

TECHNICAL MANUAL

No. 55-2320-258-14

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 15 November 1979

TRANSPORTABILITY GUIDANCE

HEAVY-EQUIPMENT TRANSPORTER (HET) SYSTEM

TRUCK-TRACTOR, 22½-TON, 8X8, M746

(NSN 2320-00-089-7264)

HEAVY-EQUIPMENT TRANSPORTER (C-HET)

SYSTEM TRUCK TRACTOR, COMMERCIAL

85,000 GVWR, 8X6, M911

(NSN 2320-01-025-3733)

SEMITRAILER, LOW-BED,

HEAVY-EQUIPMENT TRANSPORTER, 60-TON, M747

(NSN 2330-00-089-7265)

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* This manual supersedes TM 55-2320-258-15-1, 30 September 1976

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No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 31 August 1993

Transportability Guidance

Heavy-Equipment Transporter (HET) System
TRUCK-TRACTOR, 22½-TON, 8X8, M746
(NSN 2320-00-089-7264)

Heavy-Equipment Transporter (C-HET) System
TRUCK-TRACTOR, COMMERCIAL, 85,000 GVWR,
8X6, M911
(NSN 2320-01-025-3733)

Semitrailer, Low-Bed,
HEAVY-EQUIPMENT TRANSPORTER, 60-TON, M747
(NSN 2330-00-089-7265)

TM 55-2320-258-14, 15 November 1979, is changed as follows:

- 1. Remove old pages and insert new pages as indicated below.
- 2. New or changed material is indicated by a vertical bar in the margin of the page.
- 3. Added or revised illustrations are indicated by a vertical bar adjacent to the illustration identification number.

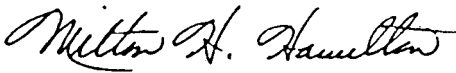
Remove Pages	Insert Pages
6-3 and 6-4	6-3 and 6-4
7-1 through 7-11	7-1 through 7-10

- 4. File this change sheet in front of the publication for reference purposes. Tables 7-1, 7-2, 7-5, and 7-6 remain unchanged.

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CHAPTER 1

INTRODUCTION

1-1. Purpose and Scope

a. This manual provides transportability guidance for logistics handling/movement of the heavy-equipment transporter system, also referred to as the HET and the C-HET system.

b. The intent of this manual is to provide transportation officers and other personnel responsible for movement or for providing transportation services with information considered appropriate for safe transport. Significant technical and physical characteristics, as well as safety considerations required for worldwide movement by the various modes of transportation, are included. Where 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

The reporting of errors, omissions, and recommendations by the individual user for improving this manual is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes

to DA Publications and Blank Forms) and forwarded to Director, Military Traffic Management Command Transportation Engineering Agency AT-TN: MTT-TRP, PO) Box 6276, Newport News, VA 23606 (electrically transmitted messages should be addressed to: DIRMTMCTEA FT EUSTIS VA //MTT-TRP//).

1-3. Safety

Appropriate precautionary measures required during movement of the heavy-equipment transporter 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 that must be emphasized.

CHAPTER 2

TRANSPORTABILITY DATA

Section I. GENERAL

2-1. Scope

This chapter provides a general description of the items, identification photographs, tabulated transportability characteristics, and data that are necessary for movement of the HET and the C-HET system.

2-2. Descriptions

a. General. The heavy-equipment transporter (HET) and the commercial heavy-equipment transporter (C-HET) are designed to provide highway and limited cross-country capability for transporting the combat tank and other items of heavy equipment and cargo.

b. M746 (Fig. 2-1). The truck-tractor, M746, is powered by a compression-ignition engine. The tandem front axles steer. The front and rear suspension are taper leaf-spring bogie type with shock absorbers and high-flotation tires.

c. M747 (Fig. 2-2). The semitrailer, M747, is

equipped with four axles, each with two sets of dual, high-flotation tires. The two forward axles are walking beam type and the two rear axles are fitted with an air suspension and air lift system.

d. HET (Fig. 2-3). The truck-tractor, M746, and semitrailer, M 747, when connected as a unit, comprise the heavy-equipment transporter system.

e. M911 (Fig. 2-4). The truck-tractor, commercial, M911 is powered by a diesel compression-ignition engine. The front suspension has semielliptic main and auxiliary springs. The rear suspension has heavy duty springs, combined with equalizer beams and torque rods. The pusher axle is equipped with shock absorbers, air bags, and air suspension system. Vehicle is equipped with on/off road tires.

f. C-HET (Fig. 2-5). The truck-tractor, commercial, M911, and semitrailer, M747, when connected as a unit, comprise the commercial heavy-equipment transporter system.



Figure 2-1. Truck-tractor, 22-½-ton, 8x8, M746

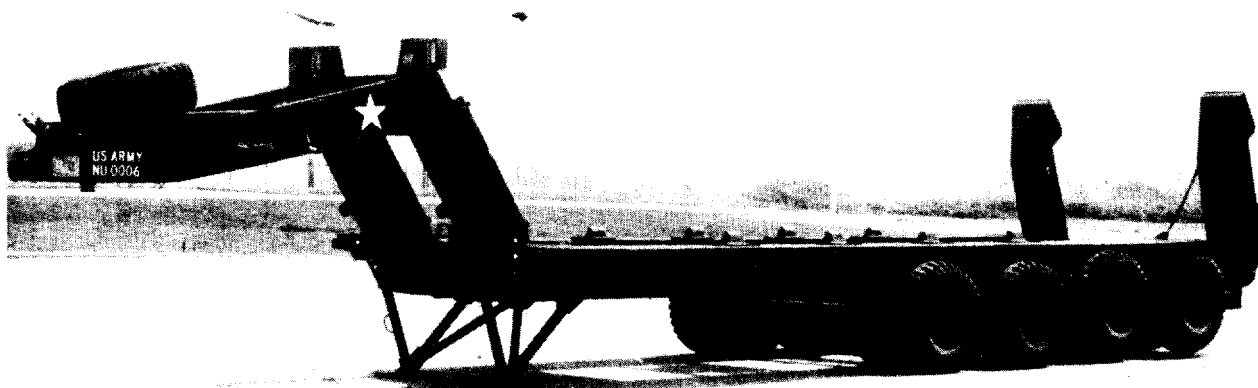


Figure 2-2. Semitrailer, low-bed, heavy-equipment transporter, 60-ton, M747

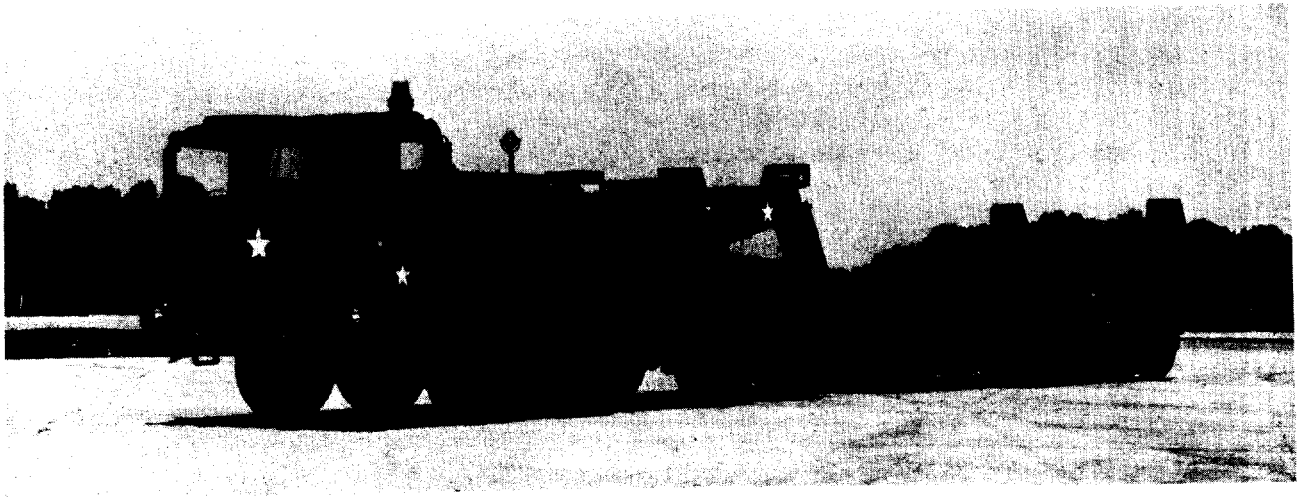


Figure 2-3. Heavy-equipment transporter system (HET)

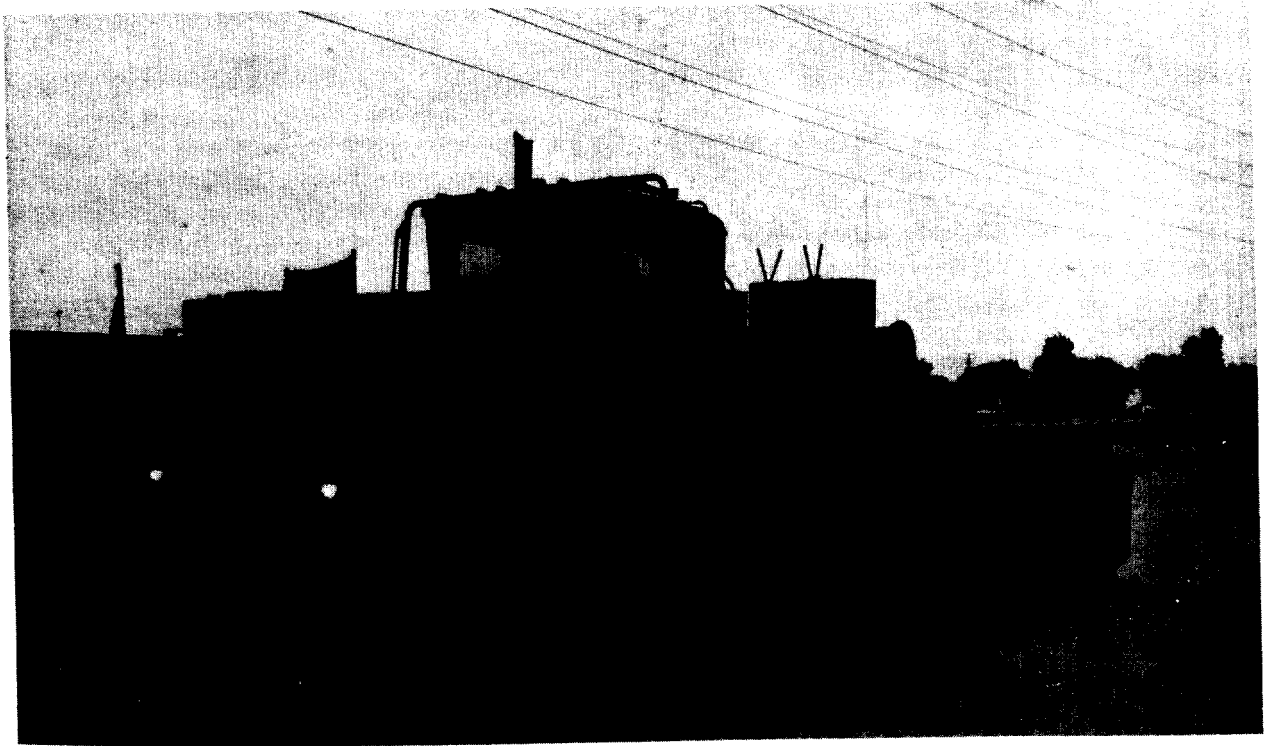


Figure 2-4. Truck-tractor, commercial, (C-HET) 85,000 GVWR 8x6 M911

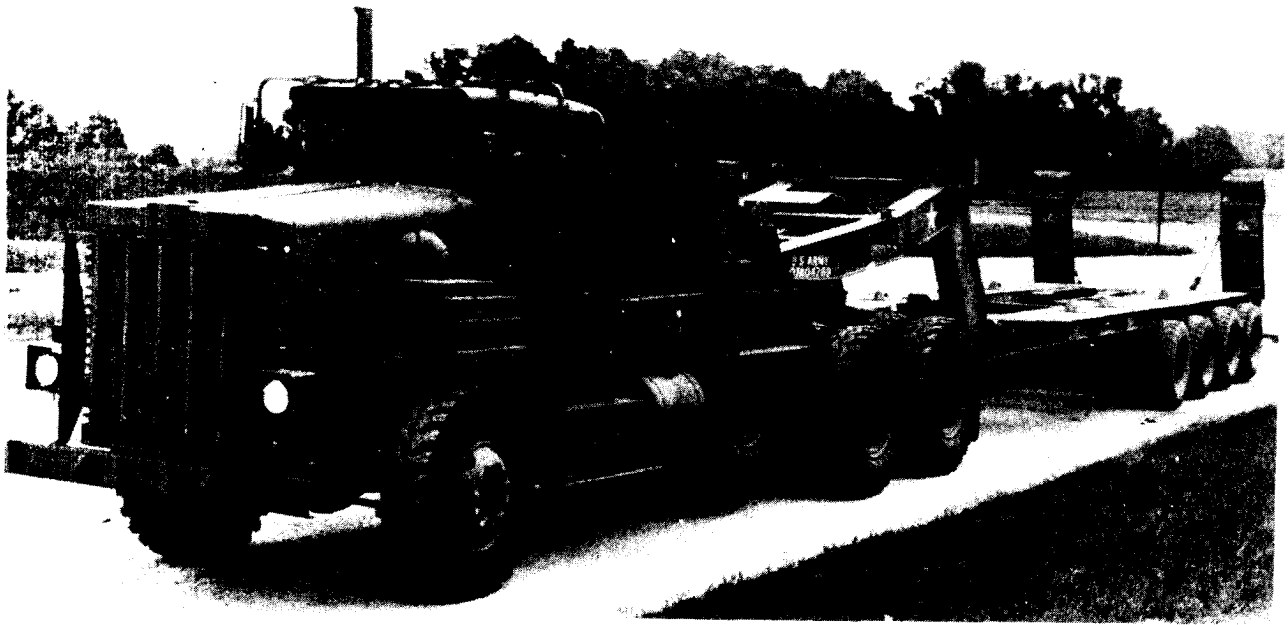


Figure 2-5. Commercial heavy-equipment transporter system (C-HET)

Section II. CHARACTERISTICS AND RELATED DATA

2-3. General

Data contained in figures 2-6 through 2-13 and table 2-1 are applicable to model number or National Stock Number (NSN) shown. Changes in model or NSN may affect transportability as related to guidance contained in this manual.

2-4. Side, Rear, and Front Elevation Drawings

Detailed side, rear, and front elevation drawings (figs 2-6 through 2-13) provide data necessary for determining transportability of the HET and the C-HET system by the various modes of transportation.

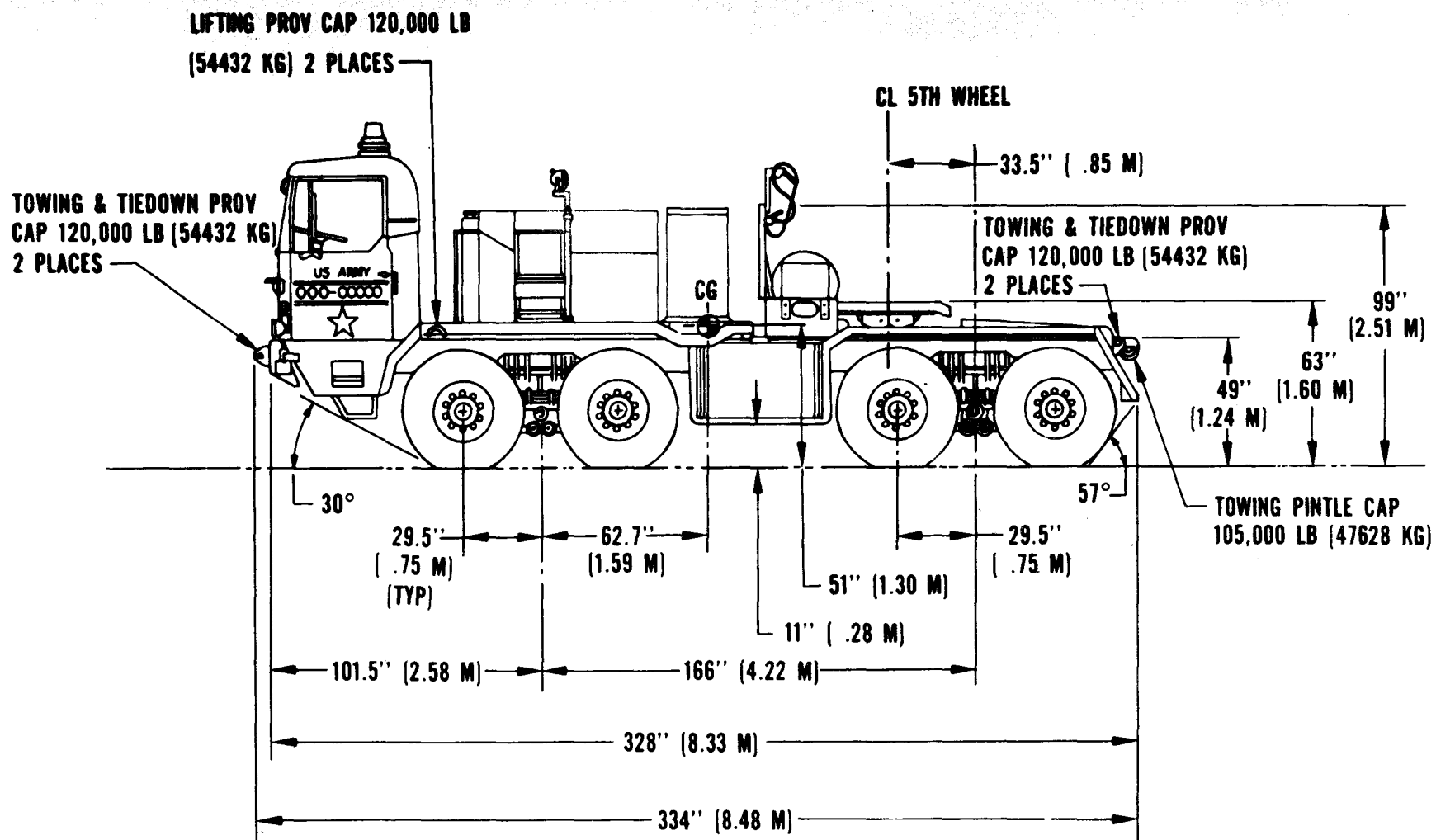


Figure 2-6. Side elevation, M746

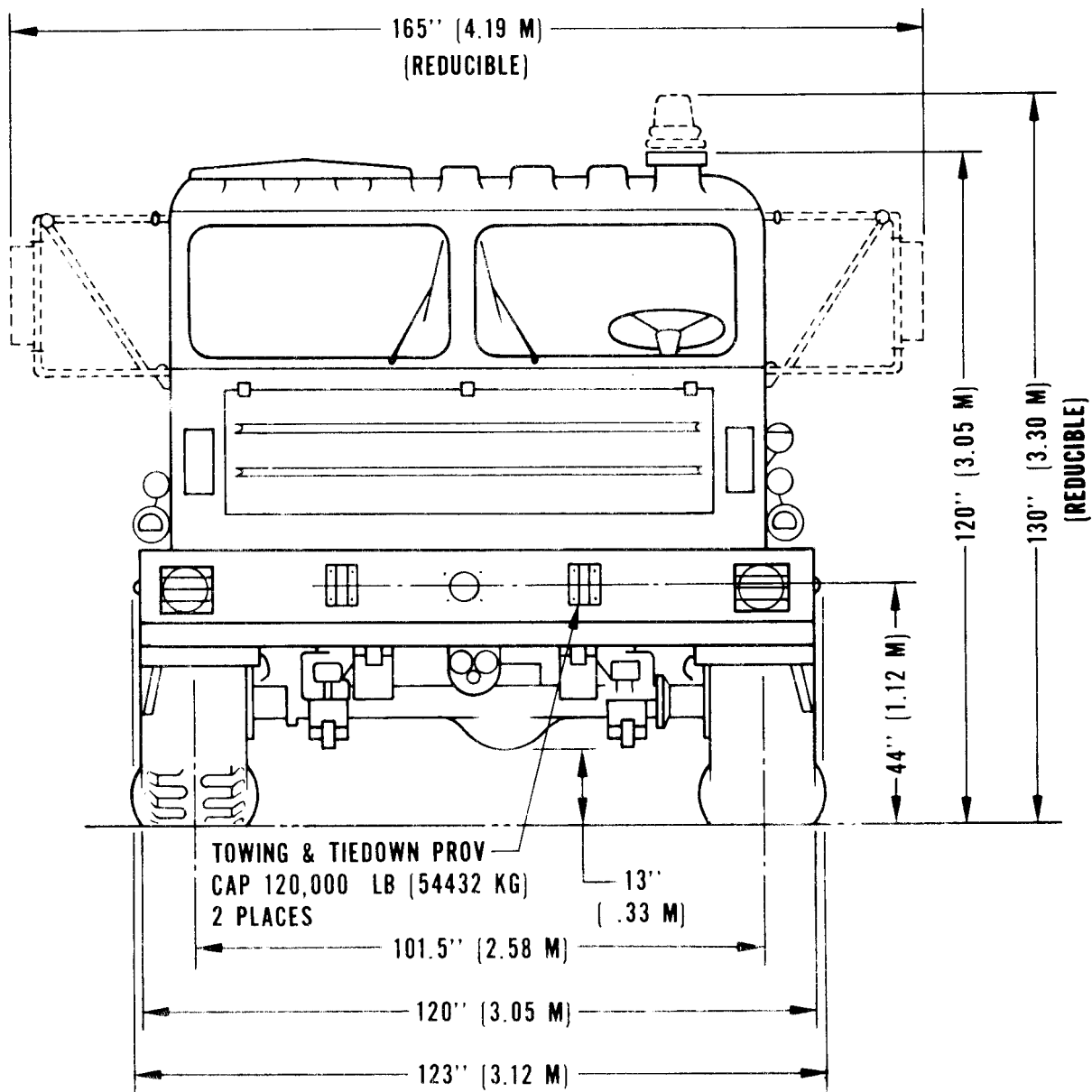


Figure 2-7. Front elevation, M746

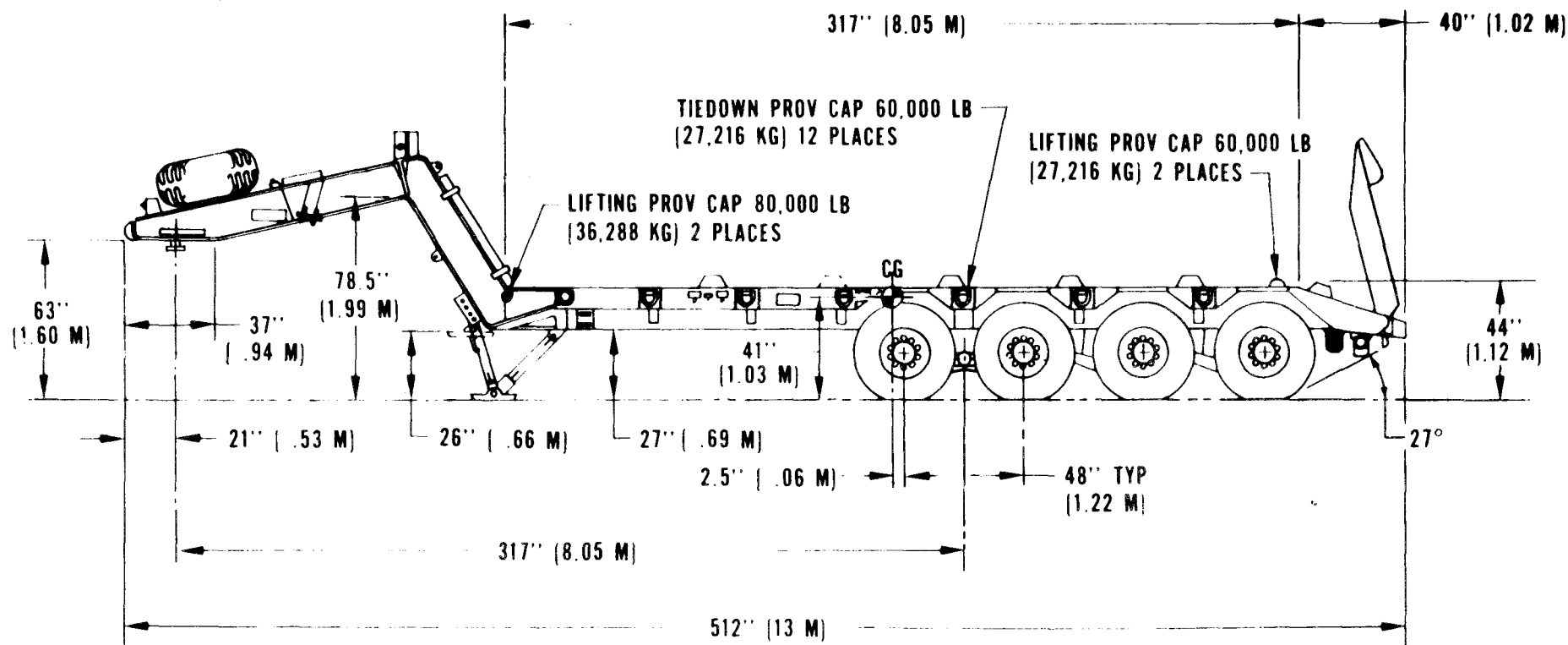


Figure 2-8. Side elevation, M747

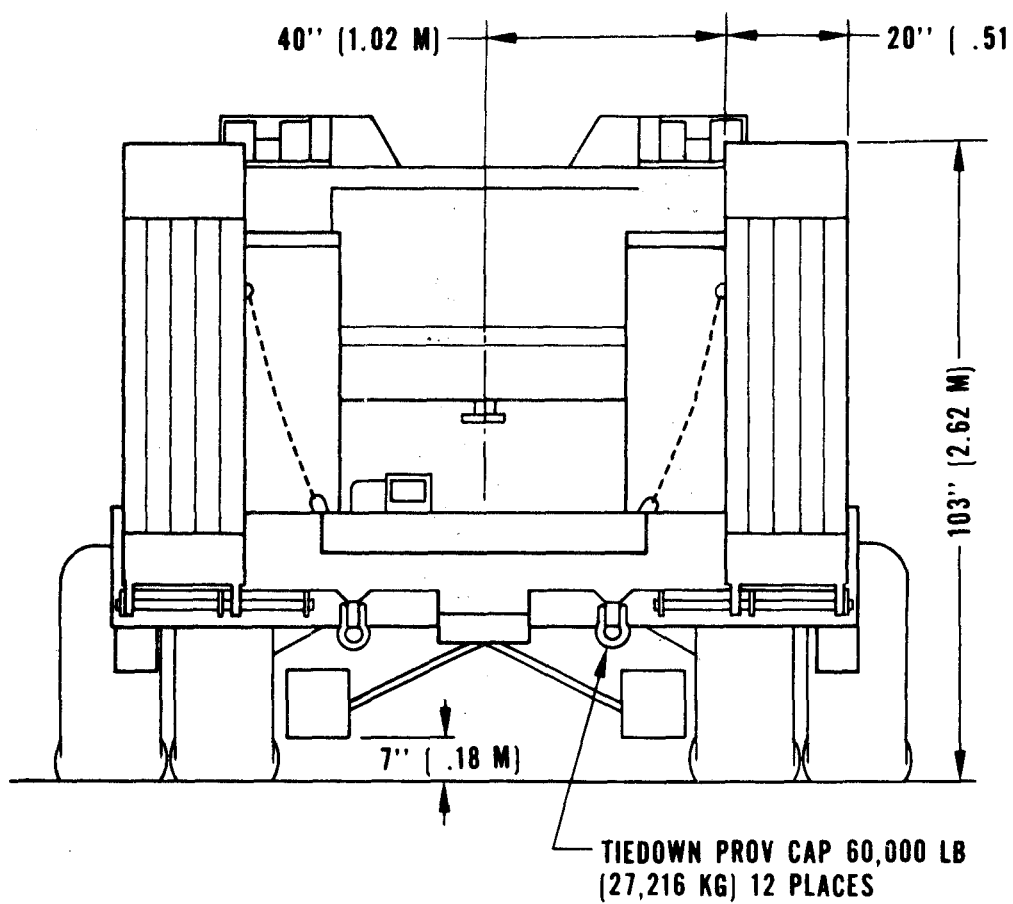


Figure 2-9. Rear elevation, M747

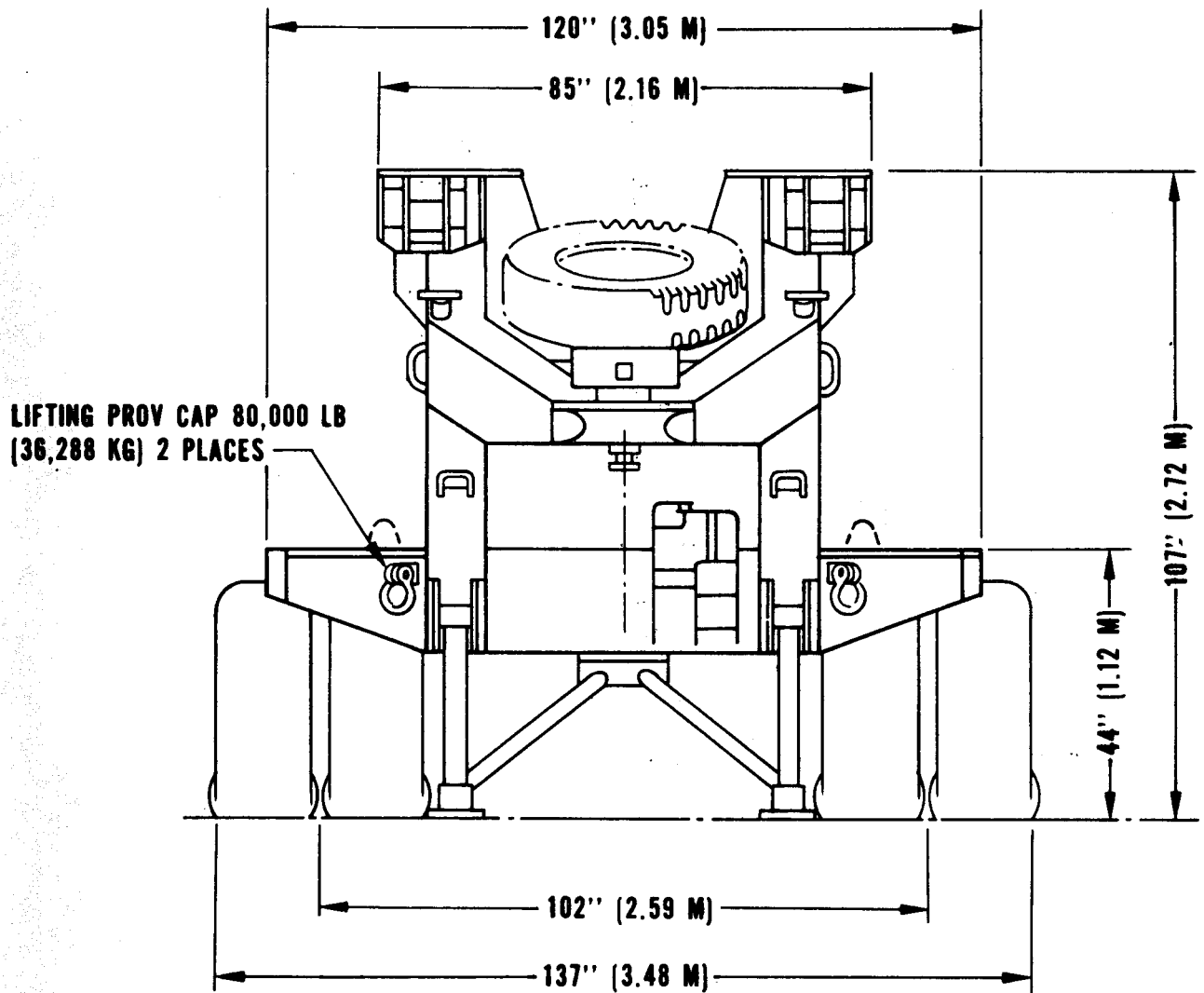


Figure 2-10. Front elevation, M747

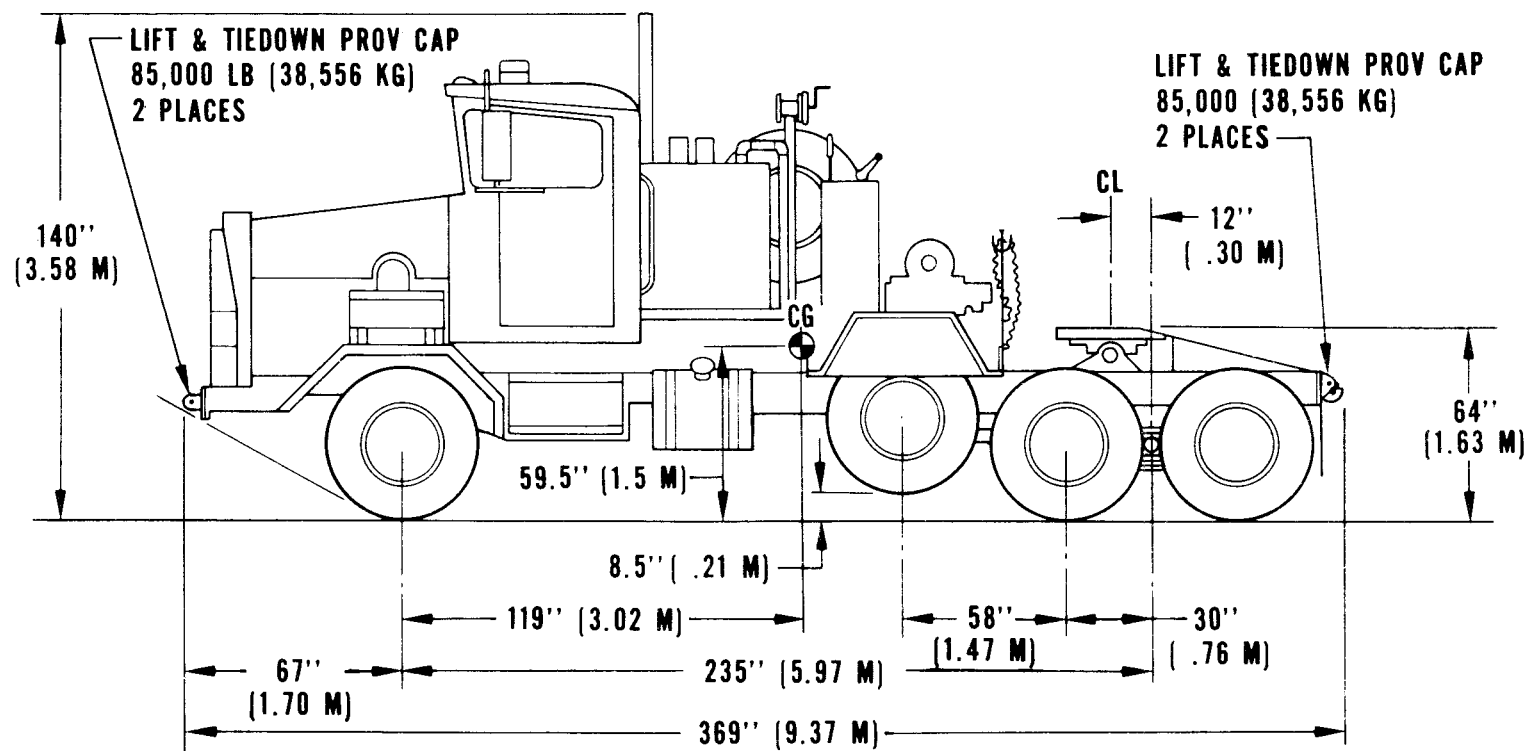


Figure 2-11. Side elevation, M911

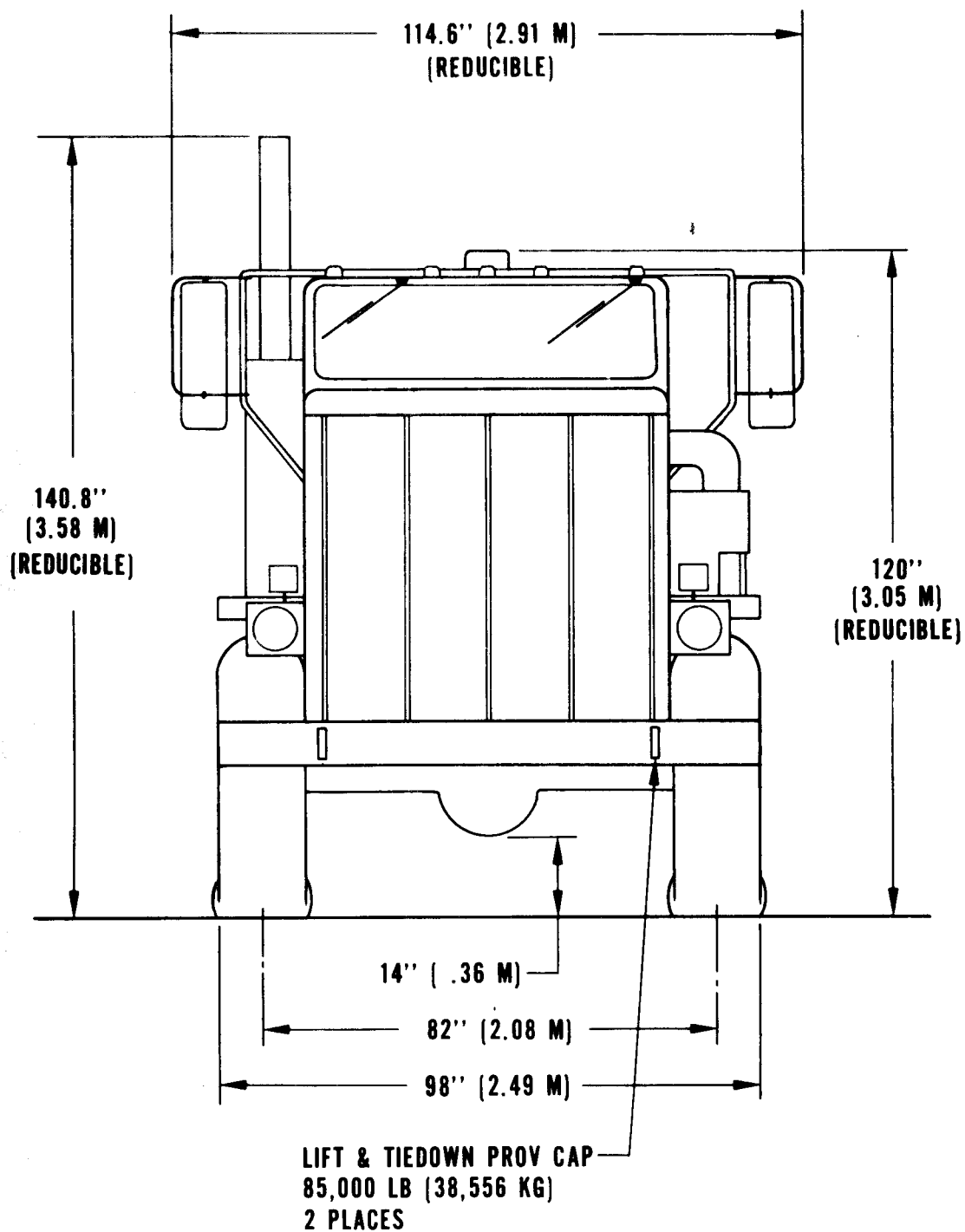


Figure 2-12. Front elevation, M911

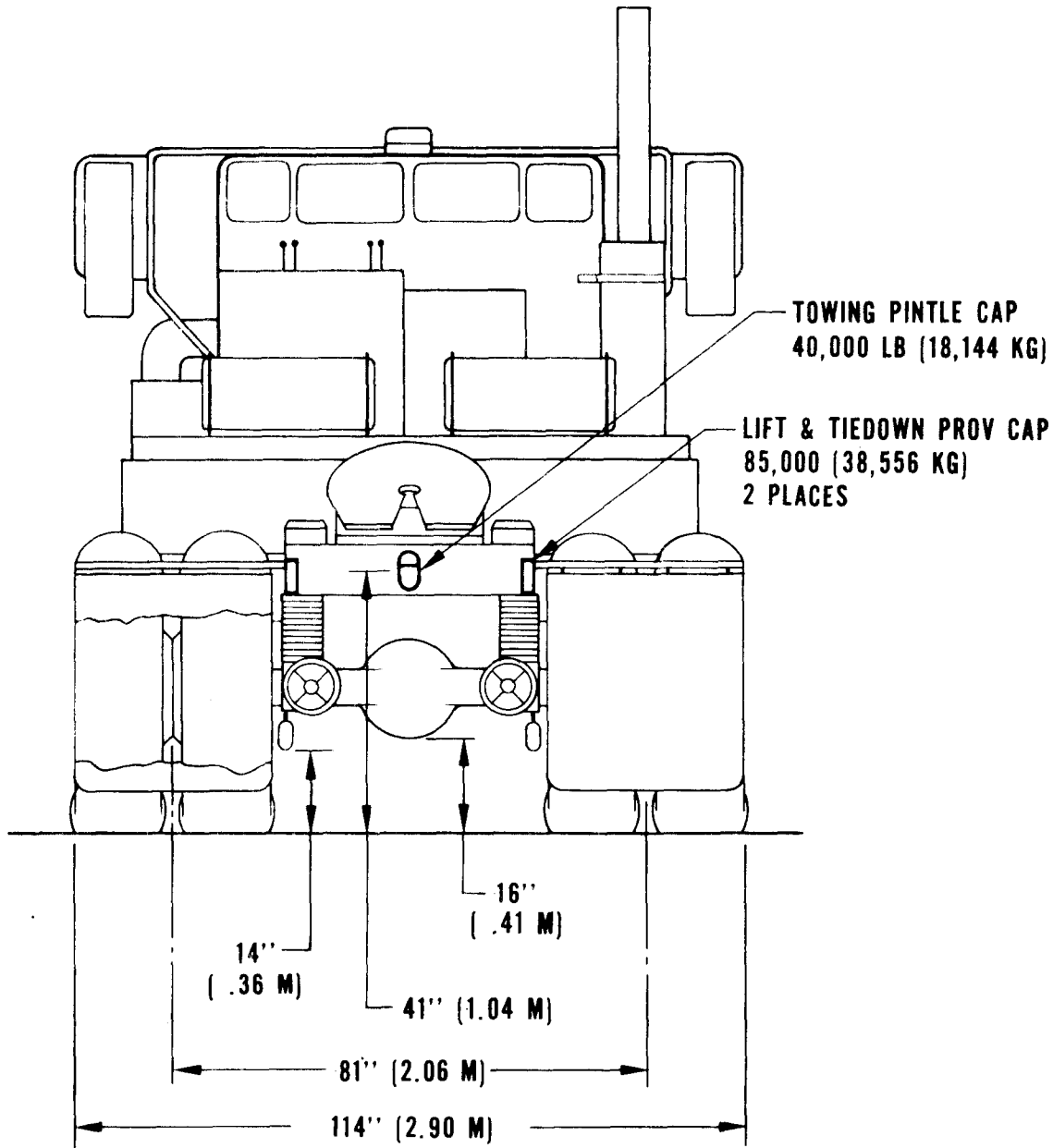


Figure 2-13. Rear elevation, M911

2-5. Reduced Configuration

Except for ocean transport, the 13E1 and the C-HET systems should be reduced only to the extent necessary for the selected mode of transportation. Transportation economies can be obtained by reducing the system components to their minimum dimensions, without major disassembly, for terminal handling and ocean transport. The width of the truck-tractor, M746 and M911, may be reduced by removing the rearview mirrors. The height of the

M746 can be reduced by removing the rotating light from the cab top, and of the M911, by removing the top exhaust pipe and cap from the muffler. When necessary, the cab top of the M 746 can be removed and the windshield lowered to achieve maximum reduction. Width of the semitrailer, M747, may be reduced by removing the two outside wheels from each of the four axles and the two loading ramps. Items so removed should be properly secured in or on the vehicle from which removed. Detailed

procedures for preparation are provided in MIL-V-6208, Military Specification, Preparation for Shipment and Storage of Wheeled Vehicles.

2-6. Unusual Characteristics

The HET and the C-HET systems 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

Unless the system is shipped with ammunition, under the provisions of Department of Transportation Special Permit No. 3498 (applicable to shipments in periods of actual national emergency), or with the ether-starting fluid cylinder, it will not present any hazardous or dangerous characteristics during exposure to normal transportation environments. Guidance for handling the ether cylinder is contained in chapter 3.

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 the Association of American Railroads Rules Governing the Loading of Commodities on Open-Top Cars and Trailers (app)).

2-8. Sensitivity

The HET and C-HET systems 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 description and item number will be determined in accordance with chapter 211, AR 55-355.

Table 2-1. *Characteristics and Related Data*

Model	TOELIN	NSN	Weight	Volume, cu ft (cu m)	
			lb (kg)	operational	reduced
M746	X60967	2320-00-089-7264	45,740 (20,748) ^a	4,146 (117.33)	2,296 (64.98)
M747	S70661	2330-00-089-7265	31,210 (14,157) ^b	4,343 (122.91)	3,804 (107.65)
M911	Z94104	2320-01-025-3733	38,233 (17,342) ^c	3,471.6 (98.25)	2,589.2 (73.27)

^a With OVE and full fuel tank

^b With OVE and no payload

^c With OVE and ¾-full fuel tank

CHAPTER 3

SAFETY

3-1. General

General safety considerations and precautions for handling and movement of the HET and C-HET systems are as follows:

a. Check to insure that all loose items are appropriately secured to prevent damage during transport.

b. When backing the HET and the C-HET systems or maneuvering in close areas, insure that a ground guide is provided.

c. Observe operating and handling procedures specified in TM 9-2320-258-10, TM 9-2330-294-14, and TM 9-2320-270-10.

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

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

f. Do not allow the HET or the C-HET system to exceed 3 miles per hour (walking speed) on loading ramps or inside aircraft.

3-2. Specific Safety Requirements

Specific safety requirements for each mode of transport are as follows:

a. Air.

(1) Truck fuel tanks must not be less than $\frac{1}{4}$ or more than $\frac{3}{4}$ full.

(2) The activity offering the system for air transport will notify the aircraft commander or his designation representative if ammunition or explosives are to be transported within the system.

(3) The provisions of chapter 1, TM 38-250/AFM 71-4 must be complied with as they pertain to the ether-starting fluid cylinder on the HET and the C-HET systems tractor.

b. Highway.

(1) Do not allow personnel on trailer bed during loading or unloading operations.

(2) CONUS movement is subject to all safety laws, rules, and regulations applicable to commercial carriers. In overseas areas movements are governed by theater and local regulations.

(3) Do not conduct loading or unloading operations on side or lateral slopes exceeding 10 percent or with a tractor-to-trailer offset angle greater than 50. Avoid loading on a severe downgrade to prevent the payload from rolling forward on the trailer.

c. Water.

(1) The provisions of *Code of Federal Regulations*, Title 46, "Shipping," subpart 146.21-65 apply when the ether-starting fluid cylinder is shipped with the truck-tractor, M746, and the truck-tractor, M911.

(2) If ammunition is to be transported with the system, compliance with AR 55-228, and Water Carriers' Tariff No. 32 or reissues thereof is mandatory.

(3) Personnel must be cautioned not to walk under items being lifted.

(4) All lifts should have at least two tag lines attached for use in controlling swing of the lift while suspended.

CHAPTER 4

AIR TRANSPORTABILITY GUIDANCE

4-1. Scope.

This chapter provides transportability guidance for air movement of the HET and the C-HET systems. It covers significant technical and physical characteristics and safety considerations and prescribes the materials required to prepare, load, and unload the HET and the C-HET systems as an internal load in the C-5 cargo aircraft. The HET and the C-HET systems exceed the dimensional limitations for transport in the C-130 and C-141 aircraft.

4-2. Maximum Use of Aircraft Capacity

The load described in this chapter is not a maximum aircraft load. 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 TM 38-236/(AFP 71-8). For specific guidance contact the nearest Military Airlift Command (MAC) Activity.

4-3. Safety

Safety precautions are listed in chapter 3.

4-4. Preparation of system

a. No special handling is required for transport of the HET and the C-HET systems in the C-5 aircraft. It may be transported in its operational configuration.

b. Insure that the system brakes are serviceable and that no rocks or stones are embedded in the tire treads or between the dual tires.

c. The HET and the C-HET systems must be clean and free of dirt, grease, or other debris that could be dislodged from the system during loading, unloading, or transport.

CAUTION

Do not load the HET or the C-HET systems on the aircraft with any equipment or cargo secured on the trailer. The wheels of the forward and rear trailer

axles lift off the ground and aircraft floor when cresting the aircraft ramp. Failure to comply could result in damage to the aircraft.

4-5. Transport by US air Force Aircraft

a. The aircraft commander or his representative is responsible for insuring that the HET and the C-HET systems are loaded, unloaded and properly secured in accordance with sections IV and VIA, item 18, of TO 1C-5A-9.

b. Restraint factors (g loads) for minimum acceptable conditions specified for crew safety in the event of a controlled emergency landing are specified in TO 1C-5A-9. The tiedown diagrams (figs. 4-1 and 4-2) and data table (table 4-1) are based on acceptable methods. Figures 4-1 and 4-2 show a representative pattern. The exact placement of the system in the aircraft is primarily dependent upon the aircraft-ready-for-loading weight and other cargo to be loaded. Since both factors are subject to wide variances, the exact placement cannot be shown in this manual and must be determined on an individual load basis. Table 4-1 lists the tiedown devices required (provided aboard aircraft) and tiedown points on the HET and C-HET systems.

c. The HET and C-HET systems may be driven over the forward or aft ramps to the final position aboard the aircraft. When the system has been positioned, the truck transmission must be placed in the lowest gear and the parking brakes set.

WARNING

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

4-6. Transport by US Army Aircraft

The HET and the C-HET systems exceed weight and size limitations for transport by US Army fixed-or rotary-wing aircraft.

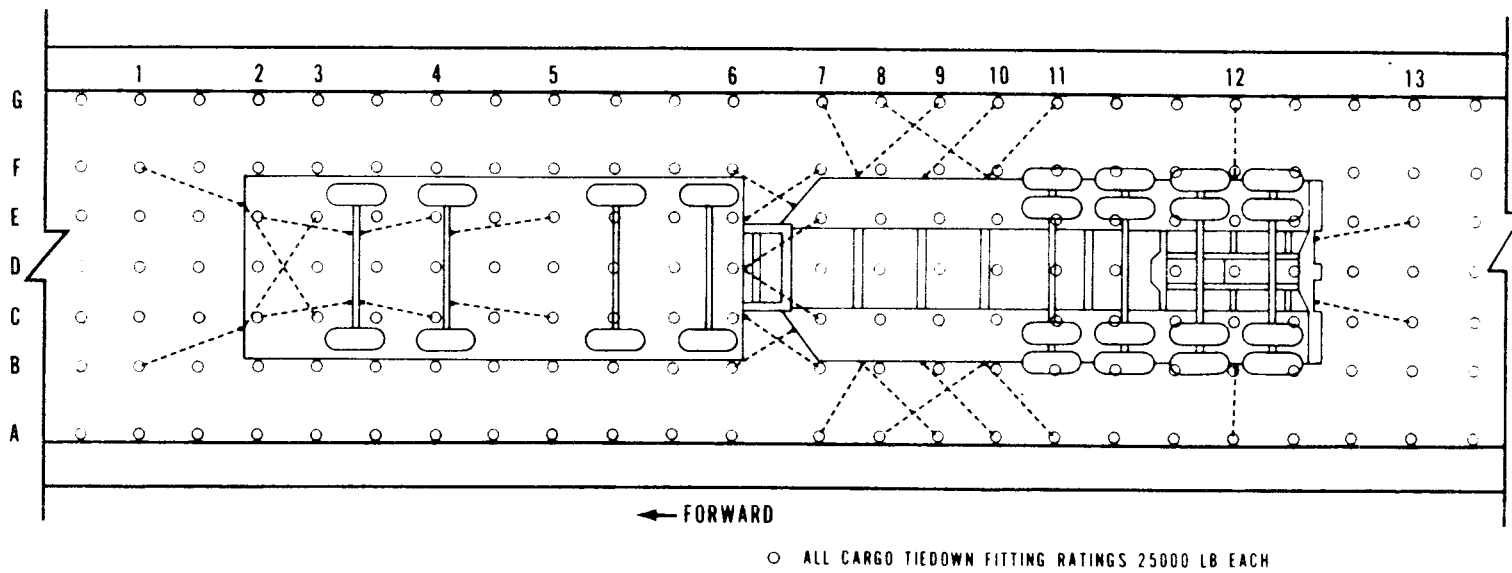


Figure 4-1. Tiedown diagram for HET system in C-5 aircraft

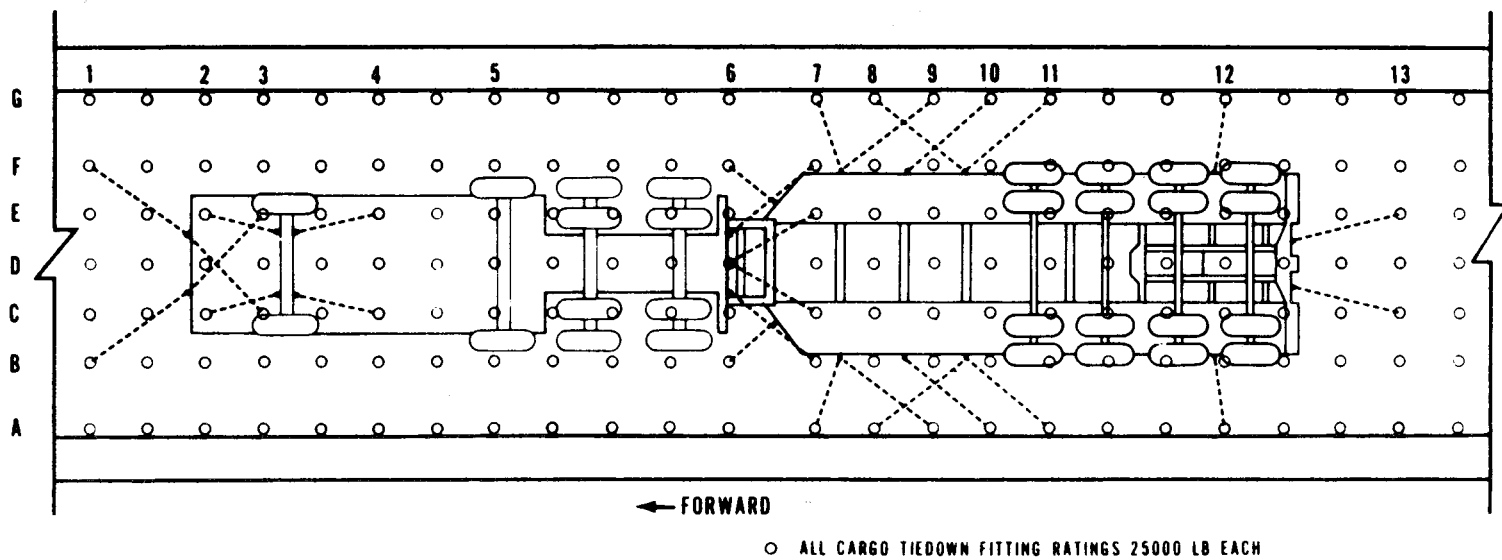


Figure 4-2. Tiedown diagram for C-HET system in C-5 aircraft

Table 4-1. Tiedown Data for HET and C-HET Systems in C-5 Aircraft

Tiedown fitting		Tiedown device *		Attach to item
designation	capacity in 1,000 lb	type	capacity in 1,000 lb	
B1	25	MB-2	25	Left front tiedown provision
F1	25	MB-2	25	Right front tiedown provision
C2	25	MB-2	25	Axle No. 1 left end
E2	25	MB-2	25	Axle No. 1 right end
C3	25	MB-2	25	Right front tiedown provision
E3	25	MB-2	25	Left front tiedown provision
C4	25	MB-2	25	Axle No. 1 left end
E4	25	MB-2	25	Axle No. 1 right end
** C5	25	MB-2	25	Axle No. 2 left end
** E5	25	MB-2	25	Axle No. 2 right end
B6	25	MB-2	25	Left front railer-lifting provision
F6	25	MB-2	25	Right front trailer-lifting provision
B7	25	MB-2	25	Left rear lifting provision
F7	25	MB-2	25	Right rear lifting provision
C7	25	MB-2	25	Towing pintle
E7	25	MB-2	25	Towing pintle
A7	25	MB-2	25	Tiedown shackle left side
G7	25	MB-2	25	Tiedown shackle right side
A8	25	MB-2	25	Tiedown shackle left side
G8	25	MB-2	25	Tiedown shackle right side
A9	25	MB-2	25	Tiedown shackle left side
G9	25	MB-2	25	Tiedown shackle right side
A10	25	MB-2	25	Tiedown shackle left side
G10	25	MB-2	25	Tiedown shackle right side
A11	25	MB-2	25	Tiedown shackle left side
G11	25	MB-2	25	Tiedown shackle right side
A12	25	MB-2	25	Tiedown shackle left side
G12	25	MB-2	25	Tiedown shackle right side
C13	25	MB-2	25	Left rear tiedown provision
E13	25	MB-2	25	Right rear tiedown provision

* D-1 May be substituted for MB-2.

** C5 and E5 tiedown fittings are not required for the C-HET system.

CHAPTER 5

HIGHWAY TRANSPORTABILITY GUIDANCE

Section I. GENERAL

5-1. Scope

This chapter provides transportability guidance for highway movement of the HET and the C-HET systems. It covers significant technical and physical characteristics and safety considerations and prescribes the materials and guidance required to prepare, load, and tie down the system.

5-2. Safety

Safety precautions are listed in chapter 3.

5-3. General

The HET and C-HET systems are transportable un-

der their own power for highway movement. The systems exceed the CONUS legal dimensional and weight limitations. Special permits are required in CONUS and special routing is required overseas for outsize shipments. The procedures for obtaining special permits in CONUS are specified in AR 55-162. The systems also exceed the legal limitations in overseas areas that are identified in *Limits of Motor Vehicle Sizes and Weights*, International Road Federation, 1023 Washington Building, Washington, DC 20005.

Section II. TRANSPORT BY SEMITRAILER

5-4 Preparation

Secure all basic issue items to preclude damage en route. For detailed instructions refer to TM 9-2320-258-10, TM 9-2330-294-14, and TM 9-2320-270-10. When the ether-starting fluid cylinder is shipped with the truck-tractor, M746, or truck-tractor, M911, the cylinder must be securely mounted and free of leaks. The shipping documents must be annotated to describe the cylinder by shipping name and classification, that is, "Ether-Flammable Liquid."

5-5. Transport on Semitrailer, M747

a. General Movement over public highways in CONUS and overseas is normally made when other modes of transport are not available or practical. Highway shipment may be made using either military or commercial equipment of adequate capacity (23 tons or more). The truck-tractor, M746, is shown loaded on the semitrailer, M747 (fig 5-1). Procedures for transporting the semitrailer, M747, on a like trailer have not been developed.

b. Material Adequate blocking and tiedown materials are included in the basic issue items for the semitrailer, M747 (table 5-1).

c. Loading. The truck-tractor, M746, may be driven or winched onto the semitrailer. TM

9-2320-258-10 provides detailed winch operation instructions. When the truck-tractor is in the tiedown position, place the transmission in the neutral position, and apply and lock in the parking brake.

d. Tiedown. Figure 5-1 provides a tiedown diagram that is compatible with standard loading practices and will adequately restrain the load against forces encountered at normal speeds and under normal operating conditions. Figure 5-2 is a turning diagram for the HET system. Figure 5-3 shows axle loads for the HET system.

e. Movement. The truck-tractor, M911, is shown loaded backwards on the semitrailer, M747 (fig 5-4). Before moving, the auxiliary transmission must be put in low range, with pusher axle up and the inner axle locked.

f. Material. Adequate blocking and tiedown materials are included in the basic issue items for the semitrailer, M747 (table 5-2).

g. Loading. The truck-tractor, M911, may be backed or winched onto the semitrailer. TM 9-2320-270-10 provides detailed winch operation instructions. When the truck-tractor is in the tiedown position, place the transmission in the neutral position and apply and lock-in the parking brake.

h. Tiedown. Figure 5-4 provides a tiedown diagram, compatible with standard loading practices, that will adequately restrain the load against

forces encountered at normal speeds and under normal operating conditions. Figure 5-5 is a turning diagram for the C-HET system.

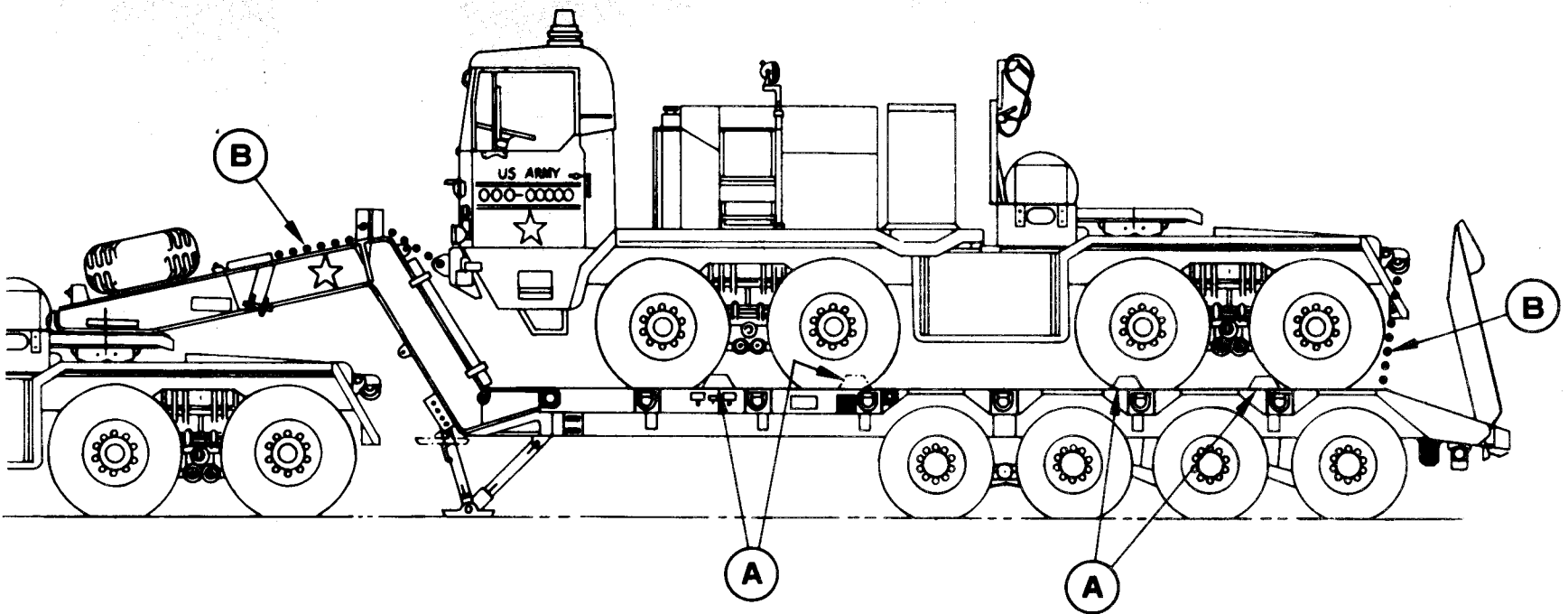


Figure 5-1. Blocking and tiedown diagram of truck-tractor, M746, on semitrailer, M747

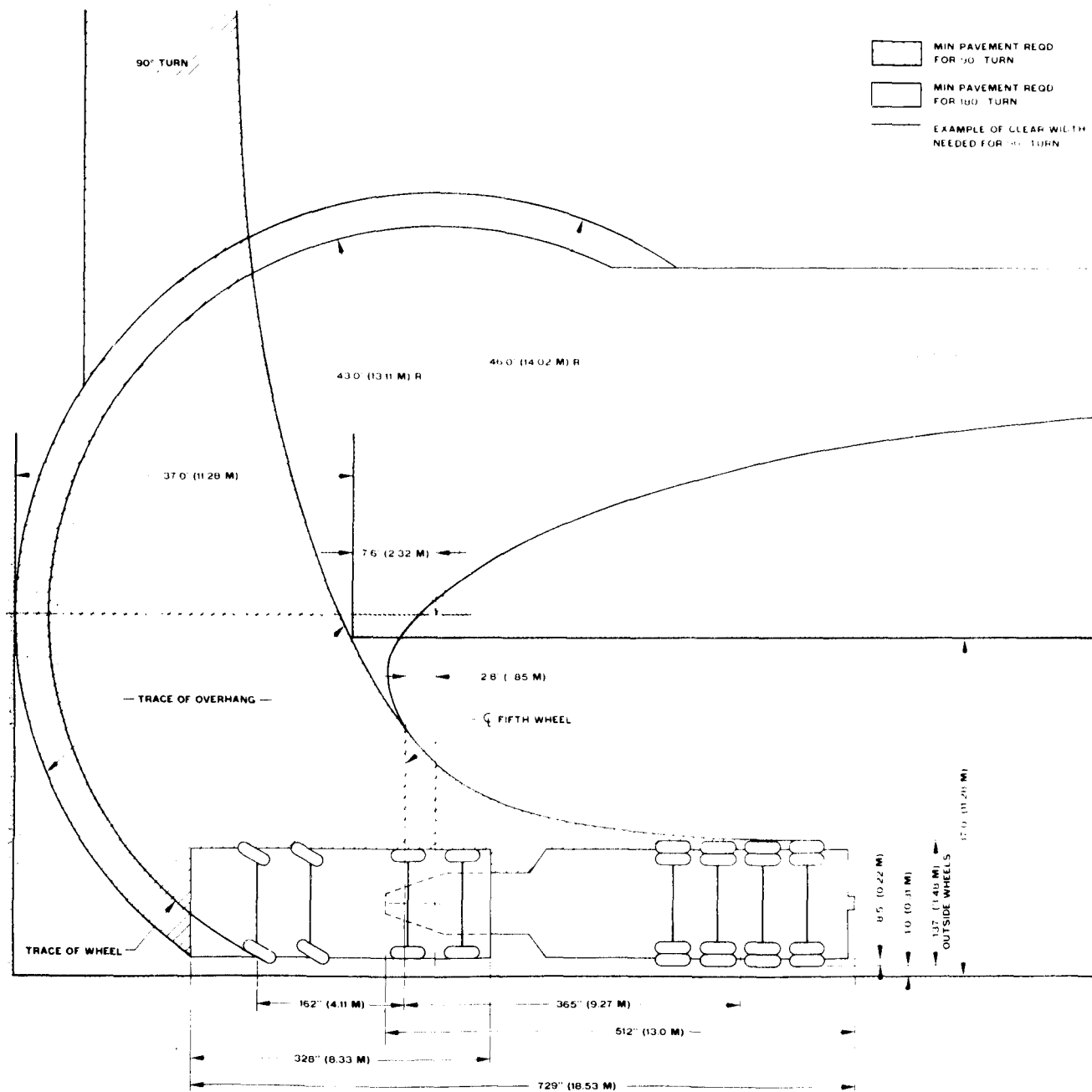
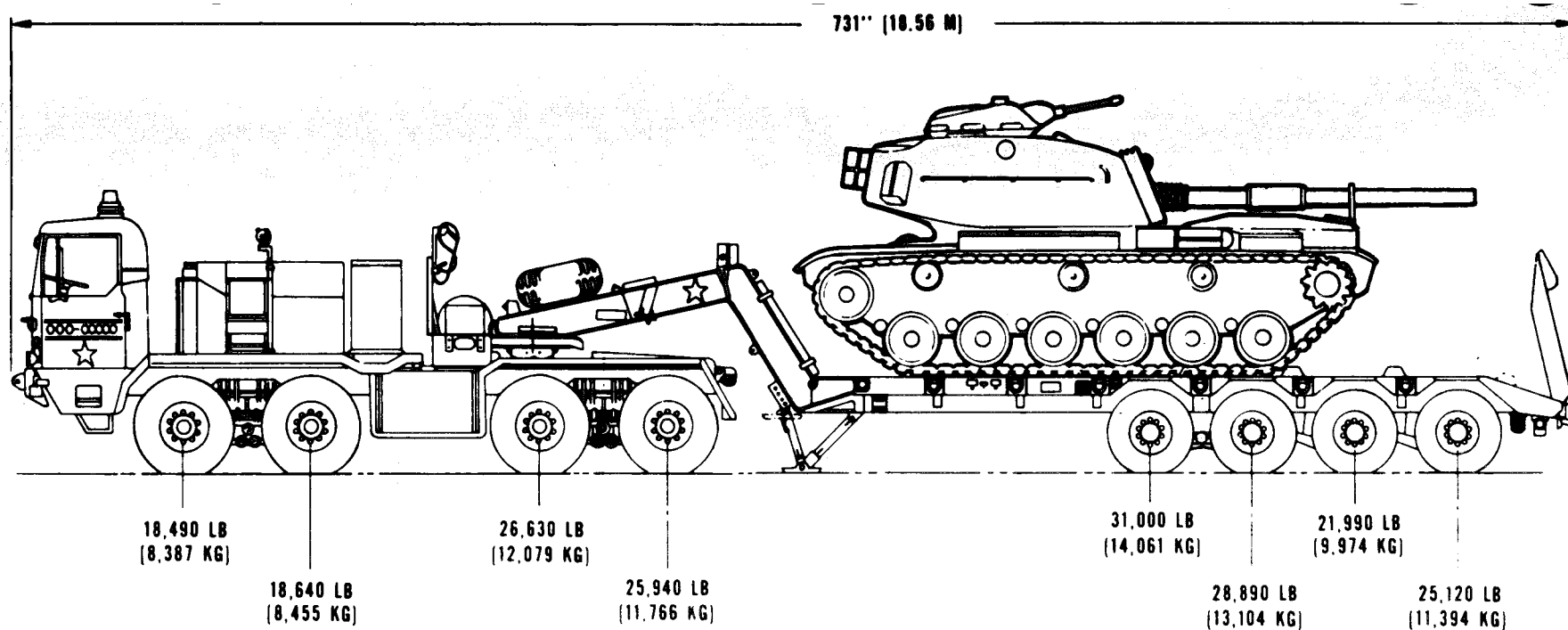
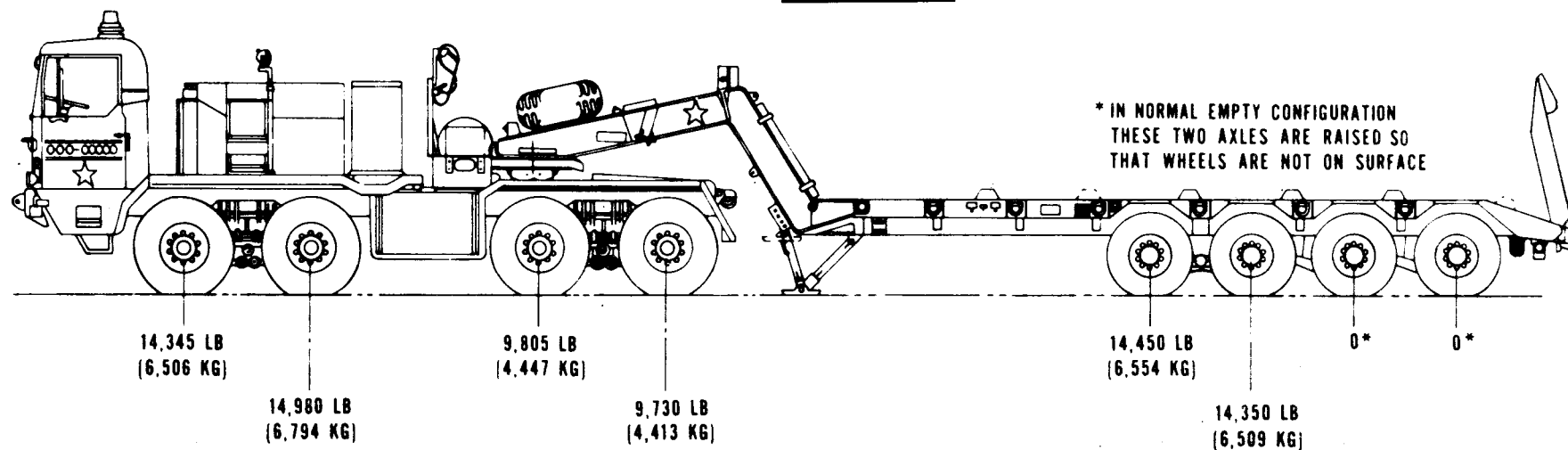


Figure 5-2. Turning diagram for truck-tractor, M746, towing semitrailer, M747



60-TON PAYLOAD



NO PAYLOAD

Figure 5-3. HET axle loads with and without payload

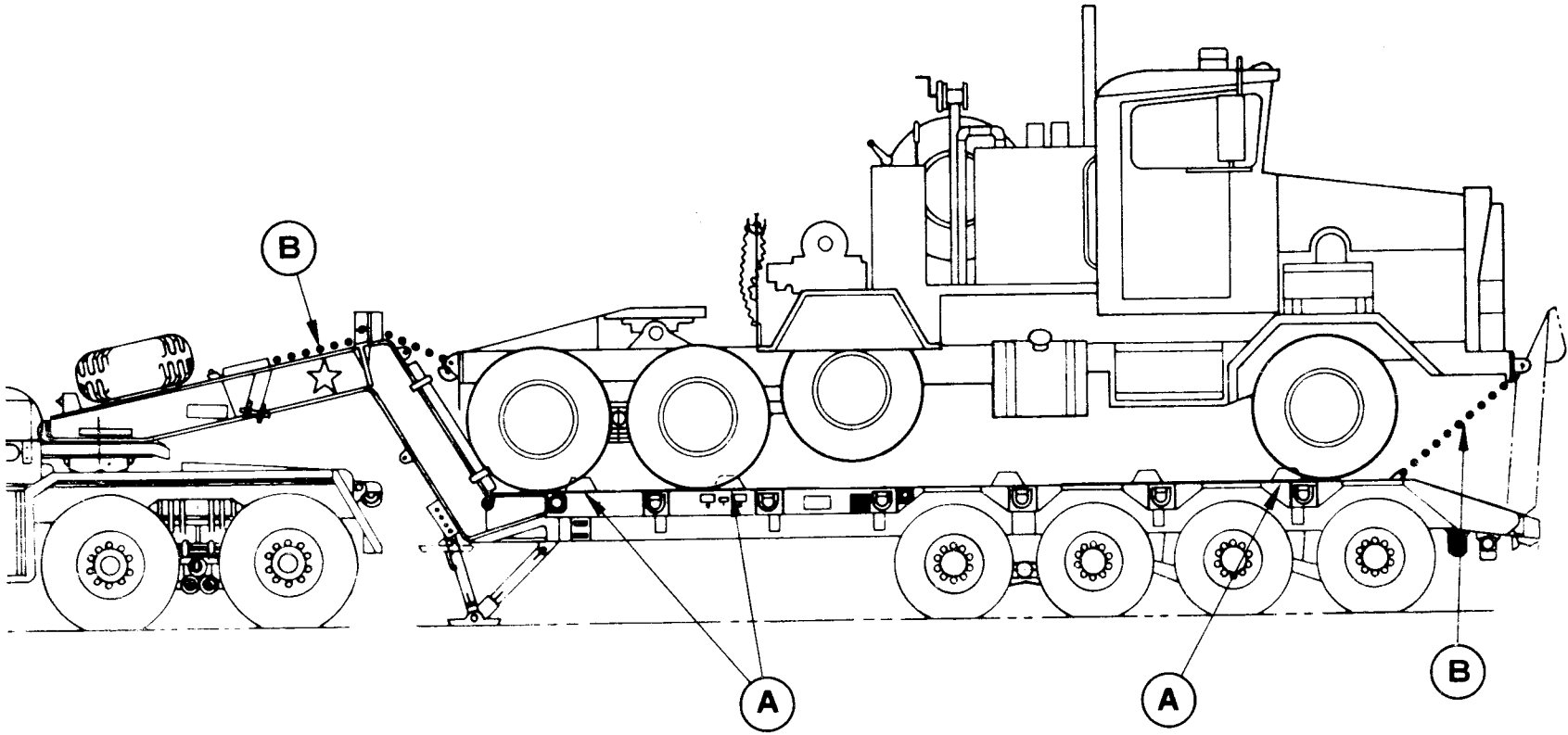


Figure 5-4 Blocking and tiedown diagram of truck-tractor, M911, on semitrailer, M747

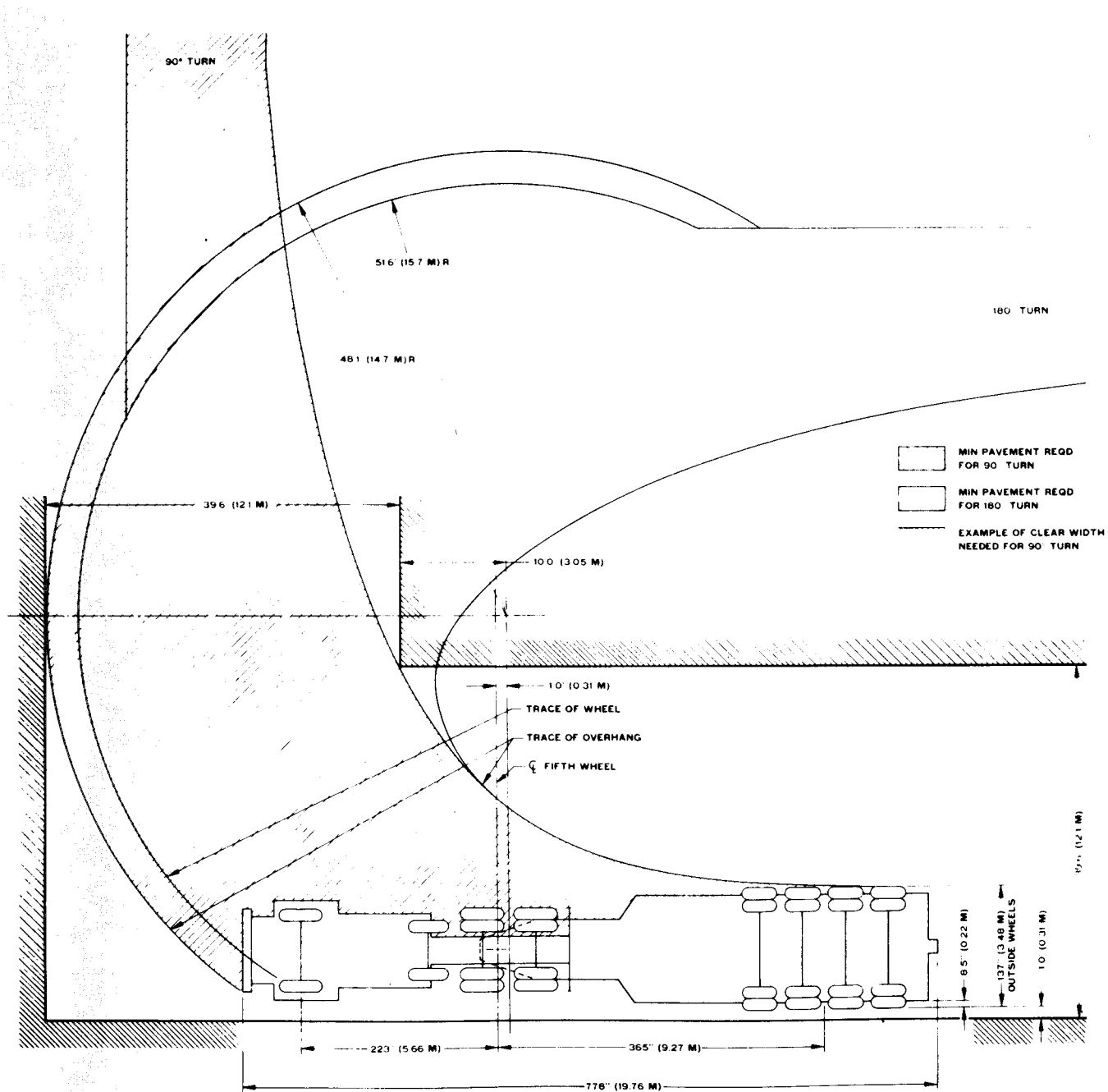


Figure 5-5. Turning diagram for truck-tractor, M911, towing semitrailer, M747

Table 5-1. Application of Blocking and Tiedowns for Truck Tractor, M746 on Semitrailer, M747 (Fig. 5-1)

No. required	Application
8	Curbing Provided as basic issue items with semitrailer, M747. Locate four curbs on each side of semitrailer bed so that when the truck-tractor, M746, is loaded the curbs will be against the inside of each tractor tire.
4	Chain and load binder. Provided as basic issue items with semitrailer, M747. Attach one chain to right front tiedown provision of the tractor. Pass the chain through the right semitrailer upper rollers, and attach to the right gooseneck cleat with one load binder. Secure the left side in a like manner. Tighten chains with load binder ratchets. Attach one load binder and chain to right rear lifting provision of the tractor and to the left rear lifting provision of the semitrailer. Attach one load binder and chain to left rear lifting provision of the tractor and to the right rear lifting provision of the semitrailer. Tighten chains with load binder ratchets.

Table 5-2. Application of Blocking and Tiedowns for Truck Tractor, M911, on Semitrailer, M747 (Fig. 5-4)

Item No. required	Application
A 6	Curbing. Provided as basic issue items with semitrailer, M747. Locate three curbs on each side of the semitrailer bed so that when the truck tractor, M911, is loaded the curbs will be against the inside of each tractor tire. (Except tires on the pusher axle, which are in the raised position.)
B 4	Chain and load binder. Provided as basic issue items with semitrailer, M747. Attach one chain to right rear tiedown provision of the tractor. Pass the chain through the right semitrailer upper rollers and attach to right gooseneck cleat with one load binder. Secure the left side in the same manner. Tighten chains with load binder ratchet. Attach one load binder and chain to right front lifting provision of the tractor and to the left rear lifting provision of the semitrailer. Attach one load binder and chain to the left front lifting provision of the tractor and to the right rear lifting provision of the semitrailer. Tighten chains with load binder ratchet.

Section III. TRANSPORT OF HET AND C-HET SYSTEMS WITH PAYLOAD

5-6. Transport of Payload

a. General. Movement of loaded HET and C-HET systems with a payload (M48-M60 series tanks) is normally made over public highways in CONUS and overseas when other modes of transport are not available or practical. The loaded HET and C-HET systems exceed the CONUS legal dimensional and weight limitations; therefore, special permits are required in CONUS, and special routing is required overseas as indicated in paragraph 5-3.

b. Bridge Limitations. Besides being oversized and overweight, of particular note are the high tandem-axle weights, and the high computed overstress of the loaded HET and C-HET systems when on a typical civilian load-rated H-15 structure in the United States. Respectively, most states allow tandem-axle loads of up to 50,000 pounds, and computed overstress of bridge materials of up to 133 $\frac{1}{3}$ percent (when compared to design-allowable stress), without certification of essentiality to national defense. Accordingly, all highway movements of the loaded HET and C-HET systems must be accompanied by a "certification of essentiality to national defense" issued by the activity offering the

system for movement to the appropriate state highway departments, and this certification must be made prior to moving.

c. Loaded Characteristics. Characteristics of the loaded system are shown in figures 5-3 and 5-6, which show that the transport system exceeds the 50,000-pound tandem-axle loads mentioned above. The state-preferred 133 $\frac{1}{3}$ percent allowable is also exceeded. The computed overstress is approximately 170 percent for the loaded HET and C-HET systems on a typical H-15 highway bridge.

d. MTMC Assistance. Assistance for highway movement of the loaded transport system can be secured from the Commander, Military Traffic Management Command, ATTN: MT-SA, Washington, DC 20315, when highway movement can be certified as essential for national defense and no other transportation mode can be utilized.

e. Loading, Tiedowns, and Safety. Requirements for loading and/or transporting a tank on the HET and C-HET systems may be obtained from TM 55-2350-215-10-15 and TM 9-2330-294-15.

f. Figures 5-6, 5-7, and 5-8. These figures show various axleloads with pusher axle raised and lowered for the C-HET system.

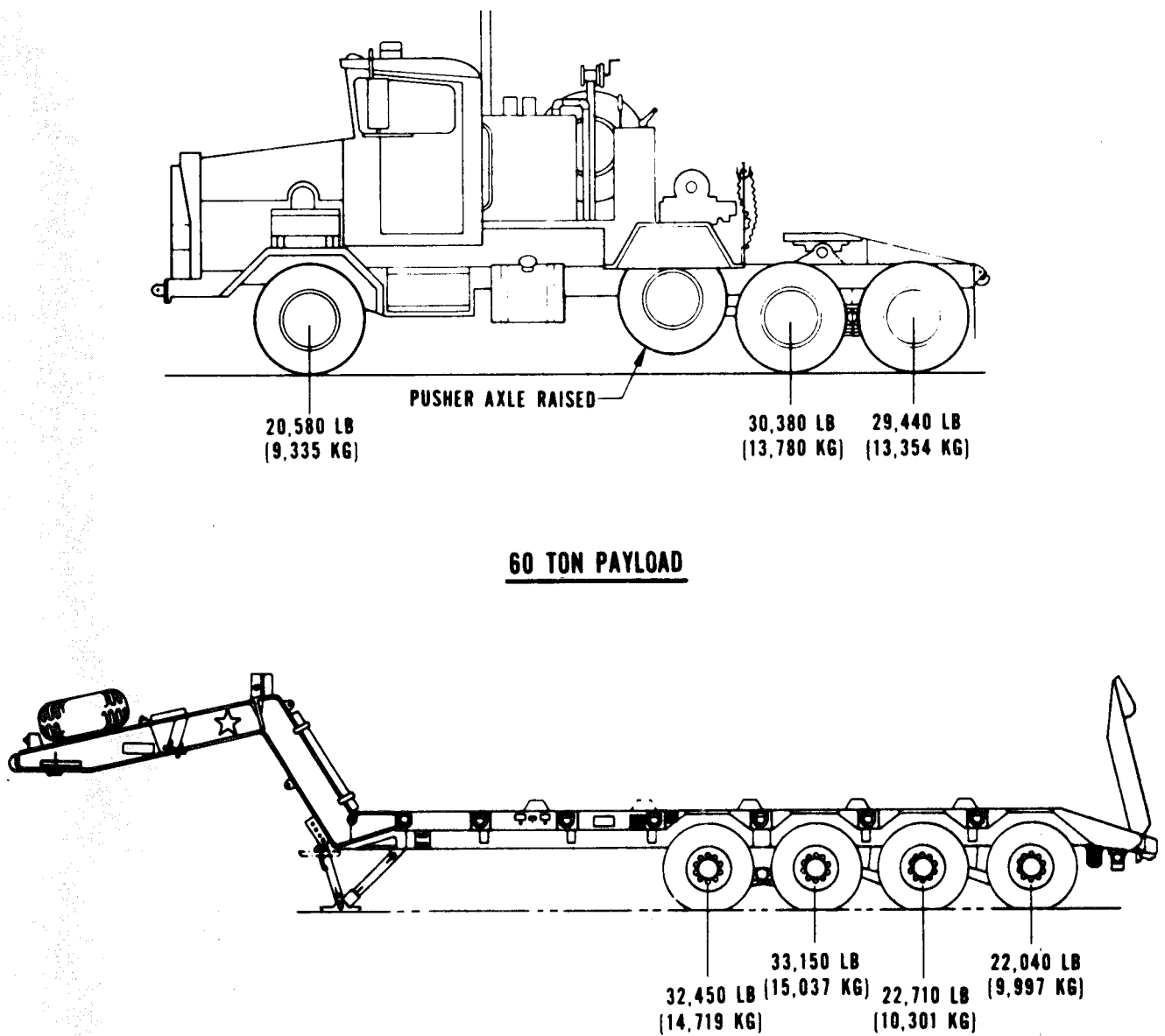
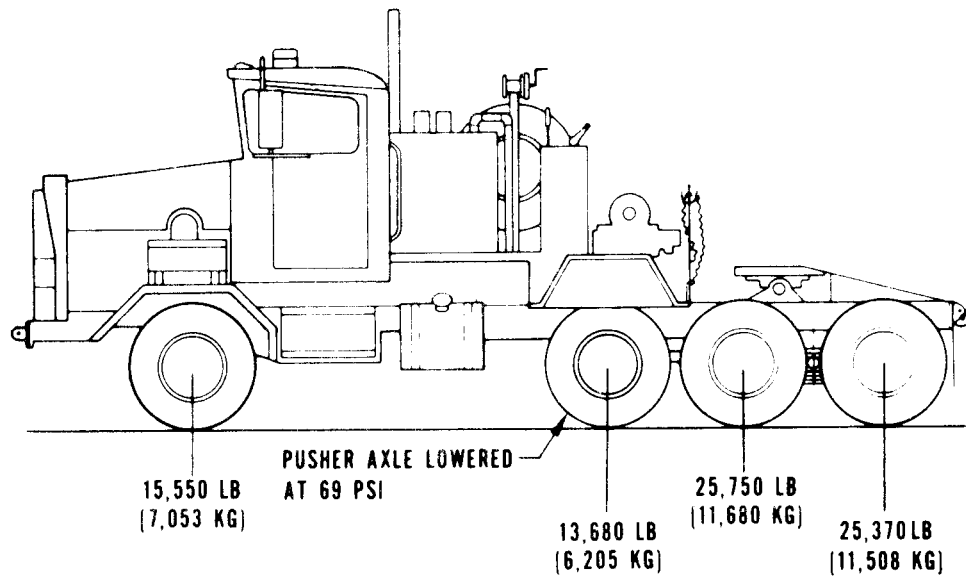


Figure 5-6. C-HET axleload with payload, pusher axle raised



60-TON PAYLOAD

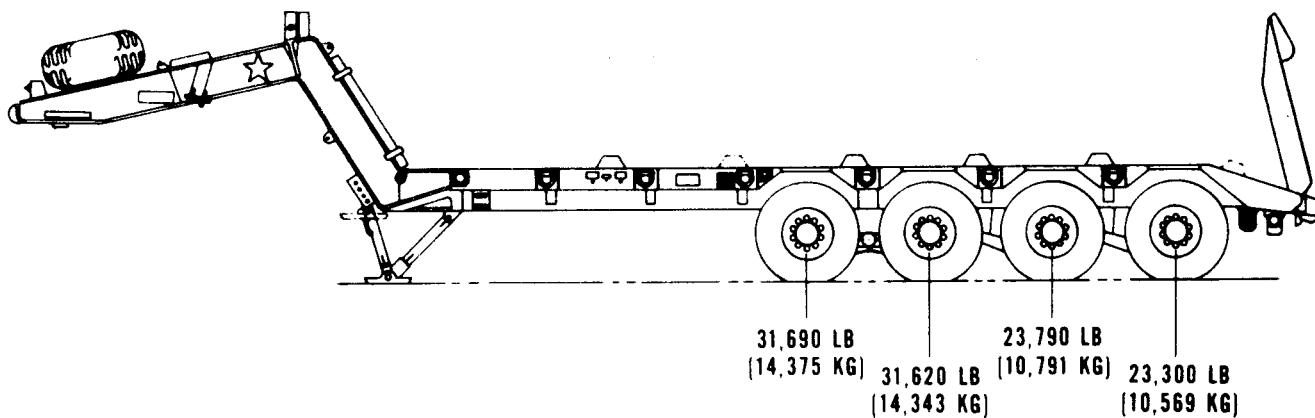
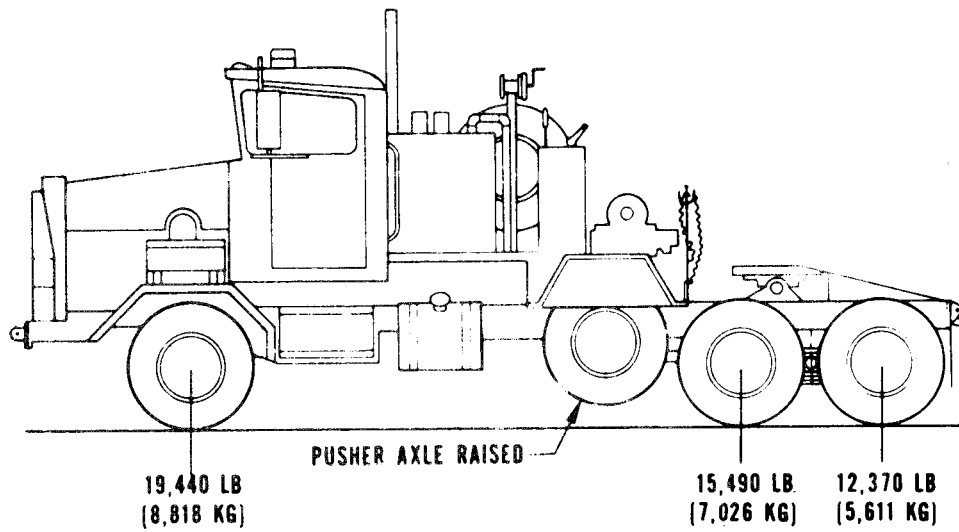


Figure 5-7. C-HET axleload with payload, pusher axle lowered



NO PAYLOAD

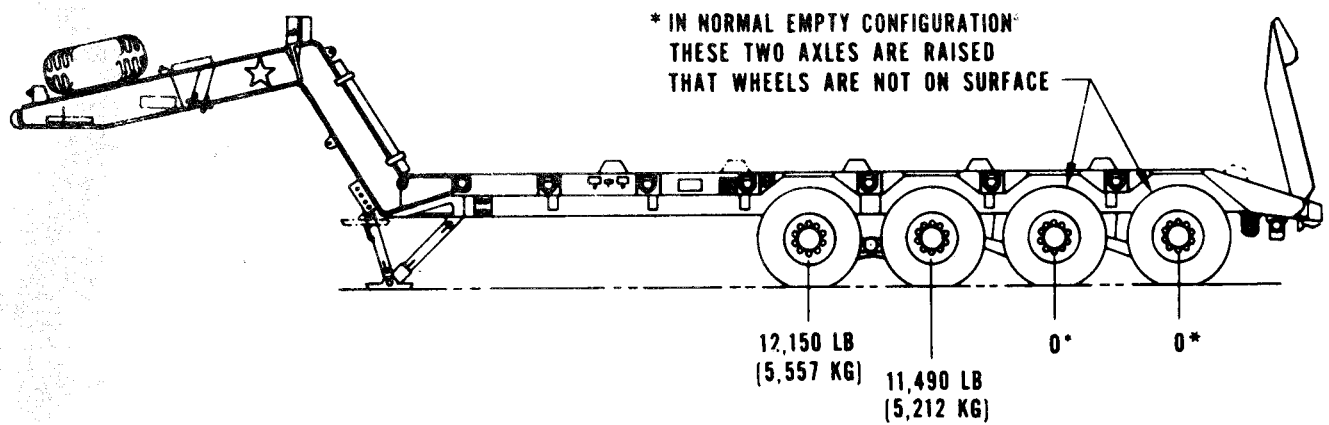


Figure 5-8. C-HET axleload without payload, pusher axle raised

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 HET systems. It covers significant technical and physical characteristics and safety considerations and also prescribes the materials and guidance required to prepare, lift, tie down, and discharge the system.

6-2. Safety

Safety precautions are contained in chapter 3.

6-3. Water Shipment

The HET and C-HET systems can be transported by a variety of inland-waterway cargo carriers, lighters, and by most seagoing cargo vessels.

NOTE

The methods described in this chapter for lifting and securing 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, below-deck stowage should be provided. In general, good stowage means placing the items as close together as practical, with minimum space between outer item and sweatboards (approximately 4 to 6 inches). Breakable parts should be protected, spare parts stowed in or near parent item, brakes set with brake lever wire tied, transmission in neutral, battery terminals disconnected and taped, and fuel tank drained. Secure the system by blocking wheels front, rear, and on both sides; lash with wire rope or chains to bulkhead, stanchions, or padeyes.

NOTE

When the HET and C-HET systems are loaded on vessels that are adequately ventilated by power blowers, such as roll-on/roll-off vessels, fuel need not be drained or batteries disconnected.

b. Lifting. The truck-tractor, M746, has four lifting eyes. Two are located at the rear of the tractor and two are located behind the cab under the hinged walkway. A spreader bar must be used with the sling attached to the front lifting eyes to preclude damage to the radiator, engine compartment, or air cleaners (fig 6-1). The semitrailer, M747, has four lifting eyes. Two are located at the rear between the ramp hinges, and two are located where the gooseneck joins the forward end of the load-bearing surface (fig 6-2).

c. Lading. The HET and C-HET systems will be

loaded on seagoing cargo vessels in their minimum configuration as described in paragraph 2-5. They may be loaded aboard landing craft, beach discharge lighters, heavy amphibious lighters, and landing ships under its own power or lifted by cranes of adequate capacity (23-ton minimum). They can also be loaded onto seagoing vessels by shoreside or floating cranes or by heavy-lift ship's gear. Figures 6-3 and 6-4 show blocking and tiedown details. Tables 6-1 through 6-4 list materials and their application for blocking and tiedown.

d. Special design. Roll-on/roll-off ships, landing ships, and attack cargo ships are equipped with patented lashing gear and prepositioned fittings in the decks. The use of such equipment is adequate and additional blocking and bracing are not required.

e. Lifting. The truck-tractor, M911, has four lifting eyes. Two are located at the front bumper and two are at the rear of the tractor. A rectangular spreader bar should be used with steel wire rope slings attached to front and rear lifting eyes to preclude damage to the radiator, engine hood, or air cleaners (fig 6-5). See MIL-S-22824B (Navy) for additional information on slings. The same bill of materials and application of materials shown in tables 6-1 and 6-2 for the truck-tractor, M746, can be used for blocking and tiedown of the truck-tractor, M911, in a general cargo vessel (fig 6-6).

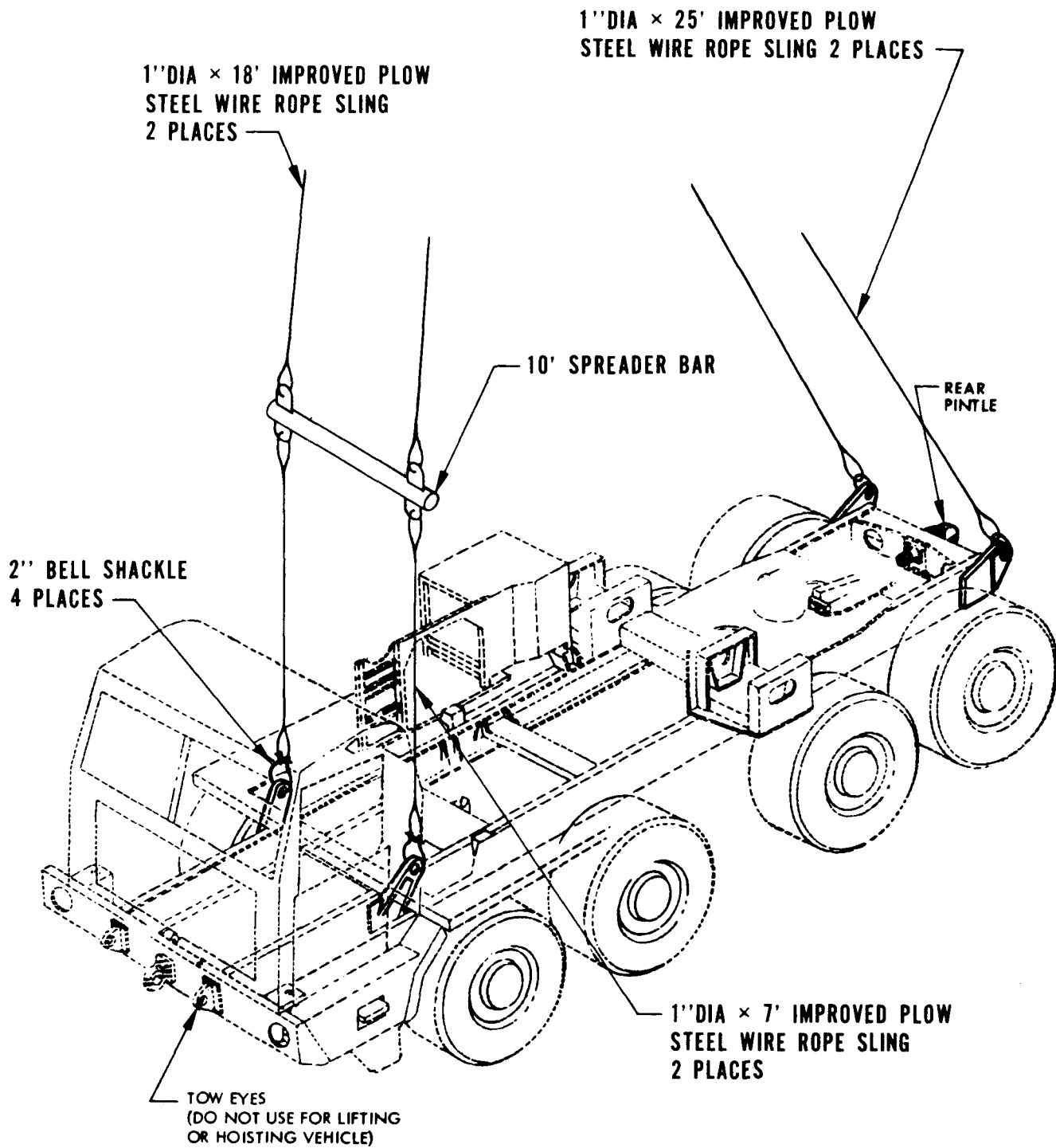


Figure 6-1. Lifting diagram for truck-tractor, M746, using four-legged bridle sling and one spreader bar

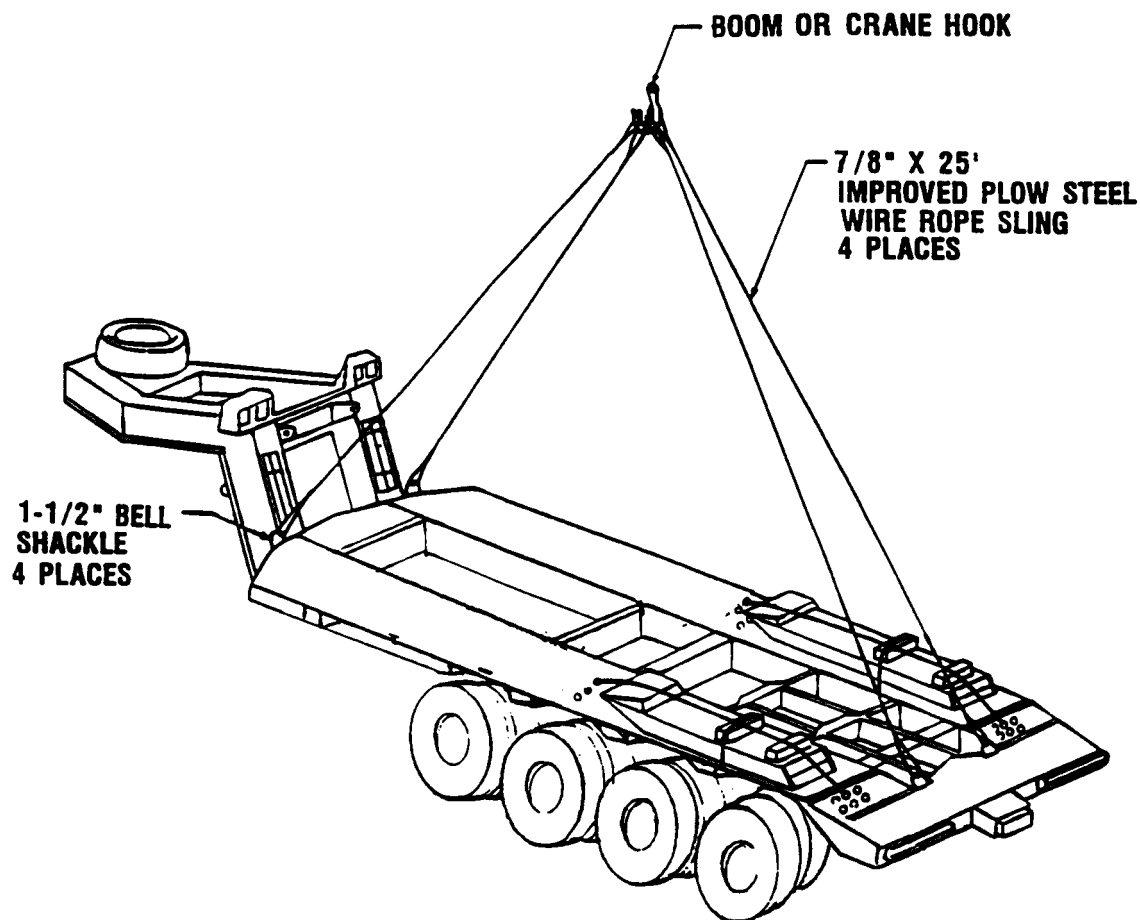


Figure 6-2. Lifting diagram for semitrailer, M747, wing four-legged bridle sling

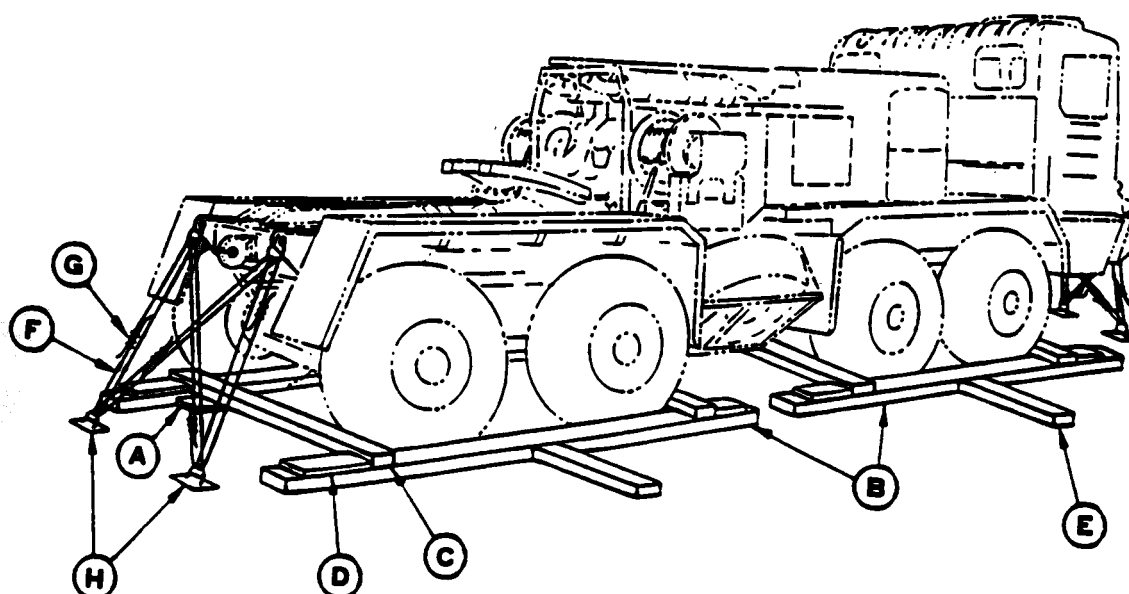


Figure 6-3. Blocking and tiedown diagram of truck-tractor, A746, in general-cargo vessel

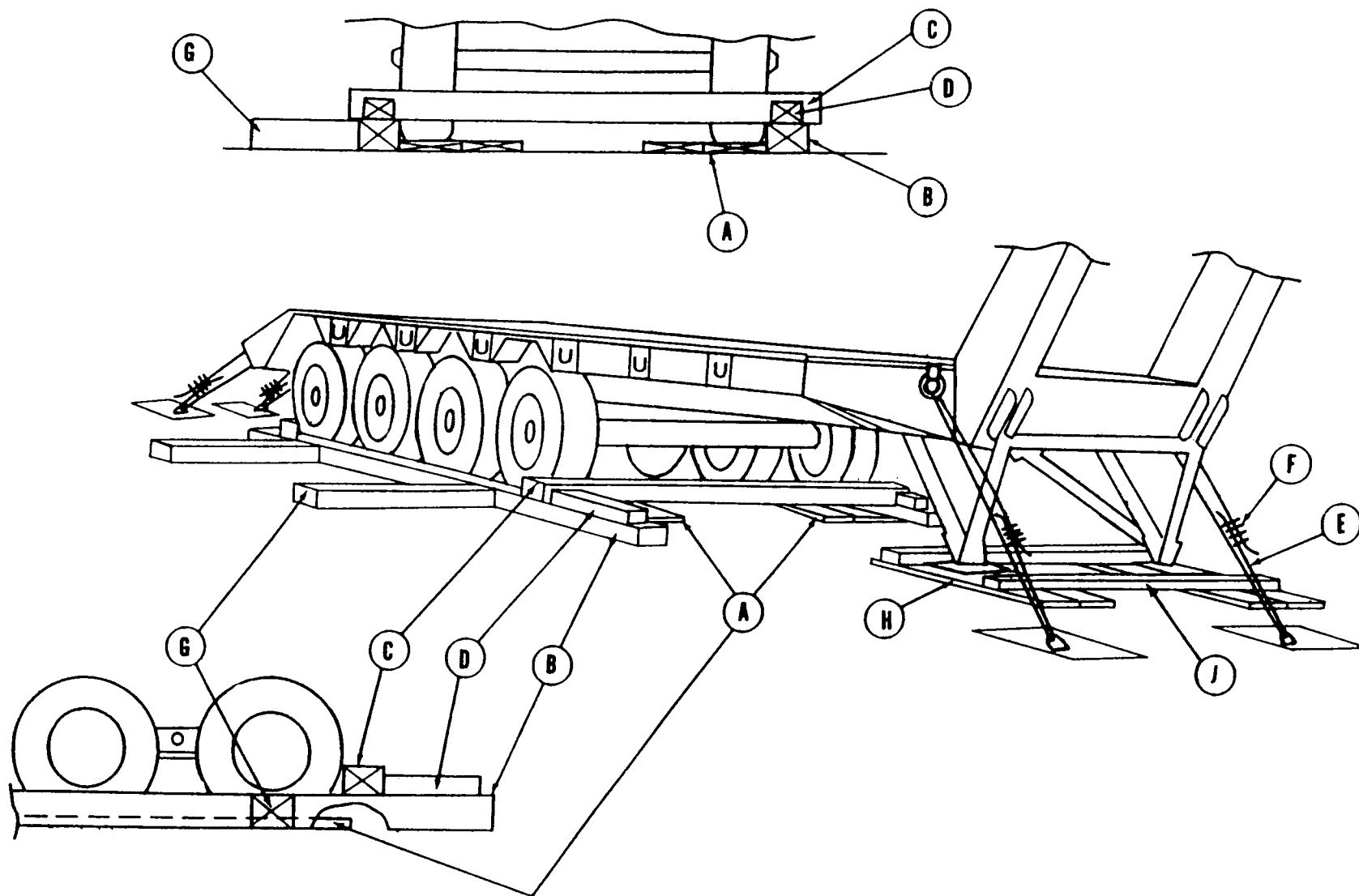


Figure 6-4. Blocking and tiedown diagram of semitrailer, M747, in general-cargo vessel

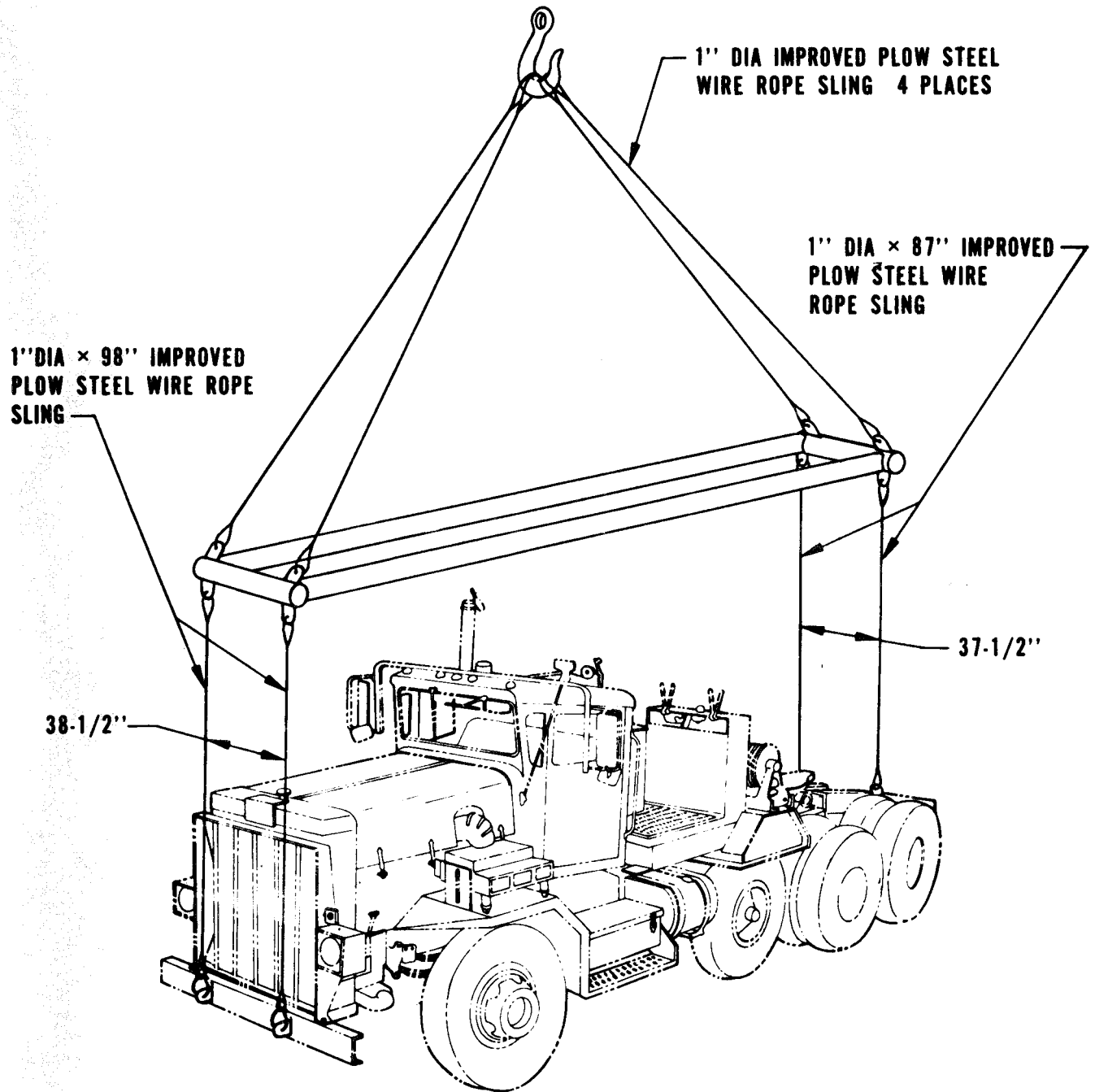


Figure 6-5. Lifting diagram for truck-tractor, M911 using rectangular spreader bar with steel wire cables

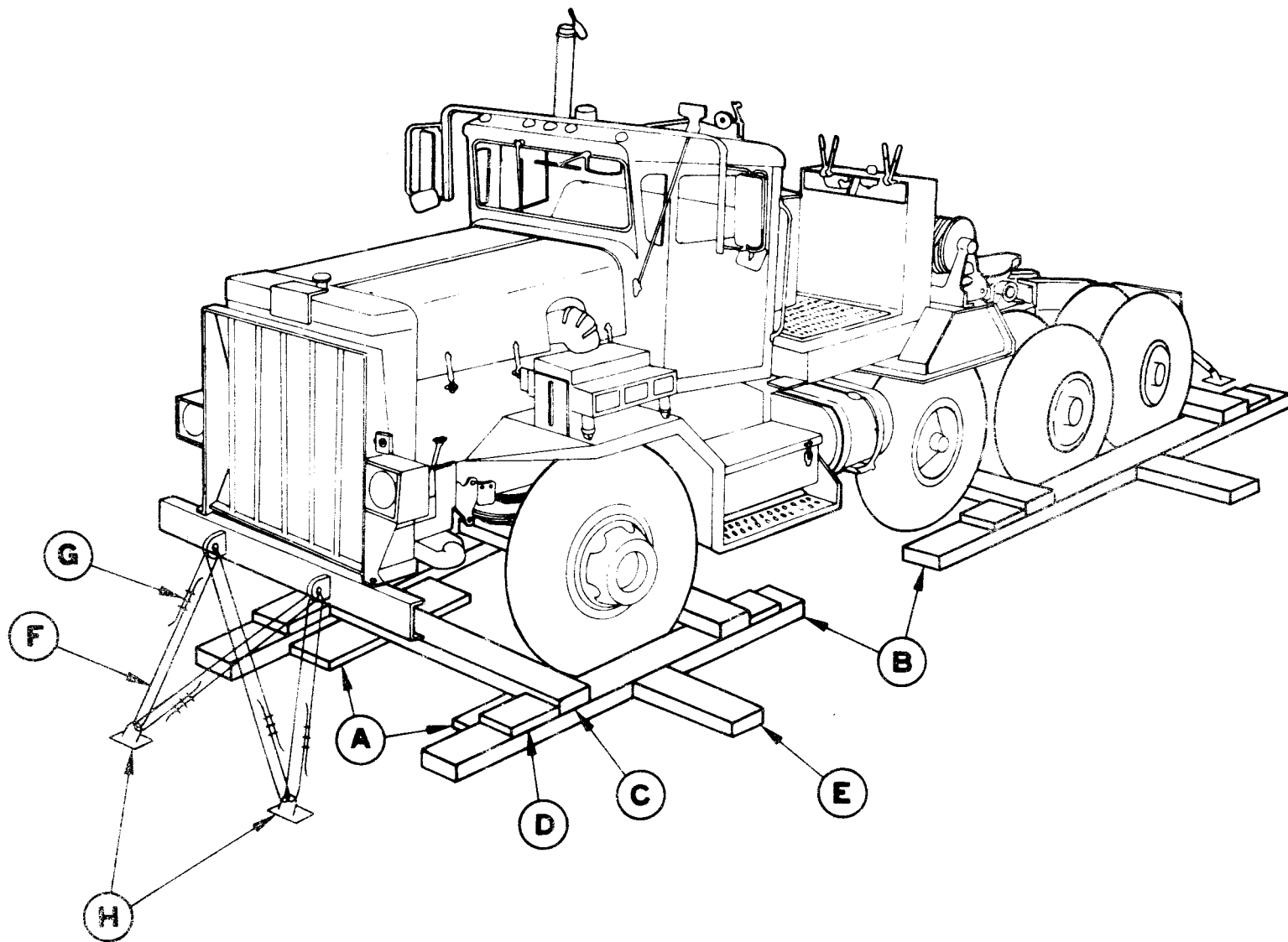


Figure 6-6. Blocking and tiedown of truck-tractor, M911, in general-cargo vessel

6-5. Barges and Lighters

When transporting the HET and C-HET systems short distances by barge or similar lighterage on

sheltered waters, blocking and chocking will be required. When moving extended distances or through rough waters, tiedowns must also be used.

Table 6-1. Bill Materials for Blocking and Tiedown of Truck-Tractor M746 and M911 in General-Cargo Vessel (Figs 6-3 and 6-6)

Item	Description	Approximate Quantity
Lumbar	Douglas-fir, or comparable, straight-grain, free from material defects: Fed Spec MM-L-751H: 2- X 12-in.	80 linear ft
	4- X 6-in.	8 linear ft
	6- X 8-in.	96 linear ft
Nails.....	Common, steel; flathead, bright or cement-coated; Fed spec FF-N-105B:40d	64
Wireropa	6 X 19, I WRC; improved plow steel; preformed, regular-lay: Fed Spec RR-W-410C:5/8-in.	160 ft
clamps	Wire rope, U-bolt clips, saddled, single-grip, steel, Crosby heavy-duty, or equal; Fed Spec FF-C-450D: 5/8 in.	32

Table 6-2. Application of Materials for Blocking and Tiedown of Truck-Tractor, M746 and M911 in General-Cargo Vessel (Figs 6-3 and 6-6)

Item	No. required	Application
A	8	Lumber, 2- X 12- X 120-in. Pre-position on vessel deck so that two pieces are under each pair of wheels and parallel to the long axis of the vehicle.
B	4	Side blocks. Each to consist of one piece of 6- X 8- X 144-in. - lumber. Locate <i>one</i> piece centered against outside of each pair of wheels.
C	4	End blocks. Each to consist of one piece of 6- X 8- X 144-in. lumber. Locate on top of item B and against wheels as shown in figure 6-3. Toenail to item B with four 40d nails at each end of each item C.
D	8	Backup cleats. Each to consist of one piece of 4- X 6- X 12-in. lumber. Locate on top of item B against the joint of each item C. Nail to item B with four 40d nails each.
E	as required	Bracing. Each consists of 6- X 8-inch X length cut-to-suit. Brace as required against adjacent, vehicle, cargo, or side of vessel bulkhead, as appropriate. Materials for this requirement not included in table 6-1.
F	8	Wire rope, approximately 20 ft. Form a complete loop through each tiedown provision shackle and appropriate vessel deck padeye. Pull wire rope taut and secure with clamps (item G).
G	32	Clamps. Use four to secure each item F.

Table 6-3. Bill of Materials for Blocking and Tiedown of Semitrailer, M747, in General-Cargo Vessel (Fig 6-4)

Item	Description	Approximate quantity
Lumbar	Douglas-fir, or comparable, straight-grain, free from material defects; Fed Spec MM-L-751H: 2- X 12-in.	75 linear ft
	4- X 6-in.	18 linear ft
	6- X 8-in.	60 linear ft
Nails	Common, steel; flathead, bright or cement-coated; Fed Spec FF-N-105B:40d	48
Wire Rope	6 X 19, IWRC; improved plow steel preformed, regular-lay; table X, Fed Spec RR-W-410C: 5/8-in.	80 ft
Camps	Wire rope, U-bolt clips, saddled, single-grip, steel, Crosby heavy-duty, or equal; Fed Spec FF-C-450D: 5/8-in.	16

*Table 6-4. Application of Materials for Blocking and Tiedown of
Semitrailer, M747, in General-Cargo Vessel (Fig 6-4)*

Item	No. required	Application
A	4	Lumber 2- X 12- X 192-in. Pre-position on vessel deck so that two pieces are under wheels on each side.
B	2	Side blocks. Each to consist of one piece of 6- X 8- X 232-in. lumber. Locate one piece on each side, against and centered on trailer wheels.
C	2	End blocks. Each to consist of one piece of 6- X 8- X 120-in. lumber. Locate on top of item B, one against rear of rear wheels and one against front of forward wheels. Toenail to item B with four 40d nails at each end of each item C.
D		Backup cleat. Each to consist of one piece of 4- X 6- X 12-in. lumber. Locate on top of item B against the joint of each item C. Nail to item B with four 40d nails each.
E		Wire rope, approximately 20 ft. Form a complete loop through each tiedown provision shackle and appropriate vessel deck padeye. Pull wire rope taut and secure with clamps (item F).
F	16	Clamps. Use four to secure each item E.
G	as required	Bracing. Each consists of 6- X 8-in. X length cut-to-suit. Brace as required against adjacent vehicle, cargo, or side of vessel bulkhead as appropriate. Material for this requirement is not included in table 6-3.
H	4	Lumber, 2- X 12- X 30-in. Pre-position on vessel deck so that two pieces are centered under each landing gear pad.
J	2	Bracing. Each to consist of one piece of 4- X 6- X 82-in. lumber. Locate on top of item H, one against front and one against rear edge of landing gear pads. Nail each piece to item H with eight 40d nails.

6-6. Landing Ships, Landing Craft, and Amphibians

When transporting the HET and C-HET systems for extended distances or through rough waters,

blocking and tiedowns must be used. In most cases, the vessels are equipped with turnbuckles with a sheep's-foot fitting on one end that fits into a deck cloverleaf. Where not provided, a suitable substitute may be used.

CHAPTER 7 RAIL TRANSPORTABILITY GUIDANCE

Section I. GENERAL

7-1. Scope

This chapter provides transportability guidance for rail movement of the HET and C-HET systems. It covers significant technical and physical characteristics and safety considerations and also prescribes the materials and guidance required to prepare, load, and tie down the system on open top flatcars.

7-2. Maximum Use of Railcar Capacity

Additional cargo, as approved by the activity offering the HET and C-HET systems for transport, may be transported on a railcar with the system, provided the railcar weight and dimensional limitations are not exceeded. Do not load additional cargo on the M747 trailer bed.

Section II. TRANSPORT ON CONUS RAILWAYS

7-3. General

The transportability guidance contained in this section is applicable when the HET and C-HET systems are transported on CONUS railways. Consideration is given to movements on railcars normally used for this type of equipment. Both systems can be transported without restrictions only at reducible height. Sectionalization or major disassembly is not required. Remove warning beacon light from the M746 and the exhaust stack from the M911 to meet height requirement. Stow items in the cab.

7-4. Preparation

As a minimum, the following preparations should be accomplished:

a. Secure all basic-issue items against pilferage and damage. Place them in stowage compartments or a wooden crate of suitable size and capacity. If crated, secure crate to parent vehicle.

b. Remove rearview mirrors from the truck-tractor and stow them in the cab.

“Paragraph c deleted”

7-5. Loading on General-Purpose Flatcars

a. The HET and C-HET systems can be placed in

the tiedown position on a railcar by a crane of adequate capacity (23-ton minimum), or they may be driven or towed onto the railcar, provided a suitable ramp or bridge is available.

b. The loads illustrated in figures 7-1, 7-2, and 7-4 are based on a flatcar width of 10 feet 6 inches. Figure 7-3 provides detailed instructions for blocking and tiedown. Tables 7-1 through 7-5 provide bills of materials and instructions for their application to secure the system on general-purpose flatcars.

c. Although the truck-tractor and semitrailer are illustrated as separate loads, they can be transported by rail when connected as a unit on a railcar at least 65 feet long with a minimum load capacity of 39 tons.

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 should be adjusted as required so that a nail for that piece will not be driven into or against a nail in the lower piece of lumber.

d. The tiedown shown for the semitrailer ramps (fig 7-2) is a suggested method and detailed instructions are not provided. One alternative method would be to restrain the ramp in the upright position as shown in figure 7-3.1. This would negate removing the ramp and securing it on the semitrailer bed.

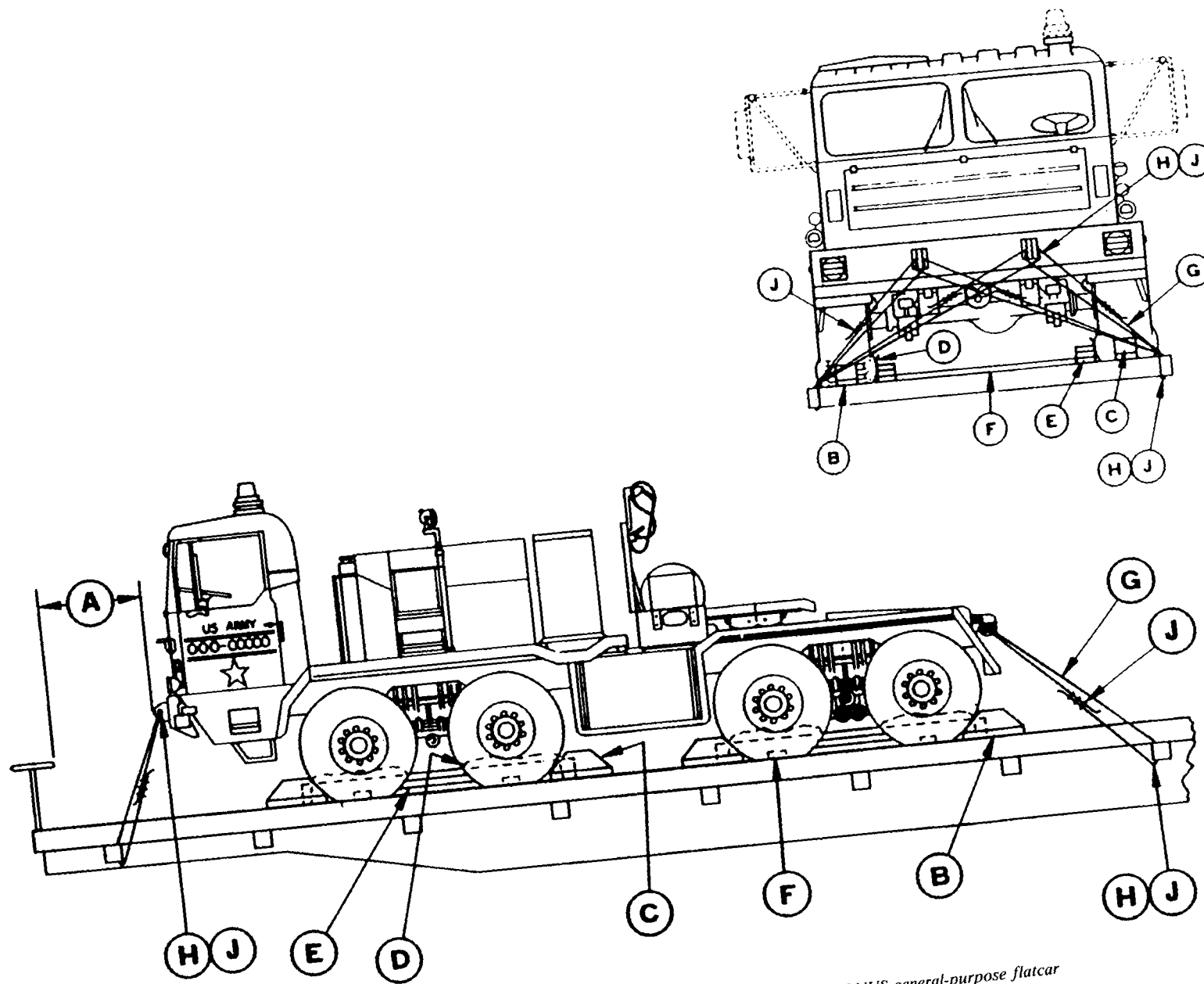


Figure 7-1. Blocking and tiedown diagram of truck-tractor, M746, on CONUS general-purpose flatcar

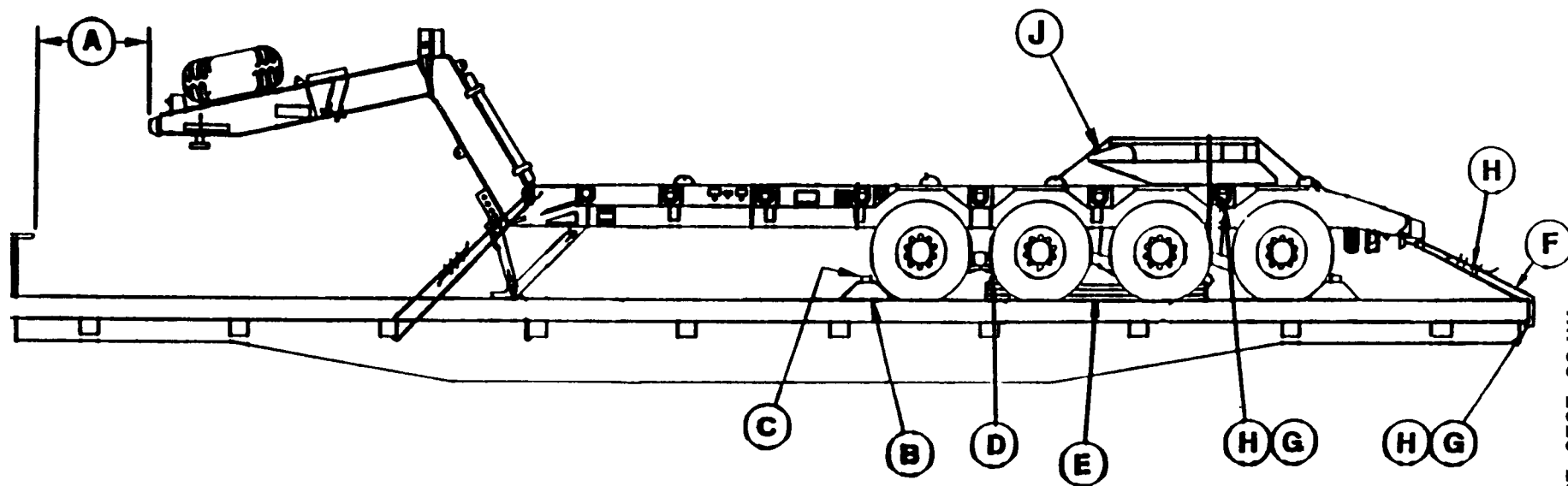
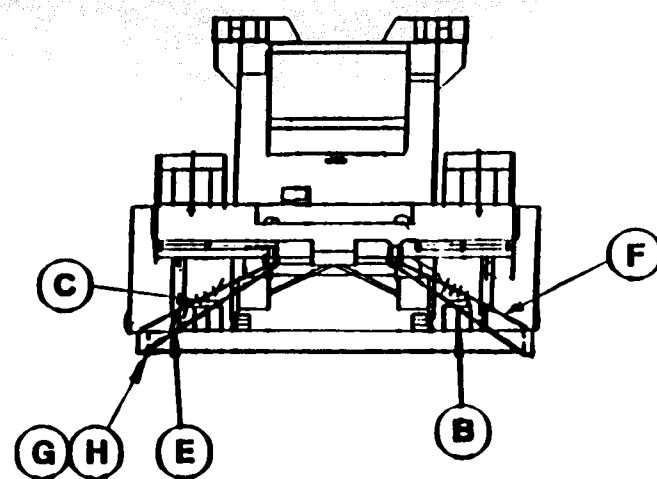
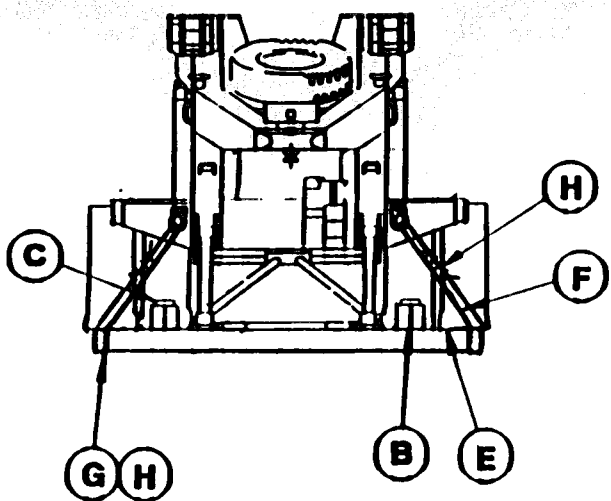


Figure 7-2. Blocking and tiedown diagram of semitrailer, M747, on CONUS general-purpose flatcar

TM 55-2320-258-14

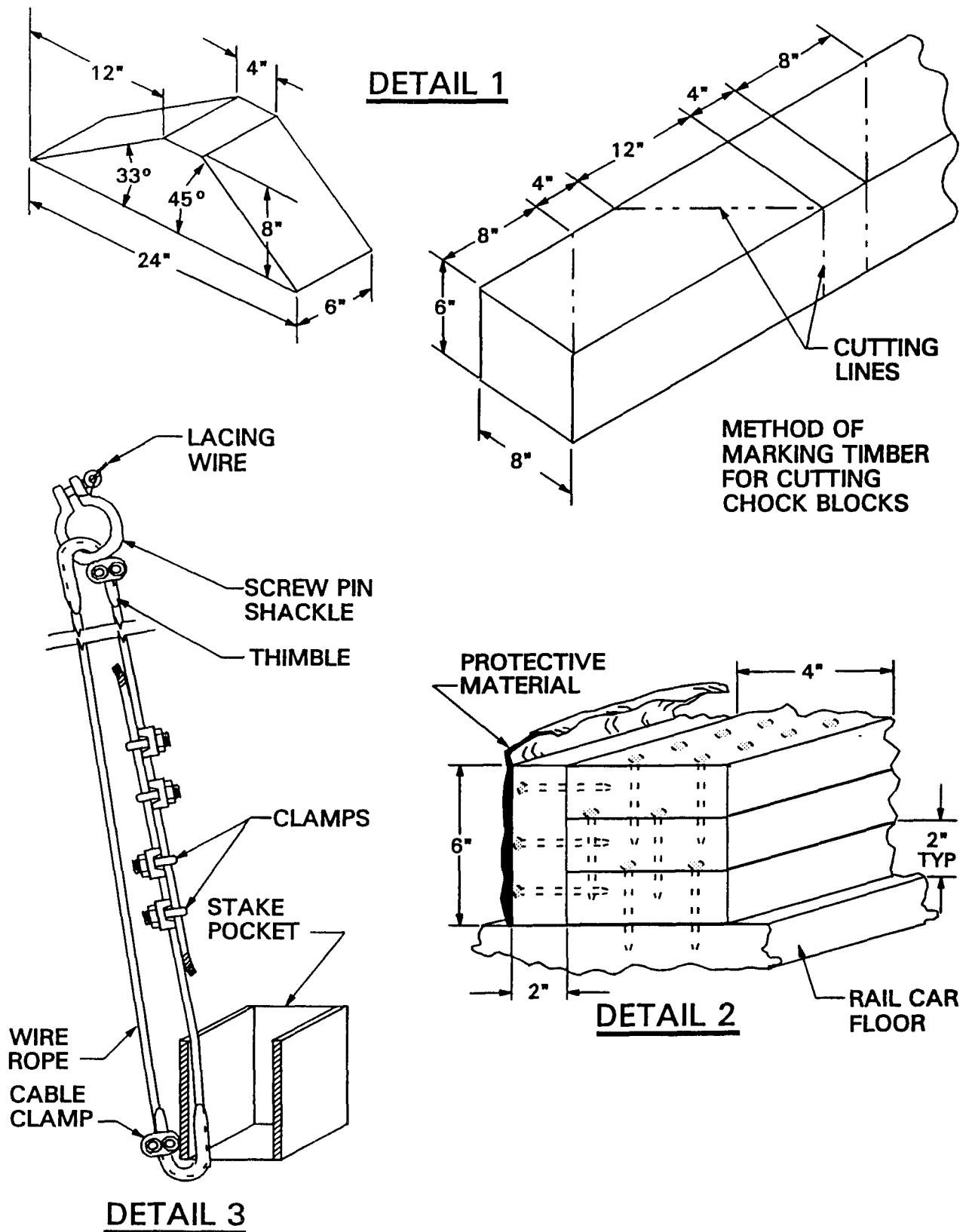


Figure 7-3. Blocking and tiedown details diagram

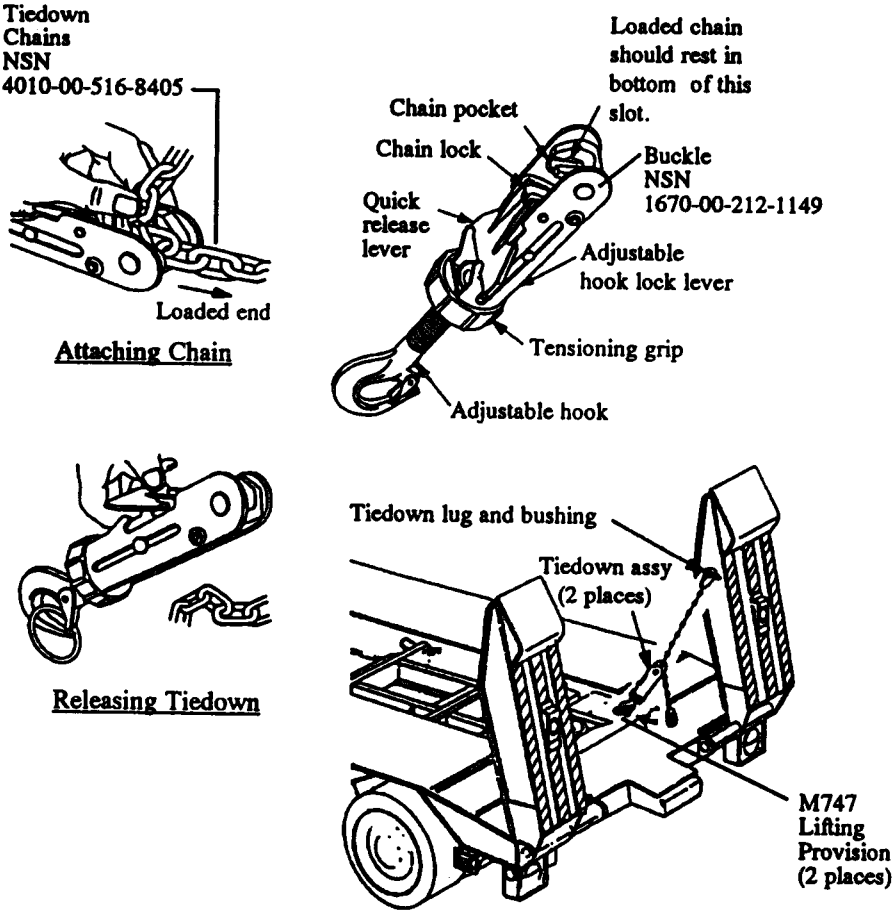


Figure 7-3.1. Optional Ramp Tiedown Diagram

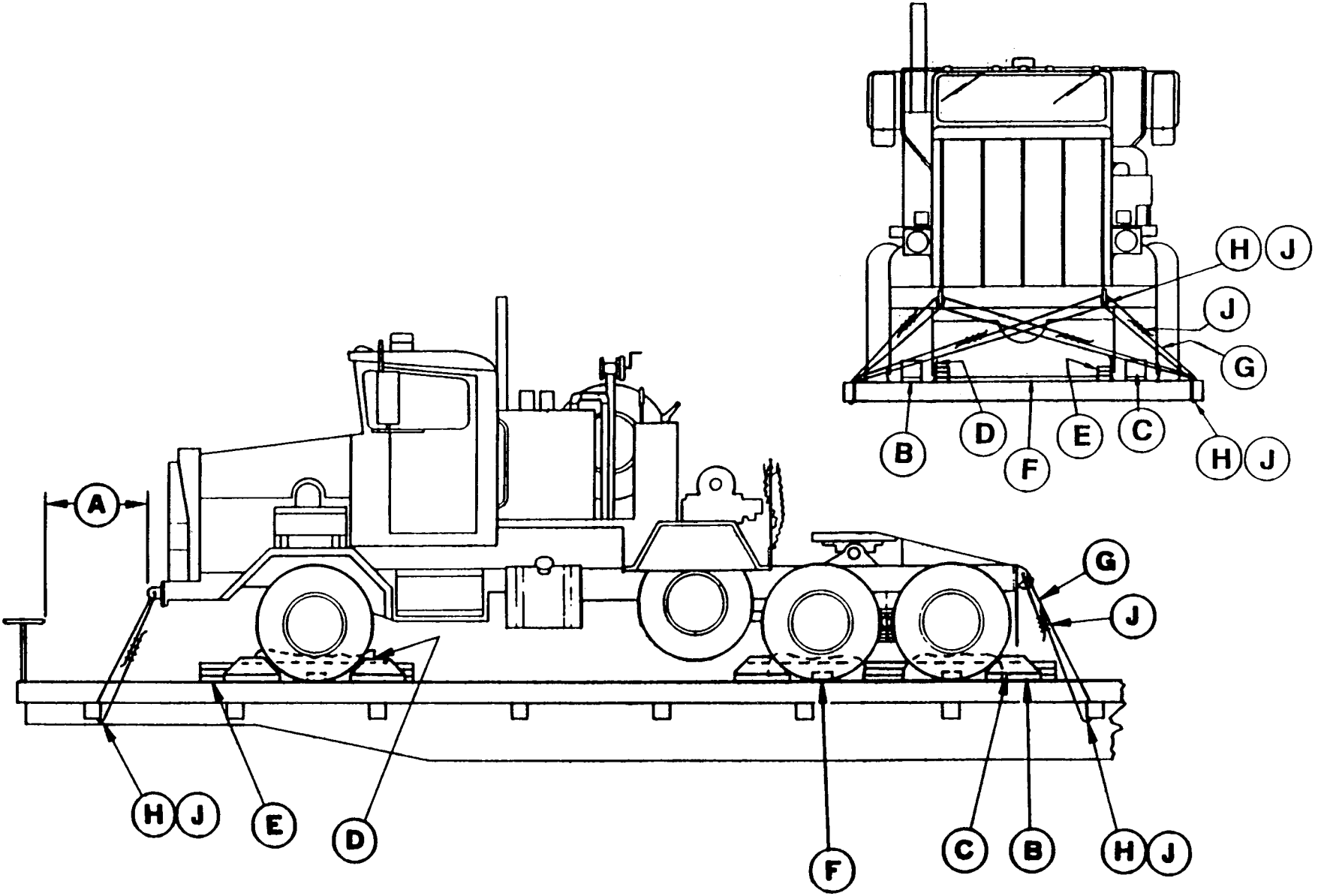


Figure 7-4. Blocking and tiedown diagram of truck-tractor, M911, on general-purpose flatcar

Table 7-1. Bill of Materials for Blocking and Tiedown of Truck Tractor, M746 and M911, on CONUS General-Purpose Flatcar (Figs 7-1, 7-3, and 7-4).

Item	Description	Approximate quantity
Lumber	Douglas-fir or comparable, straight-grain, free from material defects; Fed Spec MM-L-751H: 2- x 4-in.	108 linear ft
	2- x 6-in.	77 linear ft
	6- x 8-in.	12 linear ft
Nails	Common, steel; flathead, bright or cement-coated; Fed Spec FF-N-105B: 12d	60
	AM.....	224
	God	56
Thimbles.....	Standard, open-type 3/8-in	16
Clamps	Wire rope, U-bolt clips, saddled, single-grip, <i>steel</i> , Crosby heavy-duty, or equal; Fed Spec FF-C-450D: 3/8-in	48
Wire rope.....	6 x 19, IWRC; improved plow steel; preformed, regular-lay; table X, Fed Spec RR-W-410C: 3/8-in.	120 ft
Cushioning material.....	Waterproof paper, burlap, or other suitable material	as required

Table 7-2. Application of Materials for Blocking and Tiedown of Truck Tractor, M746, on CONUS General-Purpose Flatcar (Figs 7-1 and 7-3)

Item	No. required	Application
A		Brake wheel clearance. Minimum clearance required in 6 in. above, in back of, and on both sides of, and 4 in. underneath wheel, 12-inch minimum clearance from end of car to load, extending from center of brake wheel to side of car and 6 ft above car floor (fig 7-1).
B	8	Blocks. Each to consist of one piece of 2- x 6- x 25-in. lumber. Locate one block against wheels as shown in figure 7-1, and nail to car floor with five 20d nails.
C	8	Blocks (detail 1, fig 7-3). Each to consist of one piece of 6- x 8- x 24-in. lumber cut as shown in detail 1. Locate one block on top of each item B with 45-degree side against tire. Nail heel of block to item B with three 40d nails. Toenail sides of block to car floor through item B with two 40d nails on each side. (Pattern 16)
D	1 ea item E	Cushioning material. Locate bottom portion under item E, and between tire and item E so as to extend 2 in. above item E (detail 12, fig 7-3).
E	4	Side block. Each to consist of one piece of 2- x 6- x 108-in. lumber and three pieces of 2- x 4- x 108-in. lumber (detail 12, fig. 7-3). Nail 2- x 6- x 108-in. piece to edge of bottom 2- x 4- x 108-in. piece with fifteen 12d nails. Place against inside of tires and cushioning material and nail to car floor through 2- x 4- x 108-in. piece with twelve 20d nails. Nail other two 2- x 4- x 108-in. pieces to one below in the same manner. (Pattern 89)
F	4	Brace. Each to consist of one piece of 2- x 6- x length to-suit (approximately 72 in.) lumber. Locate one under each axle between items E. Nail to car floor with ten 20d nails.
G	8	Wire rope. Each to consist of one piece 3/8-in. 6x19, IWRC wire rope, length as required (approximately 20 ft). Form a complete loop between tiedown shackle and appropriate stake pocket at a maximum angle of 45 degrees (detail 3, fig. 7-3). Wire rope ends should overlay approximately 24 in.
H	16	Thimbles. Place one under wire rope at each place where rope passes over bottom edge of stake pocket and tie down shackle. Secure each thimble to wire rope with one 3/8 clamp (detail 3, fig 7-3).
J	48	Clamps. Place four on each item H at overlap area. Space clamps 3 1/2 in. apart with a minimum of 6 in. from ends of wire rope (detail 3, fig 7-3). Place one on each item J as indicated above.

GENERAL INSTRUCTIONS

1. Set handbrakes, and block and wire levers in place.
2. Place and wire-tie gearshift levers in the neutral position.
3. See *General Rules 1, 2, 3, 4, 5, 14, 15, 19A, and 19B, Section I 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. Tension wire rope with inapplicable sized come-along mechanical hoist or equal tensioning device.

Table 7-3. Bill of Materials for Blocking and Tiedown of Semitrailer, M747, on CONUS General-Purpose Flatcar (Figs 7-2 and 7-3)

Item	Description	Approximate Quantity
Lumber	Douglas-fir, or comparable; Straight-grain, free from material defects; Fed Spec MM-L-751H: 6- x 8-inch 2- x 6-inch 2- x 4-inch	12 linear feet 16 linear feet 52 linear feet
Nails	Common, steel; flathead; bright; table XI-b, Fed Spec FF-N-105B: 40d 12d 20d	40 44 168
Thimbles	Standard, Open-type: 1/2-inch	8
Clamps	Wire rope, U-bolt clips, saddled, single-grip, steel, Crosby heavy-duty, or equal; Fed Spec FF-C-450D: 1/2-in.	24
Wire rope	6X19, IWRC; improved plow steel; preformed, regular-lay; table X, Fed Spec RR-W-410C: 1/2 - in.	100 ft
Cushioning material	Waterproof paper, burlap, or other suitable material.	as required
Steel strap	Strapping, steel: type 1, class A, B, or C; Fed Spec QQ S-781 1 1/4-X0.050-in.	100 ft
Seal	Strap seal, commercial grade, 1 1/4-in.	20
Edge protector	Strap edge protector, commercial grade, 1 1/4-in.	25
Staple	Strap staple, commercial grade, 1 1/4-in.	25

Table 7-4. Application of Materials for Blocking and Tiedown of Semitrailer, M747, on CONUS General-Purpose Flatcar (Figs 7-2 and 7-3)

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 (fig 7-2).
B	8	Blocks (detail 1, fig 7-3). Each to consist of one piece of 6- x 8- x 24-in. lumber cut as shown in detail 1. Locate two blocks in front of each front inboard wheel and behind each rear inboard wheel with the 45-degree side against the tire. Nail heel of block to car floor with three 40d nails. Toenail sides of block to car floor with two 40d nails on each side.
C	4	Blocks. Each to consist of one piece of 2- x 4- x 10-in. lumber. Locate one piece against tires and on top of each pair of item B. Nail to item B with two 12d nails at each end.
D	1 ea item E	Cushioning material. Locate bottom portion under item E and between tire and item E so as to extend 2 in. above item E (detail 2, fig 7-3).
E	2	Side block. Each to consist of one piece of 2- x 6- x 96-in. lumber and three pieces of 2- x 4- x 96-in. lumber (detail 2, fig 7-3). Nail 2- x 6- x 96-in. piece to edge of bottom 2- x 4- x 96-in. piece with twelve 12d nails. Then place against inside of tires and cushioning material, and nail to car floor through 2- x 4- x 96-in. piece with twelve 20d nails. Nail other two 2- x 4- x 96-in. pieces to one below in the same manner.
F	4	Wire rope. Each to consist of one piece of 1/2-in. width rope, length as required (approximately 15 ft). Form a single loop between tiedown shackle and appropriate stake pocket at a maximum angle of 45 degrees (detail 3, fig 7-3). Wire rope ends should overlap approximately 24 in.
G	8	Thimbles. Place one under wire rope at each place where rope passes over bottom edge of stake pocket and tiedown shackle. Secure each thimble to wire rope with one clamp (detail 3, fig 7-3).

Table 7-4. Application of Materials for Blocking and Tiedown of Semitrailer, M747, on CONUS General-Purpose Flatcar (Figs 7-2 and 7-3)-continued

Item	No. Required	Application
H	24	Clamps. Place four on each item Fat overlap area. Space clamps 3 1/2-in apart with a minimum of 6 in. from ends of wire rope (detail 3, fig 7-3). Place one on each item G as indicated above.
J		Component items. Secure ramps to trailer bed using 2- x 4-in., and 4 1/4 x 4-in. lumber and steel straps, edge protectors, staples, and 12d nails (fig 7-2).

GENERAL INSTRUCTIONS

1. Set brakes.
2. Set air suspension controls so that wheels on all four axles are resting on car floor.
3. See General Rules 1, 2, 3, 4, 5, 14, 15, 19A, and 19B, Section I of the *Rules Governing the Load of*

Commodities on Open Top Cars and Trailers, published by the Association of American Railroads, for further details.

4. Tension wire rope with an applicable sized come-along mechanical hoist or equal tensioning device.

Table 7-5. Application of Materials for Blocking and Tiedown of Truck-Tractor, M911, on CONUS General-Purpose Flatcar (Figs 7-3 and 7-4)

Item	No. Required	Application
A		Brake wheel clearance. Minimum clearance required is 6 inches above, in back of, and on both sides of, and 4 inches underneath wheel, 12-inch minimum clearance from end of car to load, extending from center of brake wheel to side of car and 6 feet above car floor (fig 7-4).
B	12	Blocks. Each to consist of one piece of 2- x 6- x 30-inch lumber. Locate one block against wheel as shown in figure 7-4 and nail to car floor with seven 20d nails.
C	12	Blocks (detail 1, figure 7-3). Each to consist of one piece of 6- x 8- x 24-inch lumber cut as shown in detail 1. Locate one block on top of each item B with 45-degree side against tire. Nail heel of block to item B with three 40d nails. Toenail sides of block to car floor through item B with two 40d nails on each side.
D	1 ea item E	Cushioning material. Locate bottom portion under item E, and between tire and item E so as to extend 2 inches above item E (detail 2, fig 7-3).
E	4	Side blocks. Two each to consist of one piece of 2- x 6- x 30-inch lumber and three pieces of 2- x 4- x 30-inch lumber for the front tires and two each to consist of one piece of 2- x 6- x 90-inch lumber and three pieces of 2- x 4- x W-inch lumber for the rear dual tires (detail 2, fig 7-3). Place against inside of tires and cushioning material and nail to car floor through 2- x 4- x 30-inch piece with twelve 20d nails. Nail other two 2- x 4- x 30-inch pieces to one below in same manner. Repeat this operation for the 2- x 6- x 90-inch lumber.
F	3	Brace. Each to consist of one piece of 2- x 6-inch x length-to-suit (approximately 60-inch) lumber. Locate one under each axle between items E. Nail to car floor with ten 20d nails.
G	8	Wire rope. Each to consist of one piece 5/8-inch 6 x 19, IWRC wire rope, length as required (approximately 20 feet). Form a complete loop between tiedown shackle and appropriate stake pocket at a maximum angle of 45 degrees (detail 3, fig 7-3). Wire rope ends should overlay approximately 24 inches.
H	16	Thimbles. Place on under wire rope at each place where rope passes over bottom edge of stake pocket and tie down shackle. Secure each thimble to wire rope with one 5/8-inch clamp (detail 3, fig 7-3).
J	48	Clamps. Place four on each item H at overlap area. Space clamps 3 inches apart with a minimum of 6 inches from ends of wire rope (detail 3, fig 7-3). Place one on each item J as indicated above.

GENERAL INSTRUCTIONS

1. Set handbrakes, and block and wire levers in place.
2. Place and wire-tie gearshift levers in the neutral position.
3. For further details, see General Rules 1, 2, 3, 4, 5, 14, 15, 19A, and 19B, Section I 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. Tension wire rope with an applicable size come-along mechanical hoist or equal tensioning device.

Table 7-6. Characteristics of European Flatcars
Available for Transporting Vehicles

Flatcar designation	Capacity	Length	Width	Platform height ^a
SSY	52-ton (47.17 MTON)	31-ft 2-in. (9.50 m)	10-ft 4-in. (3.15 m)	4-ft 2¼-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 2¼-in. (1.29 m)

^aAbove top of rail.

7-6. Loading on Special-Purpose Flatcars

The truck-tractor, M746, truck-tractor, M911, and semitrailer, M747, can be loaded on special-purpose

flatcars that have proof tested 27,000-pound chain tiedown restraints. Contact transportation officer for detailed information.

Section III. TRANSPORT ON FOREIGN RAILWAYS

7-7. General

The transportability guidance contained in this section is applicable when the HET and C-HET systems are transported on foreign railways. Consideration is given to movement on the types of railcars normally used for the transport of this type of equipment. The HET and C-HET systems can be transported in their minimum configuration with *restrictions* within European countries complying with the International Loading Gauge (formerly Berne International). This also applies to Australia, India, and Pakistan, and to the majority of countries in the Middle East and South America. Because of the height of the system, special clearance will be required from local railway authorities. In the Middle East and South America the clearances vary, and each country will require a separate check. In Australia, and Pakistan, wide or

broad gauge railways provide greater clearances and less restrictions. Because of various designation systems, and clearances used by different countries, evaluation of transport capabilities must be made on an individual basis.

7-8. Transport on Foreign Service Flatcars.

a. The HET and C-HET systems can be transported on some foreign service flatcars. Table 7-6 presents a few of the flatcars available in Europe that are suitable for transporting this equipment.

b. The materials and procedures for blocking and tiedown of the system on foreign service cars are essentially the same as those used within CONUS. Detailed guidance is contained in the 4th Transportation Brigade Pamphlet 55-2, dated 15 August 1977, titled, *Tiedown Guide for Rail Movements*.

APPENDIX

REFERENCES

1. Army Regulations (AR)

55-29 Military Convoy Operations in CONUS
 55-162 Permits for Oversize, Overweight, or Other Special Military Movements on Public Highways in the United States
 55-228 Transportation by Water of Explosives and Hazardous Cargo
 55-355 Military Traffic Management Regulation
 70-47 Engineering for Transportability
 385-40 Accident Report and Records
 746-1 Color, Marking, and Preparation of Equipment for Shipment

2. Army Field Manuals (FM)

5-36 Route Reconnaissance and Classification
 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

9. 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)

5-725 Rigging
 9-2320-258-10 Operator's Manual for Truck-Tractor, 22-1/2-Ton, 8 X 8, M746 (2320-00-089-7264)
 9-2320-270-20 Truck-Tractor, Commercial Heavy Equipment Transporter (C-HET), 85,000 GVWR, 8 X 6, M911
 9-2330-294-14 Operation, Organizational, Direct and General Support Maintenance Manual for Semitrailer, Low-Bed, Heavy Equipment Transporter, 52-1/2-Ton, M747
 38-236 (AFP 71-8) Preparation of Freight for Air Shipment
 38-250 (AFM 71-4) Packaging and Handling of Dangerous Materials for Transportation by Military Aircraft
 55-450-15 Air Movement of Troops and Equipment (Non-tactical)
 55-500 Marine Equipment Characteristics and Data

55-2200-001-12	Application of Blocking, Bracing and Tiedown Materials for Rail Transport
55-2350-215-10-15	Transportability Guidance, Tank, Combat, Full-Tracked, M-60 Series, Change 1

Air Force Manuals

TO 1C-5A-9	Loading Instructions, USAF Series C-5 Aircraft
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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. Other Publications and Sources of Procurement

Rail and Highway Shipment:

Code of Federal Regulations

Title 49- Transportation, Parts 170-179

Available from: Superintendent of Documents
US Government Printing Office
Washington, DC 20402

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 Cars.

Available from: Secretary, Mechanical Division
Association of American Railroads
ATTN: J. H. Bean
59 E. Van Buren Street
Chicago, IL 60605

R. M. Graziano's Tariff No. 32 (or reissues thereof) - *Hazardous Materials Regulation of the Department of Transportation, Including Specifications for Shipping Containers*

Available from: R. M. Graziano, Agent
1920 L Street NW
Washington, DC 20036

American Trucking Association, Inc., Agent Publication *ICC ATA III-A/FMC F1-17 (or reissues thereof) - Department of Transportation Regulations Governing Transportation of Hazardous Materials by Motor, Rail and Water, Including Specifications for Shipping Containers*

Available from: James C. Harkins, Issuing Officer
1616 P. Street NW
Washington, DC 20036

International Road Federation

Limits of Motor Vehicle Sizes and Weights

Available from: International Road Federation
1023 Washington Building
Washington, DC 20005

Water Shipment

Code of Federal Regulations

Title 46- Shipping, Part 146

Available from: Superintendent of Documents
US Government Printing Office
Washington, DC 20402

Agent R. M. Graziano's Water Carrier Tariff No. 32 (or reissues thereof) -
*Regulations Governing the Transportation or Storage of Explosives or
Other Dangerous Articles or Substances, and Combustible Liquids on
Board Vessels*

Available from: R. M. Graziano, Agent
1920 L. Street NW
Washington, CD 20036

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To be distributed in accordance with DA Form 12-34B, requirements for TM 55 series: Transportability Guidance, Trailers, Semi-Trailers, Wheel Vehicles, DA Form 12-38, Organizational maintenance requirements for 22¹/₂-Ton Truck Tractors: 22¹/₂-Ton 8X8, M746 and Organizational Maintenance requirements for Truck, Tractor Heavy Equipment Transporter: 8X6 (C-HET) M911, DA Form 12-39, Technical Manuals, requirements for Semitrailer, Low Bed 52¹/₂-Ton (HET), M747.

