TECHNICAL MANUAL

TRANSPORTABILITY GUIDANCE

CLEAN BURNING DIESEL (CBD) FORKLIFT, PNEUMATIC TIRES:

4,000- (4K-) POUND CAPACITY (NSN 3930-01-172-7891)

6,000- (6K-) POUND CAPACITY (NSN 3930-01-172-7892)

HEADQUARTERS, DEPARTMENT OF THE ARMY
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Technical Manual

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TRANSPORTABILITY GUIDANCE CLEAN BURNING DIESEL (CBD) FORKLIFT, PNEUMATIC TIRES: 4,000- (4K-) POUND CAPACITY (NSN 3930-01-172-7891) 6,000- (6K-) POUND CAPACITY (NSN 3930-01-172-7892)

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CHAPTER 1
INTRODUCTION

1-1. Purpose and Scope

a. This manual provides transportability guidance for logistical handling and movement of the 4,000- (4k-) and 6,000- (6k-) pound-capacity, clean burning diesel (CBD) forklifts.

b. This manual provides transportation officers and all other personnel responsible for movement or transportation services with appropriate information for safe transport of these forklift trucks. It contains significant technical and physical characteristics, as well as safety considerations, required for worldwide movement of the forklifts by various transport modes. Where appropriate, metric equivalents are in parentheses following the dimensions or other measurements.

1-2. Safety

Appropriate precautionary measures for moving the item are mainly in chapter 3.

1-3. Definitions of Warnings, Cautions, and Notes

Throughout this manual, warnings, cautions, and notes emphasize important or critical guidance. Their definitions are:

a. Warning. Instructions that, if not followed, could result in injury to or death of personnel.

b. Caution. Instructions that, if not strictly observed, could result in damage to or destruction of equipment.

c. Note. An operating procedure that should receive special attention.

1-4. Reporting of Publication Improvements

Please recommend changes and submit comments to improve this manual on DA Form 2028 (Recommended Changes to Publications and Blank Forms). Send comments to Commander, Military Traffic Management Command Transportation Engineering Agency, ATTN: MTT-TRS (Mr. M. Hutchinson), PO Box 6276, Newport News, VA 23606–0276. Address electrically transmitted messages to CDR MTMCTEA FT EUSTIS VA//MTT-TRS//.

CHAPTER 2
TRANSPORTABILITY DATA

Section I. GENERAL

2-1. Scope

This chapter provides a general description, detailed figures, and tabulated transportability characteristics that are necessary for movement of the 4k- and 6k-pound CBD forklift trucks.

2-2. Description

The forklifts covered in this manual are the Hyster Co models H40XL and H60XL with 4,000- and 6,000-pound capacities at 24 inches load center, respectively. Each forklift is powered by a four-cylinder, 144-cubic-inch clean burning diesel engine. "Clean burning diesel" refers to the low exhaust emission characteristics of specially tuned engines. This feature enables the forklifts to operate in enclosed areas that have limited ventilation, such as ammunition storage bunkers.

2-3. Transportability Drawings

Figures 2-1 and 2–2 are detailed side, top, and end view transportability drawings of the 4k and 6k forklifts, with dimensions and tiedown and lifting provision load-rating capacities.

Section II. CHARACTERISTICS AND RELATED DATA

2-4. General Transportability Characteristics

The following forklift characteristics and data apply to the model and national stock number (NSN) shown. Changes in the model or NSN may affect the loadability of the forklifts as related to guidance shown in this manual.

a. Forklift, 4,000-Pound-Capacity, Hyster Co, Model H40XL.

National stock number . . . 3930-01-172-7891
Line item number. T73645
Dimensions and shipping data:
- Length:
  - Operational . . . . . 145.7 in. (370.1 cm)
  - Without forks. . . . . 103.7 in. (263.4 cm)
- Width, not reducible . . . . 45.2 in. (114.8 cm)
- Height, not reducible . . . 81.3 in. (206.5 cm)
- Floor area:
  - Operational . . . . . 46.0 ft^2 (4.3 m^2)
  - Without forks. . . . . 32.0 ft^2 (3.0 m^2)
- Cube:
  - Operational . . . . . 310.0 ft^3 (8.8 m^3)
  - Without forks. . . . . 220.0 ft^3 (6.2 m^3)

Center of gravity:
- Vertical from ground level . . . . . 27.0 in. (68.6 cm)
- From centerline of front axle . . . . . 32.9 in. (83.6 cm)

Weights, shipping:
- Front axle (drive). . . . . 4,150 lb (1882.4 kg)
- Rear axle (steer). . . . . 4,580 lb (2077.5 kg)
- Total . . . . . 8,730 lb (3950.0 kg)

Tires:
- Quantity
  - Front 2
  - Rear 2
- Size:
  - Front . . . . . 7.00x12-12 PR
  - Rear. . . . . 6.90x9-10 PR
- Pressure:
  - Front . . . . . 125 psi (862 KPa)
  - Rear. . . . . 125 psi (862 KPa)

Footprint area:
- Front . . . . . 23in.^{2} (148cm^2)
- Rear . . . . . 26in.^{2} (167.7cm^2)

Performance:
- Maximum speed . . . . . 10 mph (16 km/h)
- Turning radius . . . . . 83.9 in. (210 cm)

b. Forklift, 6,000-Pound-Capacity, Hyster Co, Model H60XL

National stock number . . . 3930-01-172-7892
Line item number. T49096
Dimensions and shipping data:
- Length:
  - Operational . . . . . 151.5 in. (384.8 cm)
  - Without forks . . . . . 109.5 in. (278.1 cm)
- Width, not reducible . . . . 62.4 in. (158.5 cm)
- Height, not reducible . . . 91.0 in. (231.1 cm)
- Floor area:
  - Operational . . . . . 65.0 ft^2 (6.0 m^2)
  - Without forks . . . . . 47.0 ft^2 (4.4 m^2)
- Cube:
  - Operational . . . . . 498.0 ft^3 (14.1 m^3)
  - Without forks . . . . . 360.0 ft^3 (10.2 m^3)

Center of gravity:	
Vertical from ground level	24.7 in. (62.7 cm)
From centerline of front axle	36.8 in. (93.5 cm)
Weights, shipping:	
Front axle (drive)	4,665 lb (2116 kg)
Rear axle (steer)	6,250 lb (2835 kg)
Total	10,915 lb (4951 kg)
Tires:	
Quantity	
Front	4
Rear	2
Size:	
Front	7.00x12-12 PR
Rear	6.50x10-10 PR
Pressure:	
Front	125 psi (862 KPa)
Rear	115 psi (793 KPa)
Footprint area:	
Front	15 $in.^2$ (97 cm^2)
Rear	26 $in.^2$ (167.7 cm^2)
Performance:	
Maximum speed	12 mph (19km/h)
Turning radius	93.0 in. (236.2 cm)

2-5. Reduced Configuration

A cost savings can be obtained by reducing both the 4k and 6k CBD forklifts to their minimum dimensions, without major disassembly, for terminal handling and ocean transport. The reduction involves removing the forklift tines and securing them on the forklifts.

2-6. Unusual Characteristics

These vehicles have no unusual characteristics that would require special attention be given to temperature, atmospheric pressure, or humidity variations during exposure to normal transportation environments.

2-7. Hazardous and Dangerous Characteristics

The 4k and 6k forklifts have no special hazardous or dangerous characteristics during exposure to normal transportation environments.

NOTE

Those regulations and transportation procedures normally associated with vehicles containing diesel fuel will apply.

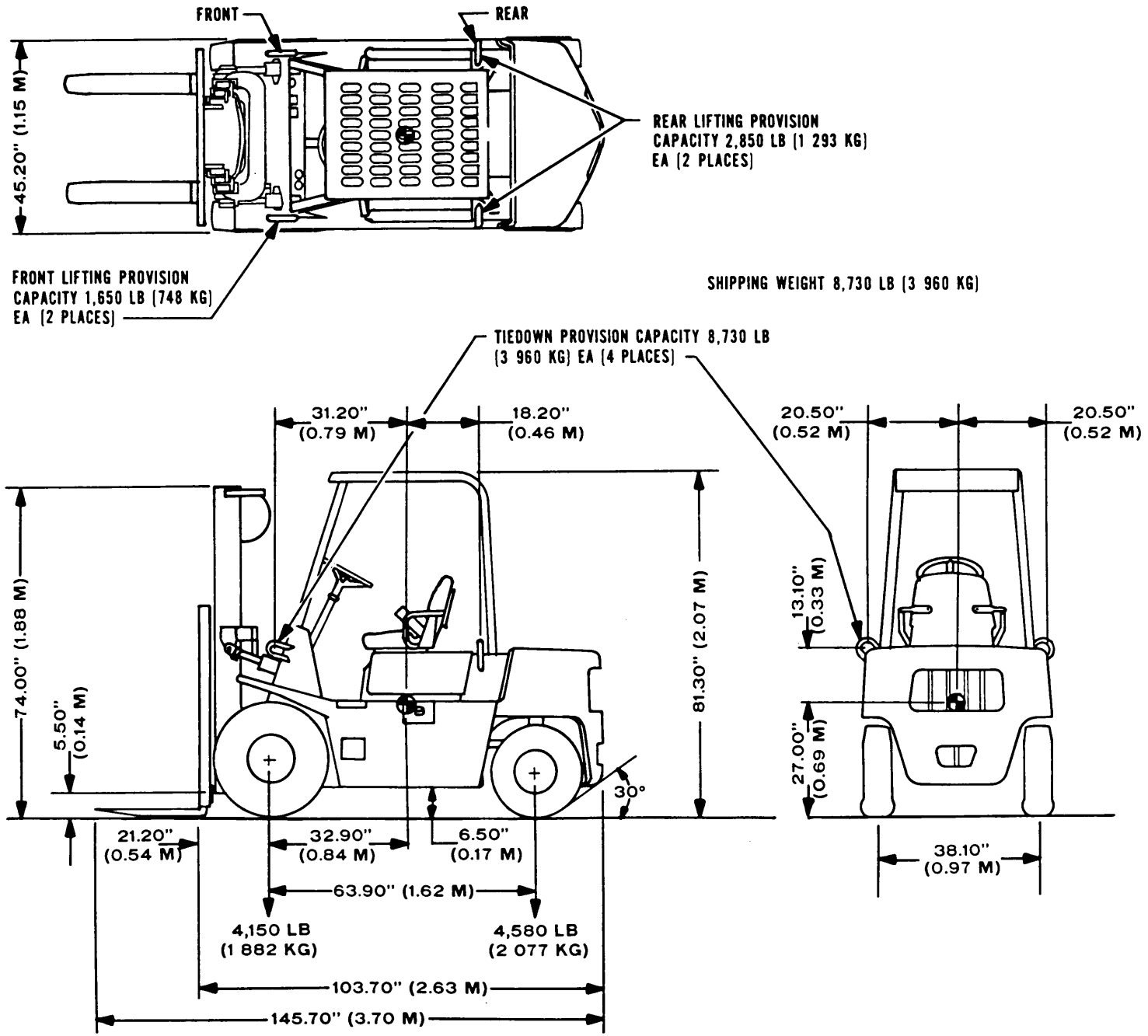


Figure 2–1. Clean burning diesel forklift, 4,000- (4k-) pound-capacity, Hyster Co, model H40XL.

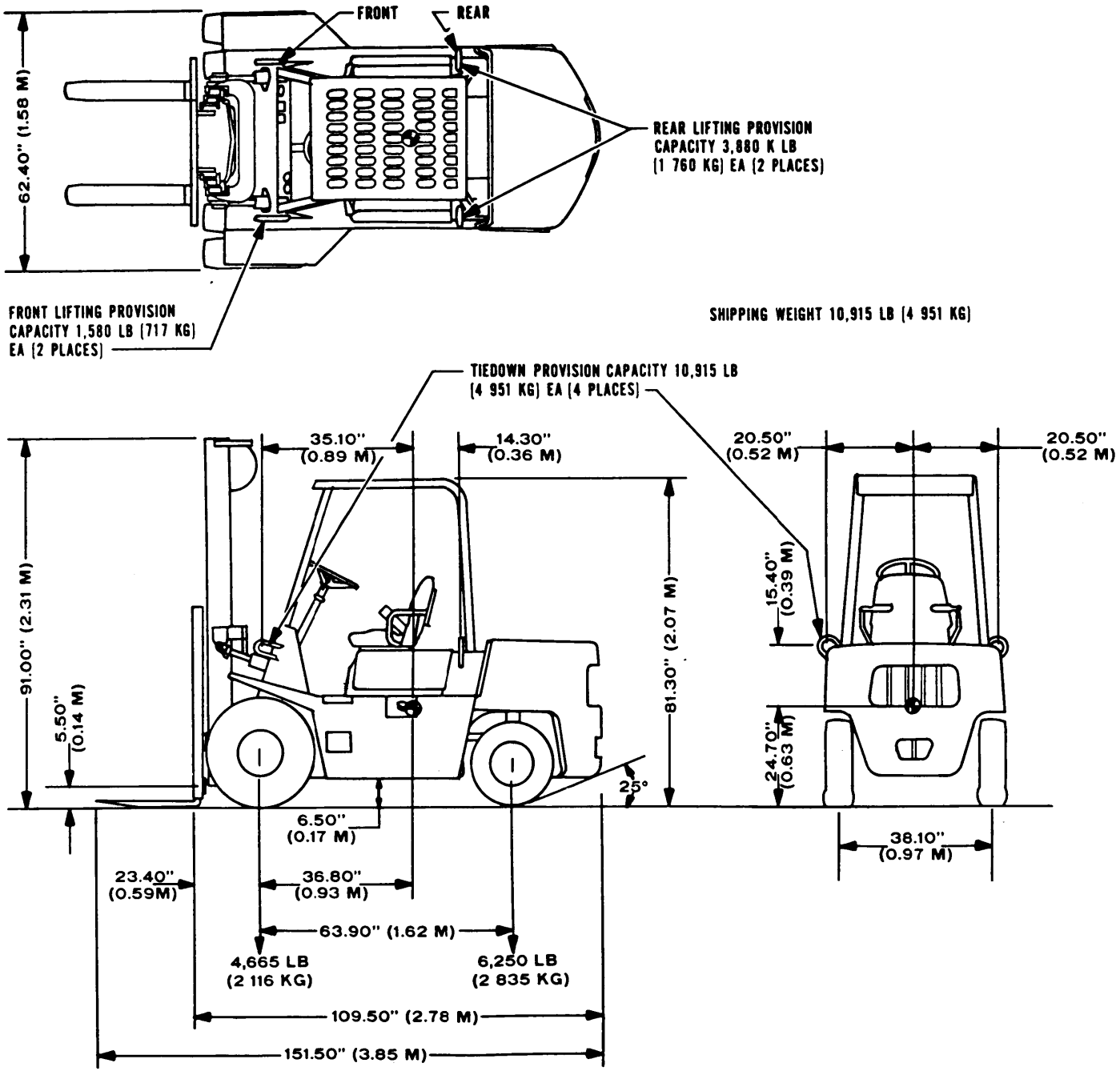


Figure 2–2. Clean burning diesel forklift, 6,000- (6k-) pound-capacity, Hyster Co, model H60XL.

CHAPTER 3
SAFETY

3-1. General Safety Precautions

General safety considerations and precautions for movement are as follows:

a. Check the entire vehicle to be sure that all loose items are properly secured.

b. Make sure no personnel or obstacles are in the way before moving the vehicle.

c. Make sure only qualified drivers drive the vehicles.

3-2. Specific Safety Requirements

Where applicable, the appropriate chapters give pertinent safety requirements by individual mode.

CHAPTER 4
AIR TRANSPORTABILITY GUIDANCE

Section I. GENERAL

4-1. Scope

This chapter provides transportability guidance for air movement of the 4k and 6k CBD forklifts. It covers significant technical and safety considerations and prescribes the materials required to prepare, load, and unload the forklifts as internal loads aboard U.S. Air Force cargo aircraft. It also provides examples of tiedown diagrams and tiedown data tables for loading the forklifts in U.S. Air Force cargo aircraft.

4-2. Maximum Use of Aircraft

The loads prescribed in this chapter are not maximum aircraft loads. Total cargo loads and operating ranges are subject to variables such as weather, airfield conditions, individual aircraft characteristics, and flight distance. TM 38–236/AFP 71-8 provides general guidance on total cargo loads and operating ranges. TM 38-250/AFR 71-4 (15 January 1988), paragraph 3-7e(1) and paragraph 6–27a(1)(a) provide the latest instructions regarding shipping of equipment with internal combustion engines and fuel in tank. For specific guidance, contact the nearest Military Airlift Command (MAC) activity.

4-3. Safety

Safety precautions listed in chapter 3 and the following procedures should be noted:

a. Station guides at strategic points outside and within the airplane to observe clearances.

b. Make sure forklifts fuel tanks are no more than one-half (½) full.

c. Raise tines before loading to prevent ramp impact/damage.

WARNING

Fire extinguishers must be available during all loading and off-loading operations.

CAUTION

Do not allow the forklifts to exceed 3 mph (walking speed) on loading ramps or inside aircraft.

4-4. Preparation of Forklifts

a. Prepare and certify that the forklifts are in accordance with TM 38–250/AFR 71–4.

b. Transport of the forklifts in U.S. Air Force aircraft require no special handling. They may be transported in their operational configuration.

4-5. Transport by U.S. Air Force Cargo Aircraft

a. The aircraft commander or designated representative ensures that the forklifts are loaded, secured properly, and unloaded in accordance with the applicable aircraft technical order.

b. Use USAF TO IC-5A-9, TO IC-130A-9, and TO IC-141B-9, as applicable, to obtain restraining factors for minimal acceptable conditions. The tiedown diagram (fig 4-1) is a suggested typical pattern to meet restraint requirements for either forklift.

c. Provisions for transport of 4k or 6k CBD forklifts in a C-130 aircraft are:

(1) Approach shoring is required. The forklifts can be loaded either forward or backward into the aircraft. The approach shoring requirements will be determined at time of loading; therefore, additional pieces of 2- by 12-inch lumber should be made available.

(2) Parking shoring of 8- by 8- by ¾-inch lumber is required under the steering axle tires.

d. Provisions for transport of the 4k and 6k CBD forklifts in C-141 aircraft are:

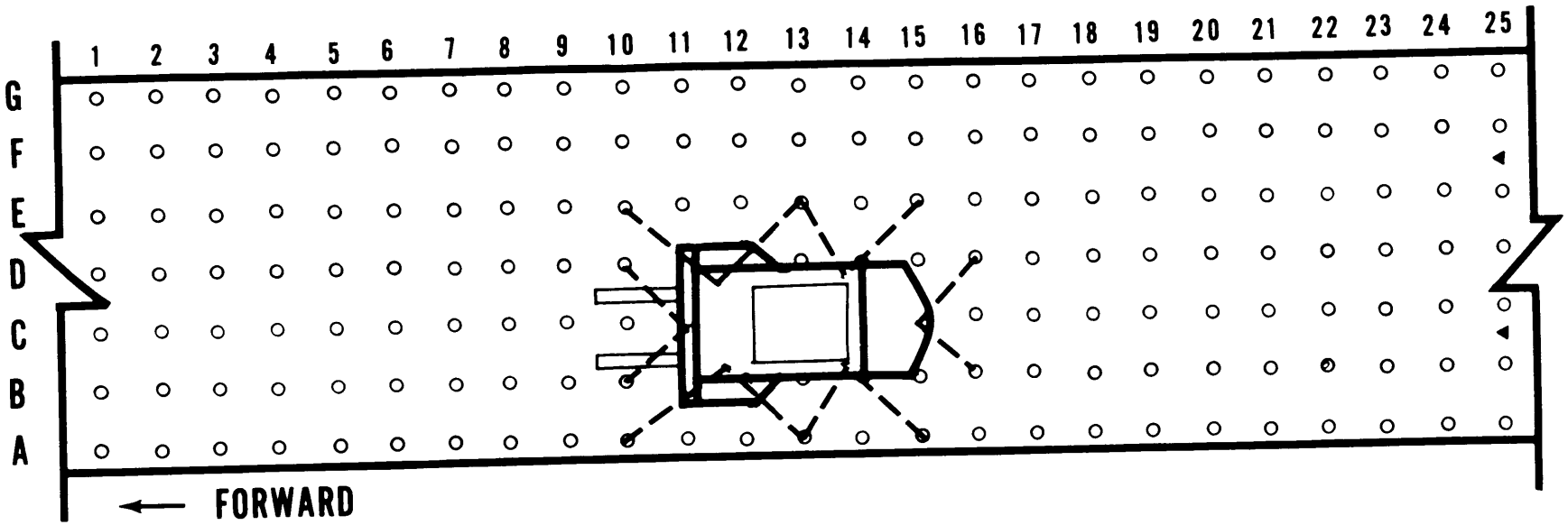
(1) Approach shoring is required. The approach shoring requirements will be determined at time of loading; therefore, additional pieces of 2- by 12-inch lumber should be made available.

(2) Parking shoring of 8- by 8- by 1-inch lumber under the drive axle tires and 10- by 10- by 1¾-inch under the steering axle tires must be provided.

e. Provisions for transport of the 4k and 6k CBD forklifts in C–5 aircraft are:

(1) Approach shoring is required. The approach shoring requirements will be determined at time of loading; therefore, additional pieces of 2- by 12–inch lumber should be carried to the airfield. The forklifts must be loaded through the aft ramp with the aircraft in the aft kneel configuration. The forklifts can be loaded either forward or backward into the aircraft.

(2) No parking shoring is required.



LEGEND: C-130 AIRCRAFT

- ○ 10,000 POUND CAPACITY TIEDOWN FITTING
- ▲ 25,000 POUND CAPACITY TIEDOWN FITTING

NOTE: FLOOR TIEDOWN FITTINGS ARE LOCATED IN ROWS A THROUGH G AND COLUMNS 1 THROUGH 25. THE RAMP HAS 5 ADDITIONAL COLUMNS. THIS IS A TYPICAL TIEDOWN PROCEDURE AND ONLY COLUMNS 1 THROUGH 25 ARE SHOWN. ITEM BEING SHIPPED CAN BE TIED DOWN AT ANY LOCATION APPROVED BY THE LOADMASTER.

Figure 4–1. Typical tiedown for a forklift in C–130 aircraft.

CHAPTER 5
HIGHWAY TRANSPORTABILITY GUIDANCE

Section I. GENERAL

5-1. Scope

This chapter provides highway transportability guidance for the movement of the 4k- and 6k-pound CBD forklift. It covers significant physical characteristics and safety concerns. It also prescribes the material and guidance required to prepare, load, tie down, and unload the forklifts on semitrailers.

5-2. Safety

Besides the safety precautions in chapter 3, CONUS movement is subject to all the safety laws, rules, and regulations that apply to commercial carriers. In overseas areas, theater regulations will govern movements. After the forklifts are in the tiedown position, place the transmission in neutral position and apply the parking brake.

CAUTION

Do not allow the forklifts to exceed 3 mph during loading and unloading operations.

NOTE

The forklifts are not self-deliverable. Do not attempt to drive the forklifts on public highways.

Section II. TRANSPORT BY SEMITRAILER/TRUCK

5-3. General

Commercial or military flatbed trailers may transport both the 4k and 6k CBD forklifts over highways as multiple loads. A 5-ton cargo truck may transport a single 4k forklift. However, the total combination of military 5-ton tractors, semitrailer, and forklifts exceeds the legal limits for width, height, length, and weight in CONUS and overseas. The transportation officer will issue permits at most military installations. Figure 5–1 shows a typical combination, using a M127 series semitrailer.

5-4. Loading on Semitrailer/Cargo Truck

a. Material. Table 5–1 shows the bill of materials for blocking and tiedown of 4k and 6k forklifts on a flatbed semitrailer. Table 5–2 provides the application of materials required to restrain the forklift.

b. Loading. Forklifts may be placed in the tiedown position on a semitrailer by a crane of adequate capacity (see paragraph 6–4b for lifting guidance) or driven onto a semitrailer if a suitable ramp is available. After the forklifts are in the tiedown position, place their transmissions in neutral and apply the parking brakes.

c. Tiedowns and Blocking. Figures 5–1 and 5–2 provide a blocking and tiedown diagram and details that are compatible with standard loading practices. These procedures will restrain the forklift against forces encountered at normal speeds and operating conditions.

Table 5-1. Bill of Materials for Blocking and Tiedown of 4k or 6k CBD Forklifts on a Flatbed Semitrailer (Figs 5-1 and 5-2)

Item	Description	Approximate Quantity
Lumber	Douglas-fir, or comparable; straight-grain, free from material defects; Fed Spec MM-L-751: 6- x 6-in.	4 linear feet
Nails	Common, steel; flathead; bright or cement-coated; Fed Spec FF-N-105: 20d	12
*Wire rope	6 x 19, IWRC; improved plow steel; preformed, regular-lay; table X, Fed Spec RR-W-40: ¾-in.	52 feet
*Clips	Wire rope, U-bolt clips, saddles, single-grip, steel, Crosby heavy-duty, or equal; Fed Spec FF-C-450: 3/8-in.	16
	½-in.	4
*Thimbles	Standard, open-type; 3/8-in.	4

Item	Description	Approximate Quantity
Chains	Type 1, Grade C, Class 2; welded steel, ¼- to ½-in. wide by 10-ft long; 16,000-lb safe-working load; Fed Spec RR–C–271; with two grabhooks equal to or better than the strength of the chain	4
Load binders	Double hook, heavy-duty, eccentric takeup, with chain grabhooks for ¼- to ½-in. chain; 16,000-lb safe working load	4

*Chains and load binders may be substituted for wire rope and clamps.

Table 5–2. Application of Materials for Blocking and Tiedown of the 4k or 6k CBD Forklifts on a Flatbed Semitrailer (Figs 5-1 and 5-2)

Item	No. Required	application
A	4	Chock blocks. Each consists of one piece of 6- x 6- x 8-in. lumber cut 55 degrees at one end. Place beveled end of block against the tread of the outside front wheels and rear wheels of both forklifts. As shown in figure 5-2, toenail the heel of the chock blocks with one 20d nail to the trailer floor. Toenail the outward side of each chock block with two additional 20d nails to the trailer floor.
*B	4	Tiedowns (detail 2, fig 5-2). Each consists of one piece of 3/8-in., 6 x 19, IWRC wire rope, about 13 ft long. Form a complete loop between tiedown provision and appropriate trailer stake pocket. Overlap the wire rope at least 12 in. Tension tiedown evenly and apply items C and D.
*C	4	Thimbles. Place one between wire rope and stake pocket. Secure thimble to wire rope with one ½-in. U-bolt clip (detail 2, fig 5-2) and torque to 65 ft lb.
*D	16	3/8-in. Clips. Place four 3/8-in. clips on each item B at overlap area. Space at least 2¼ in. apart, with a minimum of 6½ in. from the ends of wire rope (detail 2, fig 5–2). Torque 3/8-in. clips to 45 ft lb.
*E	4	½-in. clips. Secure thimble to wire rope with one ½-in. U-bolt clip (detail 2, fig 5-2), and torque to 65 ft lb.

*Chains and load binders may be substituted for wire rope and clips.

NOTE

Tension wire rope with a come-along mechanical hoist or equal tensioning device.

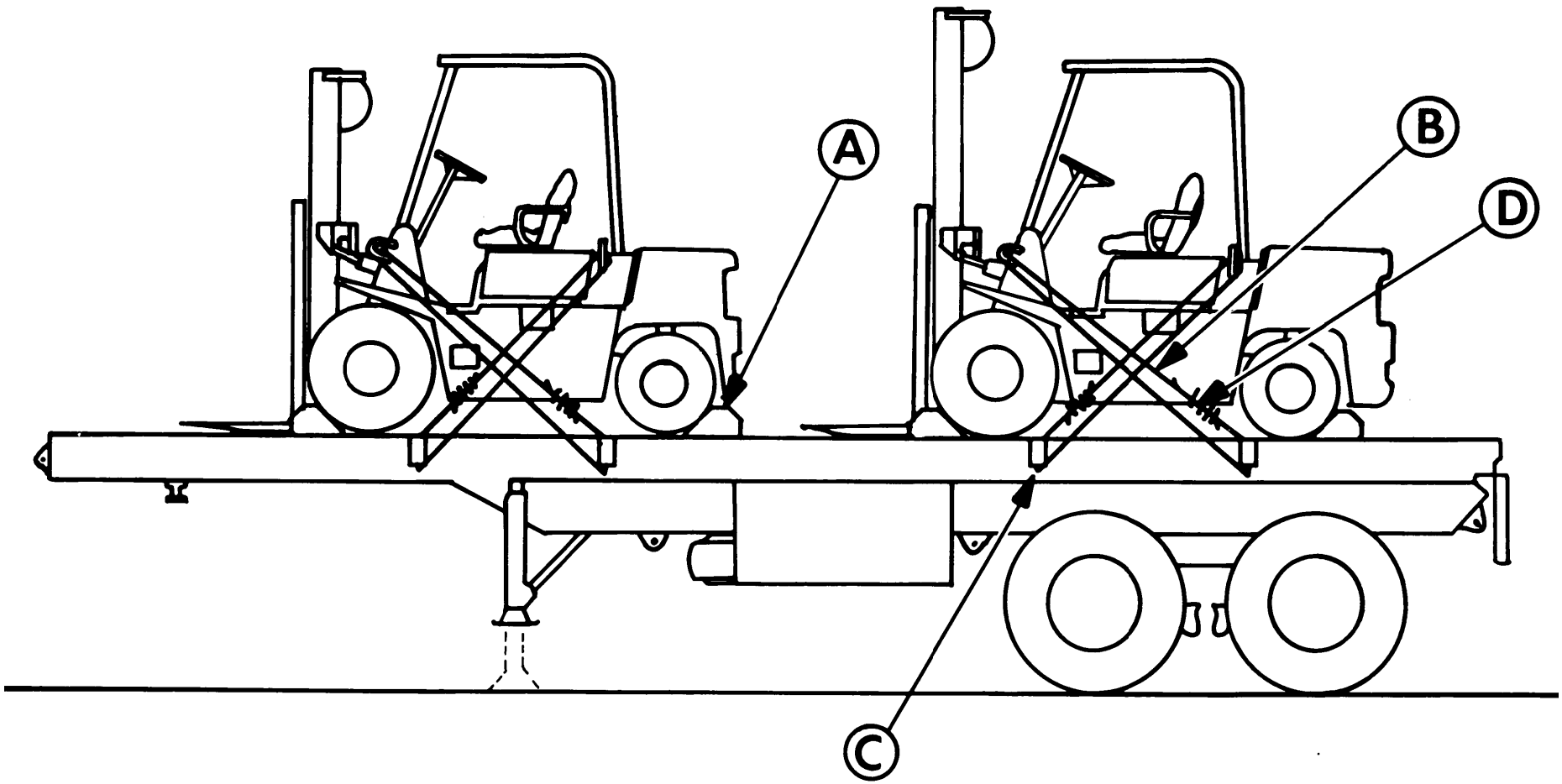
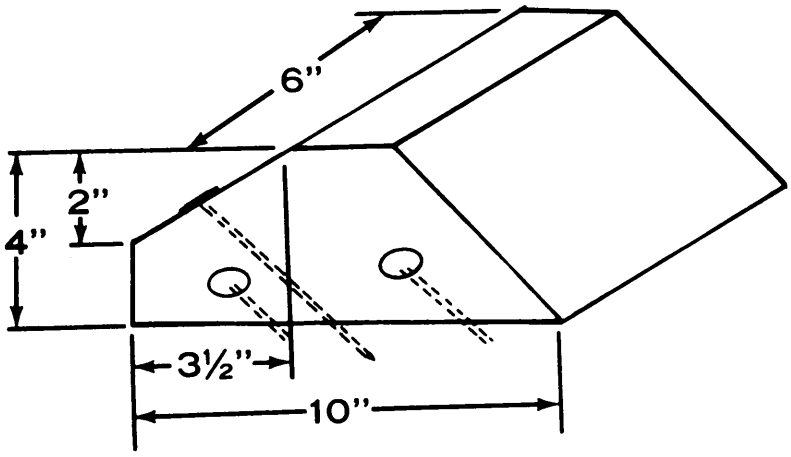
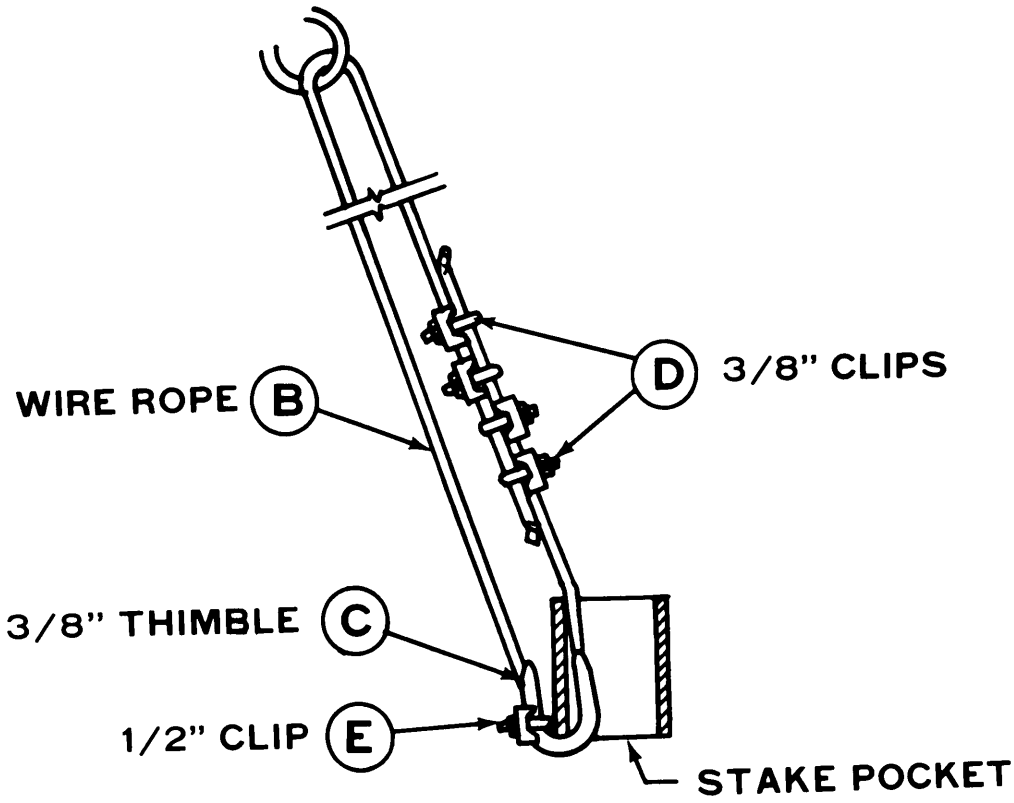


Figure 5–1. Blocking and tiedown of 4k and 6k forklifts on a flatbed semitrailer.



DETAIL 1



DETAIL 2

Figure 5-2. Blocking and tiedown details for 4k and 6k forklifts on a flatbed semitrailer.

CHAPTER 6
MARINE AND TERMINAL TRANSPORTABILITY GUIDANCE

Section I. GENERAL

6-1 Scope

This chapter provides marine and terminal transportability guidance for movement of the 4k- and 6k-pound CBD forklifts. It covers significant physical characteristics and safety considerations. It also prescribes the materials and guidance required to prepare, load, secure, and unload the forklifts.

6-2. Safety

Besides the safety precautions in chapter 3, the following should be noted as applicable:

a. Make sure fire extinguishers are available during all loading and unloading operations.

b. Inspect vessel equipment and gear before use.

c. Inspect stevedore slings and other items used in the loading and unloading operations for condition and adequate capacity.

d. Caution personnel not to walk under vehicles being lifted.

e. Make sure all lifts have at least two tag lines attached to control the swing of the forklift while suspended.

f. When loading forklifts under their own power, make sure the fork tines are in the raised position or are removed (para 2–5) to avoid damage to the forklift or vessel.

6-3. Water Shipment

A variety of inland waterway cargo carriers, lighters, and cargo vessels can transport the forklifts.

NOTE

The lifting and securing methods discussed in this chapter are suggested procedures. Other methods of handling and stowage may be used if they will ensure safe, damage-free delivery.

Section II. LOADING AND SECURING

6-4. General Rules

a. Stowage. Whenever possible, stow forklifts below deck for protection. Usually, good stowage means aligning the forklifts fore and aft as close together as practical, with minimum space between outer forklift and sweat-boards. Protect breakable parts, and secure spare parts in or near the parent vehicle. Secure the forklifts by blocking each wheel on the front, rear, and both sides, as required. Lash with wire ropes or chains to bulkheads, stanchions, or pad eyes. After securing in place, set the handbrake and place the transmission in neutral.

NOTE

Drain the forklift's fuel tanks, and disconnect and tape the battery terminals.

b. Lifting. Both the 4k- and 6k-pound CBD forklifts have four lifting provisions. They are near the overhead guard attachment point to the main frame of the forklifts (figs 6-1 and 6-2).

c. Loading. Reduce the 4k and 6k CBD forklifts to their minimum configuration for loading on cargo vessels; that is, reduced length as described in paragraph 2–5. In this operational configuration, they may be loaded aboard landing craft, beach discharge and amphibious lighters, and landing ship tanks. The 4k- and 6k-pound CBD forklifts can also be driven onto the decks of barges from a pier when tidal conditions are suitable. The forklifts can be lifted by shoreside or floating cranes of adequate capacity. They can be driven or towed onto a roll-on/roll-off vessels.

d. Materials. Figure 6-3 shows typical blocking and tiedown of a 6k-pound CBD forklift in the hold of a general-cargo vessel. Table 6–1 is the approximate bill of materials for blocking and tiedown of a 6k CBD forklift in the hold of a general cargo vessel. Table 6–2 provides data on the application of materials required to restrain the forklift.

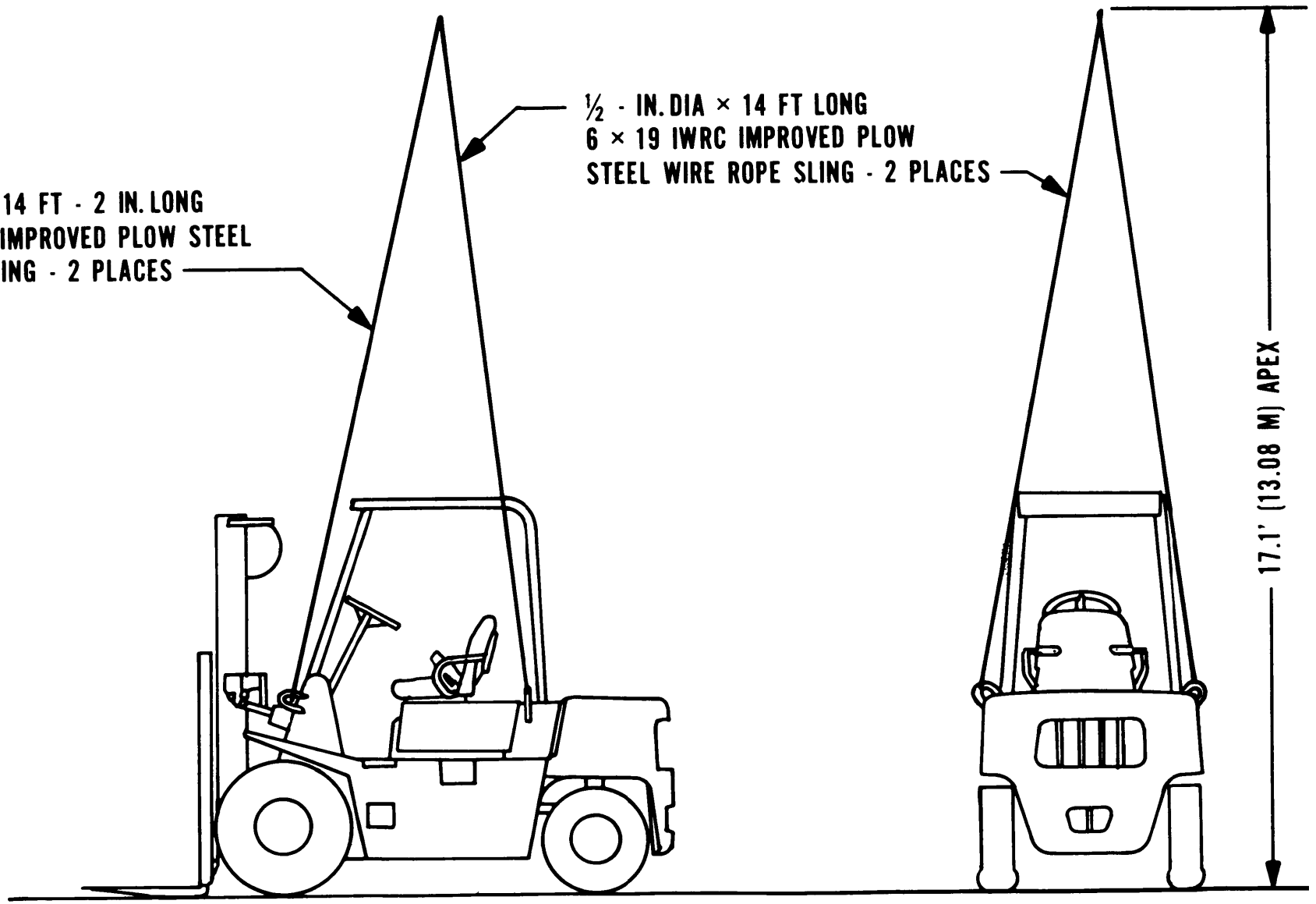


Figure 6–1. Lifting the clean burning diesel forklift, 4k-pound capacity, Hyster Co, model H40XL.

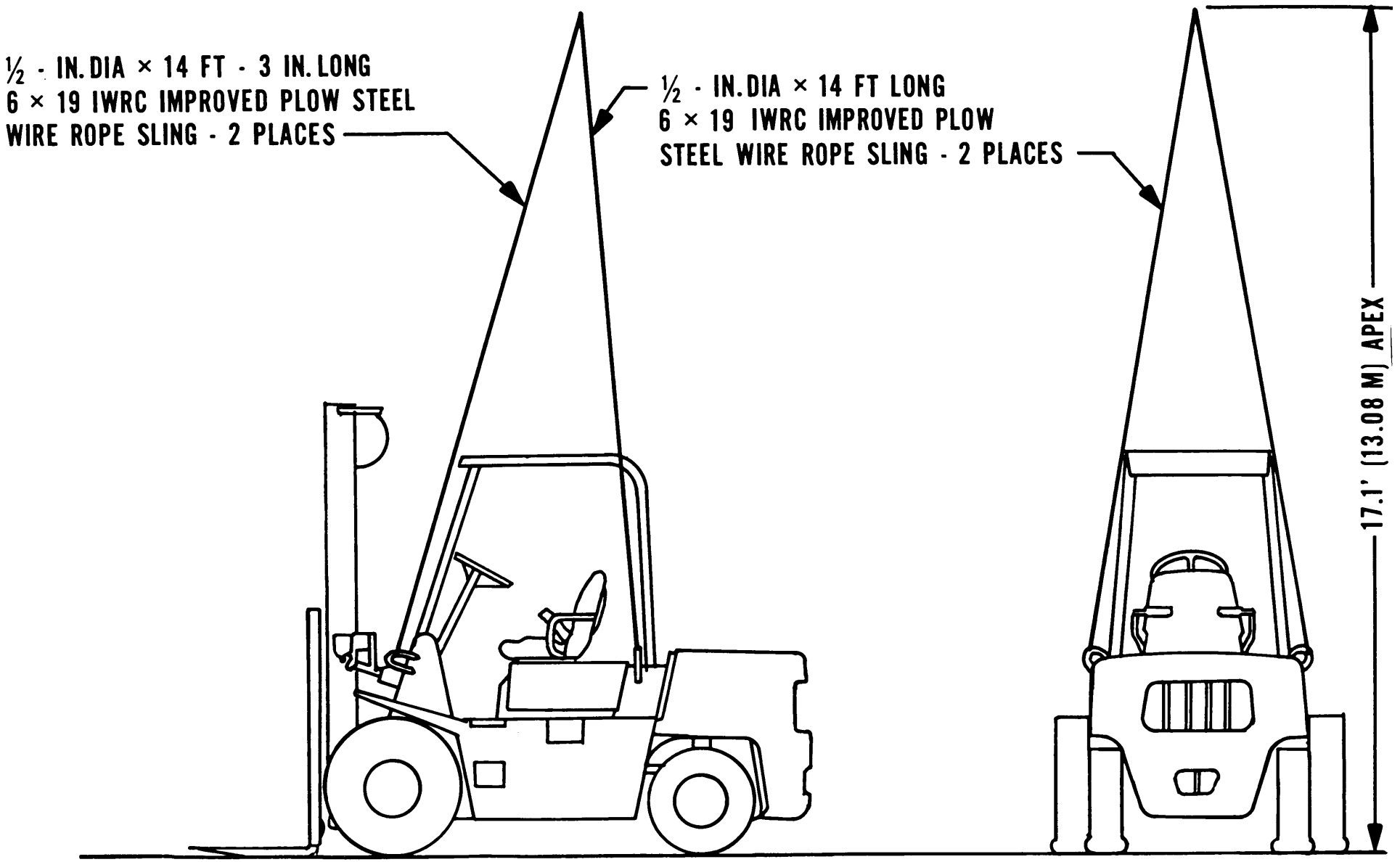


Figure 6-2. Lifting the clean burning diesel forklift, 6k-pound capacity, Hyster Co, model H60XL.

Table 6-1. Bill of Materials for Blocking and Tiedown of 6k CBD Forklift

Item	Description	Approximate Quantity
Lumber	Douglas-fir, or comparable; straight-grain, free from materiel defects; Fed Spec MM-L-751; 4- x 4-in.	45 linear feet
	4- x 10-in.	4 linear feet
Nails	Common, steel; flathead; bright or cement-coated; Fed Spec FF-N-105: 20d	40
Wire rope	6 x 19, IWRC; improved plow steel; preformed, regular lay; table X, Fed Spec RR-W-410C: 3/8-in.	60 feet
Clips	Wire rope, U-bolt clips, saddled, single-grip, steel, Crosby heavy-duty, or equal; Fed Spec FF-C-450D: 3/8-in.	16
Padeyes	Local manufacturer, from 1-in. steel rod and 4- x 6- x 5/8-in. steel plate. Bore l-in. holes through plate, and weld U-shaped 1-in. rod ends on top and bottom of the plate.	4
Turnbuckles	Eye- and jaw-type, ½-in. diameter x 6-in. takeup; Fed Spec FF-T-791, or equal	4
Steel banding	¾- x .035-in. thick	6 feet

Table 6-2. Application of Materials for Blocking and Tiedown of the 6k CBD Forklift in General-Cargo Vessel (Fig 6-3)

Item	No. Required	Application
A	4	Padeyes. Weld padeyes to the deck of vessel if D-rings or deck tiedown fittings are unavailable.
B	2	Side blocks. Each consists of one piece of 4- x 4- x 108-in. lumber. Position each piece against outside of front tires, starting at the back of rear tires.
C	2	End blocks. Each consists of one piece of 4- x 4- x 69.5-in. (52-in. for 4k-pound CBD forklift) lumber. Place on top of item B in front of the carriage, and place behind rear wheels and against item B as shown in figure 6–3. Toenail to item B with four 20d nails at each end of item C, after item F is installed. Keep item B parallel to front tires.
D	2	Backup cleats. Each consists of 4- x 4- x 12-in. lumber. Locate on top of item B against item C. Toenail to item B with four 20d nails each.
E	As Required	Bracing. Each consists of 4- x 4-in. by length cut to suit. Brace as required against adjacent vehicle, cargo, or side of vessel bulkhead, as appropriate. Secure each end of each piece to adjacent blocking by toenailing with 20d nails. Lumber and nails for this requirement are not included in table 6–1.
F	2	Side blocking. Each consists of 4- x 10- x 12-in. lumber. Locate between item B and against rear wheels of 6k–pound CBD forklift. Toenail to item B and C with four 20d nails. (Side blocking is not needed for 4k CBD forklift).
G	4	Tiedowns. Each consists of one piece of 3/8-in., 6 x 19, IWRC wire rope, about 15 ft long. Form a complete loop through each forklift tiedown, item J, and eye of a turnbuckle, item I. Allow sufficient overlap for clips.
H	19	Clips. Place four on each wire rope at the overlap area and space 2½ in. apart. Allow at least 6 in. from ends of wire rope. Details for placement of clips are shown in figure 5-2. Tighten to 45 ft lb.
I	4	Turnbuckles. Attach jaw end to padeye, stanchion, or bulkhead. Tighten as required.
J	4	Tiedown provisions.
K	4	Steel banding. Secure fork tines to fork rack, with ¾-in. x .035 x 18 in. steel banding.

NOTE

Use similar procedures detailed in figure 6-3 and tables 6-1 and 6-2 for the 4k-pound CBD forklift.

NOTE

When forklifts are loaded on vessels that are adequately ventilated by power blowers, such as RORO vessels, the fuel tanks can be three-quarters full and batteries need not be disconnected.

6-5. Special Design Ships

Seatrain vessels, roll-on/roll-off (RORO) vessels, landing ships, and attack cargo vessels are all equipped with potential lashing gear and pre-positioned fittings in the deck. The use of such equipment is adequate, and blocking and bracing are not required.

6-6. Barges and Lighters

SEABEE barges and LASH lighters with hatch covers in place can transport the forklifts. When the barges and lighters transport the forklifts, secure the vehicles with blocking and tiedowns as shown in figure 6–3. Likewise, apply materials as indicated in tables 6–1 and 6–2.

6-7. Landing Ships, Landing Craft, and Amphibian Vehicles

Secure the forklifts when transporting them for long distances or through rough waters. In most cases, landing craft and amphibians are equipped with lashings and deck fittings. If these devices are not available, use a suitable substitute.

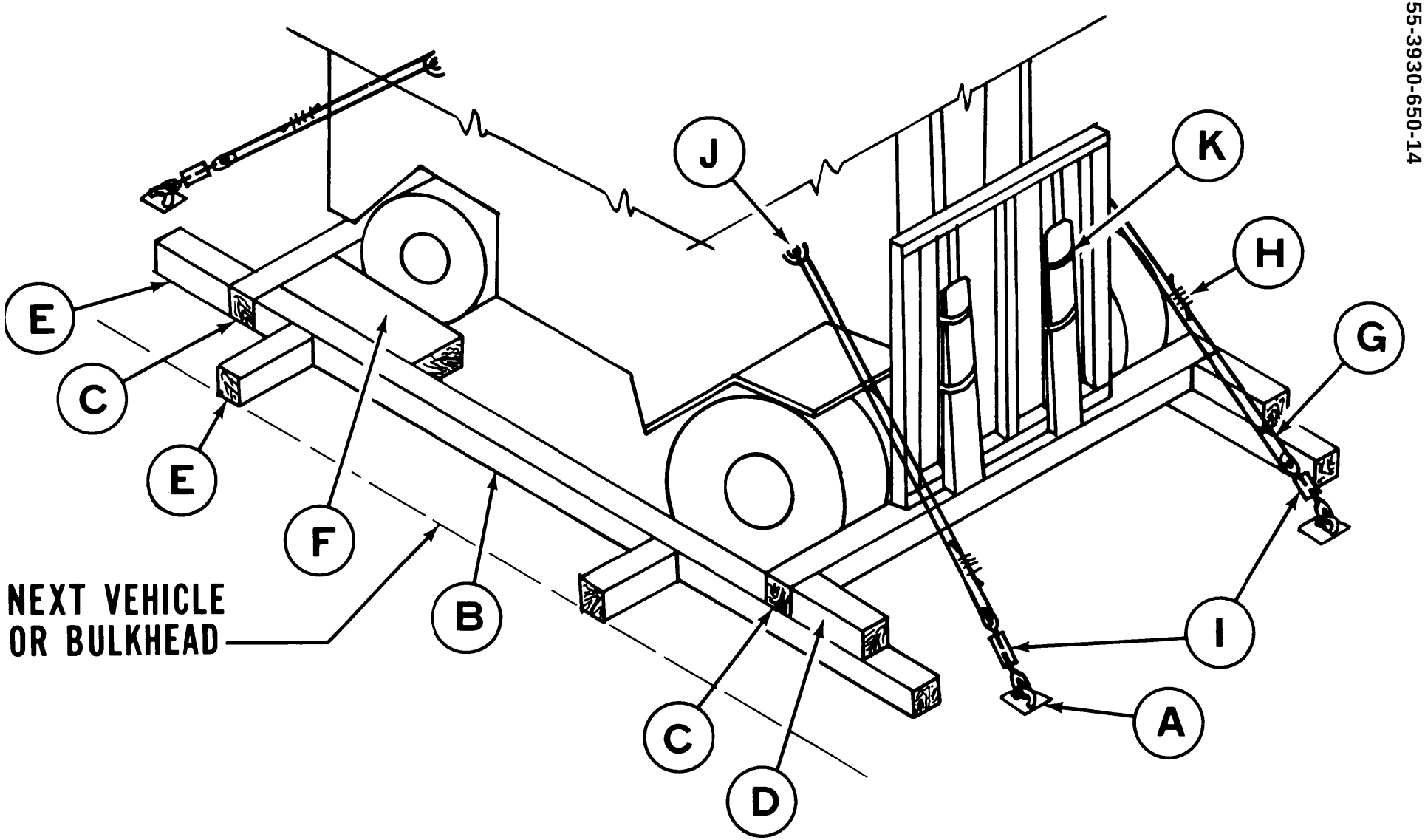


Figure 6–3. Typical blocking and tiedown of 6k-pound capacity CBD forklift in general-cargo vessel.

CHAPTER 7
RAIL TRANSPORTABILITY GUIDANCE

Section I. GENERAL

7-1. Scope

This chapter provides rail transportability guidante for movement of the 4k– and 6k–pound CBD forklifts. It covers significant physical characteristics and safety considerations. It also prescribes the materials and guidance required to load and tie down the forklifts on open-top flatcars.

7-2. Safety

Safety precautions are in chapter 3.

7-3. Maximum Use of Railcars

Railcars may carry additional cargo with the forklifts, provided the cargo is approved by the activity offering the forklifts for transport.

Section II. TRANSPORT ON CONUS RAILWAYS

7-4 General

The transportability guidance in this section applies for transport of the 4k- and 6k-pound CBD forklifts on CONUS railways. When loaded on a standard deck-height flatcar, the forklifts are within height and width limitations of the Association of American Railroads (AAR) "Outline Diagram for Single Loads Without End Overhang on Open-Top Cars" and can be moved without restriction. The forklifts require no special preparation.

7-5. Preparation for Loading

As a minimum, remove and secure all loose items to prevent loss or damage in transit. When economical benefits would be realized, prepare forklift tines as described in paragraph 2–5 and shown in figure 6-3.

7-6. Loading on General-Purpose Flatcars

a. The forklifts may be placed in the tiedown position on a railcar by a crane (para 6–4b and figs 6-1 and 6-2), or they may be driven or towed onto the railcar, provided a suitable ramp or bridge is available.

CAUTION

Do not allow the forklifts to exceed 3 mph during loading or unloading operations.

b. Figure 7-1 shows the load on a general-purpose flatcar. Figure 7-2 provides detailed instructions for blocking and tiedown. Table 7–1 provides a bill of materials, and table 7–2 presents application of those materials for securing forklifts on general-purpose flatcars.

NOTE

The lumber or laminated lumber nailed to the floor of a railcar requires a staggered nailing pattern. When nailing an upper piece of lumber, adjust the nailing pattern as required so that a nail for that piece will not be driven into or immediately adjacent to a nail in the lower piece of lumber.

Table 7-1. Bill of Materials for Blocking and Tiedown of a Typical Forklift on CONUS General-Purpose Flatcar (Figs 7-1 and 7-2)

Item	Description	Approximate Quantity
Lumber	Douglas-fir, or comparable; straight-grain, free from material defects; Fed Spec MM–L–751: 2- x 4-in.	36 linear feet
	2- x 6-in.	12 linear feet
	4- x 6-in.	8 linear feet
Nails	Common, steel; flathead; bright or cement-coated; Fed Spec FF-N-105: 16d	50
	20d	40
Thimbles	Standard, open-type; Fed Spec FF-T-276: ½-in.	4
Wire rope	6 x 19, IWRC; improved plow steel; preformed, regular lay; table X, Fed Spec RR-W–410: ½-in.	60 feet
Clips	Wire rope, U-bolt clips, saddled, single-grip, steel, Crosby heavy-duty, or equal; Fed Spec FF-C-450: ½-in.	16
	5/8-in.	4
Cushioning material	Waterproof paper, burlap, or other suitable material	as required

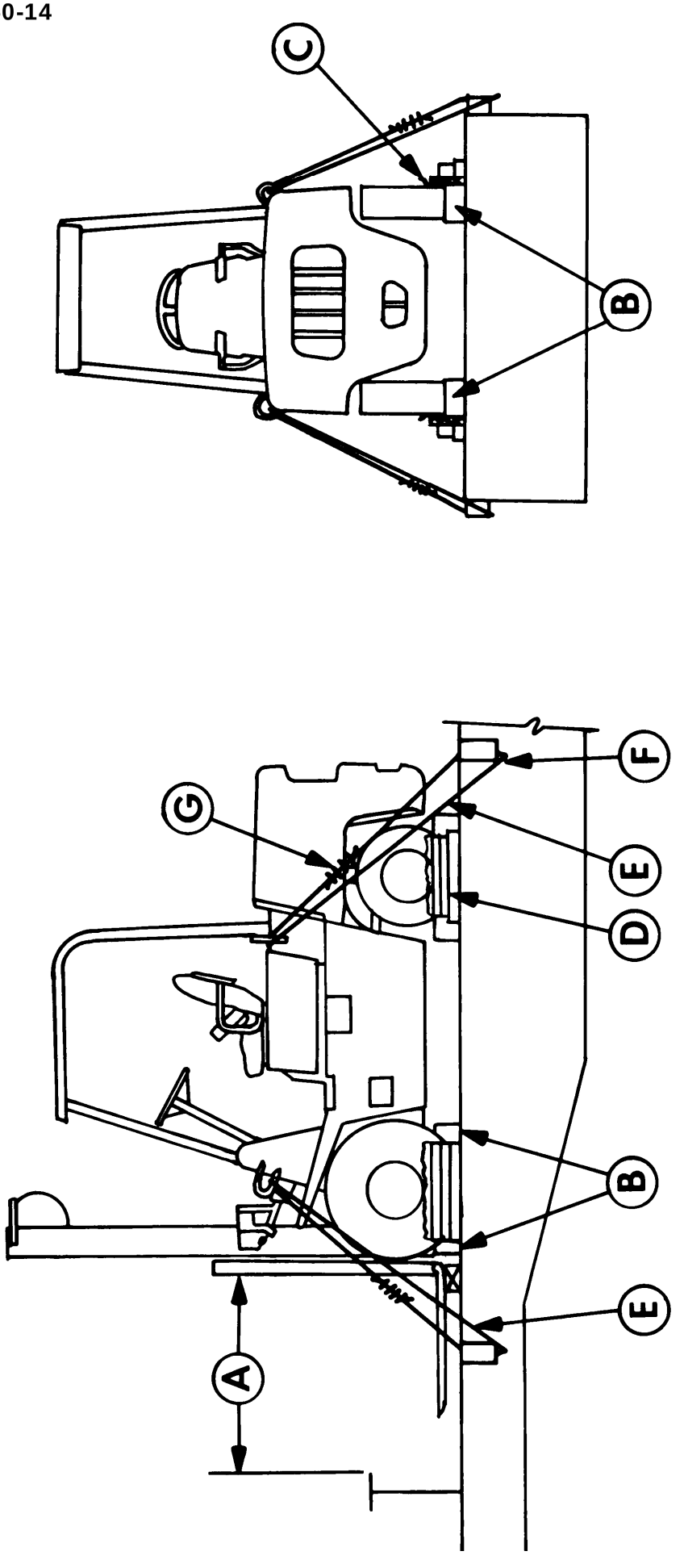


Figure 7-1. Blocking and tiedown of typical forklift on CONUS general-purpose flatcar.

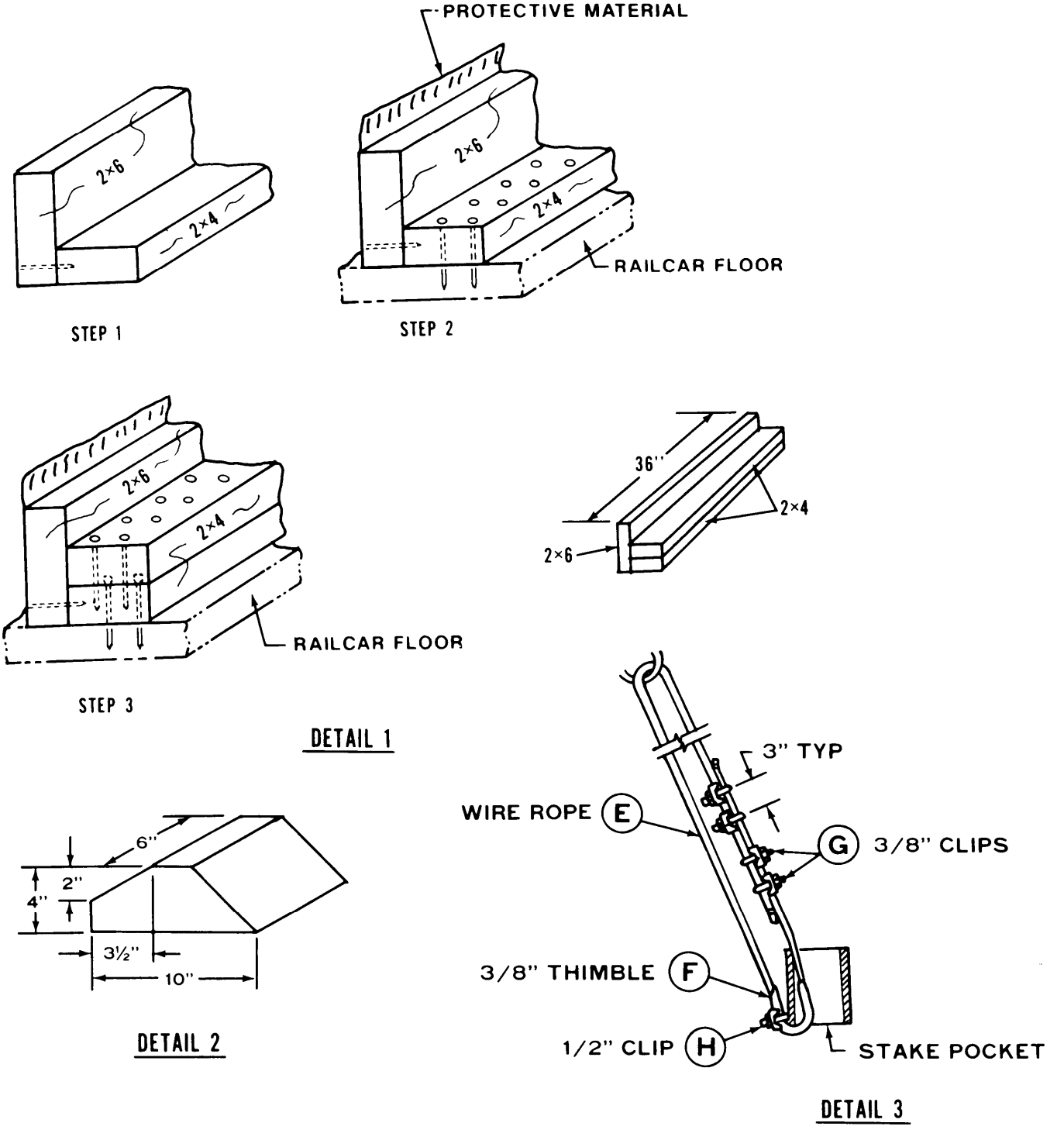


Figure 7–2. Blocking and tiedown detail diagram.

Table 7–2. Application of Materials for Blocking and Tiedown of a Typical Forklift on CONUS General-Purpose Flatcar (Figs 7-1 and 7-2)

Item	No. Required	Application
A		Brake wheel clearance. Minimum clearance required is 6 in. above, in back of, and on both sides of and 4 in. underneath wheel.
B	8	Blocks. Each consists of 4- x 6- x 10- in. lumber shaped to pattern (detail 2, fig 7-2). Locate one against front and back of wheels. Secure to floor with two 20d nails.
C	1 for each item D	Cushioning material. Locate bottom portion under item D, the top portion to extend 2 inches above item D (detail 1, fig 7-2).
D	4	Side blocks. Each consists of one piece of 2- x 6- x 36-in. lumber and two pieces of 2- x 4- x 36-in. lumber (detail 1, fig 7-2). Nail one edge of 2- x 6- x 36-in. piece to bottom 2- x 4- x 36-in. piece with five 16d nails. Then place against tire and nail to car floor through 2- x 4- x 36-in. piece with four 16d nails. Nail the remaining 2- x 4- x 36-in. piece to the one below in the same manner.
E	4	Wire rope. Each consists of one piece of ½-in. wire rope, about 14 ft long. Form a complete loop between tiedown shackle or provision and appropriate stake pocket (detail 3, fig 7-2). Overlap wire rope at least 24 in. After applying item F, tighten wire ripe and apply item G.
F	4	½-in. thimbles. Place between the bottom of each stake pocket (four) and wire rope.
G	20	Clips. Place four ½-in. clips on each wire rope at the overlap area and space 3 in. apart, with at least 6 inches from ends of cable. Secure thimble to wire rope with one ½-in. clip. Torque ½-in. clips to 65 ft-lb and 5/8-in. clips to 95 ft-lb (detail 3, fig 7-2).
H	1	Dunnage, 2 x 6 in. x 4 ft. Locate under fork at front and toenail to floor with four 20d nails. Dunnage is not required when forks are detached

7-7. Loading on Special-Purpose Flatcars

Figure 7-3 shows the load on a CONUS HTTX or similar types of flatcars. The HTTX car has special heavy-duty tiedown anchors and chain assemblies contained in channels along each side of the car and on each side of center sill, Table 7–3 presents the application of chain tiedowns for securing forklifts on flatcars equipped with tiedown rails.

Section III. TRANSPORT ON FOREIGN RAILWAYS

7-8. General

The transportability guidance in this section applies when foreign railways transport the 4k and 6k CBD forklifts. Consideration is given to single and multiple vehicle movements for the types of flatcars normally used for this type of equipment. The forklifts, when loaded on a suitable railcar and in the configuration shown in figures 2–1 and 2–2, can travel without restrictions in European countries, complying with the Gabarit International de Chargement (GIC) outline diagram. This also applies to most countries in the Middle East and to South America, Australia, India, and Pakistan. In the Middle East and South America, the clearances vary by country. Each country will require a separate check. In Australia, India, and Pakistan, wide- or broad-gauge railways provide greater clearances and less restrictions. Because of the various designation systems used by different countries, foreign railcars are not easily classified. In many cases, clearances vary from one country to the next and within one country. Therefore, transportability capability must be evaluated on an individual basis.

Table 7-3. Application of Chain Tiedowns for Securing Forklifts on Conventional Wooden Deck Chain-Tiedown Flatcar (Fig 7-3)

Item	No. Required	Application
A		Brake wheel clearance. Minimum clearance is 6 in. above, in back of, and on both sides of and 4 in. underneath wheel.
B	4 each unit	½-in.-diameter alloy steel chain, extra strength, proof-tested to at least 27,500 lb for vehicles (furnished with railcar). Attach one to each tiedown provision on each side of vehicle to parallel anchor positions, as shown in figure 7-3. Evenly tighten all chains until 1/8-in. space remains between metal rings of compression unit of the chain tiedown assembly. The angle of the tiedown chain must be as close to 45 degrees as possible.

7-9. Transport on Foreign-Service Flatcars

The materials required for blocking and tiedown of the forklifts on foreign-service flatcars are essentially the same as those used for rail within CONUS. Detailed guidance is contained in the 4th Transportation Command Pamphlet 55-2, *Tiedown Guide of Rail Movement*, which may be obtained by contacting Commander, 1st Transportation Movement Control Agency, ATTN: AEUTR-MCA-TA, APO New York 09451-4000. For intratheatre or incountry movement, clearance assistance can be obtained from the 4th Transportation Command, Oberursel, Germany.

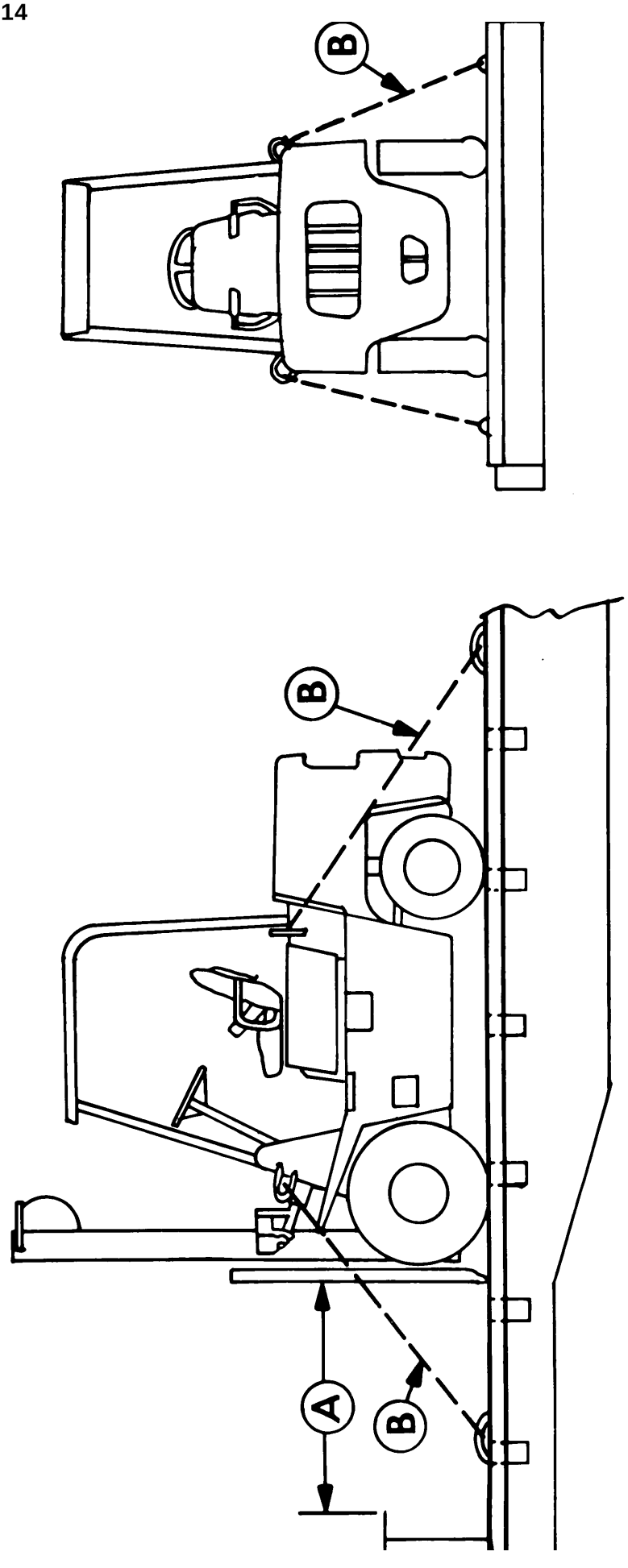


Figure 7–3. Tiedown diagram of typical forklift on CONUS HTTX or similar types of flatcars (side and rear views).

APPENDIX
REFERENCES

A-1. Army Regulations (AR)

55-29	Military Convoy Operations in CONUS
55-80	Highways for National Defense
55-162	Permits for Oversize, Overweight, or Other Special Military Movements on Public Highways in the United States
55-355	Defense Traffic Management Regulation
70-44	DOD Engineering for Transportability
70-47	Engineering for Transportability
746-1	Packaging of Army Material for Shipment and Storage

A-2. Field Manuals (FM)

5-34	Engineer Field Data
5-36	Route Reconnaissance and Classification
55-15	Transportation Reference Data
55-17	Terminal Operations Coordinator's Handbook

A-3. Supply Bulletins (SB)

700-20	Army Adopted/Other Items Selected for Authorization/List of Reportable Items

A-4. Technical Bulletins (TB)

55-46-1	Standard Characteristics (Dimensions, Weight, and Cube) for Transportability of Military Vehicles and Other Outside/Overweight Equipment

A-5. Technical Manuals (TM)

38-236 (AFP 71-8)	Preparation of Freight for Air Shipment
38-250 (AFR 71-4)	Packaging and Materials Handling Preparation of Hazardous Materials for Military Air Shipment
55-500	Marine Equipment Characteristics and Data
55-2200-001-12	Transportability Guidance: Application of Blocking, Bracing, and Tiedown Materials for Rail Transport

A-6. Air Force Manuals

TO IC-5A-9	Loading Instructions, USAF Series C-5 Aircraft
TO IC-130A-9	Loading Instructions, USAF Series C-130-9 Aircraft
TO IC-141B-9	Loading Instructions, USAF Series C-141 Aircraft

A-7. Other publications and source of procurement

a. Code of Federal Regulation, Title 49–Transportation Parts, 107–179 and Title 46—Shipping, Part 146
Available from: Superintendent of Documents
US Government Printing Offices
Washington, DC 20402

b. Association of American Railroads, *Rules of Governing the Loading of Commodities on Open-Top Cars and Trailers*
Section No. 1–General Rules
Section No. 6–Rules Governing the Loading of Department of Defense Materiel on Open-Top Cars

Available from: Association of American Railroads
59 E Van Buren Street
Chicago, IL 60605

c. 4th Transportation Command Pamphlet 55–2, *Tiedown Guide of Rail Movement*

Available from: Commander
1st Transportation Movement Control Agency
ATTN: AEUTR-MCA-TA
APO New York 09451-4000

By Order of the Secretary of the Army:

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