TECHNICAL MANUAL

TRANSPORTABILITY GUIDANCE
TRUCK, FORKLIFT, ROUGH-TERRAIN, 10,000-POUND-CAPACITY, ARMY MODEL MHE 199, RTL10; ARMY MODEL MHE 215, RTL10-1; ARMY MODEL MHE 236, M10-A

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TRANSPORTABILITY GUIDANCE
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ARMY MODEL MHE 199, RTL10;
ARMY MODEL MHE 215, RTL10-1;
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*This manual supersedes TM 55-3930-243-15-1, 28 November 1975.

LIST OF ILLUSTRATIONS

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CHAPTER 1

INTRODUCTION

1–1. Purpose and Scope

This manual provides transportability guidance for logistical handling and movement of trucks, forklift, 10,000-pound-capacity, rough-terrain. It provides transportation officers and other personnel responsible for movement or for providing transportation services with information considered appropriate to safe transport. Significant technical and physical characteristics, as well as safety considerations required for worldwide movement by the various modes of transportation, are included. When considered appropriate, metric equivalents are given in parentheses following dimensions or other measurements. References are contained in the appendix.

1–2. Reporting of Recommendations and Comments

Users of this publication are encouraged to recommend changes and submit comments for its improvement. Comments should be prepared on DA Form 2028 (Recommended Changes to DA Publications and Blank Forms) and forwarded to Director, Military Traffic Management Command Transportation Engineering Agency, ATTN: MTT-TRP, PO Box 6276, Newport News, VA 23606 (electrically transmitted messages should be addressed to: DIRMTMCTEA FTEUSTIS VA//MTT-TRP//).

1-3. Safety

Appropriate precautionary measures required during movement of the items are contained in chapter 3.

1-4. Definitions of Warnings, Cautions, and Notes

Throughout this manual, warnings, cautions, and notes emphasize important or critical guidance. They are used for the following conditions:

a. Warning. An operating procedure or practice that, if not correctly followed, could result in personal injury or loss of life.

b. Caution. An operating procedure or practice that, if not strictly observed, could result in damage to or destruction of equipment.

c. Note. An operating procedure or condition that must be emphasized.

CHAPTER 2

TRANSPORTABILITY DATA

Section I. GENERAL

2–1. Scope.

This chapter provides a general description of the forklifts, identification photographs, tabulated transportability characteristics, and data that are necessary for movement of the forklifts.

2–2 Description.

a. The Pettibone forklifts (models RTL10 and RTL10-1) are equipped with front- and rear-axle steering and may be operated with either two- or four-wheel drive. The International Harvester forklift (model M10–A) has articulated frame steering and four-wheel drive. Power for the RTL10 and RTL10-1 is provided by a six-cylinder, V-type, liquid-cooled diesel engine. Power for the M10-A is provided by a six-cylinder, in-line, liquid-cooled diesel engine.

b. The 10,000 pound Pettibone forklift illustrated in this manual has a new roll-over protective structure (ROPS) and has been modified by the addition of 72–inch long forks and 2,000 pounds of counterweight mounted to the rear of the engine housing. The Pettibone forklifts that have not been modified are equipped with 60-inch long forks and have no added counterweights. The International Harvester forklift (M10-A) has three 1,220-pound counterweights mounted on the rear of the forklift body. For transportability purposes, all models are similar. Significant differences are listed in table 2-1. The modified Pettibone forklift is shown in figure 2-1, and the International Harvester forklift is shown in figure 2-2.

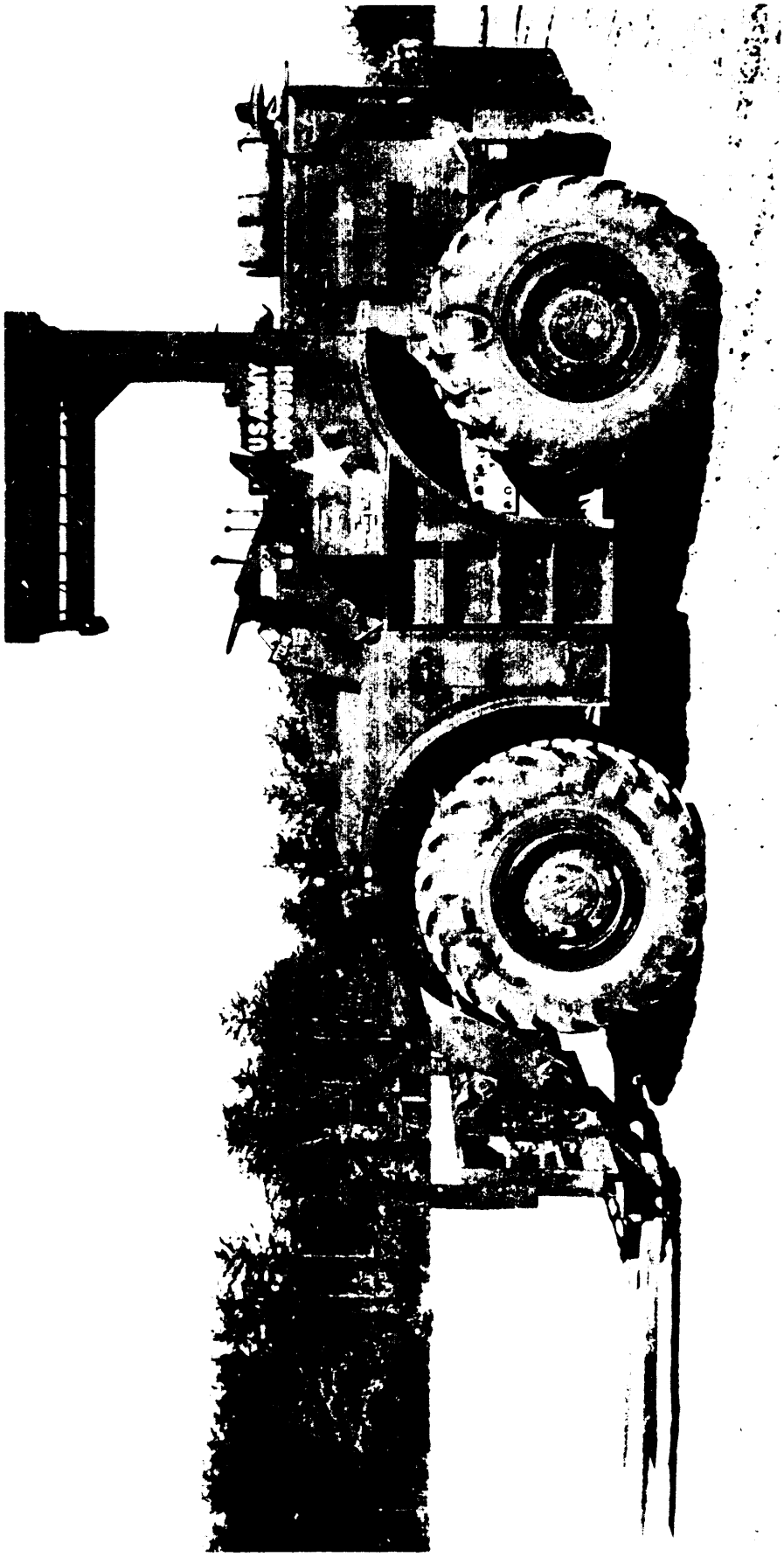


Figure 2–1. Truck, forklift, rough-terrain, 10,000-pound-capacity, Pettibone (modified).

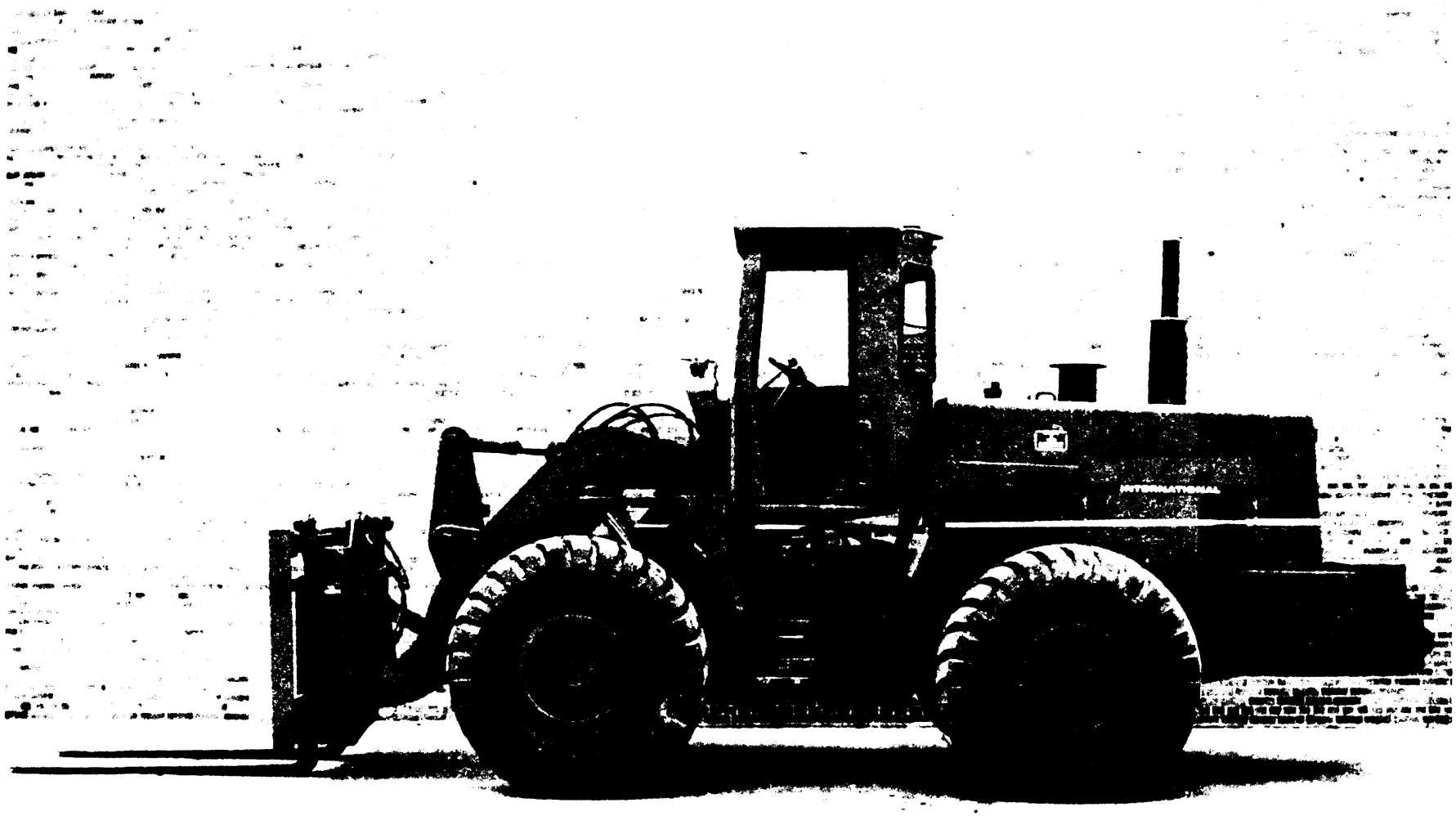


Figure 2–2. Truck, forklift, rough-terrain, 10,000-pound-capacity, International Harvester.

Section II. CHARACTERISTICS AND RELATED DATA

2-3. General

Characteristics contained in table 2–1 are applicable to model number shown. Changes in model may affect the loadability of the forklifts as related to the guidance shown in this manual.

2-4. Side and Rear Elevation Drawings

Detailed side and rear elevation drawings (figs 2–3, 2-4, 2-5, and 2-6) provide data necessary for determining transportability of the forklifts by the various modes of transportation.

2–5. Reduced Configuration

Transportation economies can be obtained by reducing each forklift to its minimum dimensions for terminal handling and ocean transport. Removable items such as fork tines, roll-over protective structure, and exhaust extensions should be removed and stowed with the truck.

2-6. Unusual Characteristics

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

2–7. Hazardous and Dangerous Characteristics

Under usual circumstances, the forklifts will not present any hazardous or dangerous characteristics during exposure to normal transportation environments.

NOTE

Those regulations and/or transportation procedures normally associated with vehicles powered by combustible liquid fuels apply (TM 38-250, *Code of Federal Regulations,* Titles 46 and 49, and Association of American Railroads, *Rules Governing the Loading of Commodities on Open-Top Cars and Trailers).*

2-8. Sensitivity

The forklifts are so designed that, when restrained in accordance with the guidance contained in this manual, they can withstand the shocks and vibrations associated with current transportation methods.

2–9. CONUS Freight Classification

Rail and motor freight classification descriptions and item numbers will be determined in accordance with chapter 211, AR 55-355. Proper classification and/or descriptions of articles must be determined and provided on the bill of lading before shipments are released to carriers.

Table 2–1. Characteristics and Related Data

Model	Weight		Volume, cu ft (M^3)	
	lb	kg	operational	reduced *
RTL10 (modified)	38,160	17,309	2,248 (63.62)	1,197 (33.87)
RTL10–1 (modified)	38,160	17,309	2,248 (63.62)	1,197 (33.87)
RTL10 (unmodified)	35,600	16,148	2,108 (59.66)	1,197 (33.87)
RTL10–1 (unmodified)	35,600	16,148	2,108 (59.66)	1,197 (33.87)
M10-A	36,520	16,565	2,692 (76.18)	1,623 (45.93)

*Reduced by removing roll-over protective structure, forks, and upright exhaust stacks.

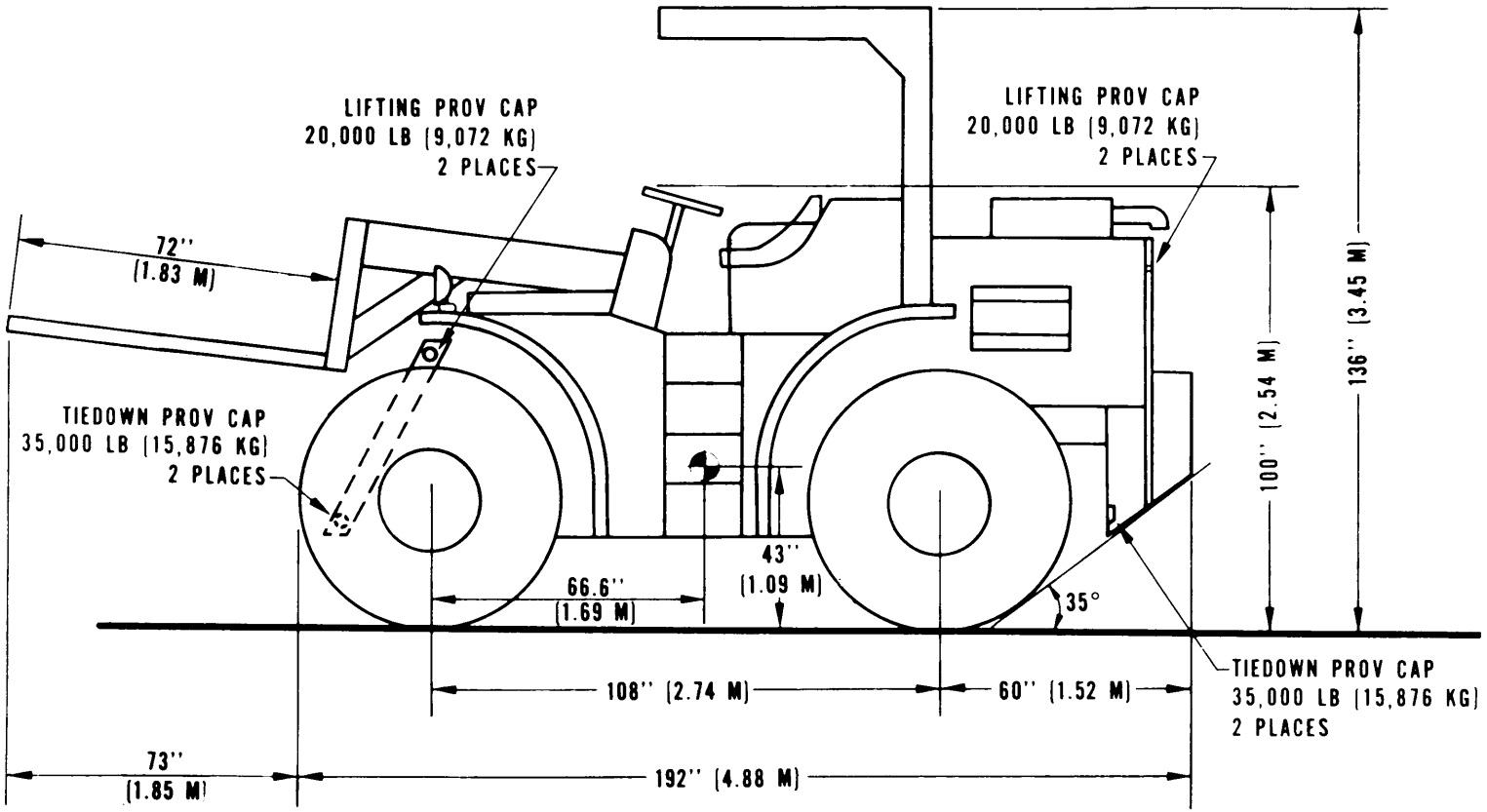


Figure 2–3. Side elevation, truck, forklift, rough-terrain, 10,000-pound-capacity, Pettibone (modified).

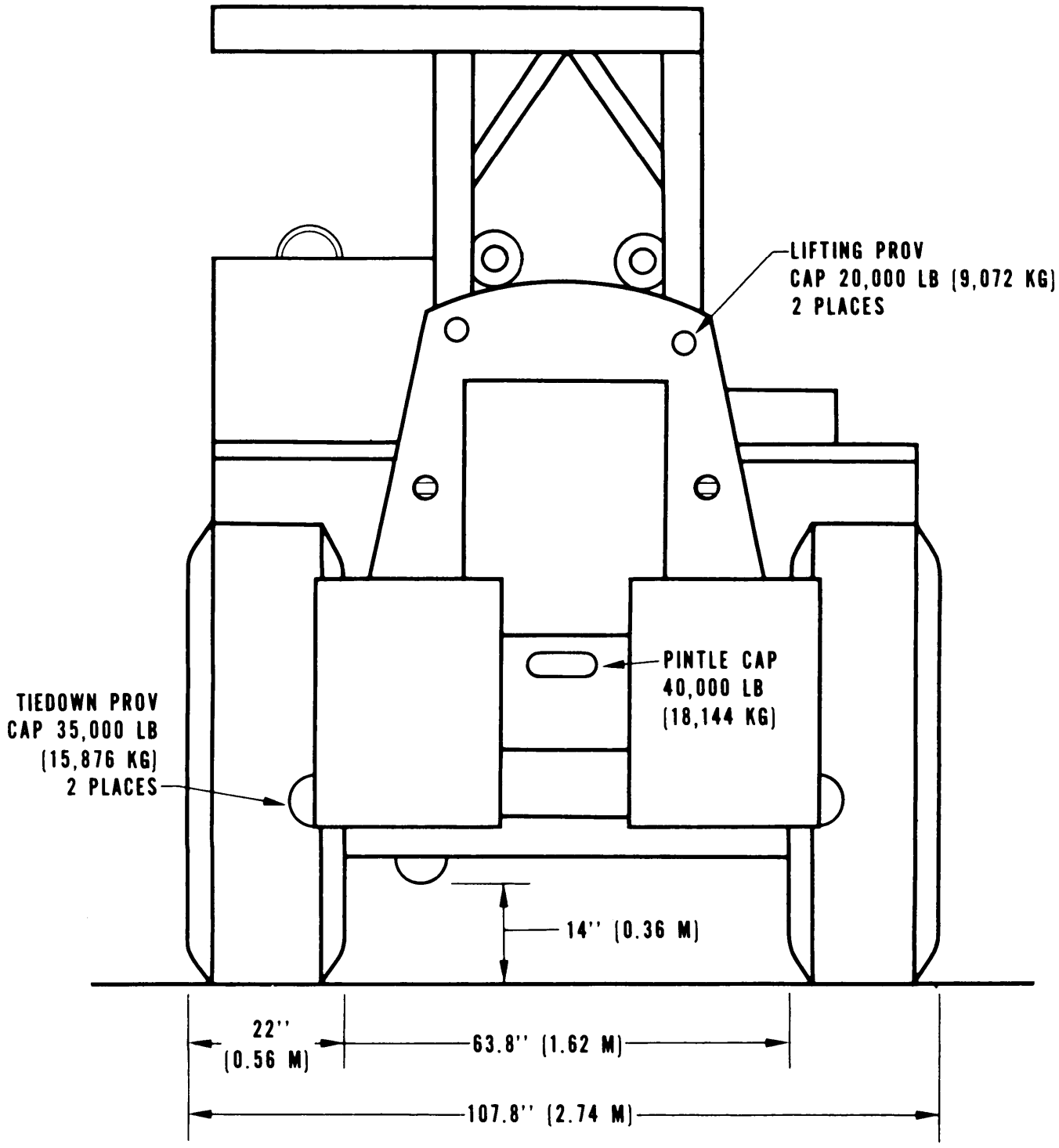


Figure 2-4. Rear elevation, truck, forklift, rough-terrain, 10,000-pound-capacity, Pettibone (modified).

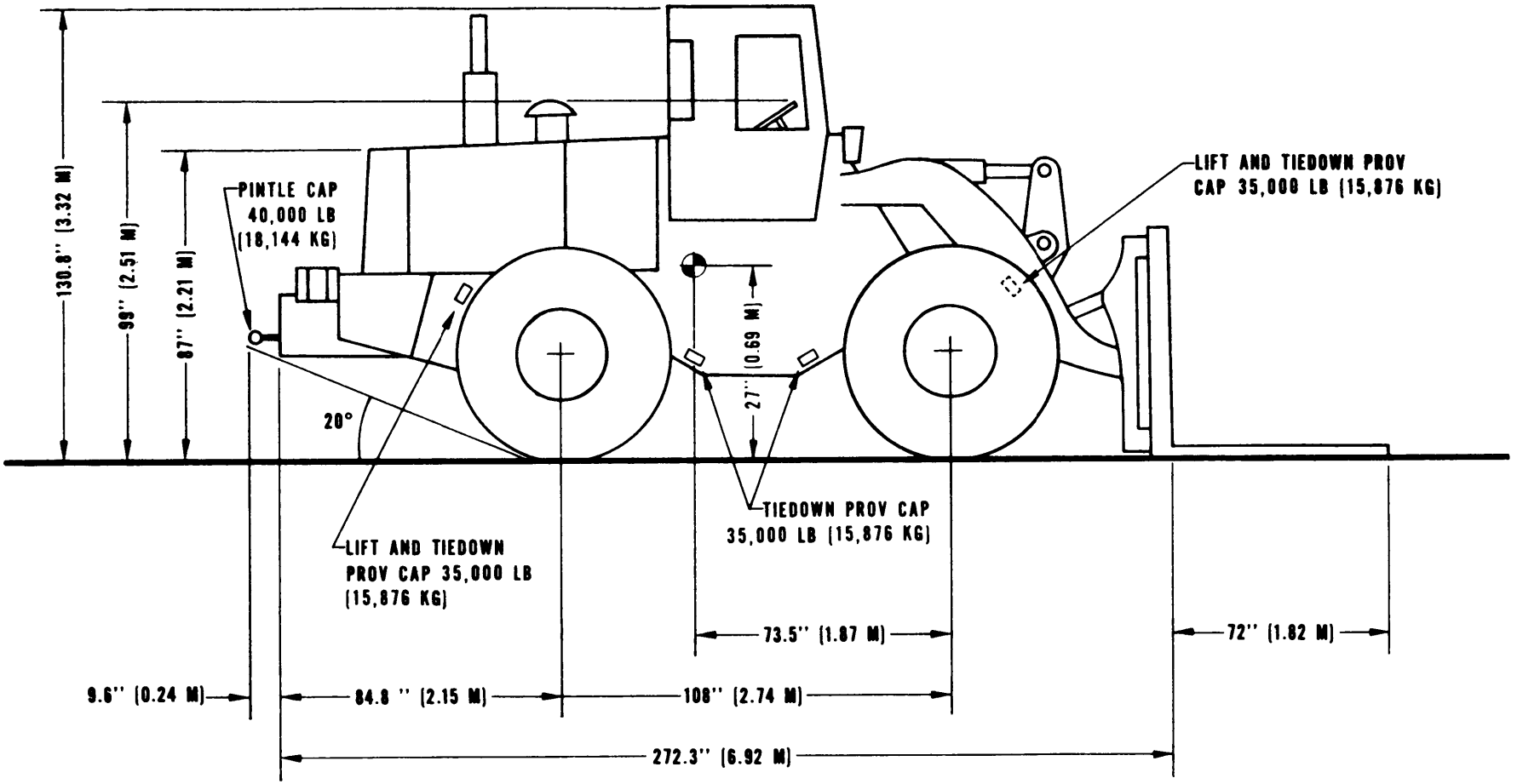


Figure 2–5. Side elevation, truck, forklift, rough-terrain, 10,000-pound-capacity, International Harvester.

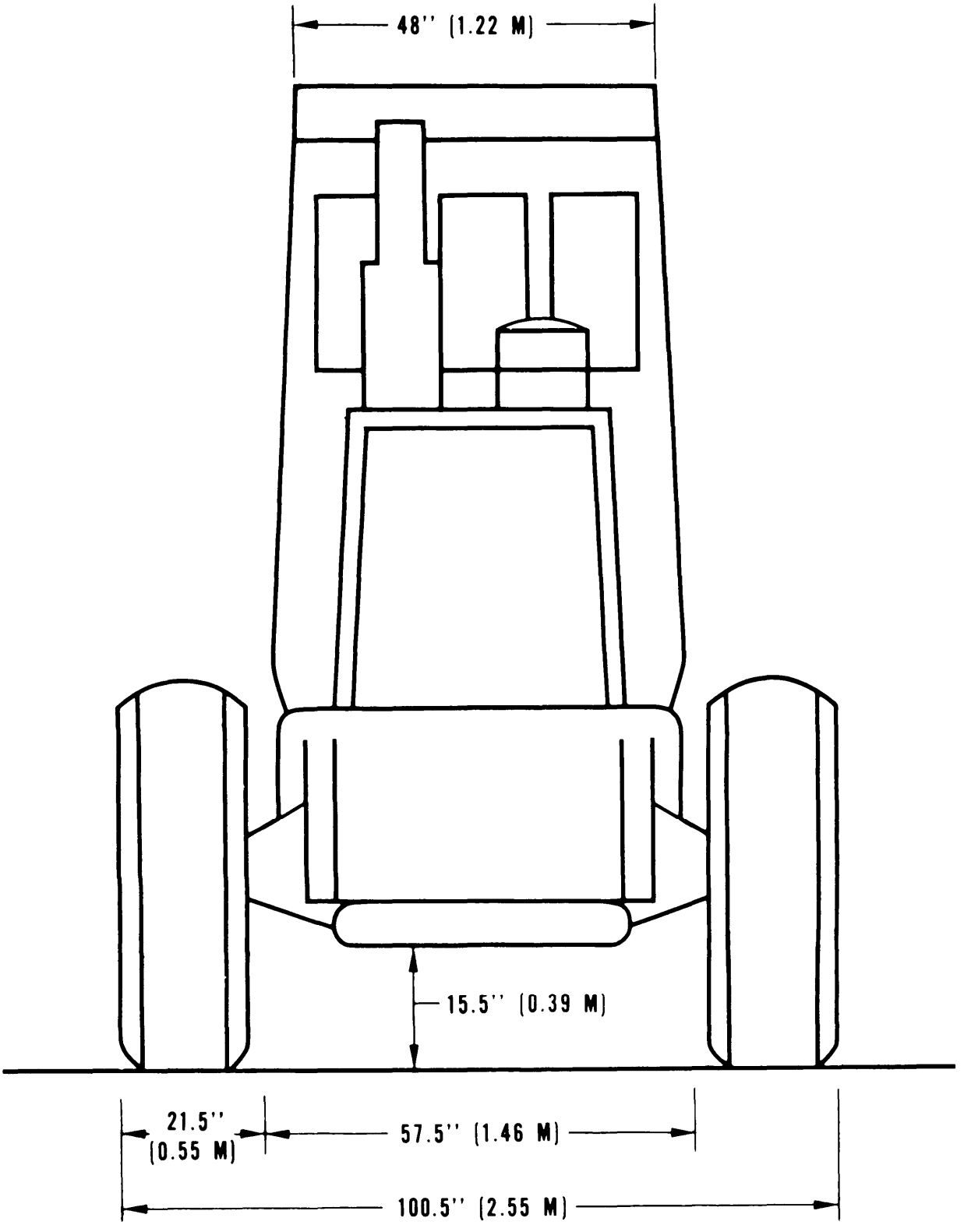


Figure 2-6. Rear elevation, truck, forklift, rough-terrain, 10,000-pound-capacity, International Harvester.

CHAPTER 3

SAFETY

3–1. General

General safety considerations and precautions for movement are as follows:

a. Check each forklift to insure that all loose items are appropriately secured.

b. When backing a forklift, insure that no personnel or obstacles are behind it.

WARNING

Fire extinguishers must be readily available during all loading and unloading operations.

WARNING

Proper ventilation must be provided during loading and unloading operations if forklift engine is operated. Prolonged inhalation of exhaust fumes will produce adverse effects that could prove fatal.

3–2. Specific Safety Requirements

Pertinent safety requirements by individual modes of transport can be found, where applicable, in the appropriate chapters.

CHAPTER 4

AIR TRANSPORTABILITY GUIDANCE

4-1. Scope

This chapter provides transportability guidance for air movement of the forklifts. It covers significant technical and physical characteristics and prescribes the materials required to prepare, load, and secure the forklifts in Air Force aircraft. The RTL10, RTL10-1, and M10-A forklifts, in operational configuration, are certified for transport in C-5A aircraft. They are certified for transport in C-141 aircraft provided that the roll over protective structure (ROPS) and removable counterweights are removed.

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 distance. General guidance on total cargo loads and operating ranges are provided in Air Force Regulation 76-2. For specific guidance contact the nearest Military Airlift Command (MAC) Activity.

4-3. Safety

In addition to the safety precautions listed in Chapter 3, the following should be noted:

a. Forklift fuel tanks must not be less than one-fourth or more than three-fourths full.

b. Forklift must be checked carefully to insure that all loose items are properly secured.

c. Forklift must be restrained for air transport in accordance with the applicable procedures in section IV of Air Force TO 1C-5A-9 or TO 1C-141A–9. Procedures outlined in this manual are for general guidance.

WARNING

Fire extinguishers must be readily available during all loading and unloading operations.

WARNING

Proper ventilation must be provided when loading or unloading. Prolonged inhalation of exhaust fumes may be fatal.

CAUTION

Do not allow the forklift to exceed 3 miles per hour (walking speed) on loading ramps or inside aircraft.

4-4. Preparation of Forklifts

a. All of the forklifts may be transported in the C-5A in their operational configuration.

b. The forklifts may be transported by C-141 provided that the total forklift weight does not exceed 33,600 pounds and the axle weights do not exceed 19,260 pounds on the rear axle and 14,340 pounds on the front axle. The ROPS must be removed, and if required, removable counterweight and forks may be removed. The vertical exhaust stacks must be removed from the RTL10. Items that are removed must be secured on pallets or as directed by the aircraft loadmaster.

4-5. Transport by US Air Force Aircraft

a. Each of the forklifts require four stacks of timber shoring between the floor of the aircraft and the forklift axles or chassis. This shoring is required to support any downward motion of the forklift. If the forklifts are transported with the forks attached, shoring must also be placed underneath the fork tines to protect the aircraft floor.

b. Two stacks of shoring are required under each axle. Each stack under the rear axle must measure at least 11- by 24-inches at the bottom (on aircraft floor), and may be tapered to no less than 11- by 4-inches where they contact the axle. Each stack under the front axle must measure at least 11- by 14-inches at the bottom (on aircraft floor), and may be tapered to no less than 11-by 4-inches where they contact the axle.

c. All shoring material will be furnished by the shipper and installed as directed by the aircraft loadmaster.

d. Tiedown diagrams (figs 4-1 thru 44) and data tables (tables 4-1 thru 4-4) are based on acceptable methods and can be used as a guide in loading and securing forklifts aboard the aircraft. Tables list the type and capacity of tiedown devices re-

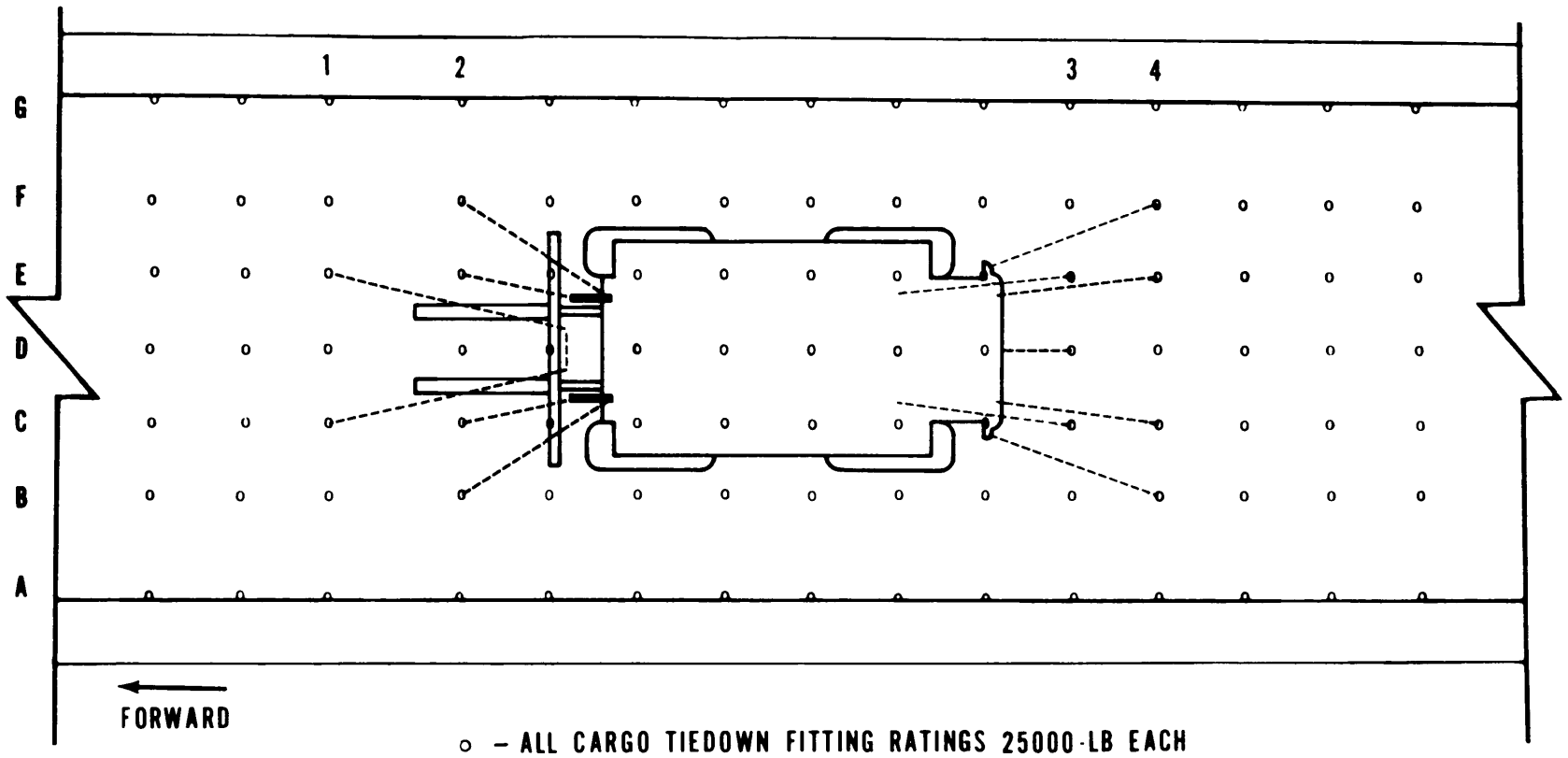
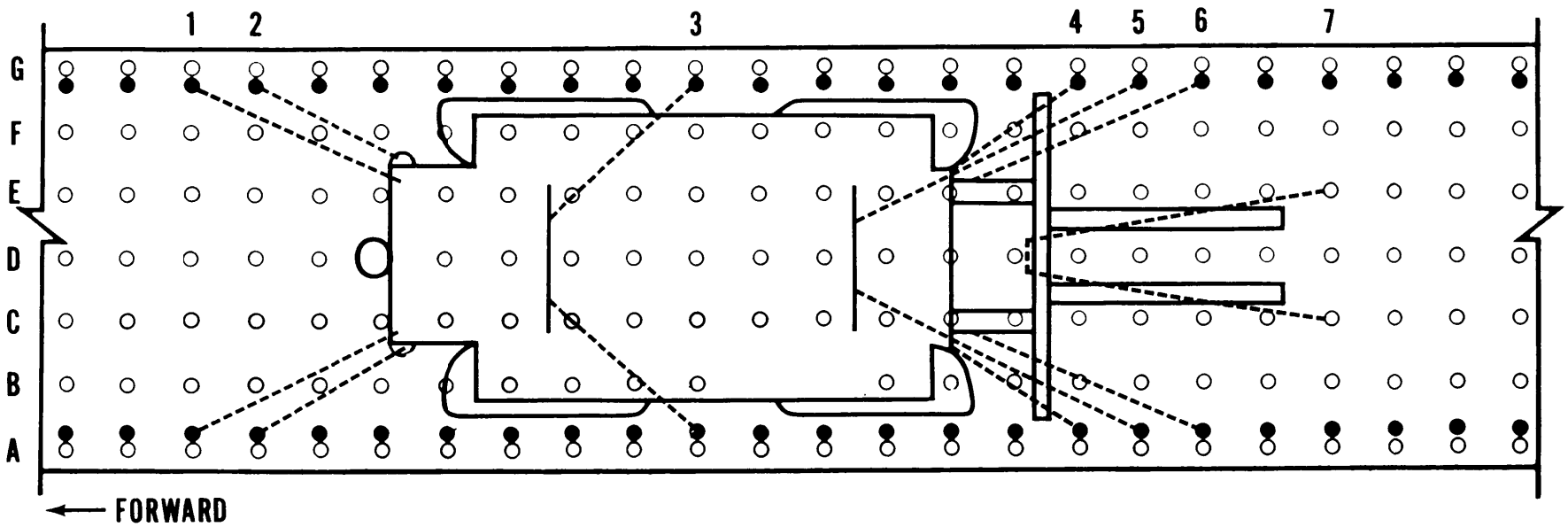


Figure 4–1. Tiedown diagram for RTL10 or RTL10–1 forklift in C–5A aircraft.



SYMBOL	○	●
STRENGTH OF FITTING AND BASIC LOAD DIRECTION	10000 LB ANY	25000 LB ANY

Figure 4–2. Tiedown diagram for RTL10 or RTL10–1 forklift in C–141 aircraft.

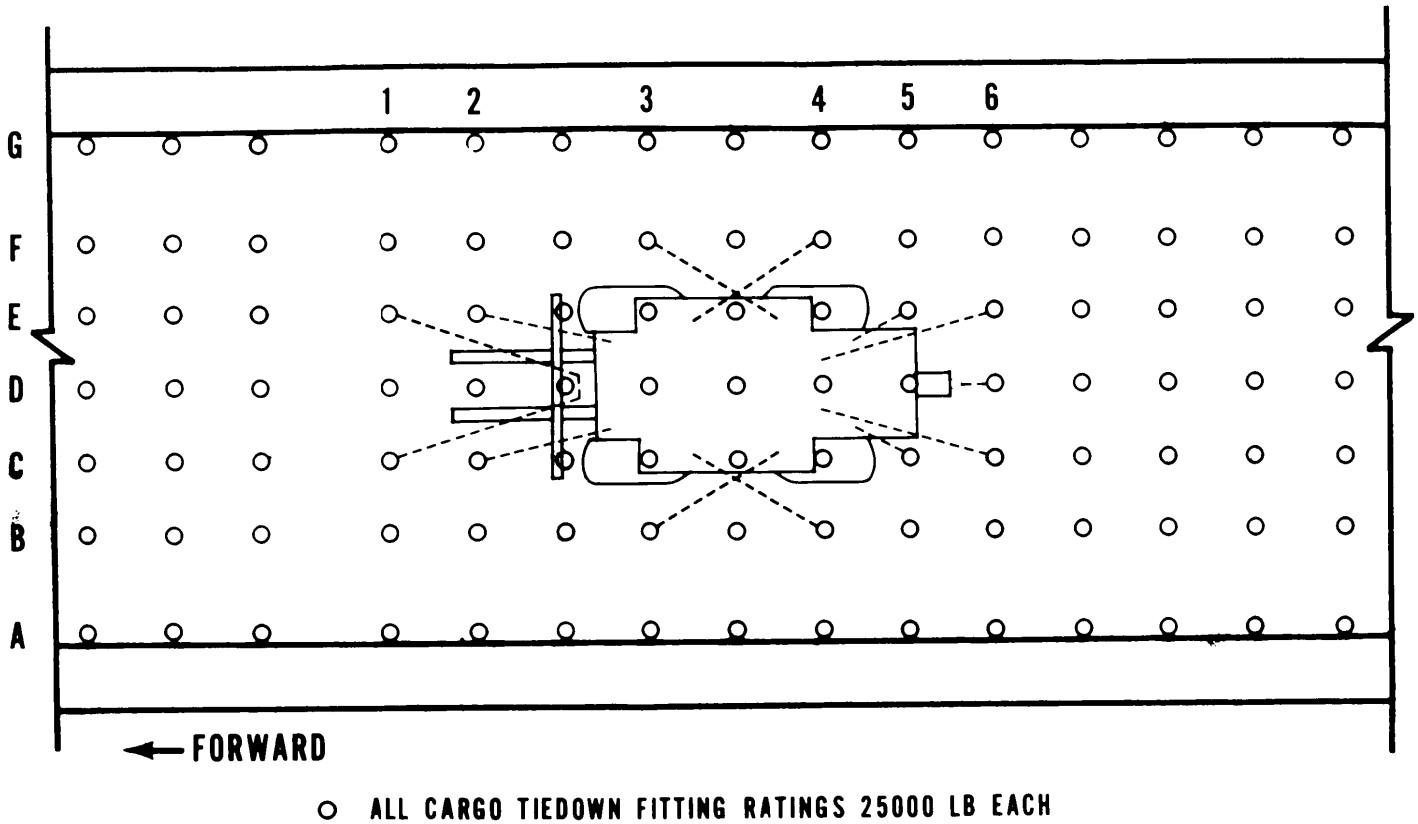
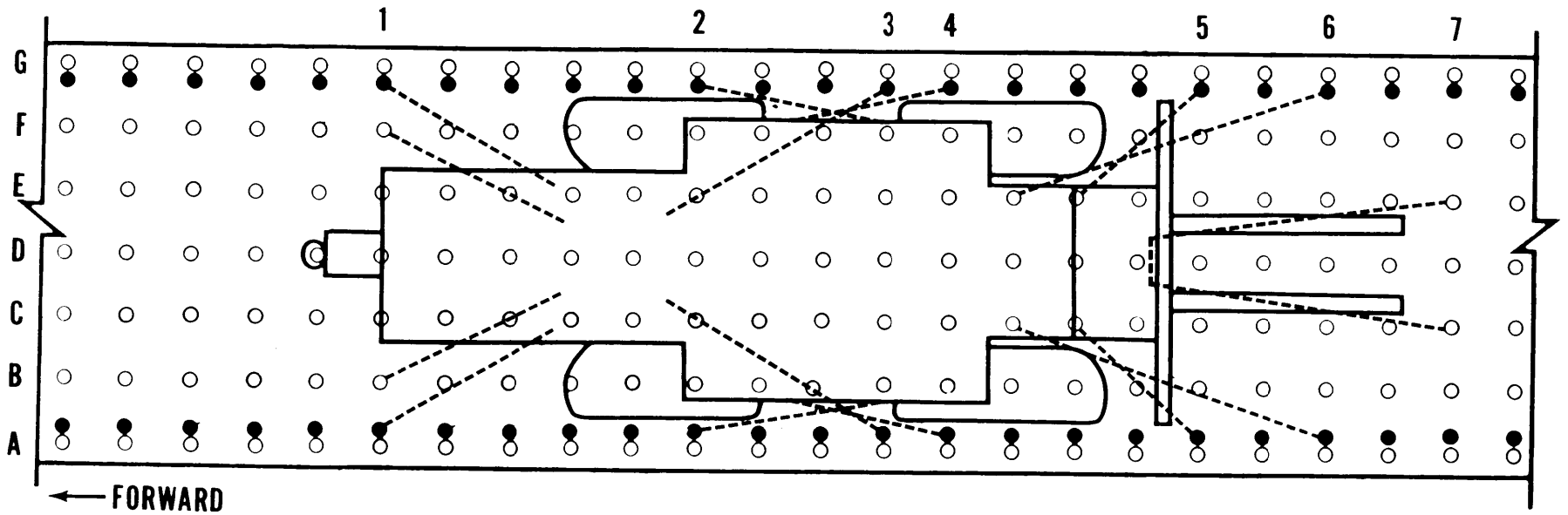


Figure 4–3. Tiedown diagram for M10–A forklift in C–5A aircraft.



SYMBOL	○	●
STRENGTH OF FITTING AND BASIC LOAD DIRECTION	10000 LB ANY	25000 LB ANY

Figure 4–4. Tiedown diagram for M10–A forklift in C–141 aircraft.

Table 4–1. Tiedown Data for RTL10 or RTL10-1 Forklift in C-5A Aircraft

Tiedown fitting		Tiedown device		
designation	capacity in 1,000 lb	type	capacity in 1,000 lb	Attach to item
C1/E1	25	CGU-1/B	.5	Through and behind carriage frame
B2	25	MB-2	25	Left front lifting provision
F2	25	MB-2	25	Right front lifting provision
C2	25	MB-2	25	Left front tiedown provision
E2	25	MB-2	25	Right front tiedown provision
C3	25	MB-2	25	Left rear axle
E3	25	MB-2	25	Right rear axle
D3	25	MB-2	25	Pintle
B4	25	MB-2	25	Left rear tiedown provision
F4	25	MB-2	25	Right rear tiedown provision
C4	25	MB-2	25	Left rear lifting provision
E4	25	MB-2	25	Right rear lifting provision

Table 4-2. Tiedown Data for RTL10 or RTL10-1 Forklift in C–141 Aircraft

Tiedown fitting		Tiedown device		
designation	capacity in 1,000 lb	type	capacity in 1,000 lb	Attach to item
A1	25	MB-2	25	Right rear lifting provision
G1	25	MB-2	25	Left rear lifting provision
A2	25	MB-2	25	Right rear tiedown provision
G2	25	MB-2	25	Left rear tiedown provision
A3	25	MB-2	25	Right rear axle
G3	25	MB-2	25	Left rear axle
A4	25	MB-2	25	Right front lifting provision
G4	25	MB-2	25	Left front lifting provision
A5	25	MB-2	25	Right front axle
G5	25	MB-2	25	Left front axle
A6	25	MB-2	25	Right front tiedown provision
G6	25	MB-2	25	Left front tiedown provision
C7/E7	10	CGU-1/B	5	Through and behind carriage frame

Table 4-3. Tiedown Data for M10-A Forklift in C-5A Aircraft

Tiedown fitting		Tiedown device		
designation	capacity in 1,000 lb	type	capacity in 1,000 lb	Attach to item
C1/E1	25	CGU-1/B	5	Through and behind carriage frame
C2	25	MB-2	25	Left front lifting provision
E2	25	MB-2	25	Right front lifting provision
B3	25	MB-2	25	Left rear tiedown provision
F3	25	MB-2	25	Right rear tiedown provision
B4	25	MB-2	25	Left front tiedown provision
F4	25	MB-2	25	Right front tiedown provision
C5	25	MB-2	25	Left rear lifting provision
E5	25	MB-2	25	Right rear lifting provision
C6	25	MB-2	25	Left rear axle
D6	25	MB-2	25	Pintle
E6	25	MB-2	25	Right rear axle

Table 4–4. Tiedown Data for M10-A Forklift in C-141 Aircraft

Tiedown fitting		Tiedown capacity		
designation	capacity in 1,000 lb	type	capacity in 1,000 lb	Attach to item
A1	25	MB-2	25	Right rear lifting provision
G1	25	MB-2	25	Left rear lifting provision
B1	10	MB-1	25	Right rear axle
F1	10	MB-1	25	Left rear axle
A2	25	MB-2	25	Right front tiedown provision
G2	25	MB-2	25	Left front tiedown provision
A3	25	MB-2	25	Right rear axle
G3	25	MB-2	25	Left rear axle
A4	25	MB-2	25	Right rear tiedown provision
G4	25	MB-2	25	Left rear tiedown provision
A5	25	MB-2	25	Right front lifting provision
G5	25	MB-2	25	Left front lifting provision
A6	25	MB-2	25	Right front axle
G6	25	MB-2	25	Left front axle
C7/E7	10	CGU–1/B	5	Through and behind carriage frame

quired, attachment points on the forklifts, and aircraft fittings to which the devices are secured. The tiedown devices are part of the aircraft equipment.

e. After the forklifts are in final position aboard he aircraft, the transmission must be placed in neutral and the parking brakes set.

NOTE

Air Force aircraft loads depicted in this manual are restrained to the minimum of 3g's forward, 1.5g's aft, 1.5g's lateral, and 2g's vertical. The forward restraint must be increased to 8g's when passengers or nuclear weapons are carried forward of other cargo.

WARNING

Consult TM 38-250 (AFM 71-4) to insure compatibility of any cargo being considered for loading and transport with the forklifts.

4-6. Transport by US Army Aircraft

The forklifts exceed size and weight limitations for transport by US Army fixed- or rotary-wing aircraft.

CHAPTER 5

HIGHWAY TRANSPORTABILITY GUIDANCE

Section I. GENERAL

5-1. Scope

This chapter provides transportability guidance for highway movement of the forklifts. It covers significant technical and physical characteristics and safety considerations and prescribes the materials required to load the forklifts on semitrailers.

5-2. Safety

In addition to safety precautions contained in chapter 3, CONUS movement is subject to all safety laws, rules, and regulations applicable to commercial carriers. In oversea areas, movements are governed by theater regulations.

CAUTION

Do not allow forklifts to exceed 3 miles per hour (walking speed) during loading or unloading operations.

5-3. General

The forklifts are considered self-deliverable only under appropriate tactical situations. In CONUS, vehicles exceeding the legal width limitation of 96 inches require special permits. With the roll-over protective structure installed, the forklift height may require special routing in oversea areas. The procedures for obtaining special permits in CONUS are outlined in AR 55-162. Legal limitations of oversea areas are identified in "Limits of Motor Vehicle Sizes and Weights," *International Road Federation, 1023* Washington Building, Washington, DC 20005.

Section II. TRANSPORT BY SEMITRAILERS

5-4 Preparation

a. The roll-over protective structure should be removed and secured on or with the forklift.

b. Loose items should be secured on or within the forklift.

5-5. Transport on Semitrailer

When loaded on semitrailers, the forklifts may be transported over highways. Movement over public highways in CONUS and overseas should be made only when other modes of transport are not available or practical. Highway shipments may be made using either military or commercial lowbed semitrailers of adequate capacity and size (20-ton rein). Tractors and semitrailers used to transport the forklift normally exceed length, width, height, or weight limitations in CONUS and overseas.

5-6. Transport on Semitrailer, M172A1

a. General. For purposes of illustration, the forklifts are shown as typical loads on the semitrailer, M172A1 (figs 5-1 thru 5-4).

b. Material. Adequate tiedown chains and binders for securing the forklifts are normally carried aboard the trailer, M172A1, as basic issue items. Materials for blocks are listed in tables 5-1 and 5-3. Applications of tiedowns and blocks are listed in tables 5-2 and 5-4.

c. Loading.

WARNING

At no time during loading operations should personnel, other than driver of forklift, be on trailer bed.

Warning

Loading should not be conducted on side or lateral slopes exceeding 10 percent or with a tractor-to-trailer offset angle greater than 5 degrees. Avoid loading on a severe downgrade to prevent the payload from rolling forward on the trailer.

(1) Place trailer loading ramps in position at rear of trailer.

(2) Drive or winch forklift into place on the trailer. The forklift may also be placed on the

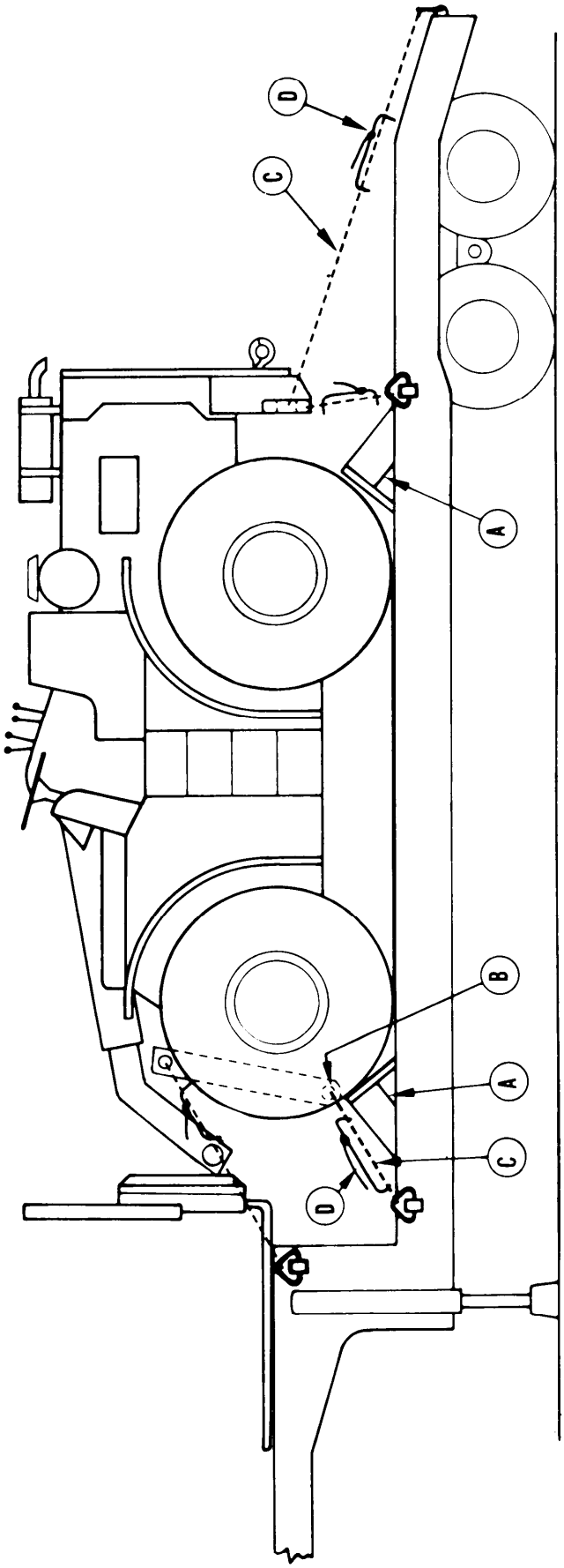


Figure 5–1. Blocking and tiedown of RTL10 or RTL10–1 forklift on semitrailer, M172A1.

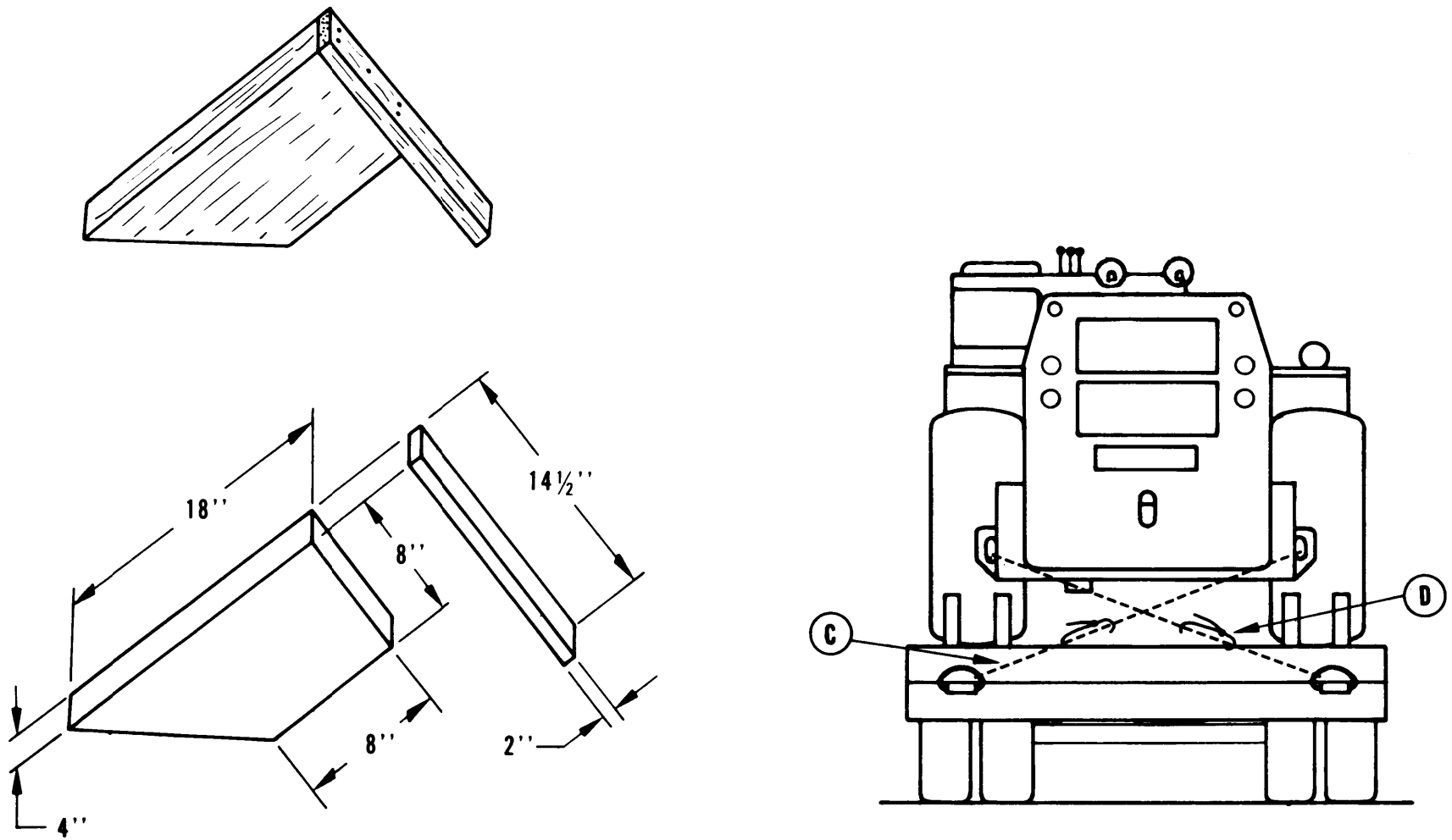


Figure 5–2. Block detail and rear view of blocking and tiedown of RTL10 or RTL10–1 forklift on semitrailer, M172A1.

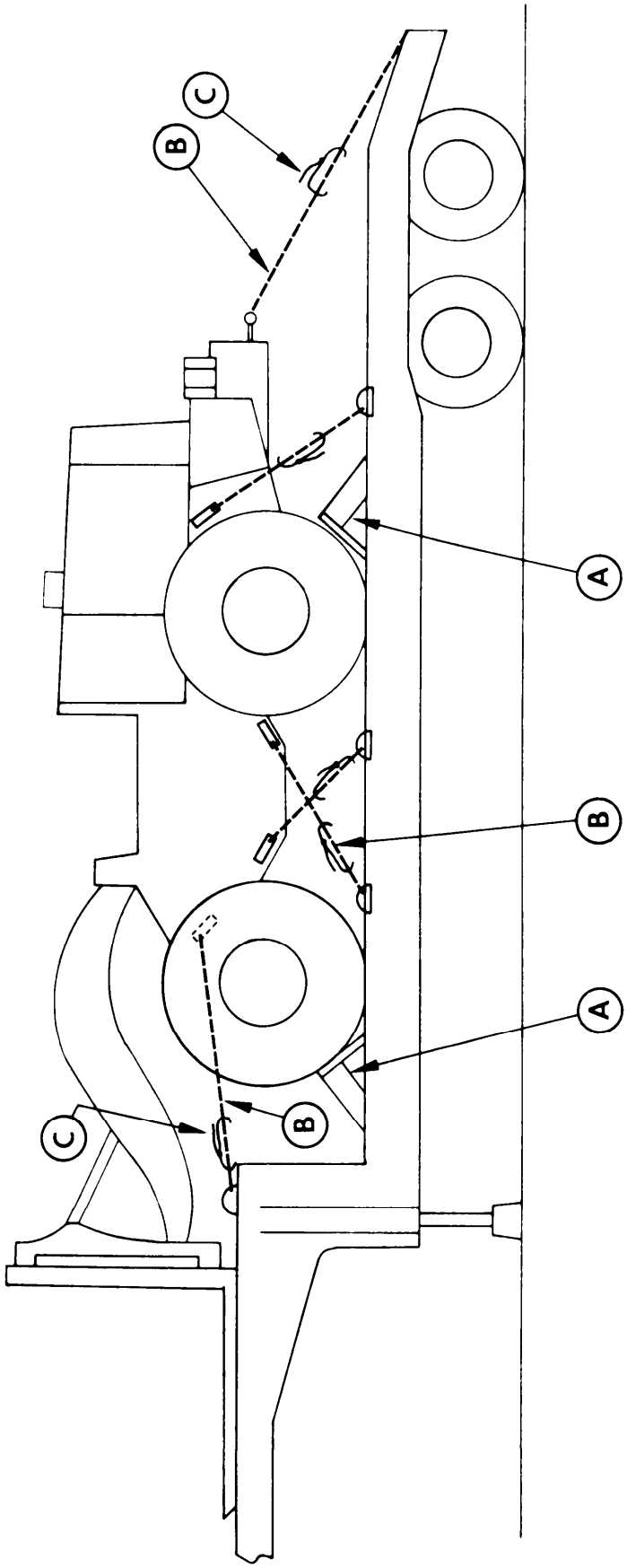


Figure 5–3. Blocking and tiedown of M10–A forklift on semitrailer, M172A1.

trailer by a crane of adequate capacity (20-ton min).

(3) Place and wire-tie forklift transmission in neutral position. Set parking brake.

d. Tiedowns. Figures 5-1 thru 5-4 provide diagrams of tiedowns that are compatible with standard loading practices and will adequately restrain the load against forces encountered at normal speeds and operating conditions. Figure 5-5 gives a turning diagram for a semitrailer, M172A1, towed by a trucktractor, M123E2.

CAUTION

When using the tow pintle as a tiedown (fig 5–4), insure that the pintle is locked with the locking pin.

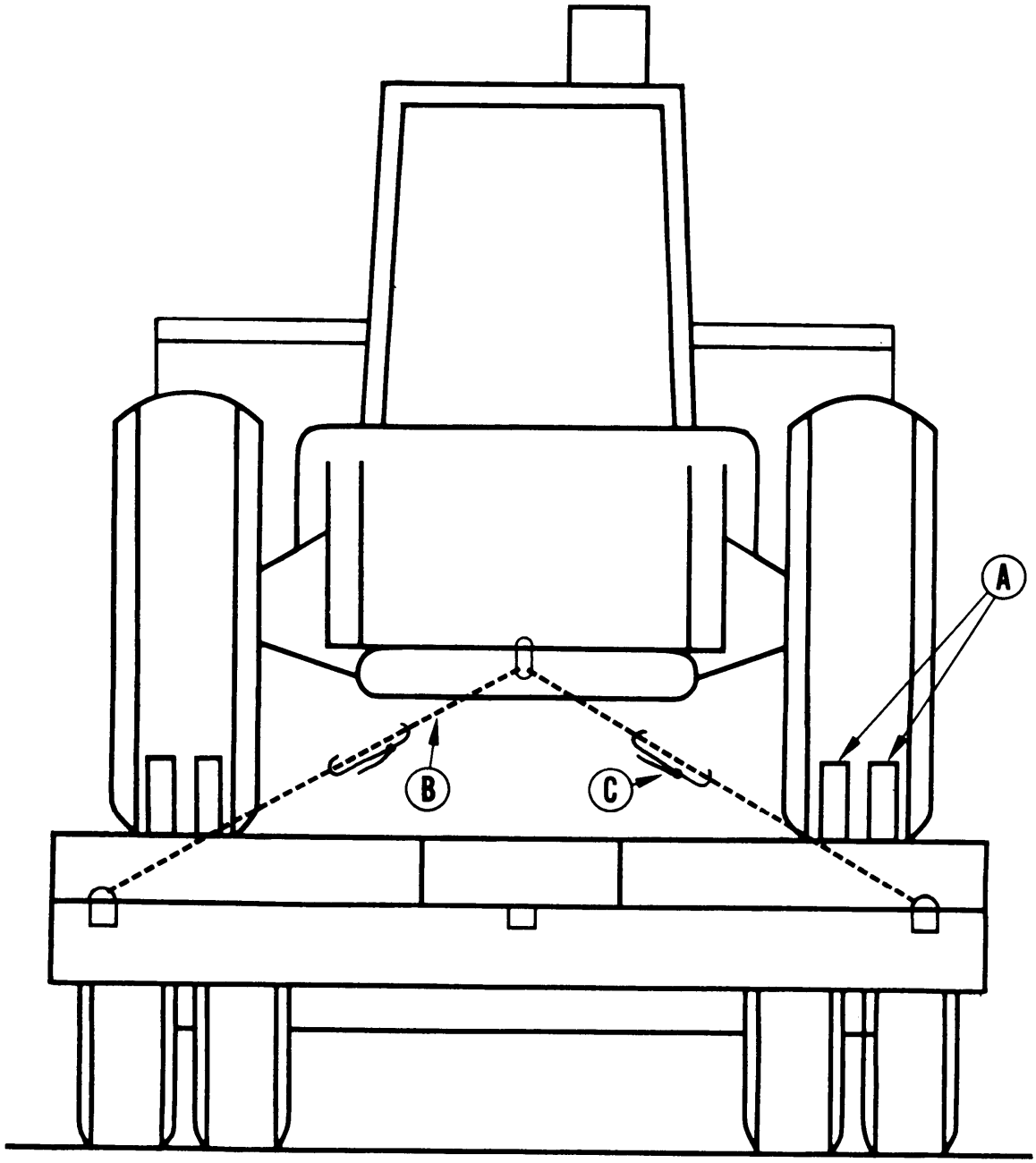


Figure 5-4. *Blocking and tiedown of M10–A forklift on semitrailer, M172A1 (rear view).*

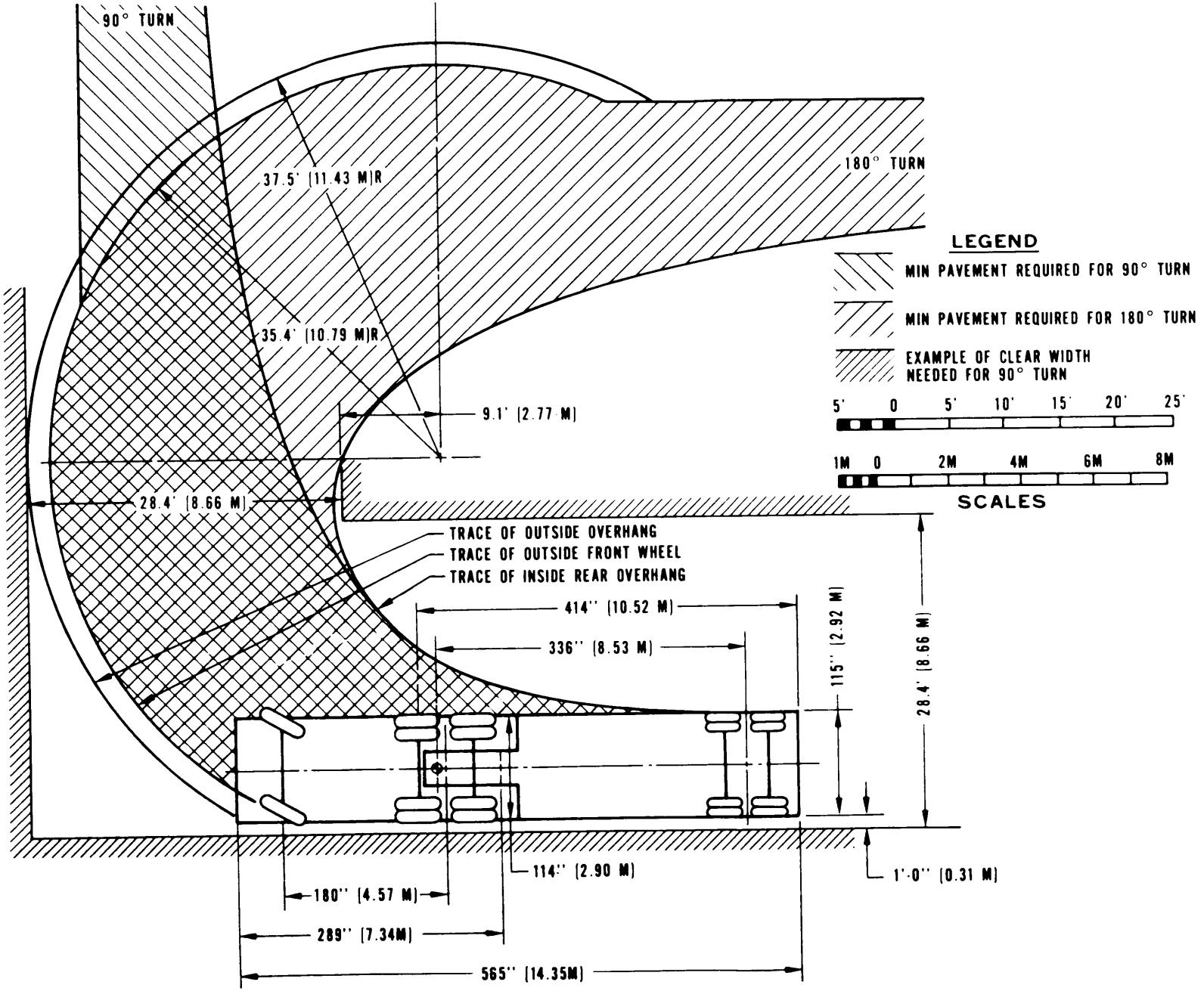


Figure 5–5. Turning diagram for semitrailer, M172A1, towed by truck-tractor, M123E2.

Table 5-1. Bill of Materials for Blocking and Tiedown of RTL10 or RTL10–1 Forklift on Semitrailer, M172A1 (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–751H:	
	2– x 4–inch	10 linear ft
	4– x 8-inch	9 linear ft
Nails	Common, steel; flathead; bright; table XI–b, Fed Spec FF–N–105B:	
	16d	40
	20d	8
	40d	40
	60d	16
Chain*	Load-lashing; ½-in. x 10-ft, with grabhooks; NSN 4010-00–803–8858	8
Loadbinder*	Double-hook, heavy-duty, 4–in., eccentric takeup with chain grabhooks, for ¼– to ½-in. chain, with 2 swivels; NSN 3990-00-274-6746	8
Shackles	Anchor, screw pin, 1–inch pin size; NSN 4030-00-542-3182	4

*Items normally carried in semitrailer, M172A1, as basic issue items.

Table 5–2. Application of Materials for Blocking and Tiedown of RTL10 or RTL10–1 Forklift on Semitrailer, M172A1 (Figs 5-1 and 5–2)

Item	No. required	Application
A	8	Chock block (block detail, fig 5-2). Locate 2- x 4-in. portion against wheels. Two blocks in front of each wheel and two blocks in rear of each wheel. Nail each block to semitrailer with one 20d, two 60d, and three 40d nails in heel and one 40d nail in each side of block.
B	4	Shackle. Attach one shackle to each front tiedown and lifting provision.
C	8	Chain. Attach one chain to shackle on left front tiedown provision and to right front trailer tiedown ring. Attach one chain to shackle on right front tiedown provision and to left front trailer tiedown ring. Attach one chain to shackle on left front lifting provision and to left trailer gooseneck tiedown ring. Repeat on right side. Attach one chain to left rear tiedown provision and to right rear trailer tiedown ring. Attach one chain to right rear tiedown provision and to left rear trailer tiedown ring. Attach another chain to left rear tiedown provision and to left side trailer tiedown ring. Repeat on right side.
D	8	Loadbinder. Attach one to each item C and tighten.

Table 5-3. Bill of Materials for Blocking and Tiedown of M10–A Forklift on Semitrailer, M172A1 (Figs 5-3 and 5–4)

Item	Description	Approximate quantity
Lumber	Douglas fir, or comparable, straight-grain, free from material defects; Fed Spec MM–L–751H:	
	2- x 4-inch	10 linear ft
	4- x 8-inch	9 linear ft
Nails	Common, steel; bright; table XI–b, Fed Spec FF–N–105B:	
	16d	40
	20d	8
	40d	40
	60d	16
Chain *	Load-lashing, ½-in. x 10-ft, with grabhooks; NSN 4010–00–803–8858	10
Loadbinder*	Double-hook, heavy-duty, 4–in., eccentric takeup with chain grabhooks, for ¼- to ½-in. chain, with two swivels; NSN 3990-00-274-6746	10

*Items normally carried on semitrailer, M172A1, as basic issue items.

Table 5–4. Application of Materials for Blocking and Tiedown of M10–A Forklift on Semitrailer, M172A (Figs 5-3 and 5–4)

Item	No. required	Application
A	8	Chock block (block detail, fig 5-2). Locate 2- x 4-in. portion against wheels. Two blocks in front of each front wheel and two blocks in rear of each rear wheel. Nail each block to semitrailer deck with one 20d, two 60d, and three 40d nails in heel and one 40d nail in each side of block.
B	10	Chain. Attach a chain from each front forklift lifting provision to trailer tiedown rings on trailer gooseneck. Attach a chain from each rear lifting provision and from each side tiedown provision to trailer tiedown rings. Attach two chains from forklift towing pintle to rear trailer tiedown rings.
C	10	Loadbinder. Attach one to each chain (item B) and tighten.

CHAPTER 6

MARINE AND TERMINAL TRANSPORTABILITY GUIDANCE

Section I. GENERAL

6-1. Scope

This chapter provides transportability guidance for marine and terminal movement of the forklifts. It covers significant technical and physical characteristics and safety considerations and prescribes the materials and guidance required to prepare, lift, tie down, and discharge the forklifts.

6-2. Safety

In addition to the safety precautions contained in chapter 3, the following should be noted as applicable:

a. Fire extinguishers must be available during all loading and unloading operations.

b. Vessel equipment and gear should be inspected before being used.

c. Stevedore slings and other items used in the loading and discharging operations should be inspected for condition and adequate capacity.

d. Personnel should be forbidden from walking under vehicles being lifted.

e. Lifting eyes and shackles on each forklift should be inspected to insure that they are complete and not damaged.

f. All lifts should have at least two tag lines attached to control the swing of the forklift while suspended.

g. When loading forklift under its own power, insure that fork tines are in a raised position to avoid damage to forklift or vessel.

6-3. Water Shipment

The forklifts can be transported by a variety of inland-waterway carriers and lighters and by most seagoing cargo vessels.

NOTE

The methods described in this chapter for lifting and securing the forklift are suggested procedures. Other methods of handling and stowage may be used provided they will insure safe delivery without damage.

Section II. LOADING AND SECURING

6-4. General Rules

a. Stowage. Whenever possible forklifts should receive the protection of below-deck stowage. In general, good stowage of the forklifts means having them placed as close together as practical, facing fore and aft, with minimum space between outer forklifts and sweatboards (approximately 4 to 6 inches). Breakable parts should be protected, spare parts stowed in or near parent vehicle, brakes set with brake lever wire-tied, and the transmission engaged.

b. Lifting. The RTL10 and RTL10-1 forklifts have four lifting eyes. Two are located on top of the fork carriage guide and two are at the upper corners of the radiator guard. The M10-A has four lifting eyes, located behind and near the top of each wheel. Typical lifting diagrams are shown in figures 6-1 and 6-2.

c. Loading. Forklifts will be loaded on cargo vessels in their minimum configuration as described in paragraph 2-5. They may be loaded in operational configuration, aboard landing craft, beach discharge lighters, and amphibious lighters under their own power or by a crane of adequate capacity. The forklifts can also be loaded under their own power onto the decks of barges from a pier when tidal conditions are suitable and ramps are available. They may be loaded onto seagoing vessels by shoreside or floating cranes of adequate capacity or by heavy-lift ship's gear.

6-5. General Cargo and Barge-Type (LASH and SEABEE) Ships

NOTE

Forklift fuel tanks must be drained and battery terminals must be disconnected and taped.

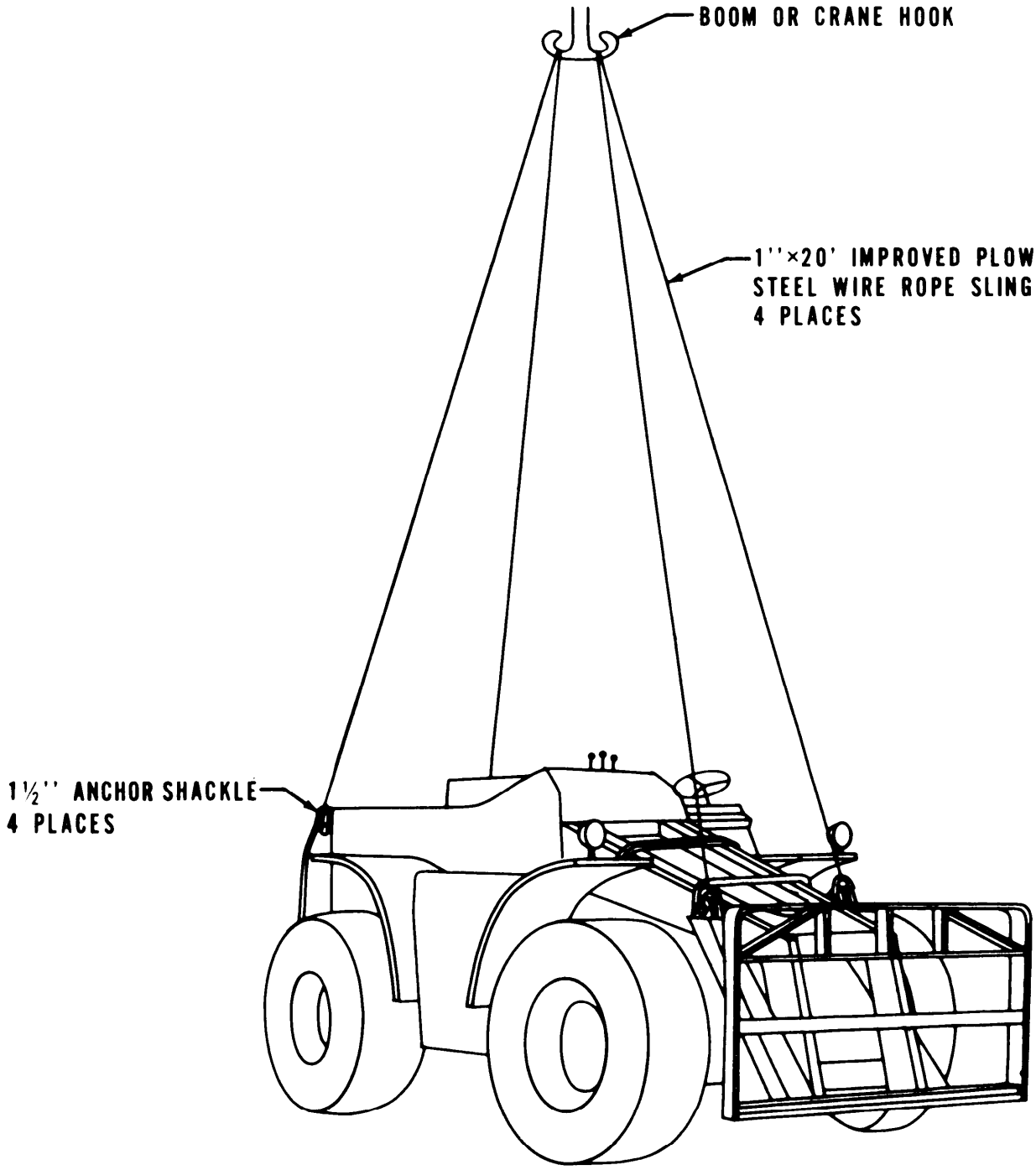


Figure 6–1. Lifting diagram for RTL10 or RTL10–1 forklift using a four-legged bridle sling.

a. Lighterage. When transporting the forklifts by lighterage to or from vessels, blocking will be required. When transporting extended distances or through rough water, tiedown must also be used.

b. Securing. Requirements for securing the forklifts aboard general-cargo and barge-type vessels is essentially the same. The forklifts are secured by blocking the wheels front, rear, and on both sides; lash with wire rope or chains to bulkheads, stanchions, or padeyes. Figure 6-3 shows typical blocking and tiedown details. Materials for blocking and tiedown are listed in table 6-1. Application of materials is shown in table 6-2.

c. Stowage in barges. Figure 6-4 shows the arrangement for stowing 12 RTL10 or RTL10-1 forklifts in barge-type vessels. Because of their length, only nine M10-A forklifts can be loaded.

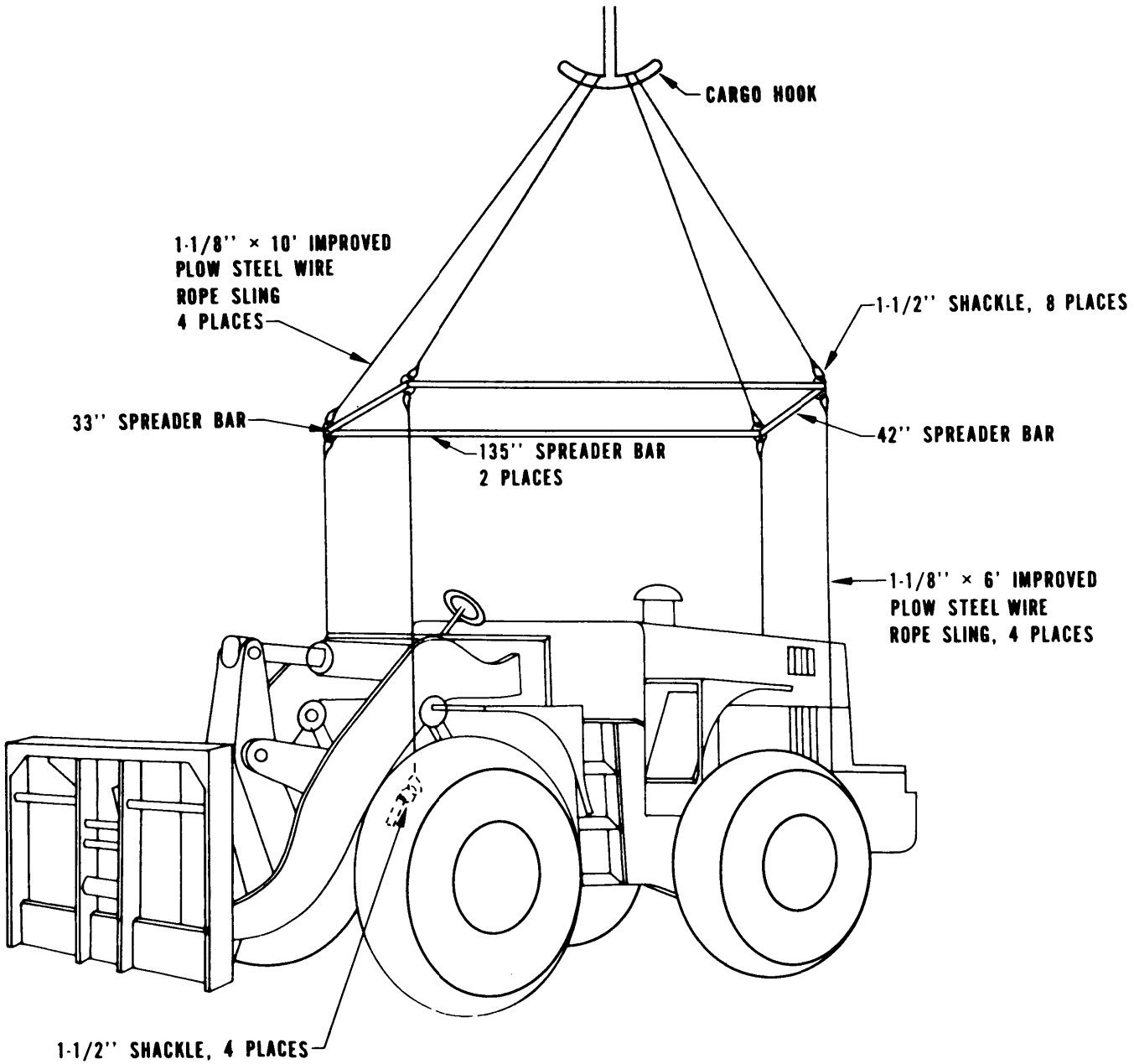


Figure 6–2. Lifting diagram for M10–A forklift using an eight-wire sling and four spreader bars.

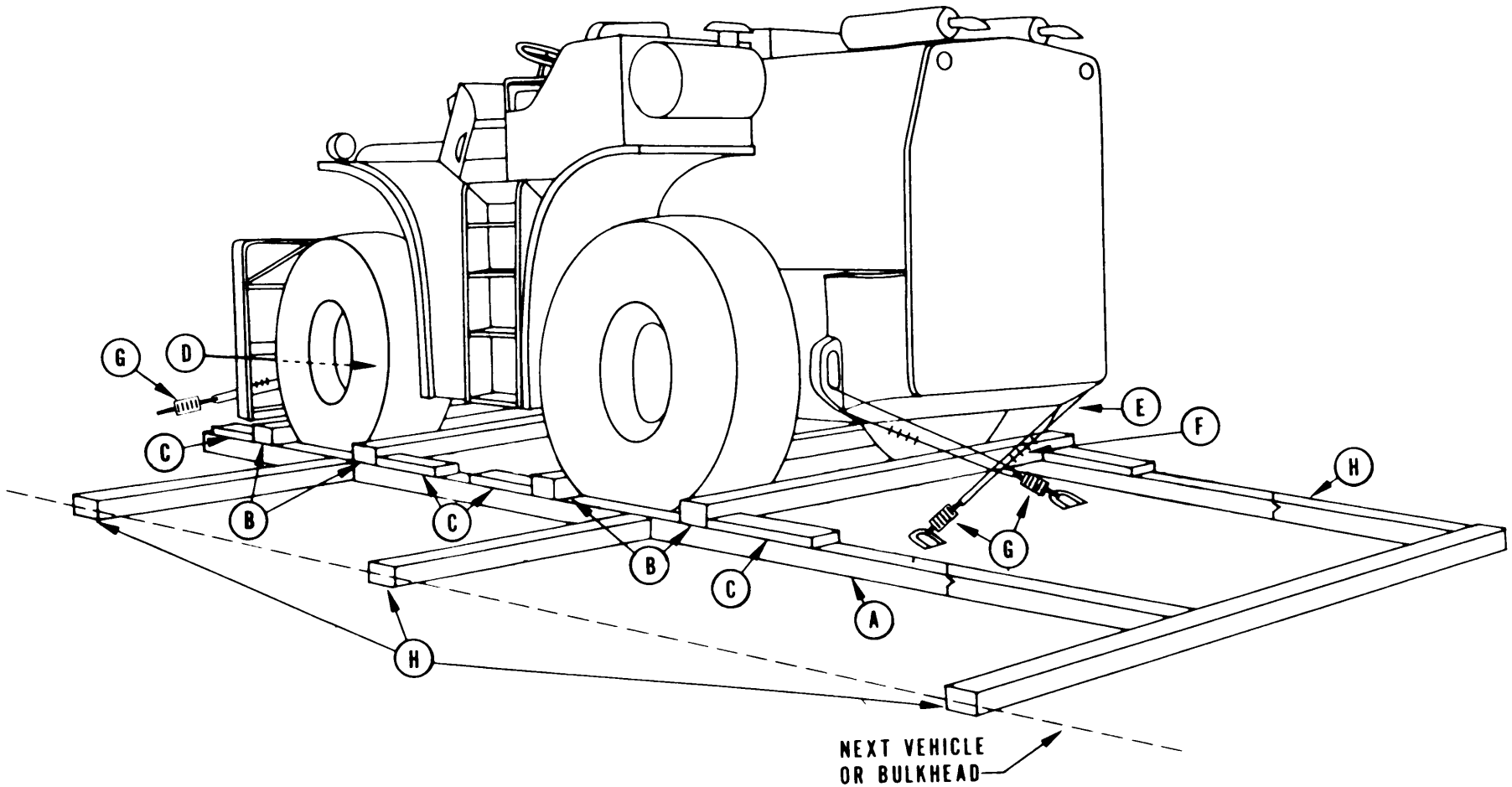


Figure 6–3. Typical blocking and tiedown of forklift in general-cargo and barge-type vessels.

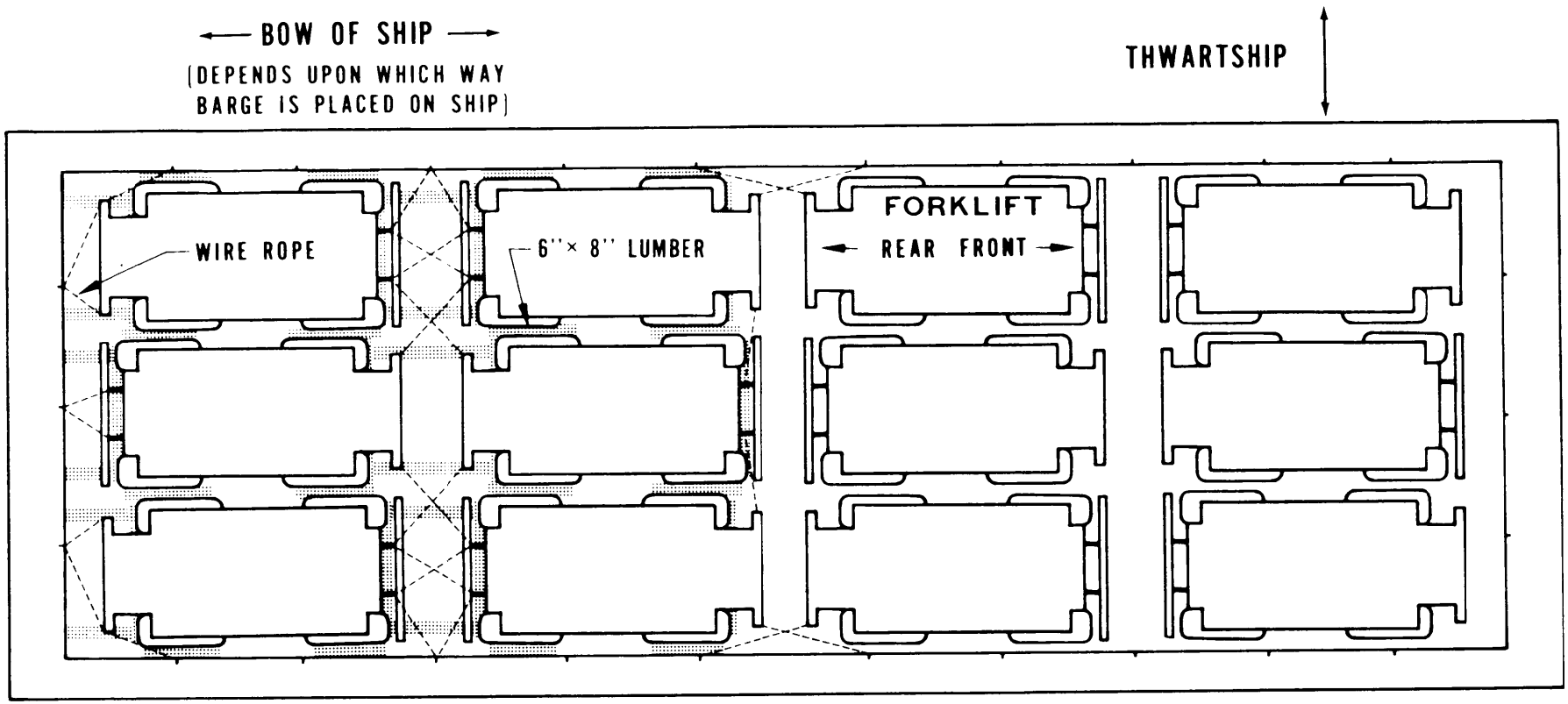


Figure 6–4. Loading of forklifts on SEABEE barge.

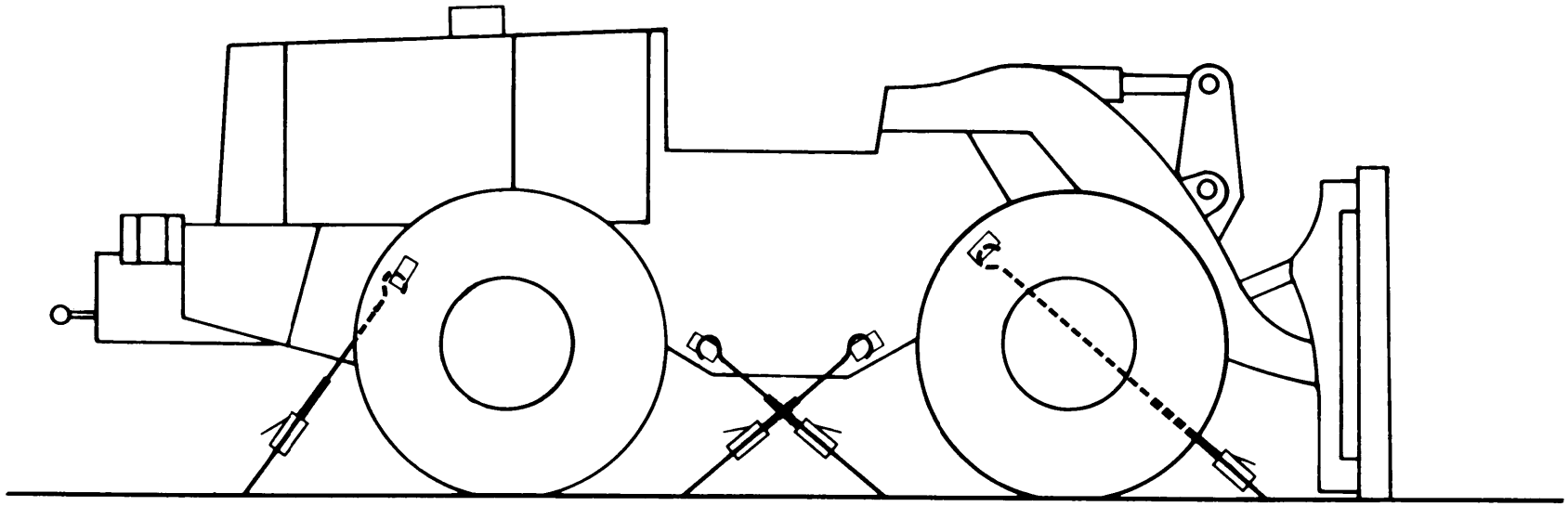


Figure 6–5. Typical tiedown of forklift on RORO vessel.

Barge stability is noticeably affected by the loading of heavy items. The forklifts should be loaded symmetrically in sequence about the center line of the barge. The forklifts should be loaded in a manner to counterbalance variations in centers of gravity; that is, alternate head to tail.

6-6. Roll-on/Roll-off (RORO), Seatrain, Landing, and Attack Cargo Ships.

NOTE

When forklifts are loaded on vessels that are adequately ventilated by power blowers, such as RORO vessels, the fuel need not be drained and batteries need not be disconnected.

a. Loading. The forklifts can be loaded under their own power or be towed aboard vessels having roll-on capability.

b. Securing. RORO, Seatrain, landing, and attack cargo ships are equipped with patented lashing gear and pre-positioned fittings in the deck. The use of such equipment is adequate, and blocking and bracing are not required. Figure 6-5 shows typical tiedown details for a forklift aboard a RORO vessel using eight 35,000-pound-capacity (M–35) lashings.

Table 6–1. Bill of Materials for Blocking and Tiedown of Typical Forklift in General-Cargo Vessel (Fig 6-3)

Item	Description	Approximate quantity
Turnbuckles	Eye-and-jaw-type, 1–in. dia. x 18-in. takeup, NSN 5340–00–188–0341, or equal	4
Lumber	Douglas fir, or comparable, straight-grain, free from material defects; Fed Spec MM–L-751H:	
	4– x 6-inch	8 linear ft
	6- x 8-inch	70 linear ft
Nails	Common, steel; flathead; bright or cement-coated; table XI–b, Fed Spec FF-N-105B: 40d	80
Wire rope	6 x 9, IWRC; improved plow steel; preformed, regular-lay; table X, Fed Spec RR–W-410C: 5/8-in,	60 ft
Clamps	Wire rope, U-bolt clips, saddle, single-grip, steel, Crosby heavy-duty, or equal; MIL-STD 16842: 5/8–in.	16
Shackles*	Anchor, screw pin, 1" pin size; NSN 4030-00-542-3182, or equal (for front tiedown provisions).	2

*Required only for RTL10 and RTL10–1 forklifts.

6-7. Landing Craft and Amphibians.

When transporting the forklifts for extended distances or through rough waters, blocking and tiedowns must be used. In most cases, landing craft and amphibians are equipped with lashings and deck fittings. When not provided, a suitable substitute may be used.

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

Item	No. required	Application
A	2	Side blocking. Each consists of 6- x 8- x 192—in.* lumber. Locate one piece on each side of forklift against outside of tires.
B	4	End blocking. Each consists of 6- x 8- x 110–in.* lumber. Locate on top of item A and against front of front wheels and rear of rear wheels. Toenail to item A with four 40d nails at each end of each piece.
C	8	Backup cleats. Each consists of 4- x 6- x 12–in. lumber. Locate one on top of each item A against item B. Nail to item A with four 40d nails.
D	2	Shackles. Secure one shackle to each front tiedown provision. (RTL10 and RTL10-1 only.)
E	4	Wire rope. Form a complete loop through each forklift tiedown provision and the eye of a turnbuckle. On the RTL10 and RTL10–1, front loop will be through item D. The M10–A forklift has two sets of tiedowns; either set may be used. Overlap wire rope ends at least 24 inches.
F	16	Clamps. Place four on each wire rope at the overlap area, and space 3-¾ inches apart, with a minimum of 6 inches from ends of wire rope. Tighten so that wire rope cannot slip.
G	4	Turnbuckles. Attach jaw end to padeye built into vessel deck. Tighten as required.
H	as required	Bracing. Consists of 6- x 8-in. lumber, length cut-to-fit. Brace as required against adjacent vehicle, cargo, or vessel bulkhead. Secure each end of each piece to adjacent blocking by toenailing with four 40d nails. Lumber and nails for this requirement are not included in table 6-1.

*Approximate lengths. May be cut length-to-suit.

CHAPTER 7

RAIL TRANSPORTABILITY GUIDANCE

Section I. GENERAL

7–1. Scope

This chapter provides transportability guidance for rail movement of the forklifts. It covers significant technical and physical characteristics and safety considerations and prescribes the materials and guidance required to load and tiedown the forklifts on open-top flatcars.

7–2. Maximum Use of Railcars

Additional cargo, as approved by the activity offering the forklifts for transport, may be transported with the forklifts.

Section II. TRANSPORT ON CONUS RAILWAY

7-3. General

The transportability guidance contained in this section is applicable when the forklifts are transported on CONUS railways. Consideration is given to single and multiple movements on the types of railcars normally used for the transport of this type of equipment. When reduced to their minimum height, as shown in figures 2-3 and 2–5, the forklifts can be transported without restriction and without sectionalization or major disassembly.

7-4. Preparation

The degree of preparation of the forklifts for transport depends on the operational commitment. As a minimum, the forklifts should be reduced as outlined in paragraph 2–5.

7–5. Loading on General-Purpose Flatcars

a. The forklifts may be placed in the tiedown position on a railcar by a crane, or they may be driven or towed onto the railcar, provided a suitable ramp or bridge is available.

CAUTION

Do not allow the forklift to exceed 3 miles per hour (walking speed) during loading or unloading operations.

b. The loads shown in figures 7–1 thru 7-4 are based on flatcar width of 10 feet 6 inches. Figure 7–5 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

A staggered nailing pattern should be used when lumber or laminated lumber is nailed to the floor of a railcar. The nailing pattern for an upper piece of lumber will be adjusted 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.

7-6. Loading on Special-Purpose Flatcars

The loads shown in figures 7–6 thru 7-9 are based on the use of CONUS HTTX or similar types of flatcars. These cars are equipped with special heavyduty tiedown anchors and chain assemblies contained in channels along each side of the car and on each side of the center sill. Table 7–3 presents application of chain tiedowns for securing forklifts.

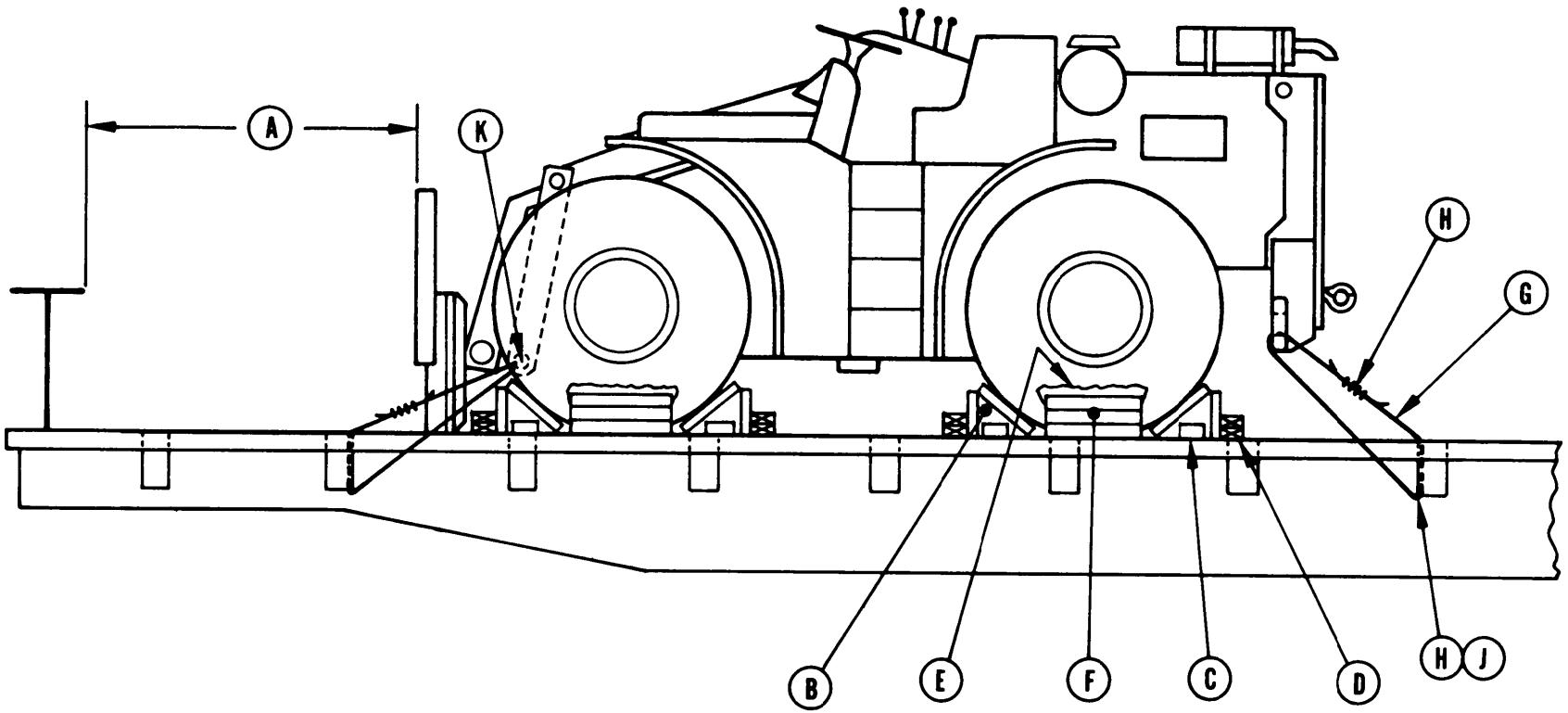


Figure 7–1. Blocking and tiedown diagram for RTL10 or RTL10–1 forklift on CONUS general-purpose flatcar (side view).

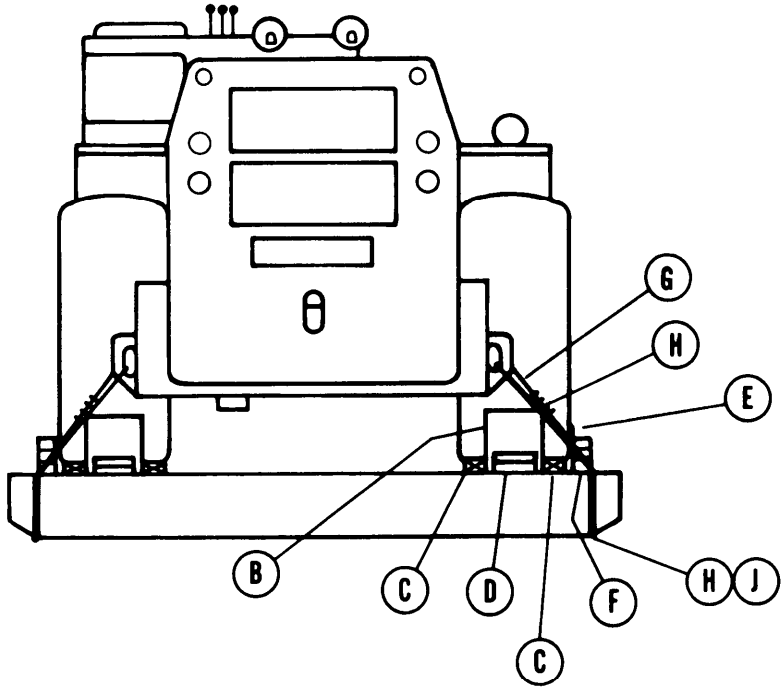


Figure 7–2. Blocking and tiedown diagram for RTL10 or RTL10-1 forklift on CONUS general-purpose flatcar (rear view).

Table 7–1. Bill of Materials for Blocking and Tiedown of Forklifts on CONUS General-Purpose Flatcar (Figs 7–1 thru 7–5)

Item	Description	Approximate quantity
Lumber	Douglas fir, or comparable, straight-grain, free from material defects; Fed Spec MM-751H;	
	2– x 4–inch	80 linear ft
	2– x 6-inch	12 linear ft
	2– x 12–inch	100 linear ft
Nails	Common steel; flathead; bright or cement-coated; table XI–b, Fed Spec FF-N-105B:	
	12d	25
	20d	560
	30d	170
Thimbles	Standard, open-type: 5/8–inch	6
Clamps	Wire rope, U-bolt clips, saddle, single-grip, steel, Crosby heavy-duty, or equal; MIL–STD 16842: 5/8-inch	20
Cushioning material	Waterproof paper, burlap, or other suitable material	as required
Shackles*	Anchor, screw pin, 1" pin size; NSN 4030-00-542-3182	2
Wire rope	6 x 19, IWRC; improved plow steel; preformed, regularly; table X, Fed Spec RR–W-410C: 5/8-inch	60 ft

*Required for front tiedown provisions on RTL10 and RTL10-1 forklifts only.

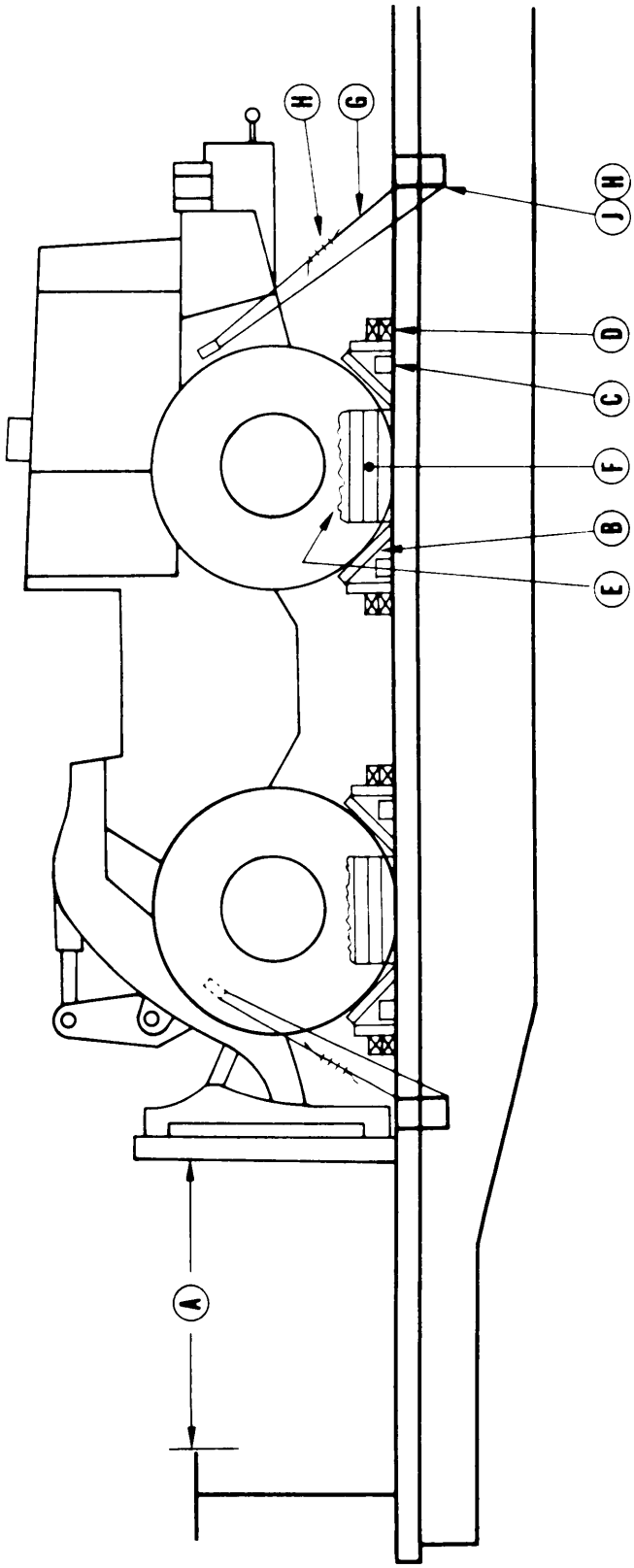


Figure 7–3. Blocking and tiedown diagram for M10–A forklift on CONUS general-purpose flatcar (side view).

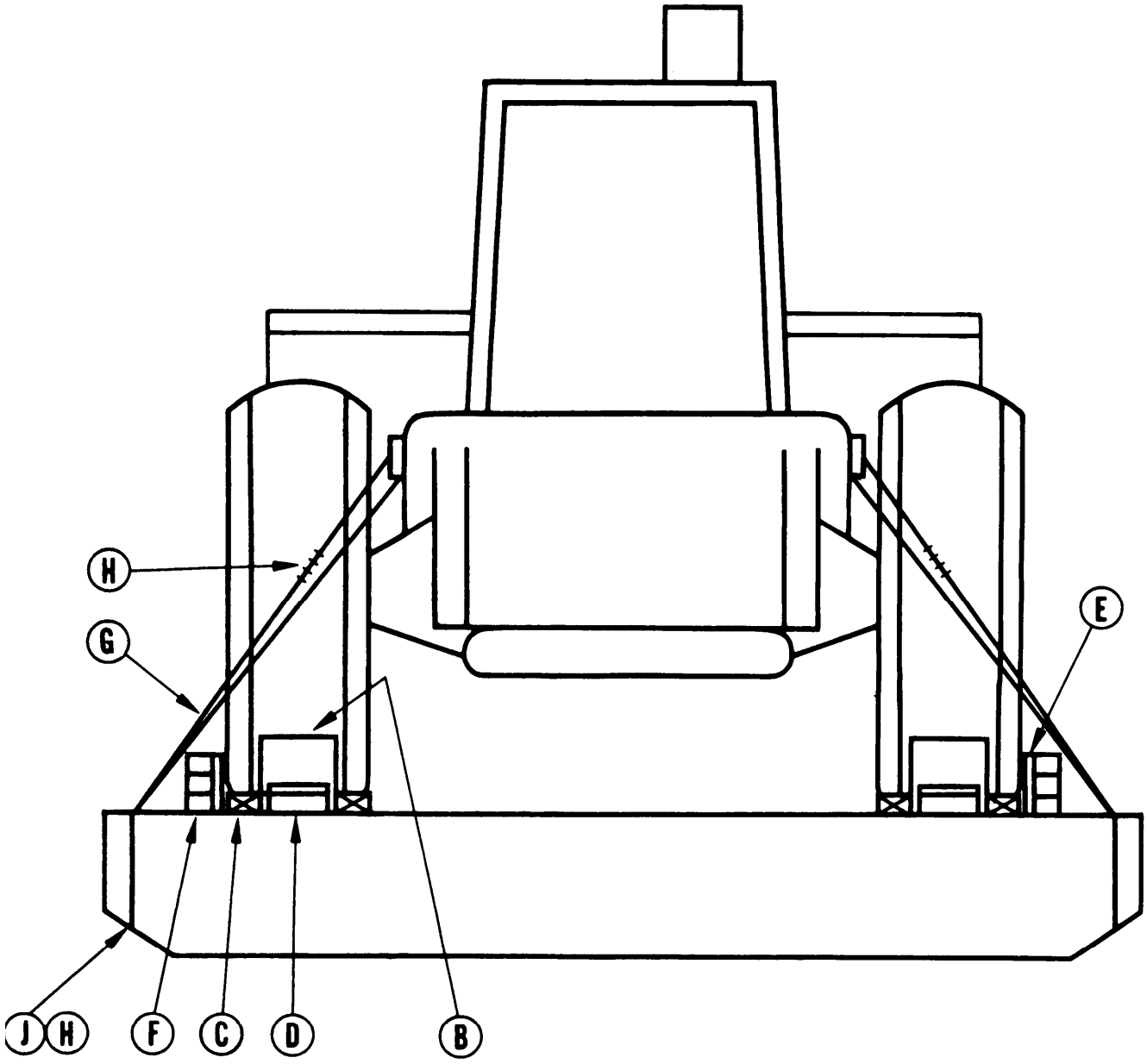
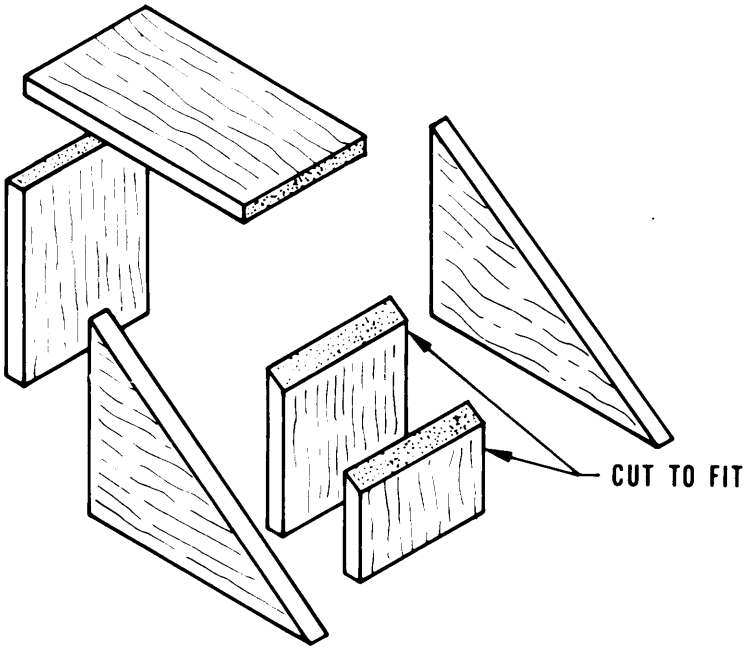
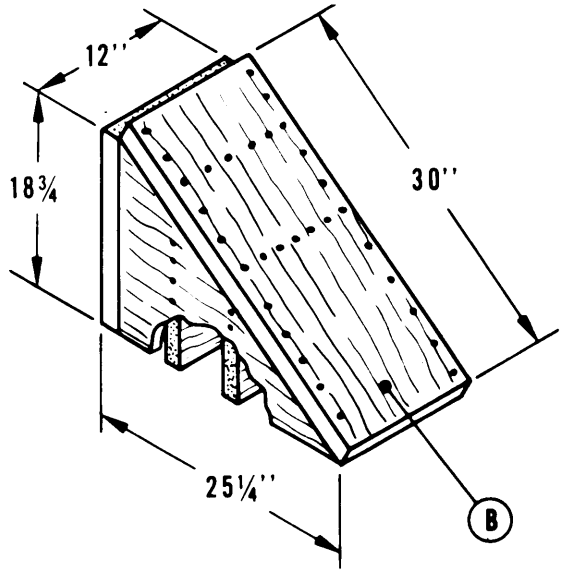


Figure 7-4. Blocking and tiedown diagram for M10-A forklift on CONUS general-purpose flatcar (rear view).



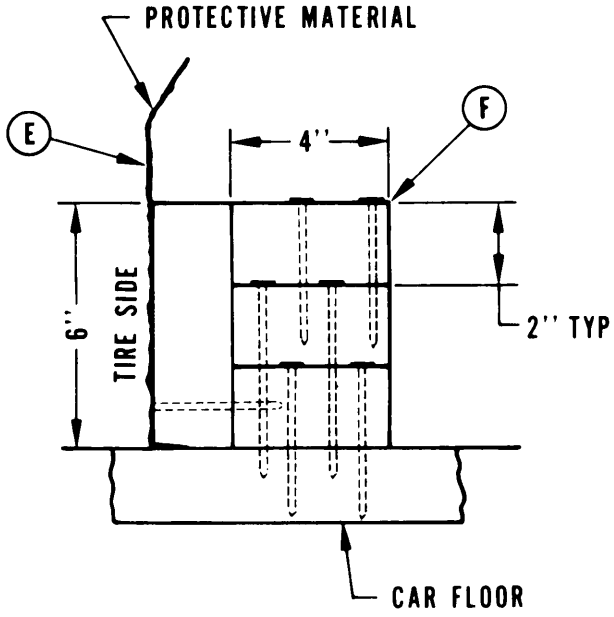
EXPLODED VIEW



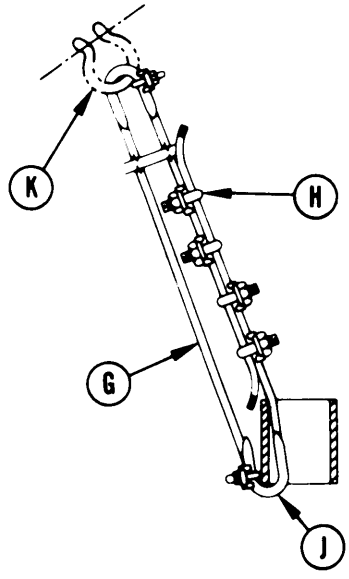
ASSEMBLED VIEW

FABRICATE BLOCK FROM 2'' × 12'' LUMBER USING 20d NAILS

DETAIL 1



DETAIL 2



DETAIL 3

Figure 7–5. Blocking and tiedown details.

Table 7Ö2. Application of Materials for Blocking and Tiedown of Forklifts on CONUS General-Purpose Flatcar (Figs 7-1 thru 7-5)

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 (detail 1, fig 7–5). Locate one against the front and rear of each wheel.
C	16	Side cleat. Each to consist of one piece of 2– x 4– x 20–in. lumber. Locate one piece on each side of each item B. Secure to car floor with six 30d nails.
D	8	End cleat. Each to consist of two pieces of 2– x 4– x 12–in. lumber. Locate one against end of each item B. Secure lower piece to car floor with four 30d nails and top piece to lower piece with four 30d nails.
E	1 each item F	Cushioning material. Locate bottom portion under item F, the top portion to extend 2 in. above item F (detail 2, fig 7–5).
F	4	Side block. Each to consist of one piece of 2– x 6- x 36-in. lumber and three pieces of 2– x 4– x 36-in. lumber (detail 2, fig 7–5). Nail one edge of 2– x 6- x 36-in. piece to bottom 2– x 4– x 36–in. piece with five 12d nails. Then place against tire and nail to car floor through 2- x 4- x 36-in. piece with four 20d nails. Nail other two 2– x 4– x 36–in. pieces to one below in the same manner.
G	4	Wire rope. Each to consist of one piece 5/8-in. wire rope, length as required (approximately 15 ft). Form a complete loop between tiedown shackle or provision and appropriate stake pocket (detail 3, fig 7-5). Wire-rope ends should overlap a minimum of 24 in.
H	20	Clamps. Place four on each wire rope at the overlap area, and space 3½ inches apart with a minimum of 6 inches from ends of cable. Place one clamp under each stake pocket and shackle to secure wire rope and thimble together (detail 3, fig 7-5).
J	6	Thimbles. Place one at bottom of each stake pocket (4) and each front shackle, item K, where used.
K	2	Shackles. Attach one to each front tiedown provision, RTL10 and RTL10-1 forklifts only.

Table 7–2. Application of Materials for Blocking and Tiedown of Forklifts on CONUS General-Purpose Flatcar (Figs 7-1 thru 7-5) — Continued

GENERAL INSTRUCTIONS

1. Handbrakes are to be set and hand levers wired or blocked in place.

2. Gearshift levers must be placed and wire-tied in the neutral position.

3. See General Rules 1, 2, 3, 4, 5, 9, 14, 15, 19A, 19B, and 19C, section 1 of the *Rules Governing the Loading of Commodities on Open-Top Cars and Trailers*, published by the Association of American Railroads, for further details.

4. Tensioning of wire rope can be accomplished with an applicable sized come-along mechanical hoist or equal tensioning device.

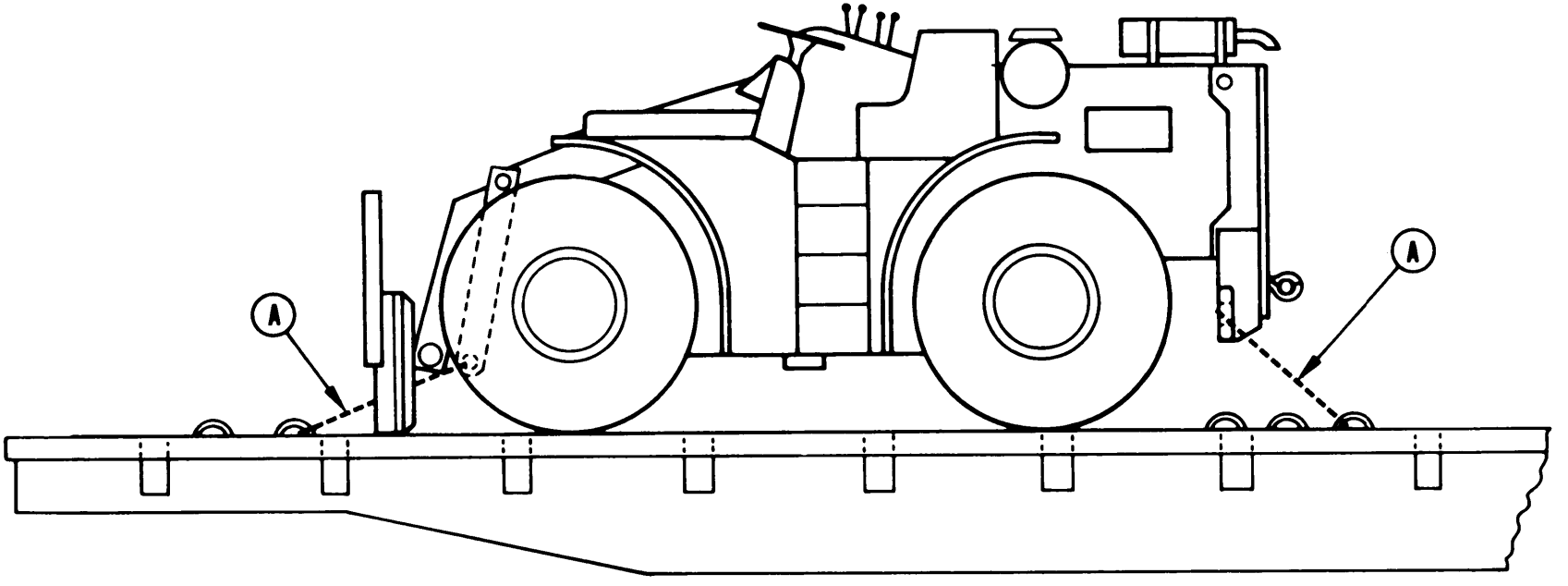


Figure 7–6. Tiedown diagram for RTL10 or RTL10–1 forklift on CONUS HTTX or similar type of flatcar (side view).

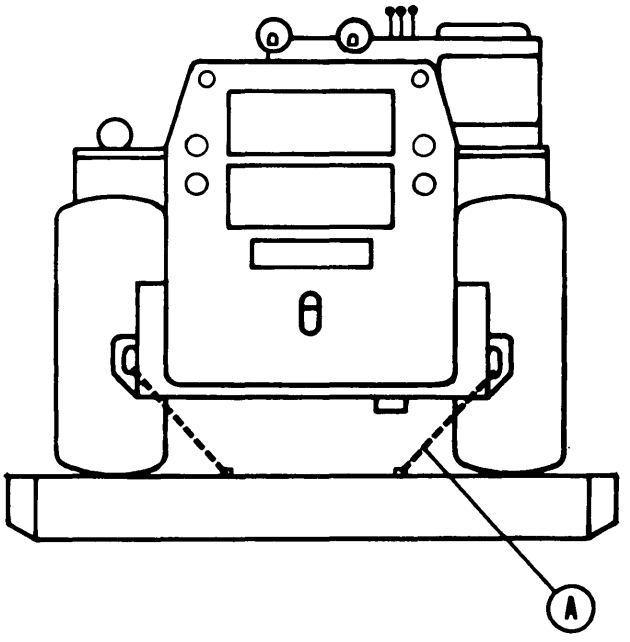


Figure 7–7. Tiedown diagram for RTL10 or RTL10–1 forklift on CONUS HTTX or similar type of flatcar (rear view).

Table 7-3. Application of Chain Tiedowns for Securing Forklifts on HTTX or Similar Type of Flatcars (Figs 7–6 thru 7-9)

Item	No. required	Application
A	4 ea unit	½-in. diameter alloy steel chain, extra strength, prooftested to a minimum of 27,500 lb for vehicles over 25,000 lb and up to 40,000 lb, inclusive.

GENERAL INSTRUCTIONS

1. Shippers should specify cars equipped with tiedown devices in the quantity shown in item A when ordering specialized railway equipment. When carriers furnish cars that do not have built-in chains and tensioning devices, chains and turnbuckles of appropriate size and strength will be used in lieu thereof for tiedown of vehicles. Load binders are not to be used in lieu of turnbuckles to tension tiedown chains.

2. Forklifts must face in the same direction and be uniformly spaced along the length of the car to allow sufficient space at each end of the car and between the forklifts for tiedown. Apply tiedowns parallel to each other at the same end of the forklift and from the forklift tiedown point to the car tiedown point. The angle of the tiedown should be as close to 45° as possible.

3. Handbrakes must be set and hand lever wire-tied.

4. Gearshift levers on forklifts equipped with automatic or standard transmission must have the gearshift lever wire-tied in neutral position.

5. Open hooks must be secured with wire over opening to prevent the hook from becoming disengaged from the chain link to which it is attached.

6. Turnbuckles used to tighten chains must be wired or locked to prevent them from turning during transit unless turnbuckles are equipped with self-locking devices.

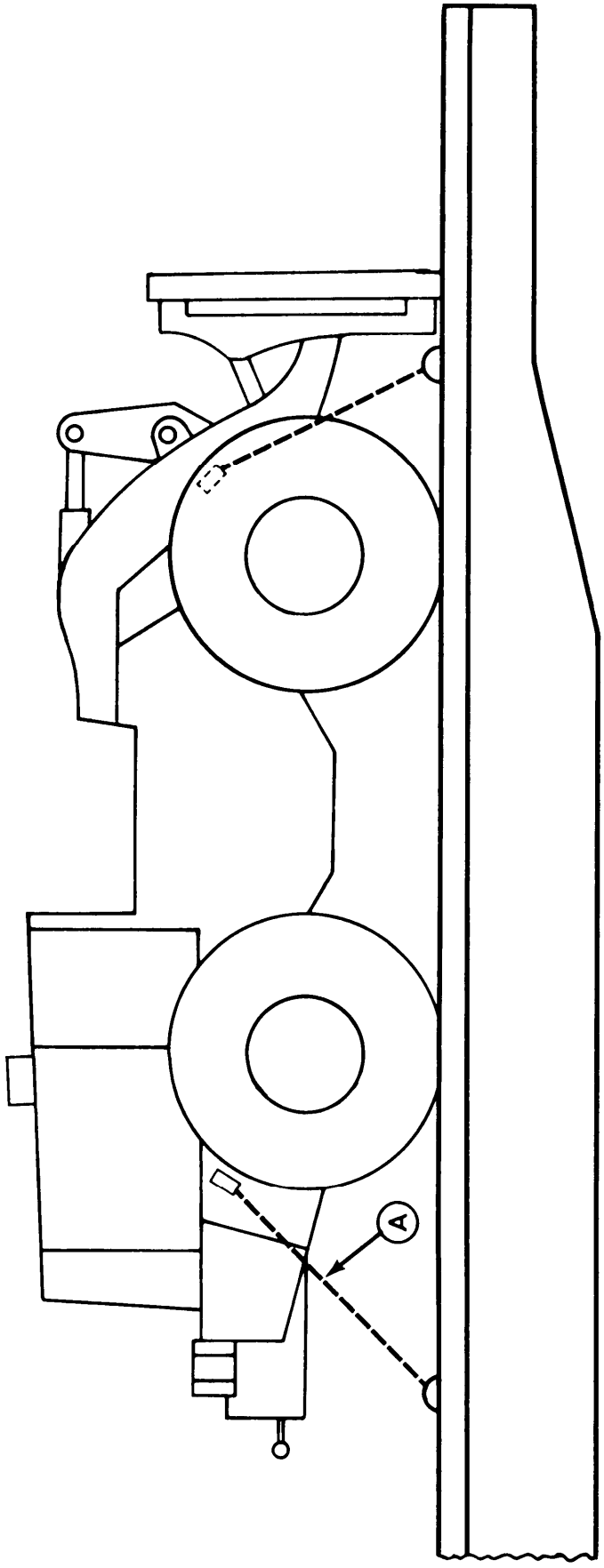


Figure 7–8. Tiedown diagram for M10–A forklift on CONUS HTTX or similar type of flatcar (side view).

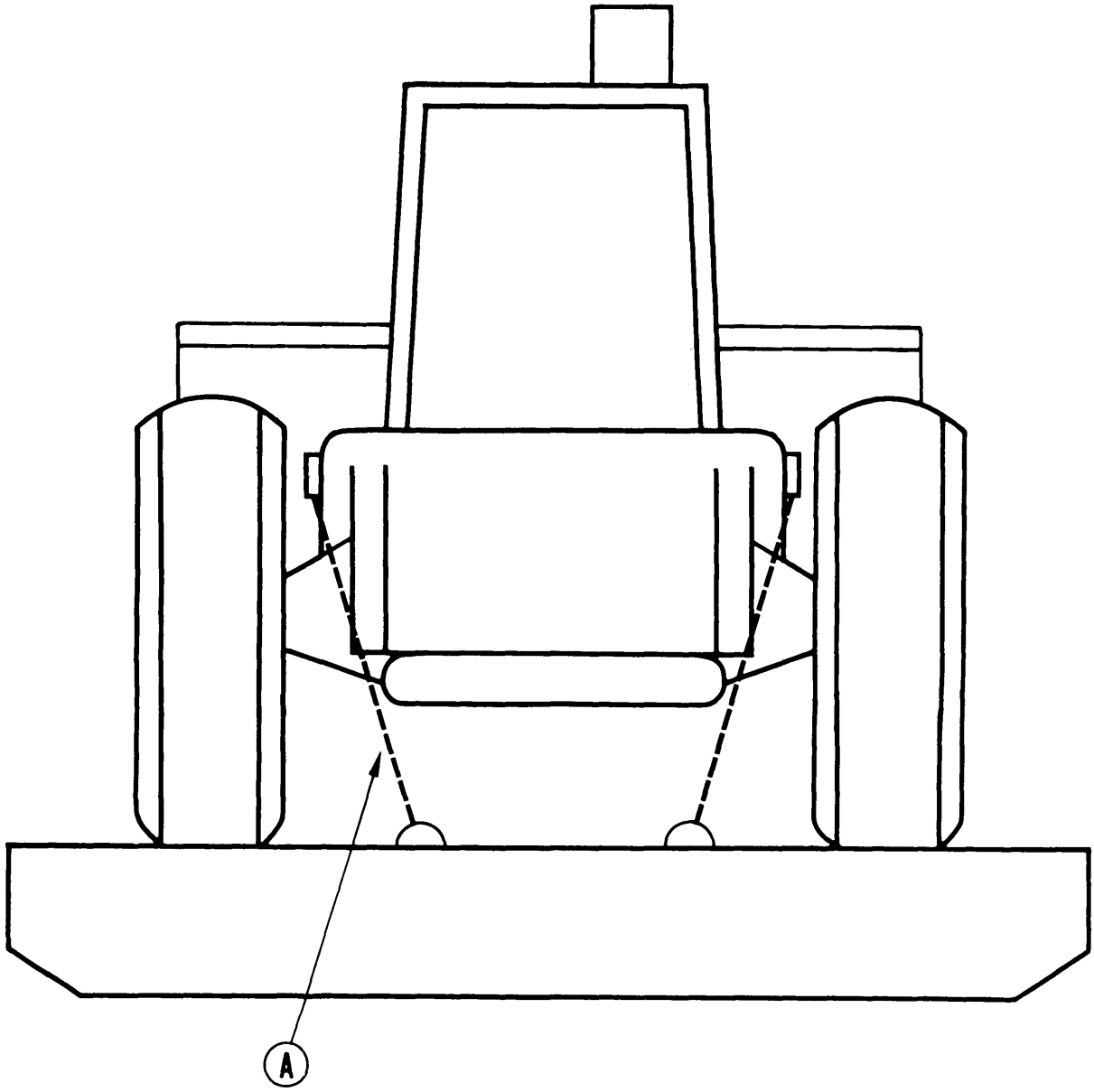


Figure 7–9. Tiedown diagram for M10–A forklift on CONUS HTTX or similar type of flatcar (rear view).

Section III. TRANSPORT ON FOREIGN RAILWAYS

7-7. General

The transportability guidance contained in this section is applicable when the forklifts are transported on foreign railways. Consideration is given to single and multiple forklift movements on the types of railcars normally used for the movement of this type of equipment. The forklifts, when loaded on a suitable railcar, can be transported in their reduced height configuration *with restrictions* within European countries complying with the International Loading Gauge (formerly Berne International); this also applies to the majority of the countries in the Middle East as well as to South America, Australia, India, and Pakistan. In the Middle East and South America, the clearances vary by country, and 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 and clearances used by different countries, evaluation of transport capability must be made on an individual basis.

7-8. Transport on Foreign Service Flatcars

a. General. The forklifts can be transported on some foreign service flatcars. Table 7-4 presents a few of the flatcars available in Europe that are suitable for transporting the forklifts.

b. Materials. The materials required for blocking and tiedown of the forklifts on foreign service flatcars are essentially the same as those used for transporting the forklifts within CONUS. Detailed guidance is contained in the 4th Transportation Brigade Pamphlet 55-2, *Tiedown Guide for Rail Movements.*

Table 7-4. Characteristics of European Flatcars

Flatcar designation	Capacity	Length	Width	Platform height*
SSY	52-ton (47.17 MTON)	31-ft 2-in. (9.50 m)	10-ft 4-in. (3.15 m)	4-ft 2¾-in. (1.29 m)
SSYS	66-ton (59.88 MTON)	31-ft 2-in. (9.50 m)	10-ft 4-in. (3.15 m)	4-ft 2¾-in. (1.29 m)

*Above top of rail.

APPENDIX

REFERENCES

1. Army Regulations (AR)

55-162	Permits for Oversize, Overweight, or Other Special Military Movements n Public Highways in the United States
55-355	Military Traffic Management Regulation
70-47	Engineering for Transportability
746-1	Color, Marking, and Preparation of Equipment for Shipment

2. Army Field Manuals (FM)

55-13	Air Transport of Supplies and Equipment: Standard Loads in Air Force C-5 Aircraft
55-15	Transportation Reference Data
55-17	Terminal Operations Specialists Handbook

3. Army Supply Bulletin (SB)

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

4. Army Technical Bulletins (TB)

55-45 (AFP 76-19)	Certification of Military Equipment for Transport in Air Force Aircraft
55-46-1	Standard Characteristics (Dimensions, Weight, and Cube) for Transportation of Military Vehicles and Equipment

5. Army Technical Manuals (TM)

10-3930-243-12	Operator and Organizational Maintenance Manual: Truck, Lift, Fork, Rough-Terrain, 10,000-Pound-Capacity
38-250 (AFM 71-4)	Packaging and Handling of Dangerous Materials for Transport on Military Aircraft
55-450-10/2	Air Transport of Supplies and Equipment: Standard Loads in US Air Force C-141 Aircraft
55-450-15	Air Movement of Troops and Equipment (Nontactical)

6. Air Force Manuals

TO 1C-5A-9	Cargo Loading Manual for USAF Series C-5 Aircraft
TO 1C-141-9	Cargo Loading Manual for USAF Series C-141 Aircraft

NOTE

Air Force Technical Orders that have not been integrated into the Department of the Army publications system may be requisitioned through the Adjutant General Office, in accordance with AR 310-71.

7. Air Force Regulation (AFR)

76-2	Airlift Planning Factors

8. Other Publications and Sources of Procurement

a. Rail and Highway Shipment

(1) *Code of Federal Regulations,* Title 49-Transportation, Parts 170-179
Available from: Superintendent of Documents
US Government Printing Office
Washington, DC 20402

(2) Association of American Railroads, *Rules 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 Car.
Available from: Association of American Railroads
59 E. Van Buren Street
Chicago, IL 60605

(3) International Road Federation
Limits of Motor Vehicle Sizes and Weights
Available from: International Road Federation
1023 Washington Building
Washington, DC 20005

(4) 4th Transportation Brigade Pamphlet No. 55-2
Tiedown Guide for Rail Movement
Available from: Headquarters
4th Transportation Brigade
APO New York 09451

b. Water Shipment
Code of Federal Regulations
Title 46-Shipping, Part 146
Available from: Superintendent of Documents
US Government Printing Office
Washington, DC 20402

By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of Staff

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Major General, United States Army
The Adjutant General

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