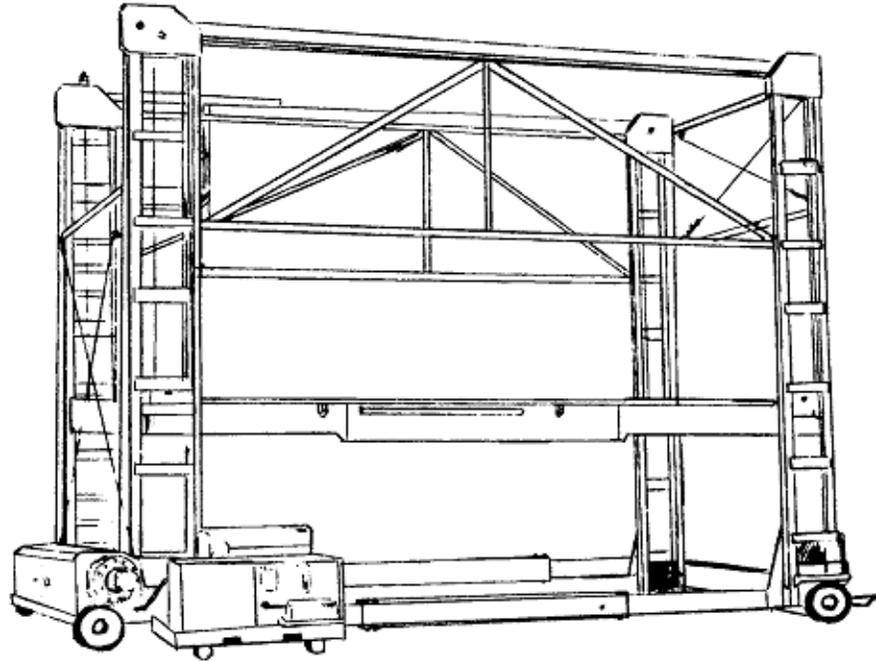


Figure 3.2. 316A Cochran Loader with C-141B Auxiliary Loading Ramps.

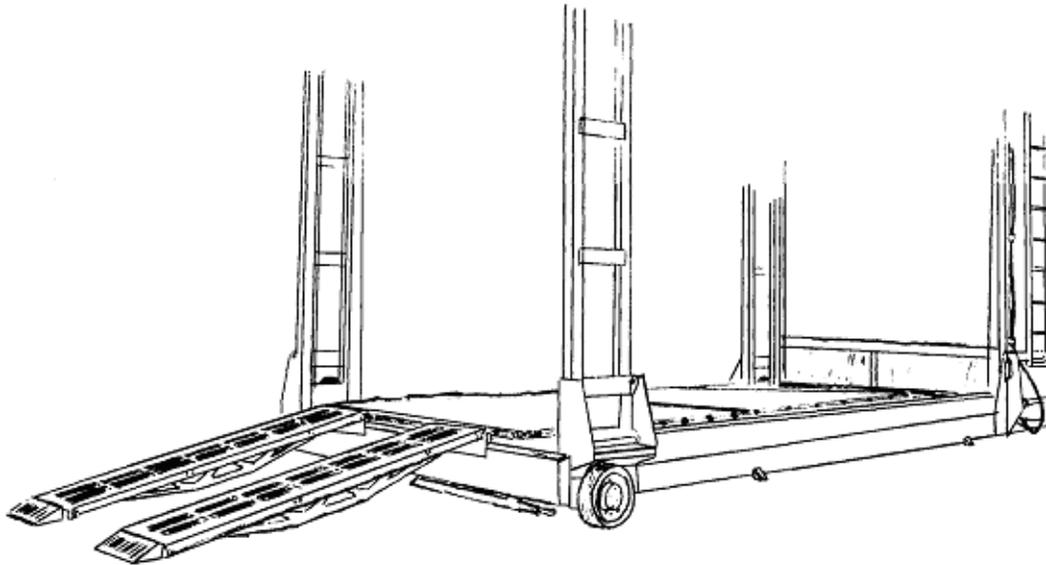


Figure 3.3. CL-3 Wilson Air Transportable Loader.

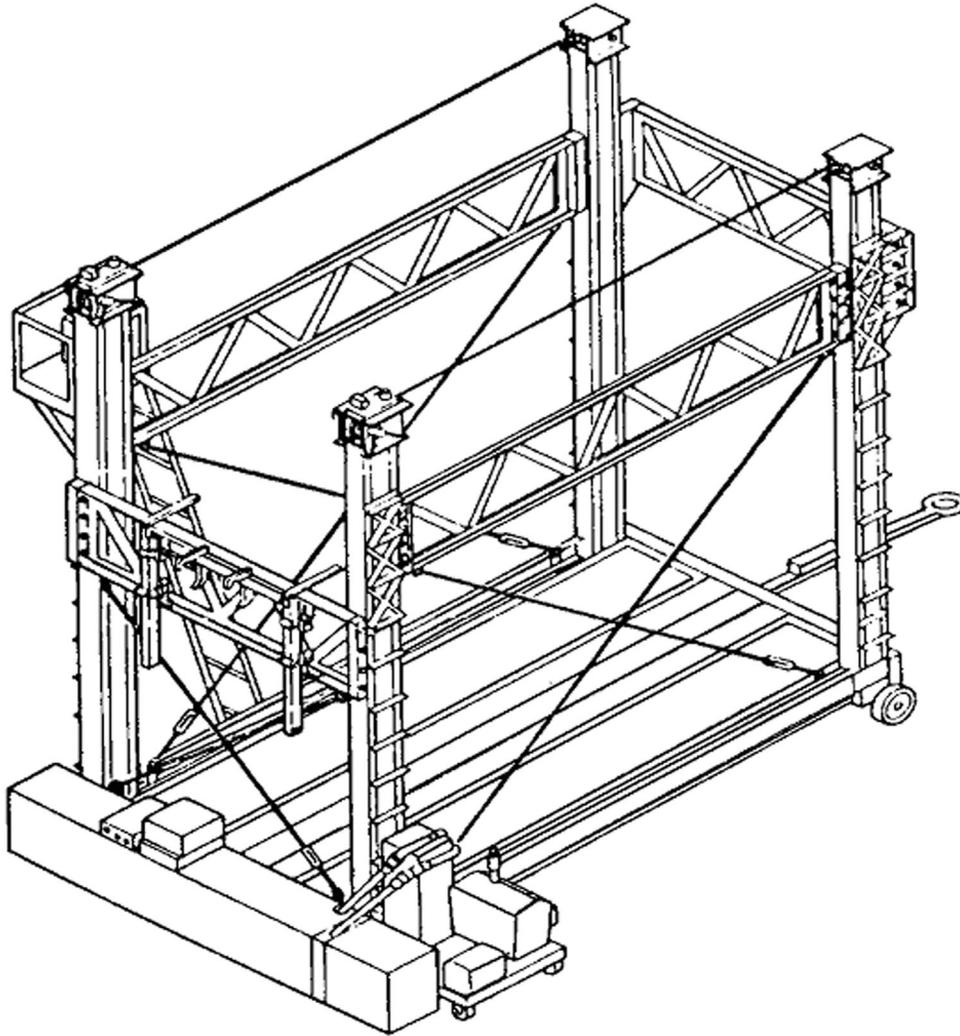


Figure 3.4. TA-40 Air Cargo Loader.



Figure 3.5. TA-40 Air Cargo Loader.



Figure 3.6. Halvorsen Loader. (25K)



Figure 3.7. 60K Loader (The “Tunner”).

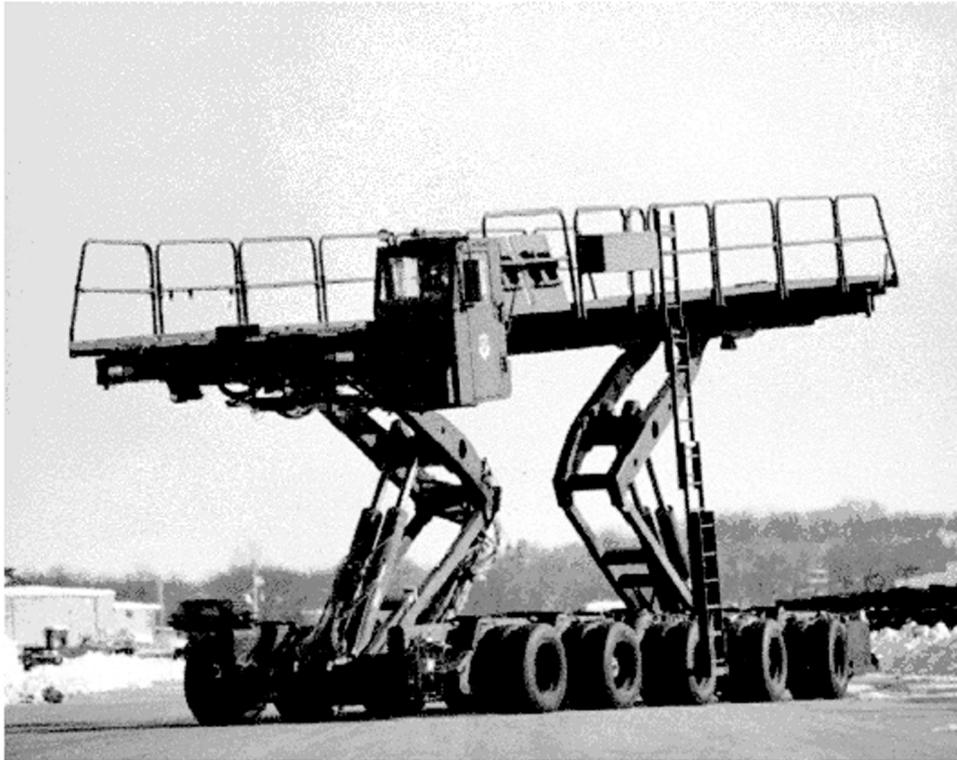


Figure 3.8. 40K Loader.

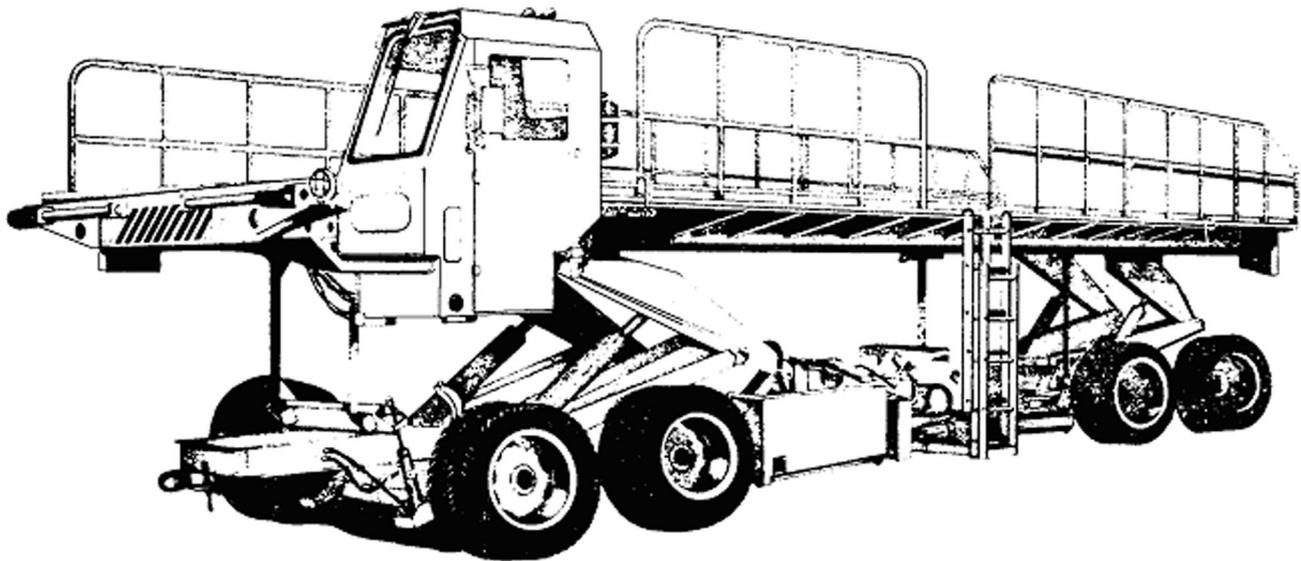


Figure 3.9. 40K Loader with Extender



Table 3.1. MHE Acceptability to Civil Aircraft.

| | Min-Max Height | | LOADERS | | | | ELEVATORS ² | | | | FORKLIFTS | | | | STAIRS | | |
|-------|----------------|---------------------------|------------------|------------------|------------------|-----------|------------------------|----------|----------|------------------|------------------|----------------|---------|---------|----------------|-----------|-----------|
| | | | 60K | 40K | 25K | Halvorsen | 316 A | 316 E | CL-3 | TA-40b | 15K ⁵ | 10K A/T | 10K STD | 6K | 4K | C-5 | Wide Body |
| | | | 39"-222" | 41"-156" | 38"-156" | 39"-225" | 19"-217" | 19"-217" | 19"-222" | 20"-216" | TO 210" | TO 80" | TO 150" | TO-150" | TO-120" | 184"-312" | 100"-200" |
| B747 | 186"-204" | Main Deck Front/Side Door | Yes | No ⁴ | No | Yes | Yes | Yes | Yes | Yes | Yes | No | No | No | No | Yes | Yes |
| | 108"-132" | Lower Lobes | Yes | Yes ¹ | Yes ¹ | Yes | No | No | No | Yes | Yes | No | Yes | Yes | M ⁴ | --- | --- |
| DC10 | 186"-204" | Main Deck Side Door | Yes | No ⁶ | No | Yes | Yes | Yes | Yes | Yes | Yes | No | No | No | No | Yes | Yes |
| | 103"-119" | Lower Lobes | Yes | Yes ¹ | Yes ¹ | Yes | No | No | No | Yes | Yes | No | Yes | Yes | M ⁴ | --- | --- |
| DC8 | 126"-135" | Main Deck Side Door | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes | No | No | Yes |
| | 68"-100" | Lower Lobes | N/A ² | N/A ² | N/A ² | Yes | No | No | No | N/A | Yes | M ⁴ | Yes | Yes | Yes | --- | --- |
| MD11 | 186"-204" | Main Deck Side Door | Yes | Yes ¹ | No | Yes | Yes | Yes | Yes | Yes | Yes | No | No | No | No | Yes | Yes |
| | 103"-119" | Lower Lobes | Yes | Yes ¹ | Yes ¹ | Yes | No | No | No | Yes | Yes | No | Yes | Yes | M ⁴ | --- | --- |
| L1011 | 182"-186" | Passenger Doors | Yes | Yes ¹ | No | Yes | Yes | Yes | Yes | Yes | Yes | No | No | No | No | Yes | Yes |
| | 105"-112" | Lower Lobes | Yes | Yes ¹ | Yes | Yes | No | No | No | Yes ³ | Yes | No | Yes | Yes | M ⁴ | --- | --- |
| B767 | 160"-176" | Passenger Doors | Yes | Yes ¹ | No | Yes | Yes | Yes | Yes | Yes | Yes | No | No | No | No | Yes | Yes |
| | 89"-102" | Lower Lobes | Yes | Yes ¹ | Yes | Yes | No | No | No | Yes ⁴ | Yes | No | Yes | Yes | Yes | --- | --- |
| B777 | 208"-218" | Passenger Doors | Yes | Yes ⁶ | No | Yes | Yes | Yes | Yes | Yes | Yes | No | No | No | No | Yes | Yes |
| | 127"-134" | Lower Lobes | Yes | Yes | Yes | Yes | No | No | No | Yes | Yes | No | Yes | Yes | Yes | --- | --- |
| B757 | 149"-158" | Passenger Doors | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | No | No | | Yes | Yes |
| | 97"-105" | Lower Lobes | No ⁷ | Yes | Yes | Yes | No | No | No | N/A | Yes | No | Yes | Yes | Yes | --- | --- |
| A310 | | Passenger Doors | | | | Yes | | | | | | | | | | Yes | Yes |
| | | Lower Lobes | | | | Yes | | | | | | | | | | --- | --- |

(See Following page for Notes.)

NOTES:

- ¹ K Loader must be backed up to lower lobe and may require safety rail removal to prevent contact with the aircraft fuselage. A 12-18 inch gap may exist between K loader and door.
- ² Narrow-body aircraft would not normally need K loaders/elevator for loading of lower compartments.
- ³ Curvature of the aircraft does not permit loading of lower lobe of wide-body aircraft.
- ⁴ M (Marginal) - Not normally recommended for use in loading due to maximum height limits.
- ⁵ Should be used with rollerized pallet dolly.
- ⁶ With height extender adapter, the 40 K loader can be used to load the main deck of wide-body aircraft.
- ⁷ Using the extender adapter, 60 inches can be added to the height.
- ⁸ Requires lower lobe adapter attachment.

Table 3.2. Loaders Selected Materials Handling Equipment (MHE) Characteristics.

| LOADERS | Tunner Loader | 40K Loader | 25K Loader | 9 Ton HI-Lift | Air Cargo Loader |
|-------------------------------|----------------------|--------------------|--------------------|----------------------|-------------------------|
| Model | Southwest | Oshkosh | Condec | 85 GMC | Transact |
| Reference | TO 36M2-3-35-11 | TO 36M2-3-21-61 | TO 36M2-3-20-11 | TO 36A2-4-69-2 | TA-40B |
| Length | 592" | 497" | 327" | 306" | 324" |
| Width (Shipping) | 111" | 120" | 110" | 103" | 95" |
| (Operational) | 150" | 155" | 148" | 103" | 151" |
| Height | 82" | 81" | | 97" | |
| Platform Height (Min) | 39" | 41" | 38" | 42" | 20" |
| (Max) | 222" | 156" ¹ | 156" | 200" ³ | 216" |
| Pallet Capacity | 6 | 5 | 3 | 2 | 2 |
| Maximum Lift (lbs.) | 60,000 | 40,000 | 25,000 | 18,000 | 40,000 |
| Shipping Weight (lbs.) | 65,000 | 49,160 | 21,485 | 22,260 | 37,000 |
| FORKLIFTS | 15K | 10K | 10AT | 6K | 4K |
| Model | Hyster | Allis Chalmers | JI Case | Clark | Allis Chalmers |
| Reference | HQ AMC/ DOZE | TO 36M2-2-165-1 | TO 36M2-2-159-1 | TO 36M2-2-113-1 | TO 36M2-2-140-2 1 |
| Length | 141" | 149" | 312" | 164" | 135" |
| Width | 78" | 75" | 91" | 80" | 43" |
| Height | 192" | 96" | 123" ⁴ | 90" | 105" |
| Max Lift Height | 210" | 150" | 80" | 150" | 120" |
| Time Length | 72" | 72" | 72" | 54" | 40" |
| Lift Capacity (lbs.) | 15,000 | 10,000 | 10,000 | 6,000 | 4,000 |
| Shipping Weight (lbs.) | 21,199 | 22,963 | 22,650 | 10,380 | 8,365 |

| TRUCK-MOUNTED PASSENGER STAIRCASES | Narrow-Body | Wide-Body | C-5 |
|---|--------------------|-------------------|--------------|
| Model | Space Corp | Wollard | Galaxy |
| Reference | TO 35A3-11-1 | TO 35A3-16-1 | TO 35A3-18-1 |
| Length | 257" | 287" | 378" |
| Width | 80" | 96" | 94" |
| Height | 136" | 145" ⁵ | 169" |
| Max Lift Height (Min) | 100" | 100" | 184" |
| (Max) | 160" | 200" | 312" |
| Platform Capacity (lbs.) | 1,000 | 1,000 | |
| Shipping Weight (lbs.) | 7,340 | 9,460 | 19,920 |

¹ Maximum height is increased to 216" with 40K extender installed.

² With extension kits installed, length is increased to 454" and pallet capacity is increased to 5.

³ Rollers increase height of bed by 4".

⁴ Height is reduced to 100" with cab removed.

⁵ Minimum height for shipping is 155".

Table 3.3. POWER REQUIREMENTS FOR CIVIL AIRCRAFT

| AIRCRAFT | ELECTRICAL (GROUND OPERATIONS AND MAINTENANCE) 400 CY/3 PHASE | | AIR (STARTING) | | |
|---|--|---|--|---|---|
| <u>LRI</u> B747 DC-10 L1011 DC-8-30/50 DC-8-60/70 B767-200 B767-300 A310-300 B777 MD-11 | 90 KVA* 80 KVA 90 KVA 60 KVA 80 KVA 90 KVA 90 KVA 90 KVA 140 KVA | 115/120 VOLTS 115/120 VOLTS 115/120 VOLTS 115/120 VOLTS 115/120 VOLTS 115/120 VOLTS 115/200 VOLTS <i>Info to come</i> 115/200 VOLTS | (LBS./MIN) 240 130 190 120 120 288 165 225 225 155 | 47 PSI 38 PSI 42 PSI 48 PSIG 50 PSIG 38 PSIG 41 PSIG 38 PSIG | 450° MAX 140°-150° 350° 450° MAX 450° MAX 300° <i>Info to come</i> 500° (P&W Engines) 300° (GE Engines) |
| <u>OTHER</u> B727 B737-100/200 B737-300 B757 DC-9 L-100-30 | 60 KVA 60 KVA 60 KVA 90 KVA 60 KVA 50 KVA | 115/200 VOLTS 120/208 VOLTS 120/208 VOLTS 115/200 VOLTS 115/120 VOLTS 115/120 VOLTS | 90 90 130 215 88 105 | 50 PSIA 50 PSIA 53 PSIA 45 PSI 38 PSI 35 PSI | 450° MAX 450° MAX 450° MAX 200° 450° |
| *Two 90 KVA-rated aircraft ground connectors required for all B747s | | | | | |

NOTE: The power requirements listed above are the most common for each type aircraft. Although the requirements may vary, this can be used as a guide to determine compatibility of commercial and military power units.

CHAPTER 4

PASSENGER AND BAGGAGE LOADING

4.1. Purpose. This section contains information on methods of loading passengers and their baggage onto civil aircraft. Regardless of the type of aircraft, many of the loading procedures are similar.

4.2. Troop and Baggage Weights. Weighing troops, passengers, and their baggage should be accomplished before aircraft arrival. (For further guidance, consult DODR 4500.9R, PART III, MOBILITY for troop planning weights in various configurations.) The following standard planning weights are incorporated into DODR 4500.9R, PART III, MOBILITY for troop planning:

Table 4.1. Passenger and Troop Weights.

| <i>Item</i> | <i>Weight</i> |
|-------------------------------------|---------------|
| Passenger (no baggage) | 175 pounds |
| Passenger with hand-carried baggage | 195 pounds |
| Checked baggage | 70 pounds |
| Mobility bag | 25 pounds |
| Web belt, helmet, mask, and canteen | 20 pounds |
| Weapon | 10 pounds |
| Tool box | 55 pounds |

NOTE: Use the standard passenger and baggage weight of 400 pounds when estimating airlift requirements. If individuals deploy with more than one type mobility bag, 25 pounds should be added for each additional bag. Consider toolboxes separately and figure into the total payload. Compute checked baggage and mobility bags at 4.0 cubic feet per bag. For category B (CAT B) missions, the passenger terminal will use standard body weights, but will weigh all baggage. During peacetime and exercises, all troops and their equipment will be weighed or required to provide actual weights.

4.3. Seating Troops. Experience has shown that assigning individual seats to troops on civil aircraft is time-consuming, confusing, and usually impractical. It is recommended that the commander of the unit to be airlifted decide on seating arrangements.

4.3.1. Unit Integrity. In this arrangement, unit personnel are to be loaded together into the aircraft and remain seated together.

4.4. Underseat Stowage. Under-seat stowage dimensions for carry-on baggage are 9 inches high, 13 inches wide, and 23 inches deep. A quick technique to check stowage suitability is to construct a box with interior dimensions as listed, with one side open.

| B747 Baggage Options | Position Available FLL/CLL | Cubic Feet/Position | Total Cube | Number of Passengers at: | |
|-----------------------|----------------------------|---------------------|------------|--------------------------|-----------------|
| | | | | 8 Cu Ft/ Troop | 12 Cu Ft/ Troop |
| 463L Pallets | 5/4 | 344 | 3096 | 387 | 258 |
| LD-6 Containers* | 8/7 | 316 | 4740 | 592 | 395 |
| LD-3 Containers | 16/14 | 158 | 4740 | 592 | 395 |
| 463L Pallets (FLL) | 5 | 344 | 1720 | | |
| LD-6 Containers (CLL) | 7 | 316 | 2212 | | |
| Total | | | 3932 | 491 | 327 |
| | | | | | |
| 463L Pallets (FLL) | 5 | 344 | 1720 | | |
| Bulk (CLL) | | 3015 | 3015 | | |
| Total | | | 4735 | 592 | 394 |

NOTE: *Another option, assuming that the LD-6 containers are walk-through, is to leave the container position open at each door in order to hand load and offload the containers in position, thus eliminating the need for specialized MHE. The vacant LD-6 positions may then be filled with loose baggage to maximize use of available cube.

4.5. Overhead Stowage. Unless otherwise notified, the overhead stowage areas are for coats or similar items. Helmets, web gear, canteens, carry-on bags, or similar items should be kept with the troops.

4.6. Coordinating Loading Operations. Most commercial aircraft load baggage and cargo from the right side and passengers from the left. Therefore, a simultaneous loading effort is possible. An arrival route for baggage that will not conflict with aircraft taxi routes and the passenger arrival route should be determined. Baggage should be processed in batches for each compartment, separated by off-load location. All lower compartments may be loaded simultaneously.

4.7. Loading of Passenger Baggage. There are at least four different methods for the loading of baggage into the lower lobes and compartments of civil aircraft. They include commercial baggage containers, tri-wall containers, bulk loading by hand, and palletizing. When passengers are traveling with three pieces of checked baggage, the limiting factor determining the number of seats available directly relates to the volume of baggage space in the lower holds and not the actual number of seats on the aircraft. The following chart lists some options for baggage loading on B747s that may be considered when planning for optimum passengers based on range or payload and baggage requirements.

4.7.1. Commercial Baggage Containers. Lower lobe and compartment baggage containers normally are not desirable for contingency deployment due to specialized MHE required for onload and off-load. Experience has shown that it is more efficient to hand-load baggage into aircraft whose cargo doors are too narrow for baggage pallets rather than use commercial baggage containers. The

use of commercial baggage containers normally requires that the loading of bags be delayed until the aircraft arrives at the onload location and that specialized MHE be brought in to load the containers. However, in the event that commercial baggage containers are used, carriers will furnish the appropriate containers. There are instructions in each of the aircraft sections of this publication on the number and cube available for the containers.

4.7.2. Tri-Wall Containers. Tri-wall containers are large cardboard boxes that can be used as baggage containers. These are normally available through transportation facilities on military installations. Loading may be accomplished using a forklift or K-loader. For ease of handling, the smallest tri-wall container available, with consideration for size of contents, should be used.

4.7.3. Bulk Loading by Hand. Experience has shown that bulk-loading baggage by hand is efficient use of available personnel and equipment under a contingency situation. Hand-loading requires minimal MHE. A flatbed truck provides maximum flexibility, and it reflects the limited support equipment that would normally be available in an actual activation of the CRAF. Hand-loading also permits weighing and loading bags onto flatbed trucks prior to aircraft arrival. Hand loading assumes that normal loading of civil aircraft by the military is done at noncommercial fields and that loading teams are readily available. It also assumes that in some instances passengers (troops) will help the loading teams. Experience has shown that teams per flatbed truck should consist of one seven-person team, including a supervisor. When using a flatbed truck, remove the aft most side panels prior to the unloading or offloading the truck at the aircraft. This allows the truck to be backed up closer to the aircraft and reduces the chances of the side panels striking the fuselage. Pre-position a chock before backing to prevent vehicle from striking the aircraft.

4.7.4. Palletizing. The use of baggage pallets on civil aircraft is limited to the B747. The forward lower lobe (FLL) and center lower lobe (CLL) of the B747 have the 104-inch wide by 66-inch high doors and pallet restraint system to accommodate baggage pallets. The doors of other widebody lower lobes, as well as all the doors on the narrowbody baggage compartments, are too small to permit the loading of a baggage pallet, and they lack pallet restraint systems. When baggage pallets are used in the B747, pallets must be loaded on a forklift or K-loader with the 88-inch side facing the aircraft fuselage. Military pallets do not lock into the 125-inch rail spacing of the lower lobes. Although forward and aft restraint is provided by the aircraft rail system, tie-down straps provide lateral restraint. Pallets must be pushed or power-driven to the far end of the compartment. The cube available on a baggage pallet in the lower hold is approximately 344 cubic feet as the sample calculated below:

EXAMPLE: 62 inches high by 104 inches wide by 84 inches long divided by 1728 cubic inches (no. of inches in a cubic foot) = 313 cubic feet plus 31 (which is a 10 percent crush-factor of product cubic feet) = 344 cubic feet.

4.8. Forklifts. Forklifts can be used to raise baggage to the door levels of wide-body aircraft. If baggage to be raised is man-portable, it may be faster to chock the forklift in position and use it as an elevator. A 463L pallet could be secured on the forklift tines for a work platform. It is recommended that a 463L pallet dolly with an empty 463L pallet be used as the preferred method for loading loose cargo and baggage. **NOTE:** Extreme caution should be observed to prevent the forklift from striking the aircraft.

4.9. Accompanying Priority Baggage . Baggage accompanying troops which is too large to stow in the passenger cabin, but must be immediately reunited with the individual soldier at off-load, requires special handling. Toolboxes, communication equipment, crew served weapons, and certain items of classified

equipment are examples of accompanying baggage that will require special handling. Unit commanders will identify these items and the individuals to accompany them before passenger and baggage processing begins. These individuals should be the last passengers loaded into the aircraft so they can then be off-loaded first. The priority baggage items should be the last items loaded in the baggage stowage area most convenient to the primary passenger exit. At the offload station, these select individuals can be off-loaded and brought to the baggage door where the items are stowed. As the baggage is offloaded, the individuals can be reunited with the high priority items.

4.10. Classified Cargo on Passenger Aircraft. DOD 5200.1-R/AFI 31-401/AR 380-5 provisions apply.

4.11. Individual Weapons:

4.11.1. Exceptions to Federal Aviation Regulation (FAR) 121.585 allow, at carriers discretion, the carrying of weapons into the passenger areas of civil aircraft operating military charters.

4.11.2. Carry-On Weapons. The intent of the FAR is to restrict such authority to individual weapons; i.e., rifles and pistols.

4.11.3. Stowage of Weapons:

4.11.3.1. Although FAA regulations permit weapons on board only if the bolts are locked "open," AMC and MTMC have expanded the provisions to further ensure safety. Therefore, the revised rule is that "weapons will be unloaded with magazines or bolts removed. When bolt removal is not practical, then a safety flag device must be inserted."

4.11.3.2. Pistols will normally be worn, but they must be unloaded with bolts locked in the open position.

4.11.3.3. All individuals with rifles will stow their weapons flat on the floor behind their feet, parallel to the seats and perpendicular to, but not protruding into main aisleway. Weapons may overlap. The width available for doublewide seats is approximately 42 inches (62 inches for triple-wide seats). This procedure is to ensure an unobstructed aisleway for the purpose of egress. Again, weapons must be unloaded with magazines or bolts either removed or with an approved safety flag device inserted. Additionally, at en route stops when troops deplane for en route aircraft servicing, their weapons should be left on the aircraft. Someone from the deploying unit must be assigned to guard the weapons during en route stops.

4.11.3.4. Crew-served weapons (mortars, machine guns, grenade launchers, etc.) do not fall under the intent of the FAR. They must be carried in the baggage compartment. They would normally fall in the category of accompanying priority baggage. (See paragraph 4.9.)

4.11.4. Definition of a Loaded Weapon. For the purpose of this section, a loaded firearm means a firearm that has a live round of ammunition, cartridge, detonator, or powder in the chamber or in a clip, magazine, or cylinder inserted in said firearm.

4.11.5. Carrier Discretion. This FAR is not directive for carriers; it only gives them the option to permit carry-on weapons.

4.12. Height of Boarding Steps. The exact height to the passenger door can be found in [Figure 3.8](#). and the appropriate aircraft section of this publication. In general, the height above ground-level of the passen-

ger door for narrow-body aircraft is 10 1/2 feet (126 inches) and wide-body aircraft is 16 feet (192 inches) high.

4.13. Narrow-Body Aircraft Passenger Steps. There are several options available for loading passengers onto narrow-body aircraft. Included already in DOD inventory are truck-mounted and trailer-mounted passenger stairs. B-1, B-2, and B-4 maintenance stands are secondary usable options. The B-4 maintenance stand has a maximum height of 7 feet. Therefore, a 40-inch high C-1 stand placed on the B-4 platform, could be used to reach the 10 1/2-foot high passenger door.

4.14. Wide-Body Aircraft Passenger Steps. With the increasing emphasis on the CRAF, new equipment is being procured. Equipment for loading passengers on the widebody aircraft include widebody staircase trucks, truck-mounted passenger stairs, and C-5 passenger steps. The B-2 maintenance stand may also be used. However, with its relatively steep climb, it should be considered as a secondary method, especially if baggage is to be carried on-board. A 4-foot high stair extender is carried on some DC-10-30CF aircraft and may be used with narrow-body passenger steps.

4.14.1. Wide-Body Truck-Mounted Stairs. Truck-mounted passenger stairs may be used for both narrow body and wide-body aircraft (figure 4.6.). These steps are transportable by C-5, based on a minimum shipping height of 155 inches. Specifications and compatibility for CRAF aircraft is listed in [Table 3.1.](#) and [Table 3.2.](#)

4.14.2. C-5A/B Stairs. A truck-mounted staircase, designed for the C-5A/B, may be available (figure 4.7.). The stairs, called the "super-sky ramp," may be used with widebody B747, DC-10, and L-1011 aircraft and is transportable by C-5A/B. Specifications and compatibility for CRAF aircraft is listed in [Table 3.1.](#) and [Table 3.2.](#)

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ATTACHMENT 1**GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION*****Abbreviations and Acronyms***

ABC—aft. bulk compartment
ACL—Allowable Cargo/Cabin Load
AESS—Aeromedical Evacuation Ship Set
AFB—Air Force Base
AFR—Air Force Regulation
AGL—Above Ground Level
TALCE—Tanker Airlift Control Element
ALCS—Airlift Control Squadron
ALS—Airlift Squadron
AMC—Air Mobility Command
AMCOS—Air Mobility Combat Operations Staff
AMCP—Air Mobility Command pamphlet
AMCR—Air Mobility Command regulation
APC—Armored Personnel Carrier
APS—Aerial Port Squadron
ASD—Aeronautical Systems Division
ATA—Air Transport Association
AW—Airlift Wing
BL—Butt Line
CB—Center of balance (or center of gravity)
CCE—Commercial Construction Equipment
CF/F—Convertible Freighter Or Freighter
CFR—Code of Federal Regulations
CG—Center Of Gravity (Or Center Of Balance)
CIV—Civilian/Civil
CL—Center Line
CLL—Center Lower Lobe
COMBI—Combination
COMM—Commercial

CONF—Configuration
CRAF—Civil Reserve Air Fleet
CU FT—Cubic Feet
DDT—Double Dual Tandem Type Landing Gear (B-747 etc.)
DIST—Distance
DOD—Department of Defense
EST.—Estimate
ELEV—Elevator
FAA—Federal Aviation Administration
FAR—Federal Aviation regulation
FLL—Forward Lower Lobe
FS—Flight Station Or Fuselage Station
GACL—Guaranteed Allowable Cabin (Or Cargo) Load
HGT—Height
HQ—Headquarters
IATA—International Air Transport Association
IN.—Inches
JSCP—Joint Strategic Capabilities Plan
LAT.—Laterally
LBL—Left Butt Line
LCN—Load Classification Number
LONG—Longitude
LOX—Liquid Oxygen
LOSS—Liquid Oxygen Subsystem
MAC—Mean Aerodynamic Chord
MAX—Maximum
MHE—Material Handling Equipment
MIL—Military
MOS—Medical Oxygen Subsystem
MSU—Multi-Servicing Unit
MTMC—Military Traffic Management Command
MTOW—Maximum Take Off Weight

MLW—Maximum Landing Weight
MZFW—Maximum Zero Fuel Weight
N/A—Not Applicable
NM—Nautical Mile (Statute Mile X 1.15)
OEW—Operating Empty Weight
OL—Operation Location
PAX—Passenger
PDO—Publications Distribution Office
PLF—Pounds Per Linear Foot
PLI—Pounds Per Linear Inch
PLS—Patient Loading System
PP—Pallet Position
PSF—Pounds Per Square Foot
PSI—Pounds Per Square Inch
RBL—Right Butt Line
RWY—Runway
SBTT—Single-Belly Twin Tandem Landing Gear (DC-10, KC-10 etc.)
S/T—Short Ton (2,000 lbs.)
SPR—Single Point Refueling
STN—Station
TACC—Tanker Airlift Control Center
TAW—Tactical Airlift Wing
TO—Technical Order
T/O—Takeoff
TT—Twin Tandem (DC-8, B757, B767)
UKN—Unknown
WDT—Width
WBEL—Wide Body Elevator Loader
WL—Water Line
WRSK—War Readiness Spares Kit
WT—Weight
ZFW—Zero Fuel Weight

ATTACHMENT 2

INTERNATIONAL CARGO AND PASSENGER PLANNING FACTORS

Table A2.1. CRAF LONG-RANGE INTERNATIONAL CARGO PLANNING FACTORS

| Aircraft Type | Maximum ACL (s/t) | Pallets | Range with Maximum ACL (nautical mi) | Maximum ACL (s/t) per Leg Length (nautical mile) | | | | Ferry Range No Cargo (nautical mi) |
|---------------|-------------------|---------|--------------------------------------|--|-------|-------|-------|------------------------------------|
| | | | | 2,000 | 2,500 | 3,000 | 3,500 | |
| A300-600F | 56.6 | 15 | 1,800 | 54 | 52.5 | 46 | 40 | 4,450 |
| B-757-200F | 43 | 13 | 3,600 | 43 | 43 | 43 | 43 | 4,850 |
| B-767-300F | 65.9 | 26 | 3,500 | 65.9 | 65 | 65.9 | 65.9 | 7,150 |
| DC-8-55F | 43.8 | 13 | 2,400 | 43.8 | 42.5 | 37 | 31.5 | 4,700 |
| DC-8-62F | 44 | 14 | 3,500 | 44 | 44 | 44 | 44 | 5,600 |
| DC-8-62 Combi | 36 | 10 | 3,450 | 36 | 36 | 36 | 35.5 | 5,700 |
| DC-8-63F | 55 | 18 | 2,250 | 55 | 52.3 | 47.5 | 42.8 | 4,600 |
| DC-8-71F | 48.5 | 18 | 2,300 | 48.5 | 45 | 38.5 | 32.3 | 4,700 |
| DC-8-73F | 54.3 | 18 | 2,500 | 54.3 | 54.3 | 50.3 | 43.5 | 4,800 |
| B-747-100F | 106.5 | 33 | 3,200 | 106.5 | 106.3 | 106.5 | 99.8 | 6,800 |
| B-747-200F | 120 | 33 | 3,200 | 120 | 120 | 120 | 112 | 7,900 |
| B-747-300F | 116 | 33 | 3,100 | 116 | 116 | 116 | 113.5 | 7,900 |
| B-747-400F | 129.7 | 33 | 3,800 | 129.7 | 129.7 | 129.7 | 129.7 | 8,650 |
| DC/MD-10-10F | 69.3 | 30 | 2,000 | 69.3 | 61.25 | 54.6 | 46.7 | 4,200 |
| DC-10-30CF | 71.8 | 30 | 3,000 | 71.8 | 71.8 | 71.8 | 69.5 | 6,700 |
| DC/MD-10-30F | 83.1 | 30 | 3,600 | 83.1 | 83.1 | 83.1 | 83.1 | 6,700 |
| MD-11CF | 89 | 35 | 4,500 | 89 | 89 | 89 | 89 | 7,800 |
| MD-11F | 96 | 35 | 3,750 | 96 | 96 | 96 | 96 | 7,800 |
| L-1011-200F | 63 | 26 | 2,600 | 63 | 63 | 55.5 | 48.5 | 3,750 |

NOTE: Ferry Range is distance the aircraft can fly with no cargo

Table A2.2. CRAF LONG-RANGE INTERNATIONAL PASSENGER PLANNING FACTORS

| Aircraft Type | Maximum Seats (Troops) | Range with Maximum Troops (NM) | Maximum Troops per Leg Length (NM) | | | | Ferry Range No Troops (NM) |
|----------------|------------------------|--------------------------------|------------------------------------|-------|-------|-------|----------------------------|
| | | | 2,000 | 2,500 | 3,000 | 3,500 | |
| A-300-600ER | 138 | 3,200 | 138 | 138 | 138 | 120 | 4,260 |
| B-757-200 | 127 | 2,300 | 127 | 120 | 103 | 85 | 4,400 |
| B-757-200ER | 131 | 3,175 | 131 | 131 | 131 | 116 | 4,700 |
| B-757-300ER | 166 | 2,700 | 166 | 166 | 150 | 126 | 4,400 |
| DC-10-10 | 222 | 2,300 | 222 | 201 | 150 | 100 | 4,000 |
| DC-10-30 | 235 | 3,900 | 235 | 235 | 235 | 235 | 5,800 |
| DC-10-40 | 222 | 2,750 | 222 | 222 | 203 | 160 | 4,875 |
| DC-10-40J | 219 | 3,200 | 219 | 219 | 219 | 195 | 4,856 |
| MD-11 | 233 | 5,000 | 233 | 233 | 233 | 233 | 6,800 |
| MD-11ER | 338 | 4,500 | 338 | 338 | 338 | 338 | 6,800 |
| B-747-100 | 394 | 2,900 | 394 | 394 | 365 | 313 | 6,600 |
| B-747-200 | 365 | 3,800 | 365 | 365 | 365 | 365 | 7,600 |
| B-747-400 | 295 | 6,250 | 295 | 295 | 295 | 295 | 8,650 |
| B-767-200 | 149 | 2,450 | 149 | 145 | 120 | 98 | 7,500 |
| B-767-200ER | 161 | 3,650 | 161 | 161 | 161 | 161 | 7,700 |
| B-767-300 | 186 | 3,375 | 186 | 186 | 186 | 167 | 6,800 |
| B-767-300ER | 213 | 3,500 | 213 | 213 | 213 | 213 | 7,200 |
| B-767-400ER | 232 | 3,500 | 232 | 232 | 232 | 232 | 6,500 |
| B-777-200 | 250 | 4,200 | 250 | 250 | 250 | 250 | 9,200 |
| B-777-200ER | 263 | 5,515 | 263 | 263 | 263 | 263 | 9,500 |
| L-1011-50 | 225 | 2,300 | 225 | 215 | 183 | 140 | 4,000 |
| L-1011-100/150 | 230 | 2,900 | 230 | 230 | 220 | 174 | 4,400 |
| L-1011-500 | 223 | 4,100 | 223 | 223 | 223 | 223 | 6,000 |

NOTE: Troop weights are calculated at 400 pounds each, which includes personal equipment and field gear for combat operations.