

TECHNICAL MANUAL

TRANSPORTABILITY GUIDANCE

SEMITRAILERS, 12-TON, 4-WHEEL

Semitrailer, Stake:	M127, M127A1, M127A1C, M127A2C
Semitrailer, Van Cargo:	M128A1C, M128A2C
Semitrailer, Van, Supply:	M129A1C, M129A2C
Semitrailer, Tank, Fuel, 5,000-Gallon:	M131A2, M131A4, M131A5
Semitrailer, Tank, Fuel- Servicing, 5,000-Gallon	M131A3C, M131A4C, M131A5C
Semitrailer, Low-Bed, Wrecker:	M269, M269A1, M270, M270A1

SEMITRAILER, 15- to 25- TON, 4-WHEEL

Semitrailer, Low-Bed, 15-Ton, M172
Semitrailer, Low-Bed, 25-Ton, M172A1

TECHNICAL MANUAL }
 No. 55-2330-200-15-1 }

HEADQUARTERS
 DEPARTMENT OF THE ARMY
 WASHINGTON, D. C., 30 July 1976

TRANSPORTABILITY GUIDANCE

SEMITRAILERS, 12-TON, 4-WHEEL

SEMITRAILER, STAKE: M127, M127A1, M127A1C, M127A2C

SEMITRAILER, VAN, CARGO: M128A1C, M128A2C

SEMITRAILER, VAN, SUPPLY: M129A1C, M129A2C

SEMITRAILER, TANK, FUEL, 5,000-GALLON: M131A2, M131A4, M131A5

SEMITRAILER, TANK, FUEL-SERVICING, 5,000-GALLON: M131A3C,
 M131A4C, M131A5C

SEMITRAILER, LOW-BED, WRECKER: M269, M269A1,
 M270, M270A1

SEMITRAILERS, 15- to 25-TON, 4-WHEEL

SEMITRAILER, LOW-BED, 15-TON, M172

SEMITRAILER, LOW-BED, 25-TON, M172A1

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* This manual supersedes TM 55-2330-207-10-2, 18 November 1968; TM 55-2330-207-20-1, 22 July 1969; TM 55-2330-207-20-2, 22 July 1969; TM 55-2330-208-20-1, 20 March 1968; TM 55-2330-211-10-1, 1 October 1963; TM 55-2330-211-10-2, 21 October 1963; TM 55-2330-211-20-3, 27 September 1968; TM 55-2330-220-20-1, 4 September 1968.

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CHAPTER 1

INTRODUCTION

1-1. Purpose and Scope

a. This manual provides transportability guidance for logistical handling and movement of the semitrailers, 12- to 25-ton, 4-wheel.

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 appendix A, and conversion tables are shown in appendix B.

1-2. Reporting of Recommendations and Comments

The reporting of errors, omissions, and recommendations for improving this manual by the individual user is encouraged. Comments 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, ATTN: MTT-TRP, PO Box 6276, Newport News, VA 23606. A reply will be furnished by the Agency.

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 semitrailers, 12- to 25-ton, 4-wheel with identification photographs, tabulated transportability characteristics, and data necessary for movement of these semitrailers.

2-2. Descriptions

The semitrailers, 12- to 25-ton, 4-wheel, covered in this manual are of various lengths and body styles; each has a tubular tandem axle, dual tires, an upper fifth-wheel plate, kingpin, and foot-type landing legs. The semitrailers are designed for towing over all types of roads, highways, and limited cross-country terrain, in all types of weather. Appropriate prime movers are 5-ton, 6x6, truck, tractor, M52,

M818, or similar vehicles equipped with a fifth wheel. For detailed description and data refer to the applicable 9-series technical manuals. A brief description, with an identification photograph, of each of the various semitrailers and body types follows:

a. Semitrailers, Stake, M127 (fig 2-1) The 12-ton, M127-series semitrailer is primarily a flatbed trailer with stake pockets to facilitate the securing of removable, interlocking panel sides and ends. The panels can be installed and removed by hand without special tools. The semitrailer is used in the movement of all types of equipment. The differences between models are of minor internal and external characteristics.

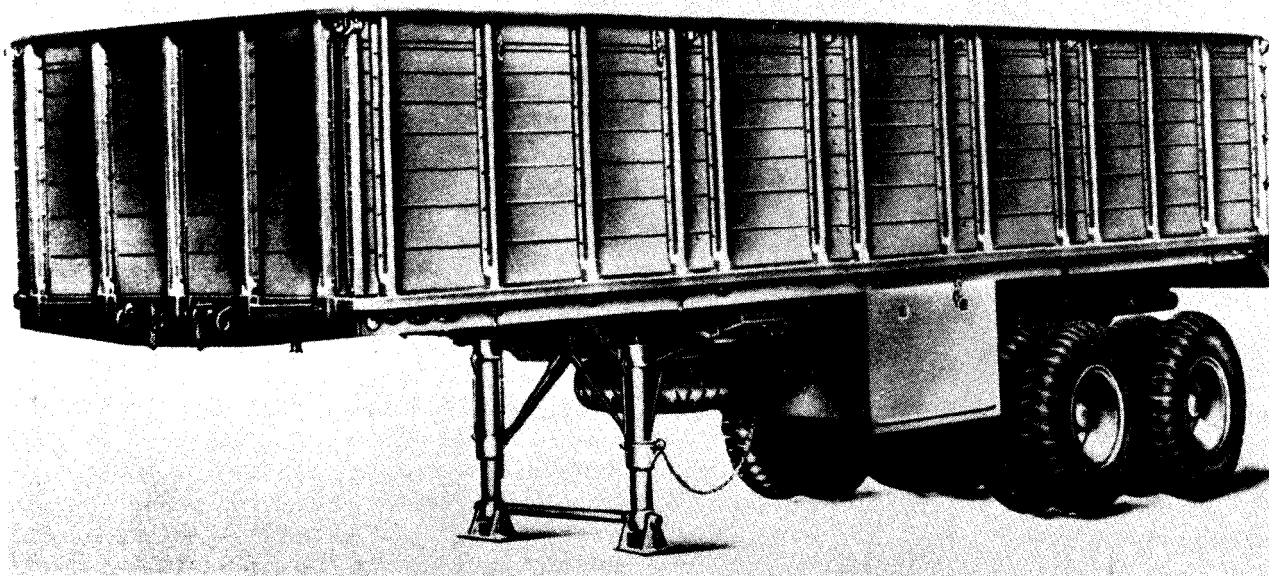


Figure 2-1. Semitrailer, stake, 12-ton, 4-wheel, M127A1.

b. Semitrailer, Van, Cargo, M128A1C and M128A2C (fig 2-2). The 12-ton, M128-series semitrailer, van, cargo, is designed for use as a cargo carrier and does not have windows or ventilation

openings. The van body, constructed as a separate unit of steel tubing covered by steel sheeting, is mounted on the same basic semitrailer chassis.

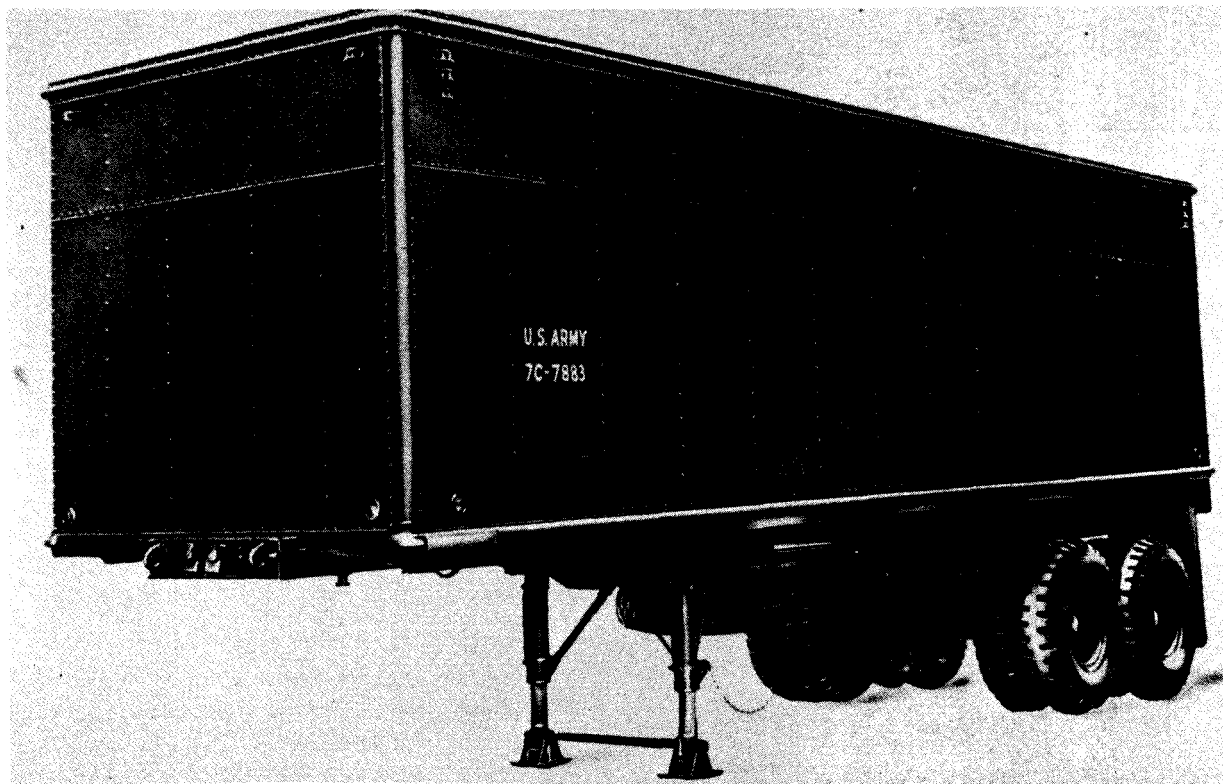


Figure 2-2. Semitrailer, van, cargo, 12-ton, 4-wheel, M128A1-C.

c. Semitrailer, Van, Supply, M129A1C and M129A2C (fig 2-3). The 12-ton, M129-series semitrailer, van, supply, is designed for use as a supply van and has seven windows to provide

ventilation and light. The sides and roof are insulated to protect the interior of the semitrailer against heat or cold.

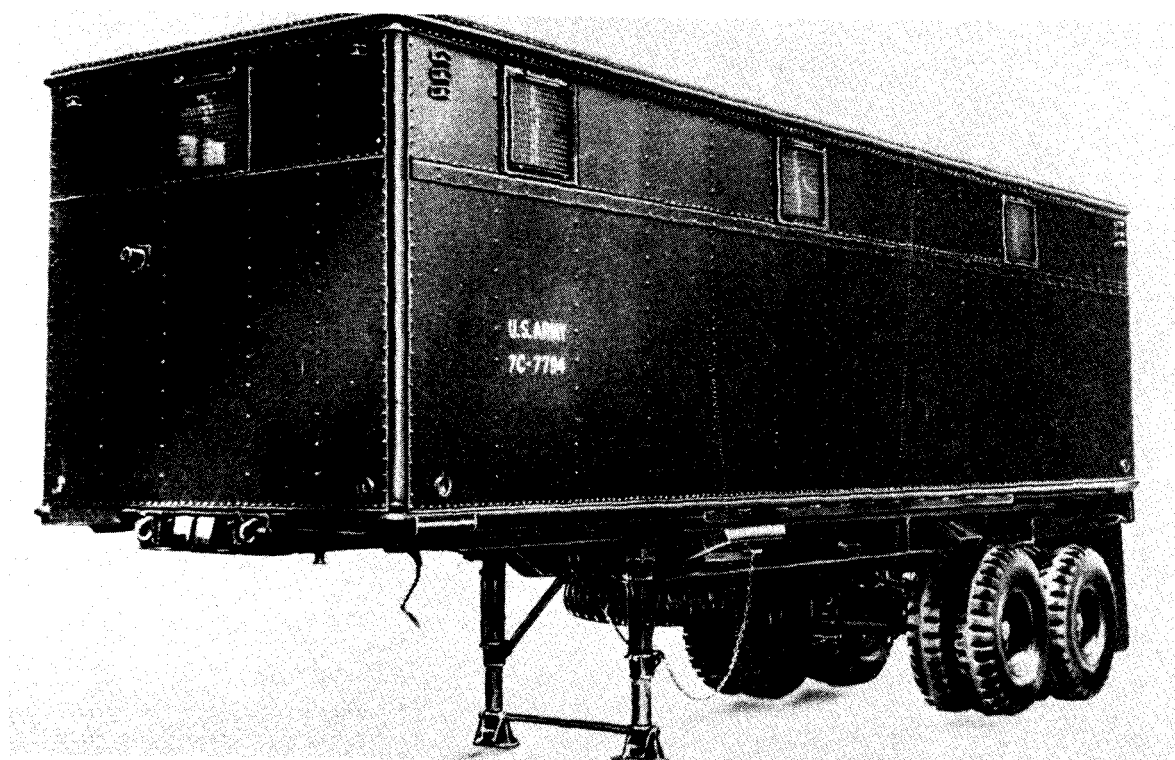


Figure 2-3. Semitrailer, Van, Supply, 12-Ton, 4-Wheel, M129A1C.

d. *Semitrailer, Tank, Fuel, and Tank, Fuel-Servicing, 5,000-Gallon, M131-Series.* The 12-ton, **M131-Series. The 12-ton, M131-series semitrailer, tank, fuel,** is used to transport and distribute liquid fuel in bulk. The semitrailer, tank, fuel-servicing, is also used for fuel transport, but has the additional capability for fuel transfer or fuel-servicing

operations of fuel-storage containers, ground vehicles, and aircraft. For transportability purposes, these semitrailers are similar and the differences between models consist only of design variations. Figure 2-4 depicts the semitrailer, tank, fuel, 5,000-gallon, 4-wheel, M131A2.

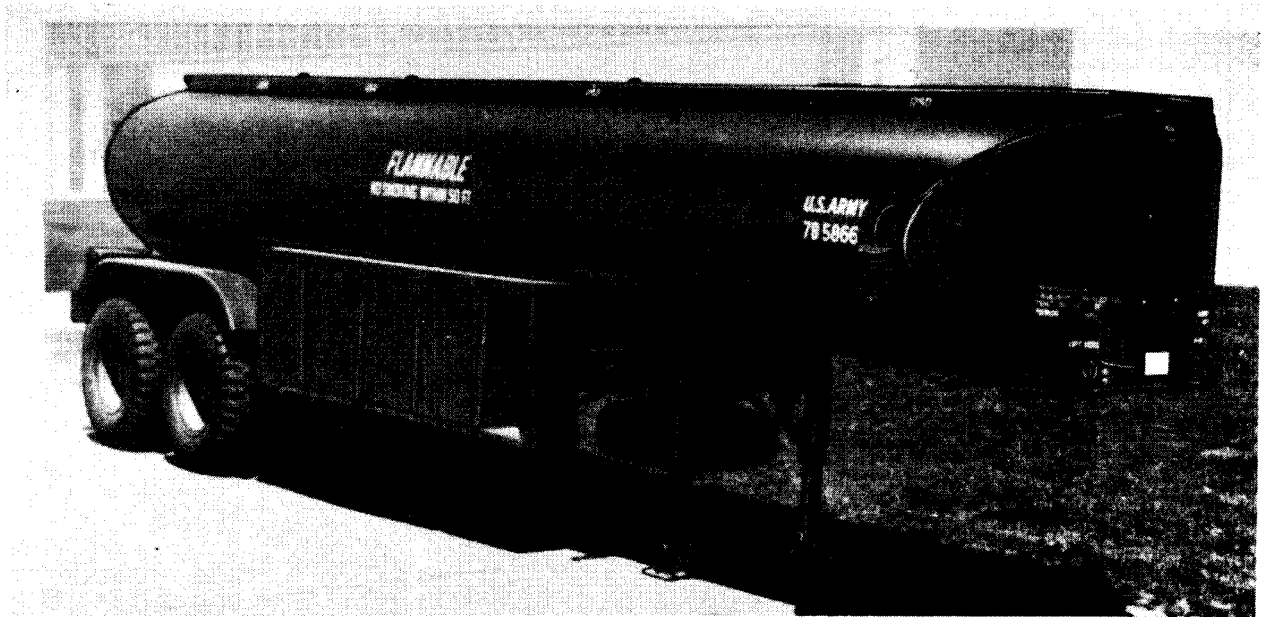


Figure 2-4. Semitrailer, tank, fuel, 5,000-gallon, 4-wheel, M131A2.

e. *Semitrailer, Low-Bed, Wrecker, M269 and M269A1 (fig 2-5).* The 12-ton, M269-series semitrailer is used to transport new or salvaged aircraft and for general-purpose hauling. The M269 differs from the M269A1 in that the latter model has

no stowage box mounted on the gooseneck. The M269A1 has a modified gooseneck that includes a door on the top platform with stowage facilities within the gooseneck.

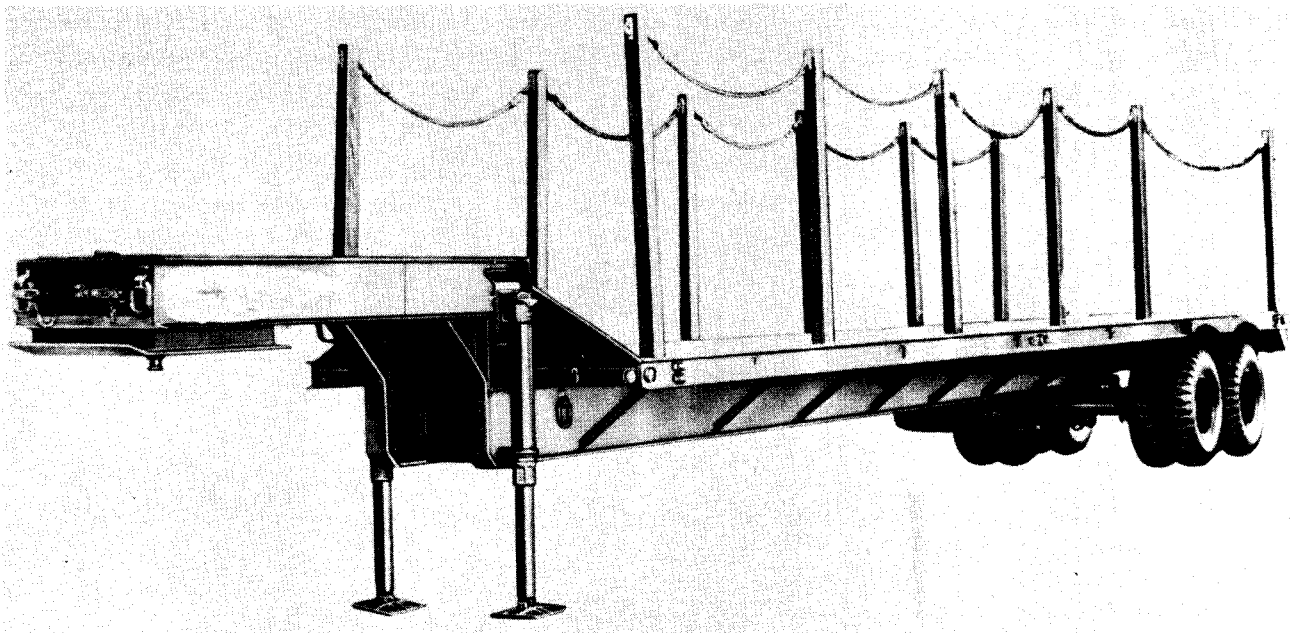


Figure 2-5. Semitrailer, low-bed, wrecker, 12-ton, 4-wheel, M269A1.

f. Semitrailer, Low-Bed, Wrecker, M270 and M270A1 (fig 2-6) The 12-ton, M270-series semitrailer is identical in characteristics to the M269-series except in length. The M270-series is

considerably longer and consequently more suitable for transport of elongated-type cargo and equipment.

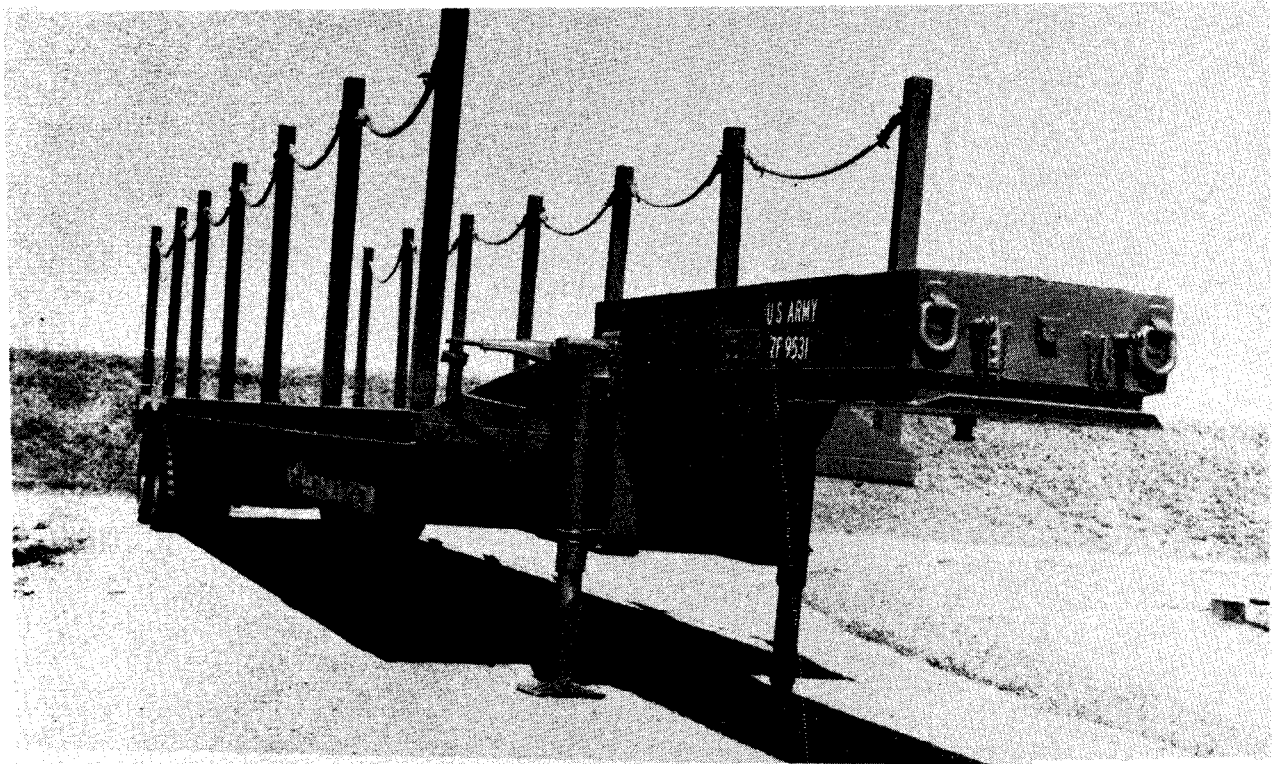


Figure 2-6. Semitrailer, low-bed, wrecker, 12-ton, 4-wheel, M270A1.

g. Semitrailer, Low-Bed, M172. The 15-ton, M172 low-bed semitrailer is used to transport outsized and heavy equipment over all types of roads, trails, and open cross-country terrain.

25-ton, M172A1 low-bed semitrailer is identical in characteristics to the M172 except in its carrying capacity. The M172A1 can be towed over prepared roads with up to a 50,000-pound load.

h. Semitrailer, Low-Bed, M172A1 (fig 2-7) The

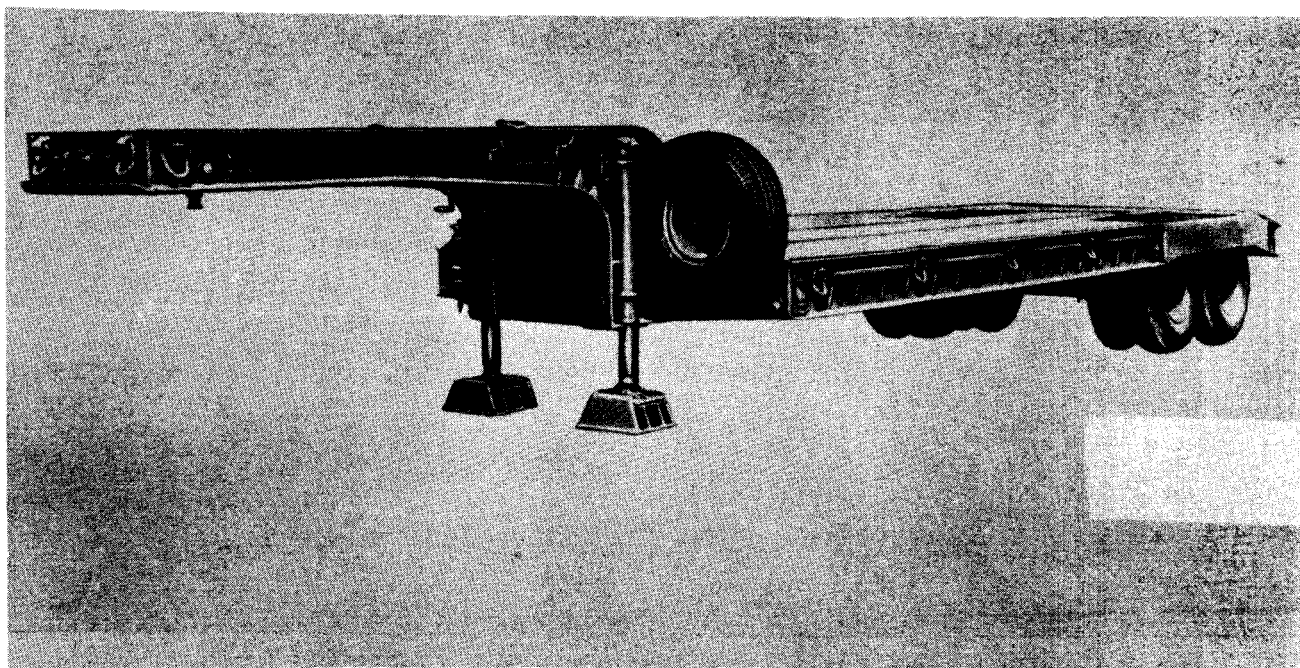


Figure 2-7. Semitrailer, low-bed, 25-ton, 4-wheel, M172A1.

Section II. CHARACTERISTICS AND RELATED DATA

2-3. General

Table 2-1 provides an overview of semitrailer characteristics and data applicable to model number or National Stock Number (NSN) shown. Changes in model number or NSN may affect the loadability of the semitrailers as related to the guidance shown in this manual. Data shown is based on empty configuration unless otherwise noted. Table 2-2 provides data on the weight distribution of the semitrailers.

2-4. Side and Rear Elevation Drawings

This section provides drawings (fig 2-8 through 2-17) necessary for determining the loadability of the vehicles for movement by various transportation modes. The models depicted by the following figures are a representative selection of the semitrailers covered in this manual.

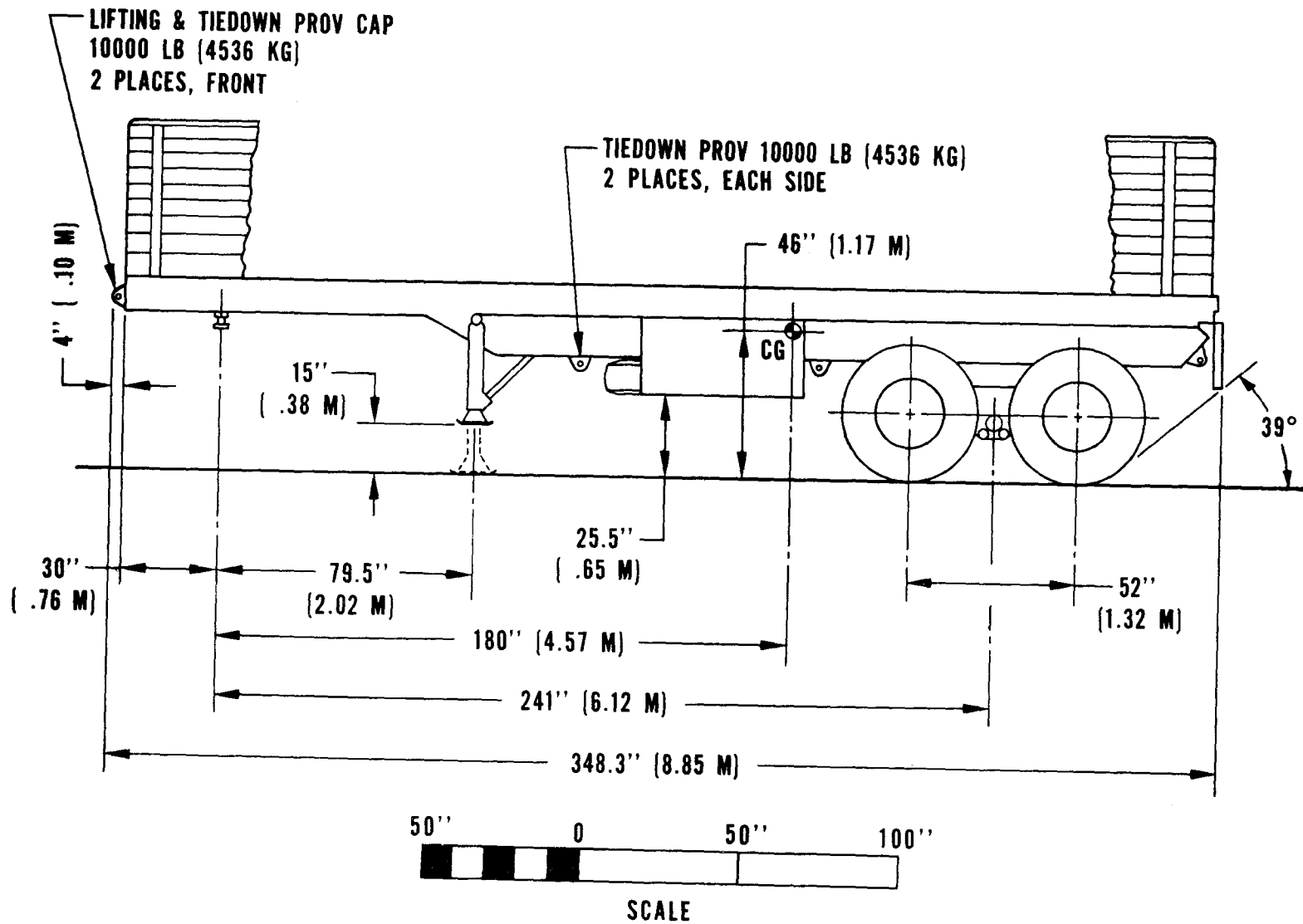


Figure 2-8. Side elevation, semitrailer, stake, 12-ton, 4-wheel, M127A1C.

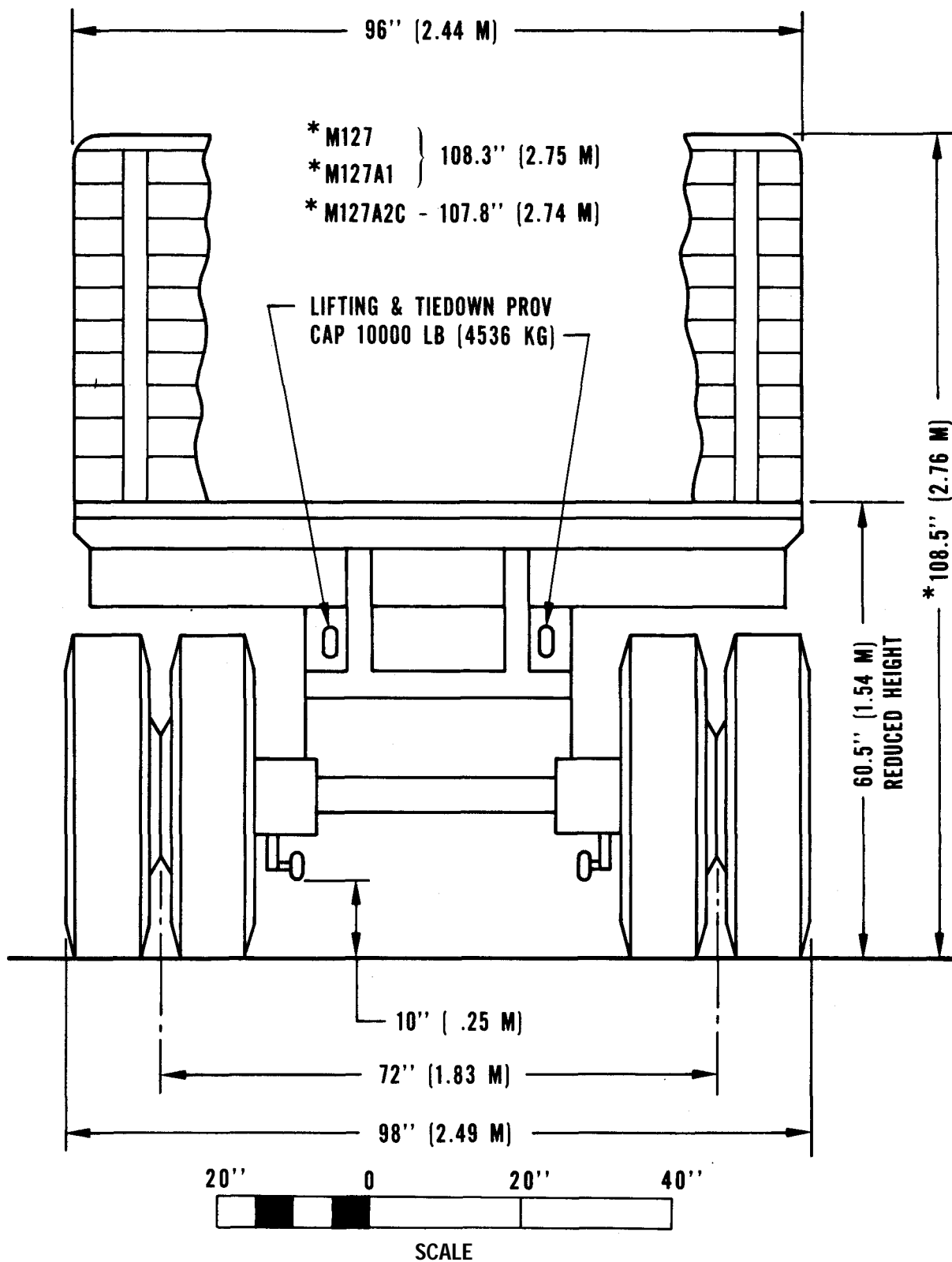


Figure 2-9. Rear elevation, semitrailer, stake, 12-ton, 4-wheel, M127A1C.

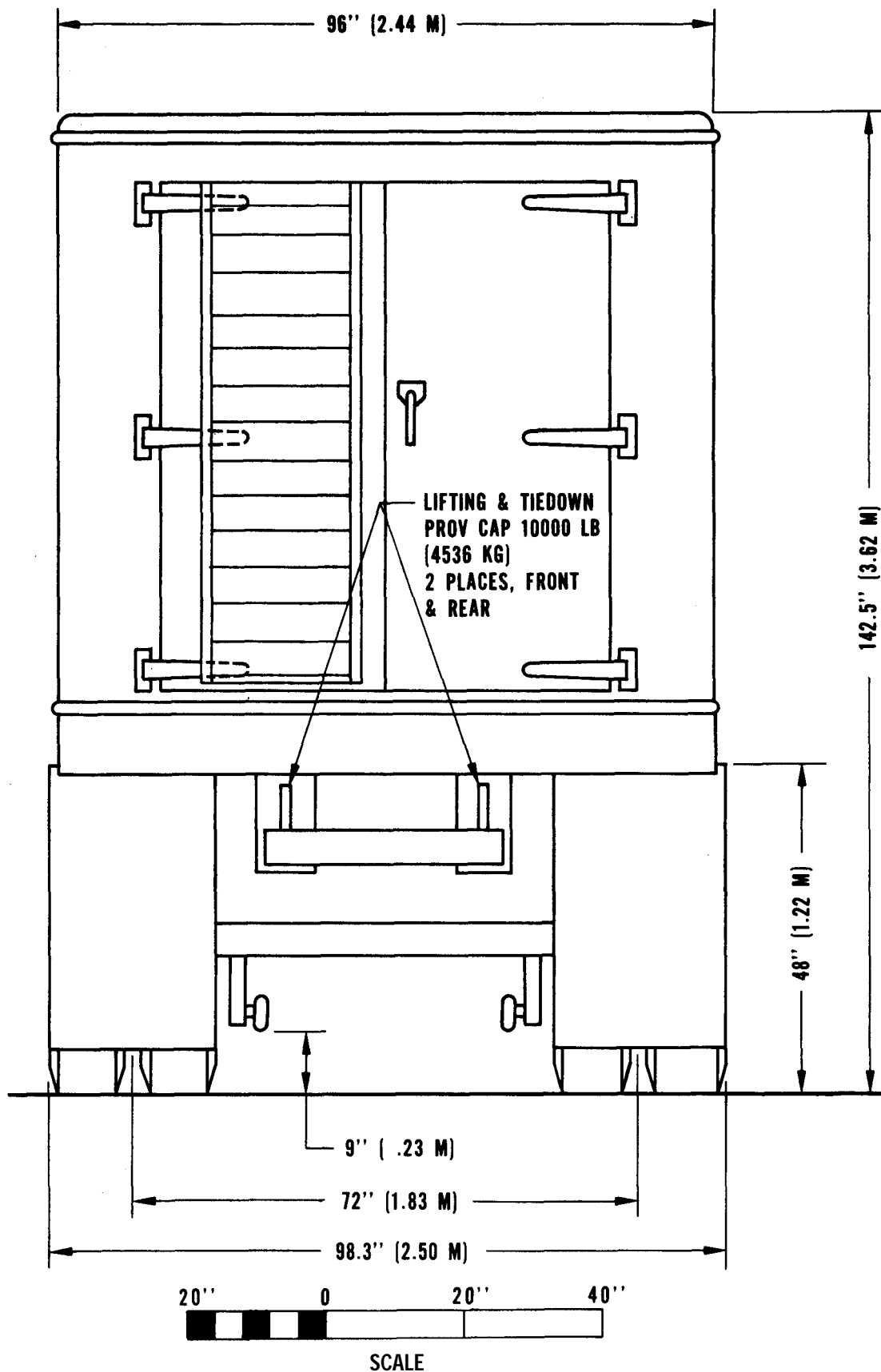


Figure 2-11. Rear elevation, semitrailer, van, cargo, 12-ton, 4-wheel, M128A1C.

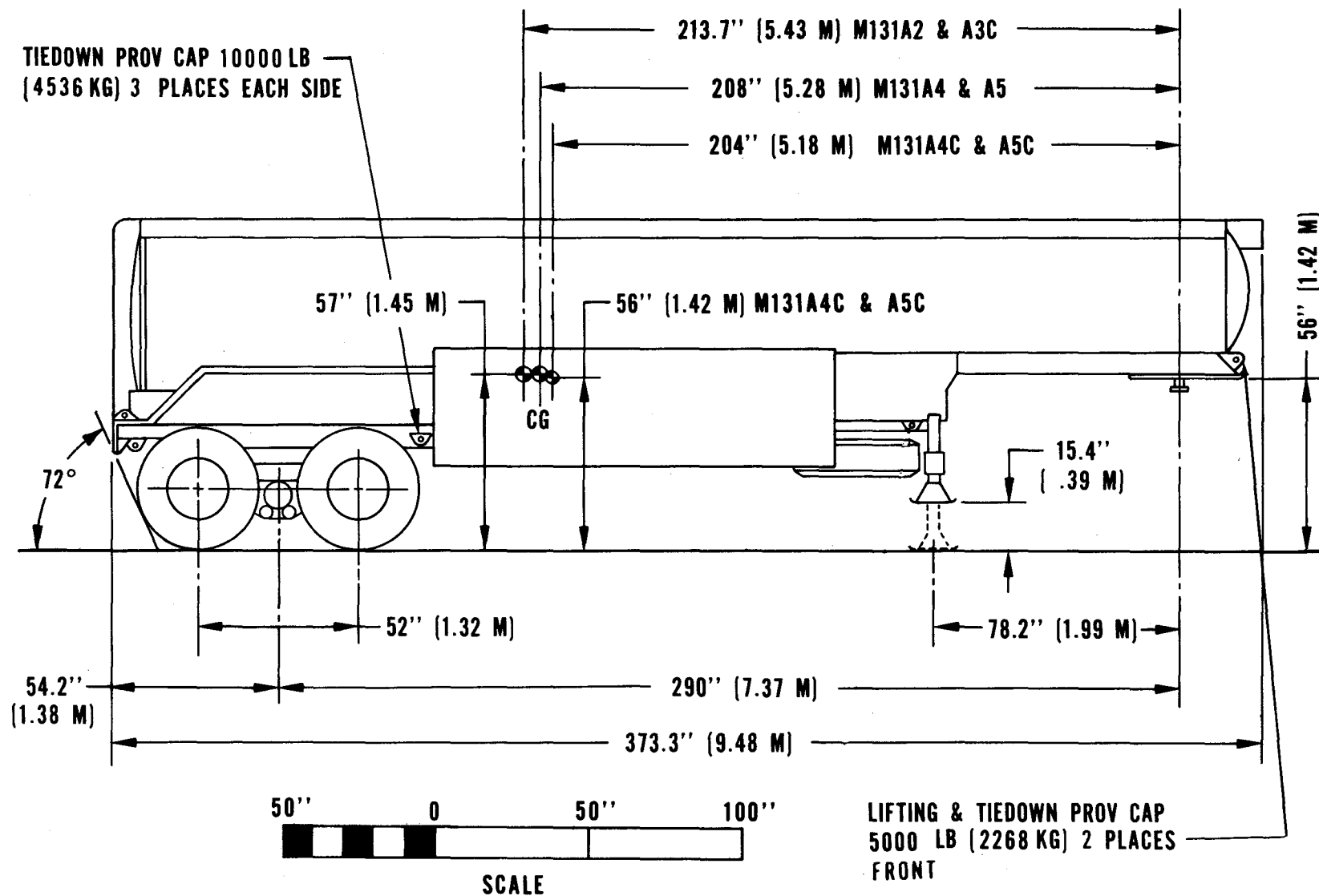


Figure 2-12. Side elevation, semitrailer, tank, fuel, 5,000-gallon, 4-wheel, M131A4.

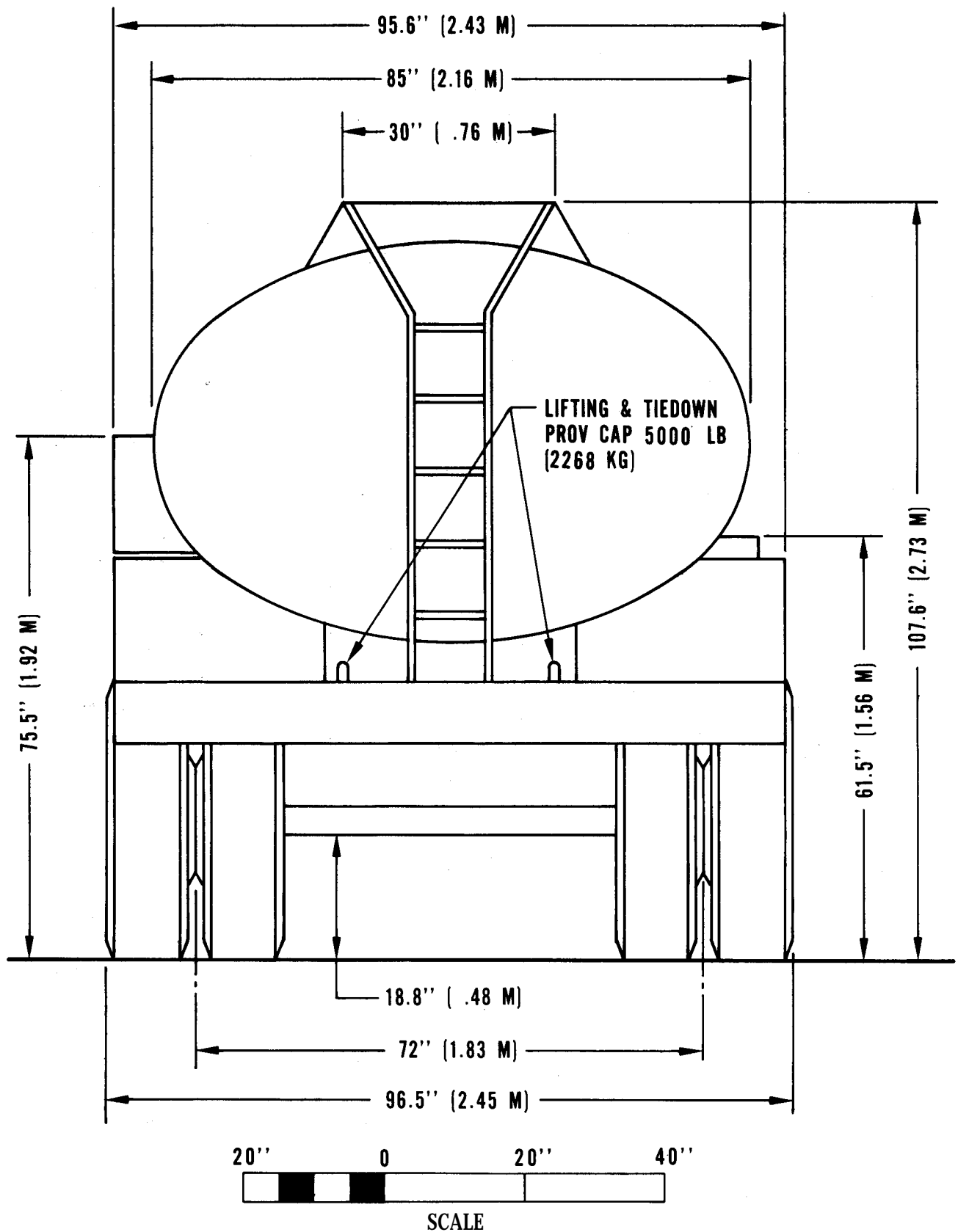


Figure 2-13. Rear elevation, semitrailer, tank, fuel, 5,000-gallon, 4-wheel, M131A4.

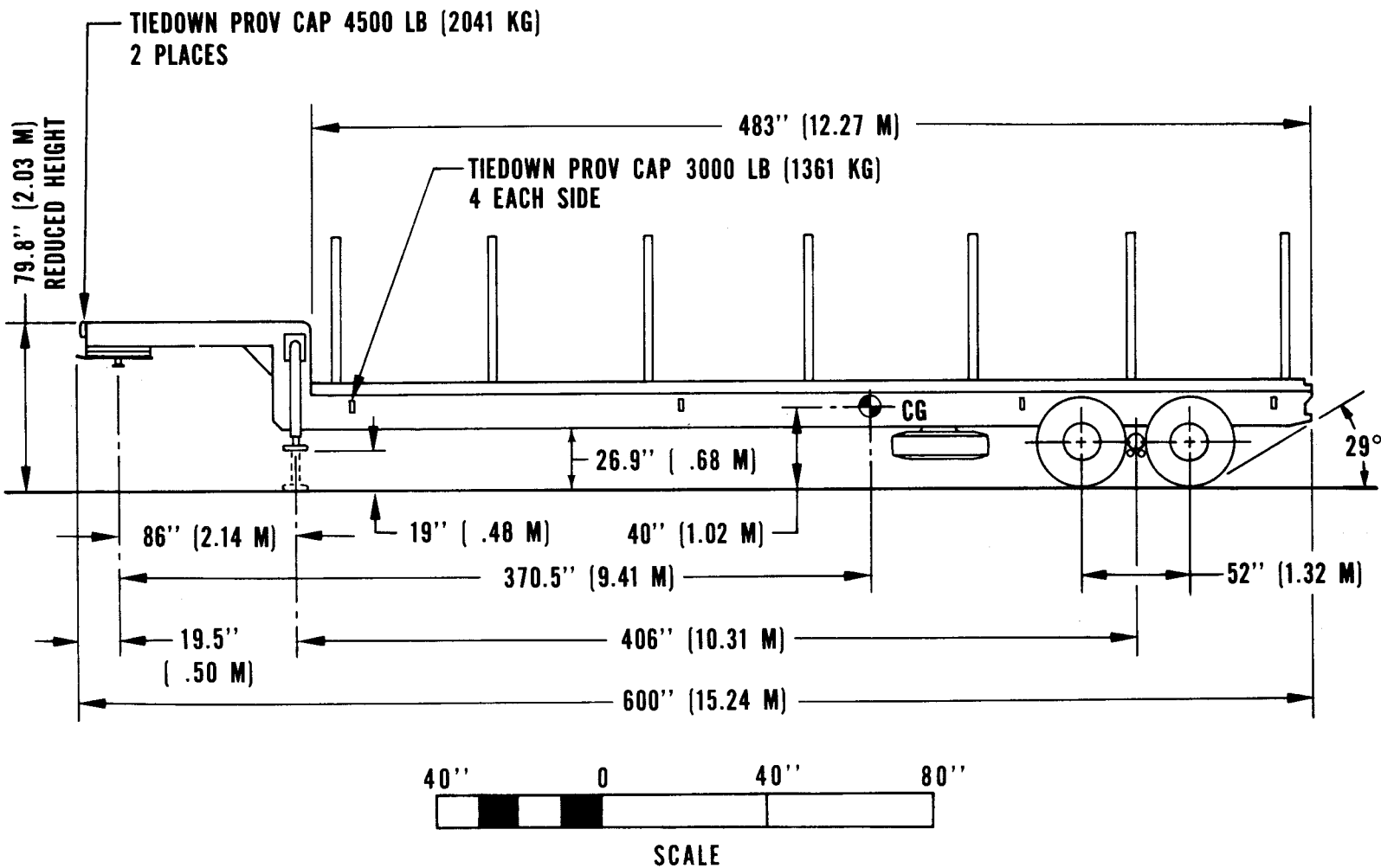


Figure 2-14. Side elevation, semitrailer, low-bed, wrecker, 12-ton, 4-wheel, M270.

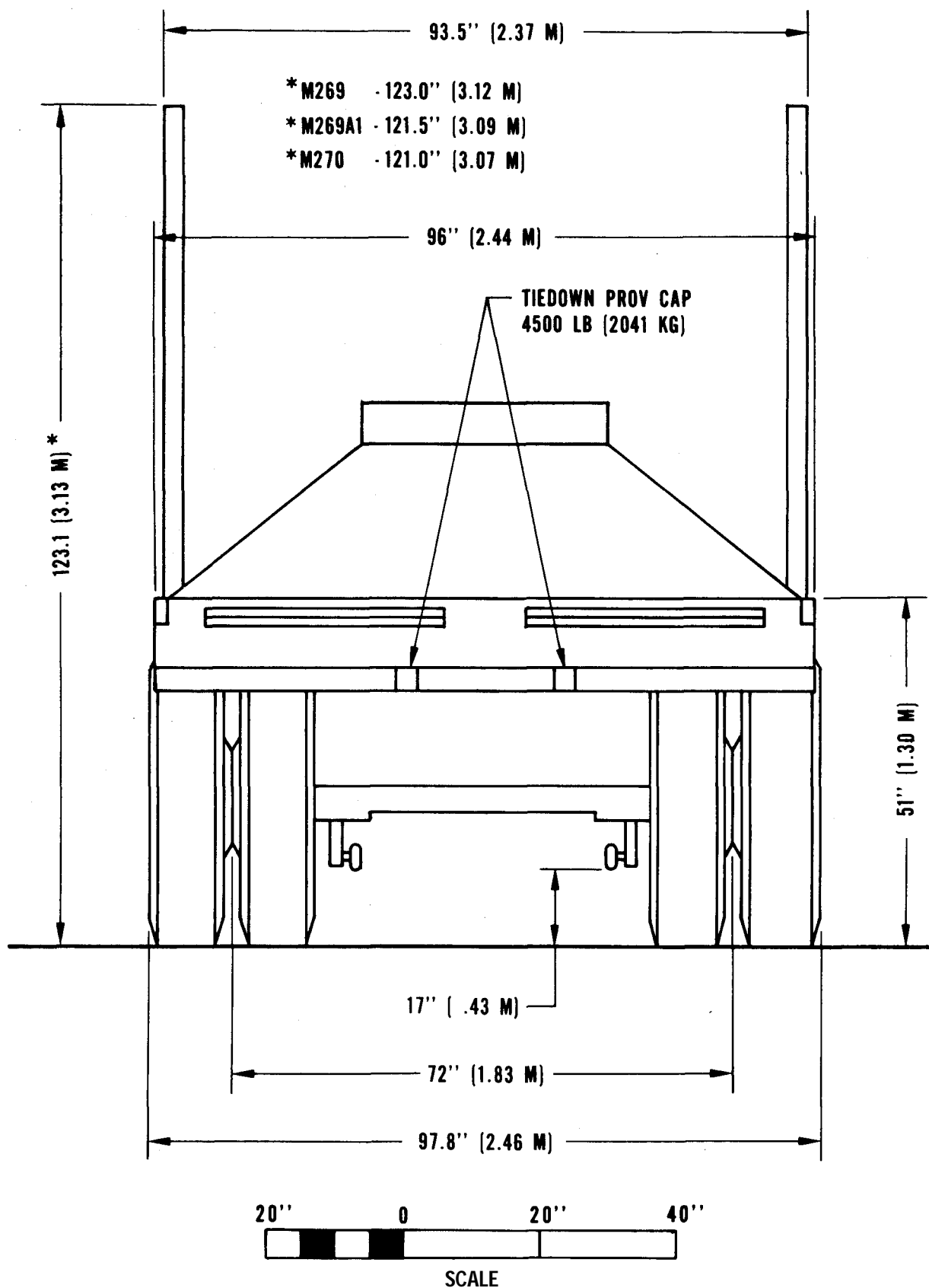


Figure 2-15. Rear elevation, semitrailer, low-bed, wrecker, 12-ton, 4-wheel, M270.

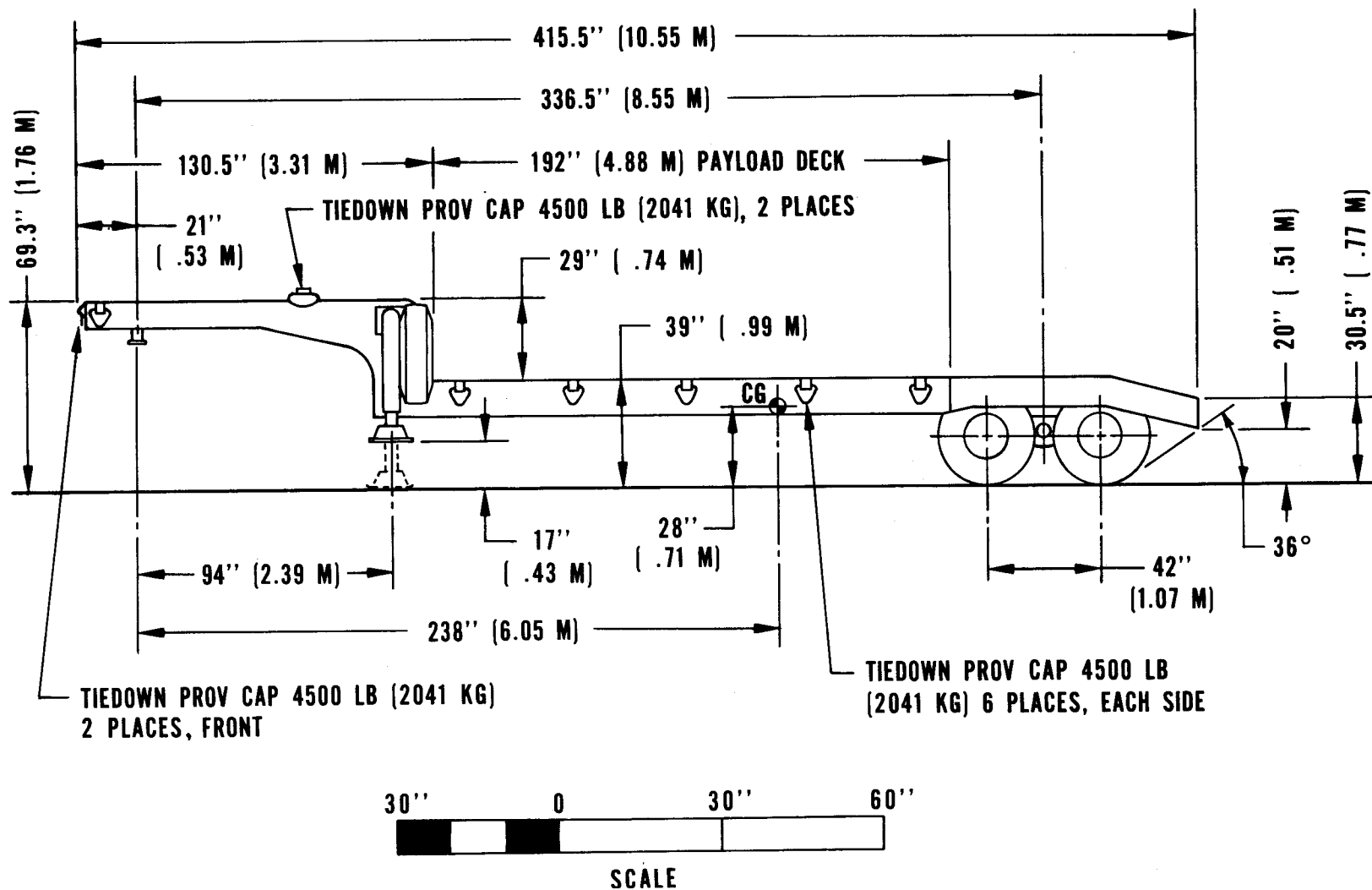


Figure 2-16. Side elevation, semitrailer, low-bed, 25-ton, 4-wheel, M172A1.

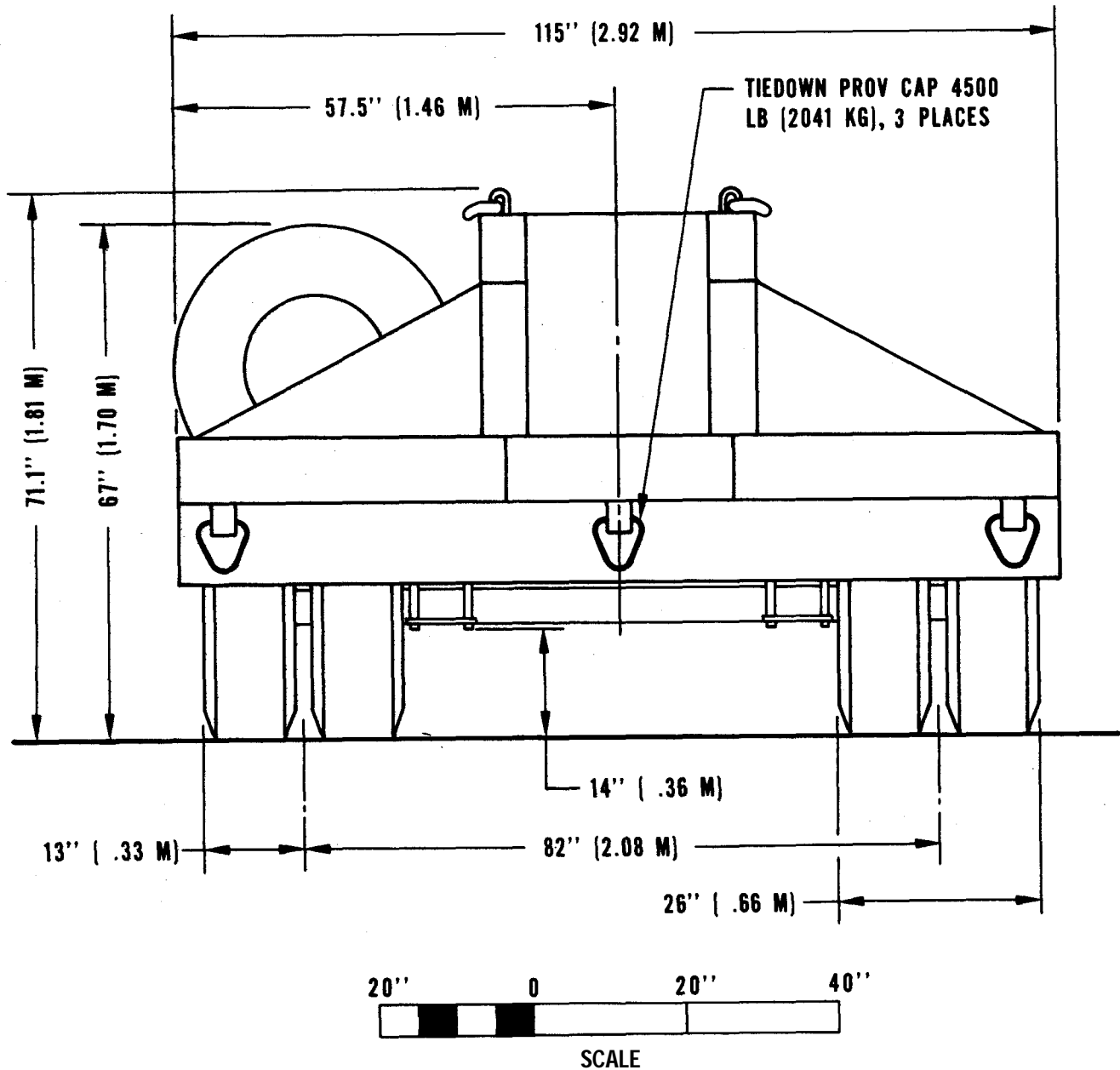


Figure 2-17. Rear elevation, semitrailer, low-bed, 25-ton, 4-wheel, M172A1.

2-5. Reduced Configurations

Transportation economies can be obtained by reducing each vehicle to its minimum dimensions for transport. Dimensional reductions are particularly important for ocean transport and may result in substantial dollar savings. Reduced shipping configurations can be achieved by removing side, rear, and front panels or body cargo stakes, as applicable. For specifics refer to the appropriate organizational maintenance manuals. Summary of

reduced dimensions for length, width, and height are shown in table 2-1.

2-6. Unusual Characteristics

The vehicles do not have any unusual characteristics that would require special precaution or attention be given to temperature, atmospheric pressure, or humidity variations during their exposure to normal transportation environments.

2-7. CONSUS Freight Classification

Rail and motor freight classification descriptions and item numbers will be determined in accordance with chapter 211 of AR 55-355 and the Freight

Classification Guide System. Proper classification and/or description of articles must be determined and provided on the bill of lading before the shipment is released to the carrier.

Table 2-1. Characteristics and Related Data

Nomenclature (12-ton, 4-wheel)	TOE LIN	NSN (2330-00-)	Weight		Volume, cu ft (cu m)				Reduced dimensions, in (m)					
			lb	(kg)	operational		reduced		length		width		height	
Semitrailer, stake														
M127	S72024	797-92207	13,370	(6,064.6)	2,106.9	(59.6)	1,177.0	(33.3)	345.5	(8.78)	97.3	(2.47)	60.5	(1.54)
M127A1	S72024	048-7743	14,240	(6,459.3)	2,106.9	(59.6)	1,177.0	(33.3)	345.5	(8.78)	97.3	(2.47)	60.5	(1.54)
M127A1C	S72024	752-9750	14,280	(6,477.4)	2,143.2	(60.7)	1,195.1	(33.8)	348.3	(8.85)	98.0	(2.49)	60.5	(1.54)
M127A2C	S72024	788-6299	13,980	(6,341.3)	2,125.0	(60.1)	1,178.8	(33.4)	348.3	(8.85)	97.8	(2.48)	59.8	(1.52)
Semitrailer, van cargo														
M128A1C	S74079	752-9751	15,340	(6,958.2)	2,833.2	(80.2)	2,833.2	(80.2)	349.5	(8.88)	98.3	(2.50)	142.5	(3.62)
M128A2C	S74079	788-6296	15,850	(7,189.6)	2,862.4	(81.0)	2,862.4	(81.0)	346.3	(8.80)	98.3	(2.50)	145.3	(3.69)
Semitrailer, van supply														
M129A1C	S75175	752-9752	15,080	(6,840.3)	2,870.5	(81.2)	2,762.5	(78.2)	345.5	(8.78)	97.3	(2.47)	142.0	(3.61)
M129A2C	S75175	788-6289	15,110	(6,853.9)	2,870.5	(81.2)	2,762.5	(78.2)	345.5	(8.78)	97.3	(2.47)	142.0	(3.61)
Semitrailer, tank, fuel, 5,000-gal														
M131A2	S72846	574-7964	12,360	(5,606.5)	2,301.2	(65.1)	2,301.2	(65.1)	380.0	(9.65)	97.8	(2.48)	107.0	(2.72)
M131A4	S72846	994-9459	12,785	(5,799.3)	2,243.1	(63.5)	2,243.1	(63.5)	373.3	(9.48)	96.5	(2.45)	107.6	(2.73)
M131A5	S72846	226-6079	12,470	(5,656.4)	2,252.5	(63.7)	2,252.5	(63.7)	373.8	(9.49)	97.5	(2.48)	106.8	(2.71)
Semitrailer, tank, fuel-servicing, 5,000-gal														
M131A3C	S72846	533-3380	14,720	(6,677.0)	2,300.5	(65.1)	2,300.5	(65.1)	384.5	(9.77)	98.0	(2.49)	105.5	(2.68)
M131A4C	S72983	994-9458	14,060	(6,377.6)	2,254.4	(63.8)	2,254.4	(63.8)	374.0	(9.50)	96.0	(2.44)	108.5	(2.76)
M131A5C	S72983	226-6080	14,250	(6,463.8)	2,213.1	(62.6)	2,213.1	(62.6)	376.0	(9.55)	95.5	(2.43)	106.5	(2.71)
Semitrailer, low-bed, wrecker														
M269	S70106	395-1876	14,200	(6,441.1)	2,823.9	(79.9)	1,859.7	(52.6)	409.0	(10.39)	97.0	(2.46)	8.10	(2.06)
M269A1	S70106	542-2980	14,260	(6,468.3)	2,849.5	(80.6)	1,707.4	(48.3)	417.8	(10.61)	97.0	(2.46)	72.8	(1.85)
M270	S70243	395-1877	17,590	(7,978.8)	4,027.8	(114.0)	2,739.6	(77.5)	593.0	(15.06)	97.0	(2.46)	82.3	(2.09)
M270A1	S70243	289-7515	16,740	(7,593.3)	4,180.3	(118.3)	2,709.9	(76.7)	600.0	(15.24)	97.8	(2.48)	79.8	(2.03)
(15-to 25-ton, 4-wheel)														
Semitrailer, low-bed														
15-ton, M172	S70517	735-9326	15,560	(7,058.0)	1,916.3	(54.2)	1,916.3	(54.2)	415.5	(10.55)	115.0	(2.92)	69.3	(1.76)
25-ton, M172A1	S70517	317-6448	16,285	(7,386.9)	1,966.1	(55.6)	1,966.1	(55.6)	415.5	(10.55)	115.0	(2.92)	71.1	(1.81)

Table 2-2. Semitrailer Weight Distribution in Pounds

Model	Kingpin	Bogie	Total	Landing gear	Bogie	Total
M127	3,520	9,850	13,370	5,840	7,530	13,370
M127A1	3,960	10,280	14,240	6,000	8,240	14,240
M127A1C	4,020	10,260	14,280	6,020	8,260	14,280
M127A2C	3,800	10,180	13,980	5,600	8,380	13,980
M128A1C	4,720	10,620	15,340	6,980	8,360	15,340
M128A2C	4,810	11,040	15,850	7,210	8,640	15,850
M129A1C	4,640	10,440	15,080	6,860	8,220	15,080
M129A2C	4,610	10,500	15,110	6,880	8,230	15,110
M131A2	3,490	8,870	12,360	4,870	7,490	12,360
M131A3C	4,220	10,500	14,720	5,800	8,920	14,720
M131A4	3,400	9,385	12,785	5,035	7,750	12,785
M131A4C	4,010	10,050	14,060	5,540	8,520	14,060
M131A5	3,320	9,150	12,470	4,930	7,540	12,470
M131A5C	4,060	10,190	14,250	5,610	8,640	14,250
M172	4,670	10,890	15,560	5,520	10,040	15,560
M172A1	4,995	11,290	16,285	6,975	9,310	16,285
M269	3,680	10,520	14,200	4,850	9,350	14,200
M269A1	3,720	10,540	14,260	4,880	9,380	14,260
M270	5,220	12,370	17,590	6,175	11,415	17,590
M270A1	4,880	11,860	16,740	5,815	10,925	16,740

CHAPTER 3

SAFETY

3-1. General

General safety considerations and precautions for movement during loading operations are as follows:

- a. Check the entire semitrailer to insure that all loose items are properly secured.
- b. Make sure no personnel or obstacles are in the way before moving the semitrailer.
- c. When backing or moving the semitrailer in confined areas, make sure appropriate guides to assist are visibly posted.

WARNING

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

WARNING

Proper ventilation must be provided when loading and unloading if prime mover engine is used. Prolonged inhalation of carbon monoxide fumes will produce adverse effects that may prove fatal.

3-2. Specific Safety Requirements

Pertinent safety requirements by individual mode can be found, where applicable, in subsequent chapters.

CHAPTER 4

AIR TRANSPORTABILITY GUIDANCE

Section I. GENERAL

4-1. Scope

This chapter provides transportability guidance for air movement of the semitrailers described in chapter 2. It covers significant technical and physical characteristics and safety considerations; prescribes the materials required to prepare, load, and unload the semitrailers as internal loads aboard US Air Force aircraft; and provides examples of tiedown diagrams and tiedown data tables for loading these semitrailers in C-130, C-141, and C-5 aircraft.

4-2. Maximum Utilization of Aircraft

Cargo may not be carried in or on the bed of the semitrailers unless approval of the specific load has been obtained from the Air Force. Such cargo must be securely restrained in the trailer bed either by attachment to the semitrailer or to the aircraft and must meet the same restraint criteria as required for the semitrailer. No cargo may be carried in the tanker semitrailer. When loading and securing cargo in the bed of the semitrailer, the load must not exceed the maximum rated cross-country load capacity, and consideration must be given to the aircraft allowable cargo load (ACL) and compatibility of cargo items. The weight of the semitrailer plus the weight of any cargo it may contain must be accurate. The semitrailer and its cargo are considered as one package and the gross weight is used to determine tiedown requirements in accordance with paragraph 4-40, TM 55-450-15. If the semitrailer is to carry any cargo when it is in the aircraft, load and then weigh the semitrailer before it is loaded in the aircraft. The weight of any cargo **loaded on a semitrailer will change** the center of gravity (CG) of the semitrailer as shown in chapter 2. Determine the new CG in accordance with paragraph 3-4, TM 55-450-15. Chapter 3 and 4 of TM 55-450-15 contain detailed instructions for load planning and aircraft loading.

4-3. Safety

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

- a. The activity offering the semitrailers for air transport will notify the aircraft commander or his

designated representative if ammunition or explosives are to be transported on or within a particular semitrailer.

- b. The semitrailer must be restrained for air transport in accordance with the applicable procedures in section IV of the appropriate USAF-9 Technical Order.

- c. Each semitrailer must be checked carefully to insure that all loose items are properly secured in accordance with restraint criteria.

- d. Cargo tanks of tanker semitrailers must be emptied and purged prior to loading on aircraft.

- e. All fuel must be drained from the fuel segregator assembly of tanker semitrailers that are equipped with filter separators.

WARNING

Proper ventilation must be provided when loading and unloading. Prolonged inhalation of carbon monoxide fumes may be fatal.

WARNING

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

CAUTION

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

NOTE

Cargo loads depicted in this manual are restrained to the required minimum of 3g forward restraint. This must be increased to a minimum of 8g forward restraint when passengers or nuclear weapons cargo are carried forward of the other cargo.

NOTE

In air loading, the center of gravity of each vehicle must be determined, and where weight and/or measurement is critical, each vehicle should be weighed and/or measured.

4-4. Responsibility

The aircraft commander or his representative is responsible for insuring that the load is secured in accordance with restraint criteria outlined in the applicable aircraft technical order.

Section II. TRANSPORT BY US AIR FORCE AIRCRAFT

4-5. Aircraft Capabilities

In accordance with appendix D, AR 70-47, the following semitrailers are air transportable by the type of aircraft listed:

- a. *C-130 and C-141*: M127- and M269-series.
- b. *C-141*: M270-series.
- c. *C-5*: All series covered in this manual.

4-6. Typical Loads

The following tiedown diagrams (fig 4-1 through 4-3) and data (tables 4-1 through 4-3) are based on acceptable methods and can be used as a guide for loading and securing the semitrailers aboard the aircraft. Loads are based on empty vehicles in a reduced configuration *without* major sectionalization. Figures 4-1 through 4-3 show a typical tiedown pattern of a representative semitrailer for logistical movement; similar patterns are applicable to the other types of semitrailers covered in this manual. Appropriate prime movers are required for loading and unloading, and TM 55-2320-260-15-1 and/or TM 55-2320-211-15-1, as appropriate, should be consulted if prime movers are to be transported with the semitrailers. Tables list the type and capacity of tiedown devices required, location points on the semitrailers, and aircraft fittings to which the devices are secured.

4-7. Material Requirements

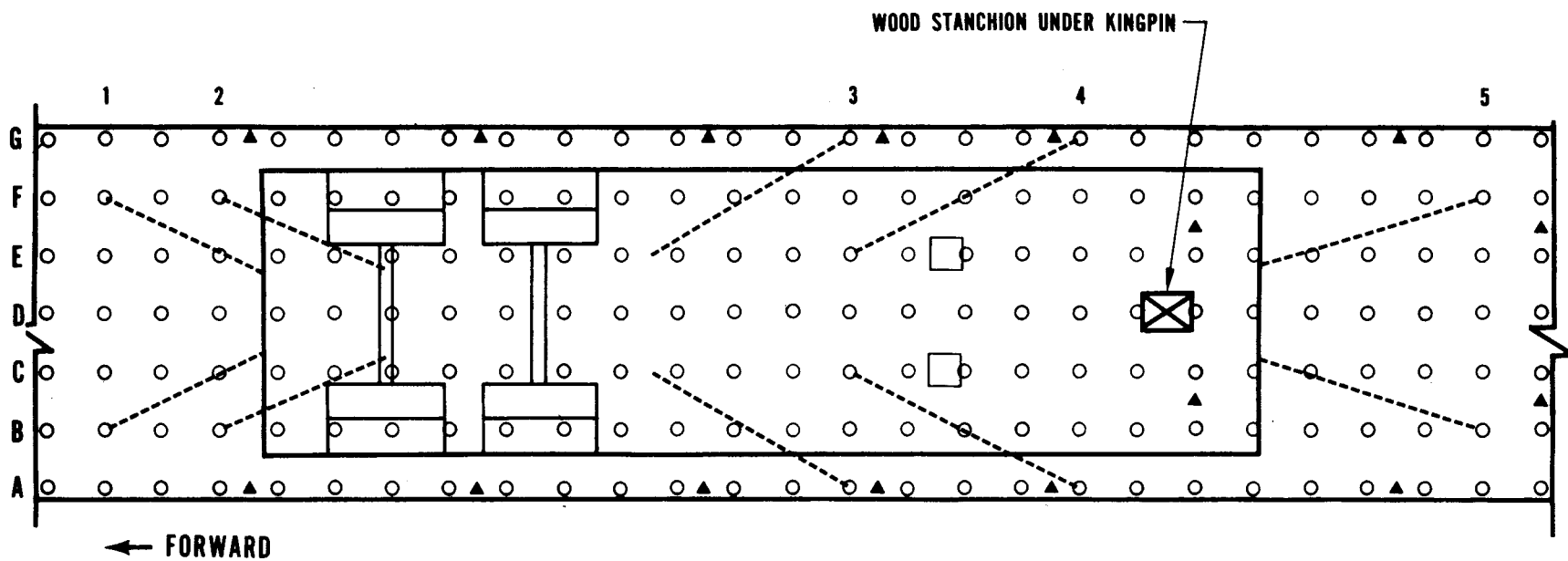
Shoring and bracing materials will be provided by the shipping activity, and the following must be accomplished prior to final securing of the semitrailer:

a. Using 2- by 4-inch lumber, cut-to-suit, construct a brace cradle (stanchion) to be placed under the kingpin area for additional support (item G, fig 6-2).

b. Prior to lowering the semitrailer landing legs to the aircraft floor, place a double layer of $\frac{3}{4}$ -inch-thick, 1½- by 6-foot plywood under the landing legs.

4-8. Piggyback Loads for C-5 Aircraft

To maximize aircraft loads and to gain transportation economies, the M127-, M172-, M269-, and M270-series semitrailers, when reduced to their minimum height, can be stacked on top of each other in the upright position. The removed side, rear, and front panels or body cargo stakes of this type of semitrailer, when properly banded, can be placed on the cargo deck of the lower semitrailer. This type of load must receive specific approval by the Air Force and must adhere to the applicable requirements of paragraph 4-2 above.



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

Figure 4-1. Tiedown diagram for M127A1C in C-130 aircraft.

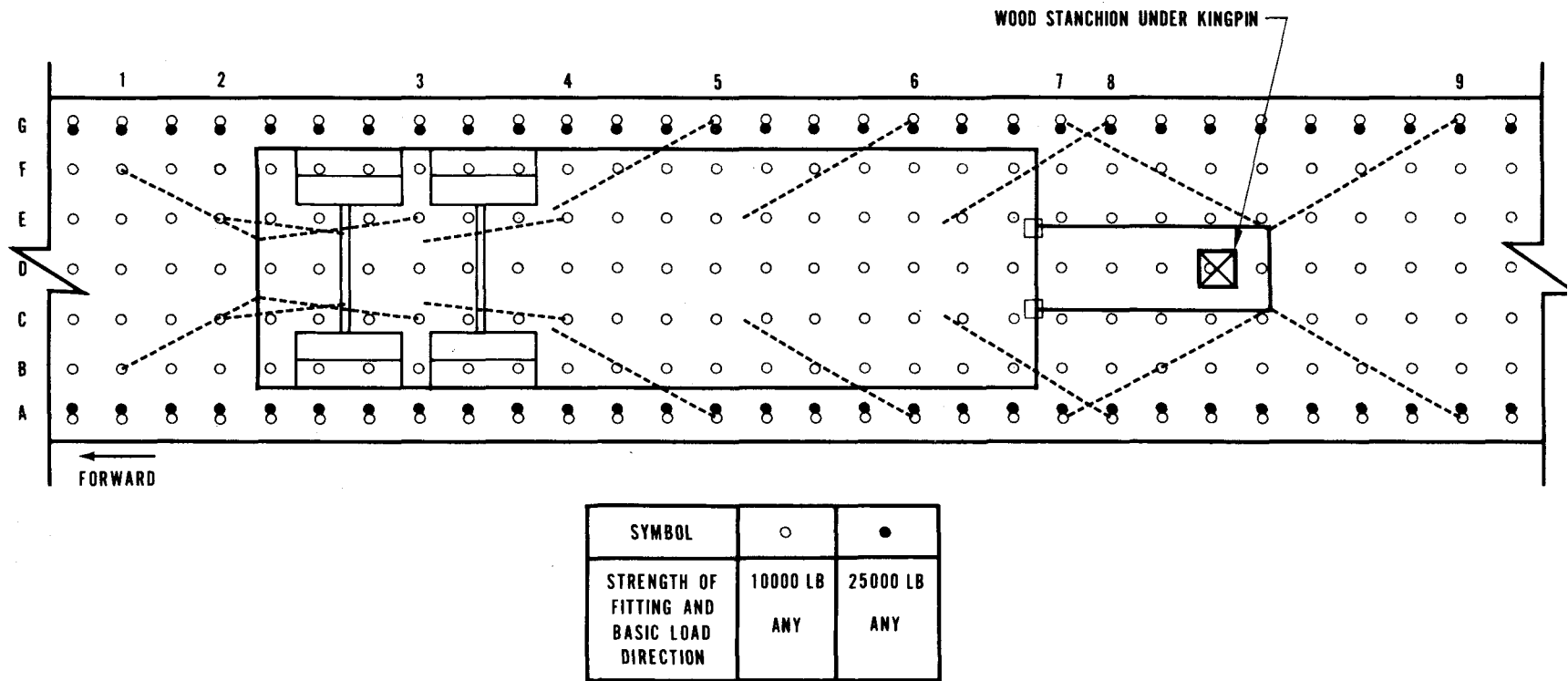


Figure 4-2. Tiedown diagram for M269 in C-141 aircraft.

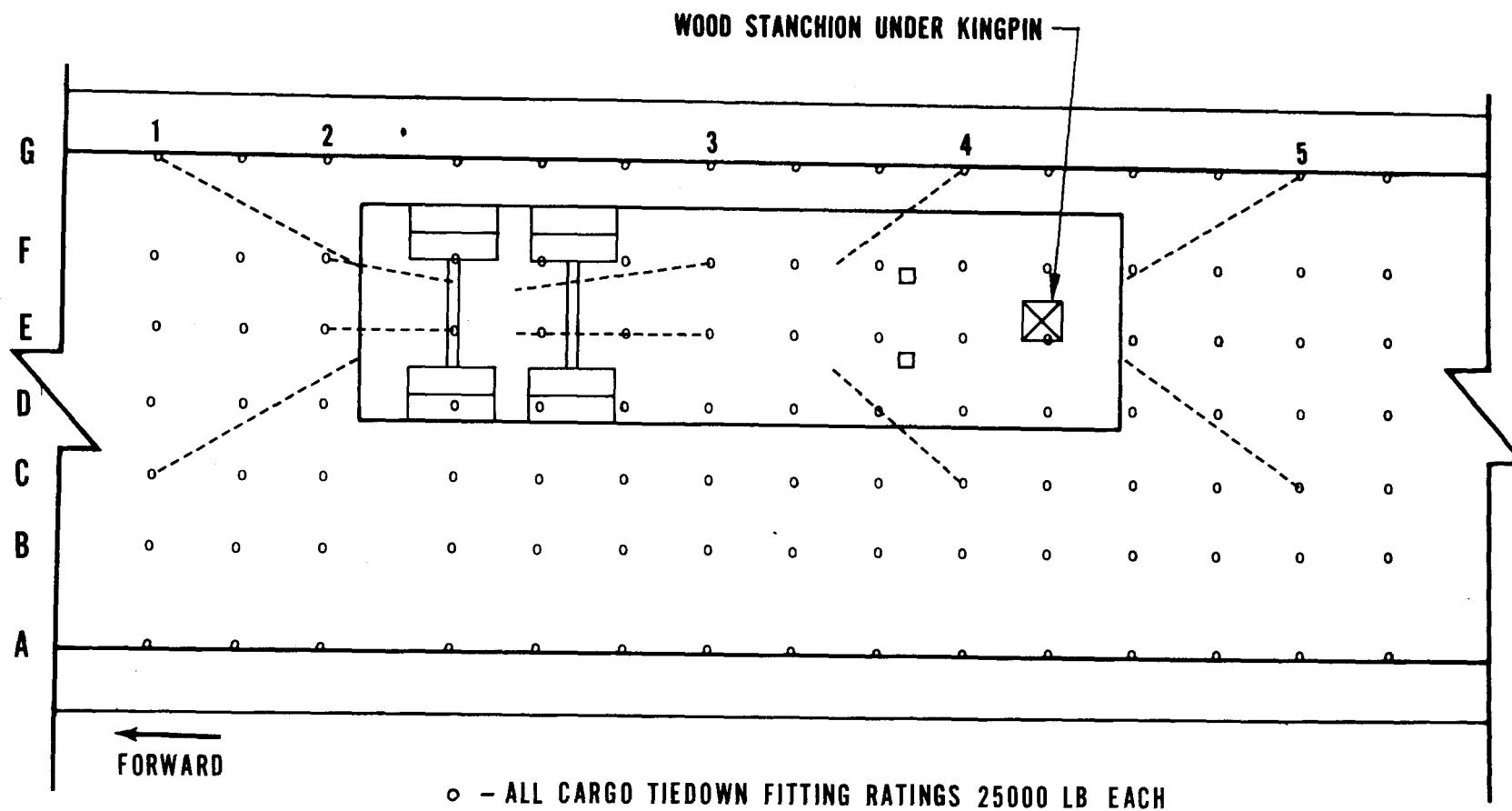


Figure 4-3. Tiedown diagram for M128A1C in C-5 aircraft.

Table 4-1. Tiedown Data for M127A1C in C-130 Aircraft

Tiedown fitting		Tiedown device*		Attach to item
Designation	capacity in 1,000 lb	type	capacity in 1,000 lb	
B1	10	MB-1	10	Right rear tiedown provision
F1	10	MB-1	10	Left rear tiedown provision
B2	10	MB-1	10	Right side rear-rear axle
F2	10	MB-1	10	Left side rear-rear axle
A3	10	MB-1	10	Right side tiedown provision on frame.
G3	10	MB-1	10	Left side tiedown provision on frame.
A4	10	MB-1	10	Right side tiedown provision on frame.
G4	10	MB-1	10	Left side tiedown provision on frame.
B5	10	MB-1	10	Right front tiedown provision
F5	10	MB-1	10	Left front tiedown provision

*C-2 may be substituted for MB-1.

Table 4-2. Tiedown Data for M269 in C-141 Aircraft

Tiedown fitting		Tiedown device*		Attach to item
Designation	capacity in 1,000 lb	type	capacity- in 1,000 lb	
B1	10	MB-1	10	Right rear tiedown provision
F1	10	MB-1	10	Left rear tiedown provision
C2	10	MB-1	10	Right side rear-rear axle
E2	10	MB-1	10	Left side rear-rear axle
C3	10	MB-1	10	Right rear tiedown provision
E3	10	MB-1	10	Left rear tiedown provision
C4	10	MB-1	10	Right side trunnion tube
E4	10	MB-1	10	Left side trunnion tube
A5	10	MB-1	10	Right side tiedown provision on frame.
G5	10	MB-1	10	Left side tiedown provision on frame.
A6	10	MB-1	10	Right side tiedown provision on frame.
G6	10	MB-1	10	Left side tiedown provision on frame.
A7	10	MB-1	10	Right front tiedown provision
G7	10	MB-1	10	Left front tiedown provision
A8	10	MB-1	10	Right side tiedown provision on frame.
G8	10	MB-1	10	Left side tiedown provision on frame.
A9	10	MB-1	10	Right front tiedown provision
G 9	10	MB-1	10	Left front tiedown provision

*C-2 may be substituted for MB-1.

Table 4-3. Tiedown Data for M128A1C in C-5 Aircraft

Tiedown fitting		Tiedown fitting device*		Attach to item
Designation	capacity in 1,000 lb	type	capacity in 1,000 lb	
C1	25	MB-2	25	Right rear tiedown provision
G1	25	MB-2	25	Left rear tiedown provision
E2	25	MB-2	25	Right side rear-rear axle
F2	25	MB-2	25	Left side rear-rear axle
E3	25	MB-2	25	Right side trunnion tube
F3	25	MB-2	25	Left side trunnion tube
C4	25	MB-2	25	Right side tiedown provision on frame.
G4	25	MB-2	25	Left side tiedown provision on frame.
C5	25	MB-2	25	Right front tiedown provision
G5	25	MB-2	25	Left front tiedown provision

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

Section III. TRANSPORT BY US ARMY AIRCRAFT

4-9. Fixed-Wing Aircraft

All semitrailers depicted in this manual exceed size and weight limitations for transport by US Army fixed-wing aircraft.

4-10. Rotary-Wing Aircraft

All semitrailers exceed size limitations for internal transport by US Army rotary-wing aircraft. The CH-47A helicopter external lift capability is 16,000

pounds, and that of the CH-47B and CH-47C is 20,000 pounds. The external lift capability of the CH-54A is 20,000 and of the CH-54B is 25,000 pounds. Consequently, all semitrailers can be transported by external lift except the M172A1, M270, and M270A1 (see table 2-1). Rigging instructions for external loads are contained in TM 55-450-11 and TM 55-450-12.

CHAPTER 5

HIGHWAY AND OFF-ROAD TRANSPORTABILITY GUIDANCE

5-1. Scope

This chapter provides transportability guidance for highway and off-road movement of the semitrailers described in chapter 2. It covers general technical and physical characteristics and safety considerations required for safe transport of these semitrailers.

5-2. Safety

In addition to the safety precautions contained in chapter 3, the semitrailers are subject to all the safety regulations applicable to commercial carriers when moving over public highways in CONUS. In overseas areas, movements are governed by theater and local regulations.

5-3. Movement on Own Wheels

The semitrailers covered in this manual are designed to be towed by a prime mover such as the 5-ton, 6x6, truck, tractor, M52, M818, or by a similar vehicle equipped with a fifth wheel, an air supply, and a 24-volt electrical system. In the case of the M172A1 semitrailer, the 10-ton, truck, tractor, M123 is recommended. The semitrailers are designed to be towed over prepared roads at up to 50 miles per hour (mph) and over unimproved roads and open rolling terrain at up to 30 mph. For reasonable distances, therefore, the desirable method of land movement of the semitrailers would be by use of an appropriate prime mover. Figures 5-1 and 5-2 show turning-

characteristics diagrams of the M131A4 semitrailer towed by the M52 tractor and of the M270A1 semitrailer towed by the M246 tractor, wrecker. Similar turning characteristics are applicable to the other types of semitrailers of similar size covered in this manual.

5-4. Limitations

The semitrailers described in this manual exceed CONUS legal width limitations of 96 inches and therefore require special highway permits. In some states the legal length limitations are also exceeded, and consequently the local installation transportation officer should be consulted for appropriate clearance. The procedures for obtaining special permits in CONUS are outlined in AR 55-162. Legal limits of overseas areas are identified in "Limits of Motor Vehicle Sizes and Weights," *International Road Federation*, 1023 Washington Building, Washington, D. C. 20005.

5-5. Piggyback Transport

The M127-, M172-, M269-, and M270-series semitrailers, when reduced to their minimum height, can be piggybacked on another semitrailer of the same series. The semitrailer can be stacked on top of another either in the upright or inverted position. However, if long-distance hauling is required, transport by rail is recommended (see chapter 7).

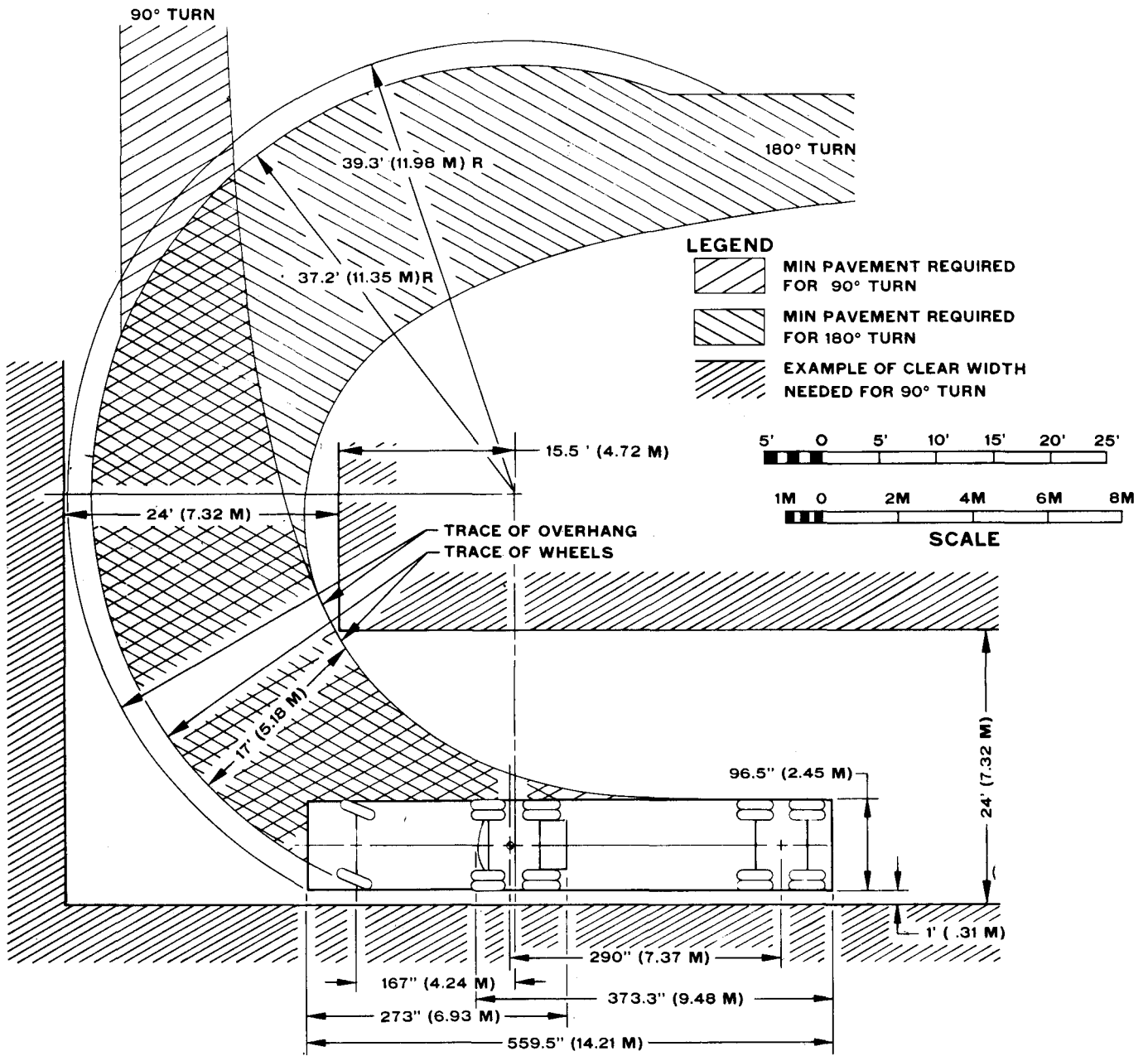


Figure 5-1. Turning-characteristics diagram for semitrailer, tank, fuel, 5,000-gallon, M131A4, towed by truck, tractor, M52.

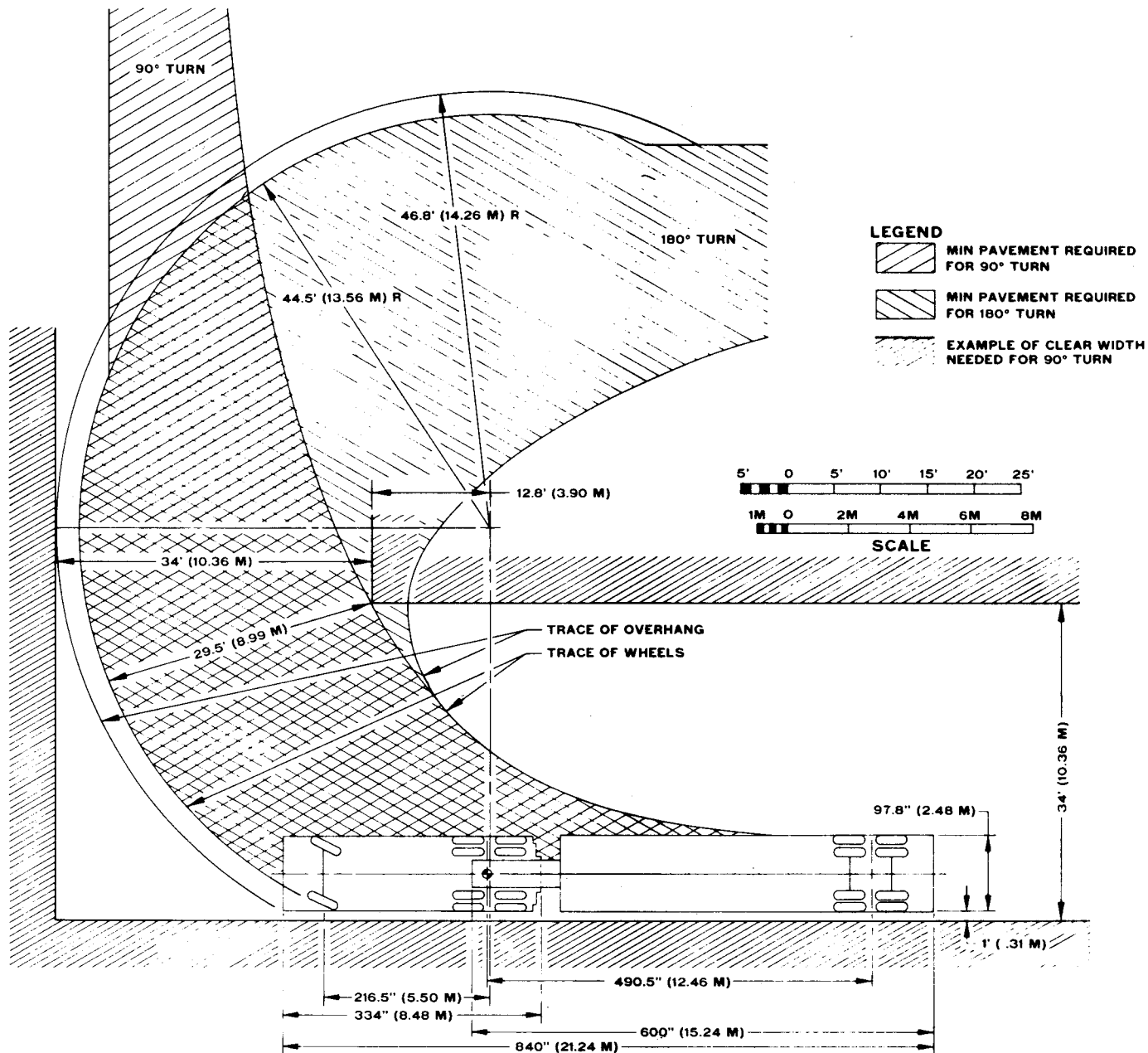


Figure 5-2. Turning-characteristics diagram for semitrailer, low-bed, wrecker, 12-ton, M270A1, towed by truck, tractor, wrecker, M246.

CHAPTER 6

MARINE AND TERMINAL TRANSPORTABILITY GUIDANCE

6-1. Scope

This chapter provides transportability guidance for marine and terminal movement of the semitrailers listed in chapter 2. It covers significant technical and physical characteristics and safety considerations; prescribes blocking materials; and provides guidance required to prepare, lift, tie down, and discharge the vehicles.

6-2. Safety

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

- a.* All vessel equipment and gear should be inspected prior to use.
- b.* All stevedore slings and other items used in the loading and unloading operations should be inspected for condition and adequate capacity.
- c.* All personnel should be cautioned not to walk under semitrailers being lifted.
- d.* Lifting provisions on each semitrailer should be inspected to insure that they are complete and undamaged.
- e.* All lifts should have at least two tag lines attached to control the swing of the semitrailer while suspended.

6-3. General Rules for Stowing

Whenever possible, semitrailers should receive the protection of below-deck stowage. In general, good stowage of vehicles means placing them fore and aft

as close together as practical, with minimum spacing between outer vehicles and the sweatboards (approximately 4 to 6 inches). Removable parts (such as side, rear, and front panels or body cargo stakes), spare parts, and on-equipment materiel (OEM), if not shipped on the trailer, should be protected and identified for location or disposition during shipment. Semitrailers in the hold of the ship should be blocked in front, in the rear, and on both sides of the wheels so that the vehicle cannot move in any direction; individual vehicle blocks should be braced to bulkheads, stanchions, and other vehicle wheel blocks. Additionally, a brace cradle (stanchion) should be placed under the kingpin for additional support. All semitrailers should be lashed with wire rope or chains to nearby bulkheads, stanchions, or padeyes.

NOTE

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

- a. Lifting.* For location of lifting points on the semitrailers refer to the side and rear elevation drawings in paragraph 2-4 (fig 2-8 through 2-17); however, due to the length of the semitrailers, a heavy-lift spreader is normally used. For a typical lifting diagram see figure 6-1.

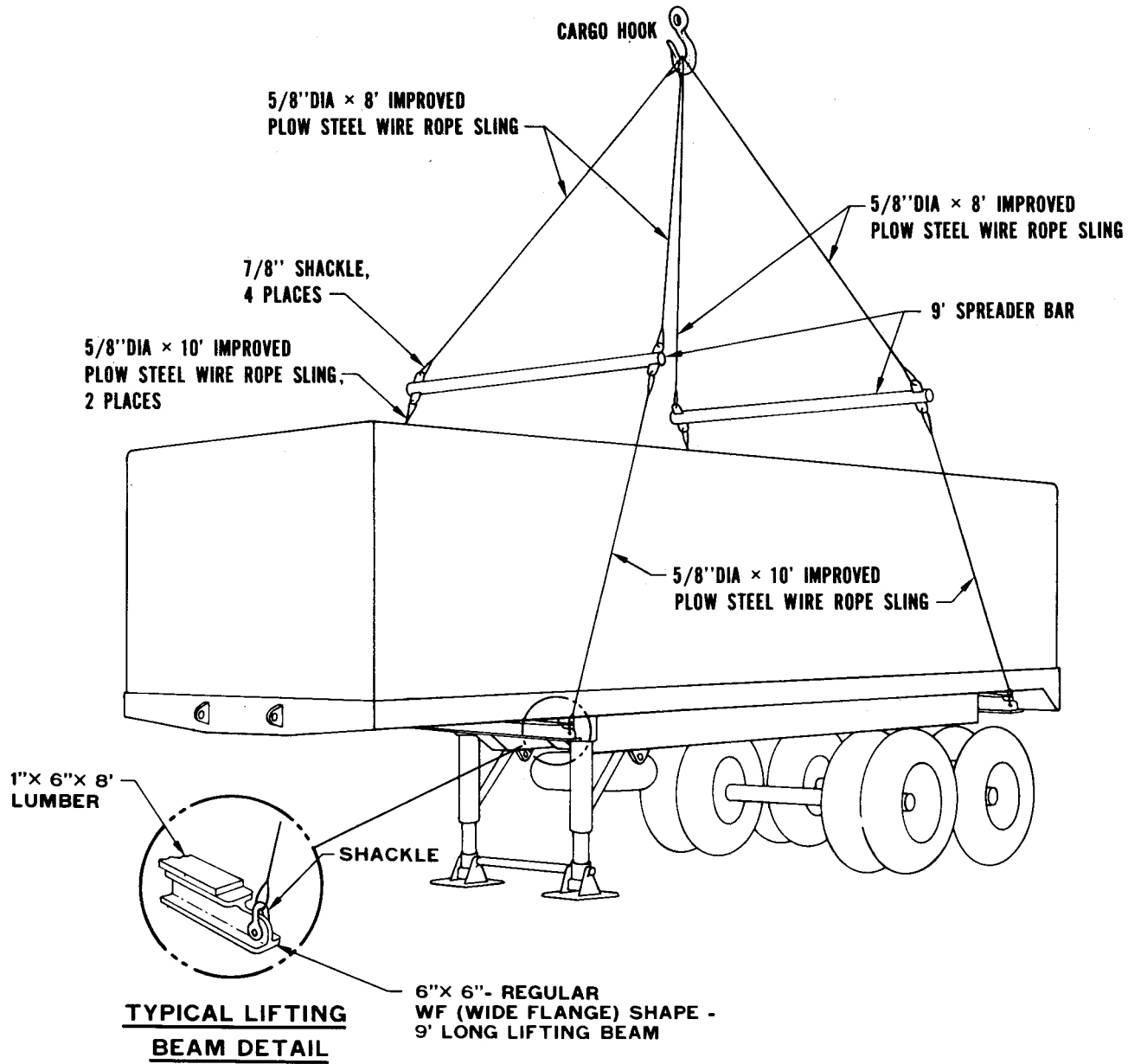


Figure 6-1. Lifting diagram for M128A1C using eight-wire sling and heavy-lift spreader bars.

b. Loading. Vehicles of any type are always loaded on vessels in their minimum configuration—that is, reduced height, with or without cargo. Semitrailers can be loaded over the beach or from piers onto landing craft, beach discharge and amphibious lighters, landing ship tanks (LST), and landing ship docks (LSD) by using a prime mover or a crane. Semitrailers can be loaded by using a prime mover on roll-on/roll-off vessels or onto the deck of

barges from a pier when tidal conditions are suitable and ramps are available, they can also be loaded onto sea going vessels by shoreside or floating cranes. Jumbo booms and heavy-lift ship's gear may be used in loading semitrailers on vessels. Figure 6-2 shows typical blocking and tiedown details of a representative semitrailer in the hold of a general-cargo vessel.

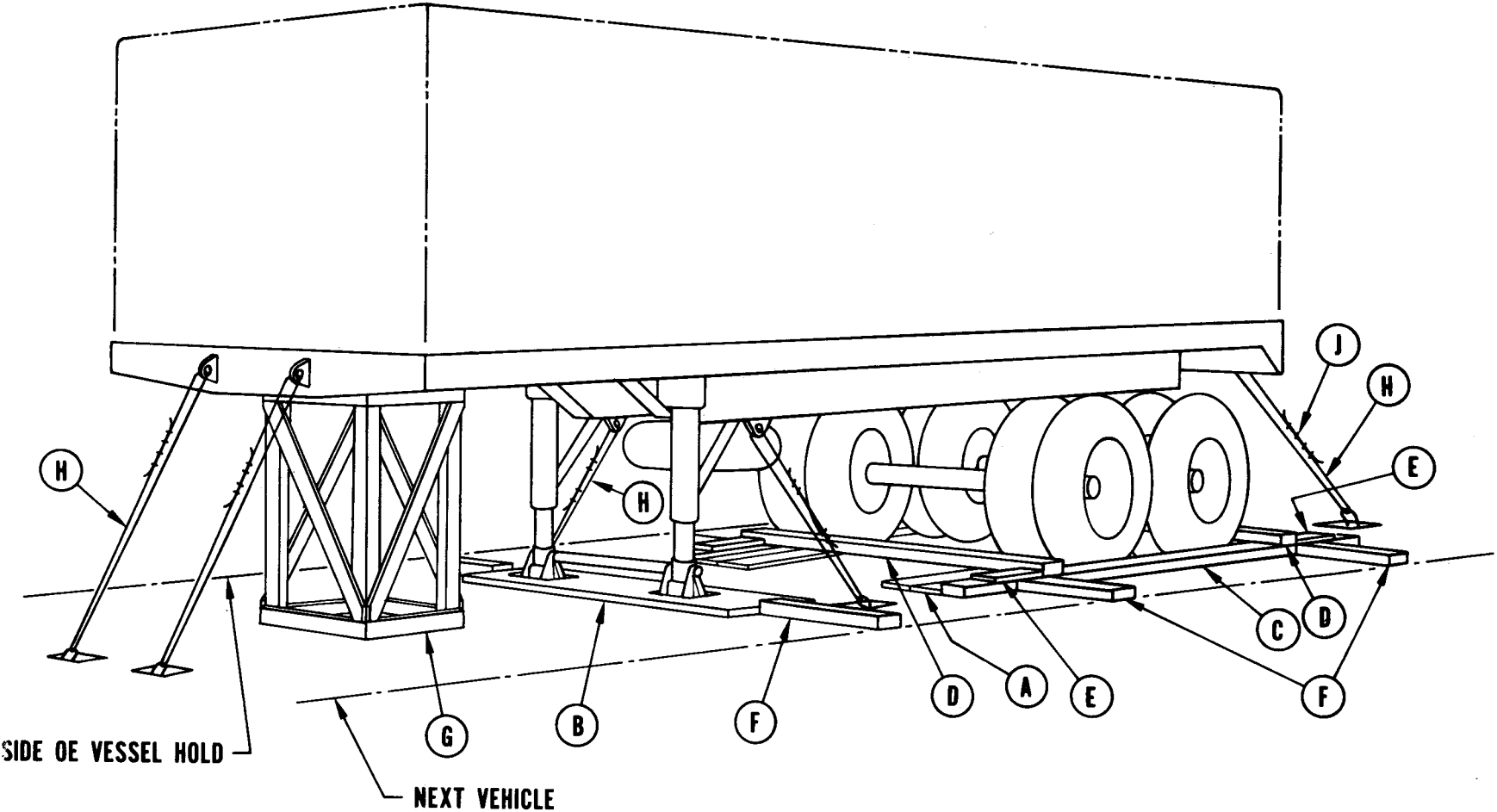


Figure 6-2. Typical blocking and tiedown of 12-ton semitrailer, 4-wheel, in hold of general-cargo vessel.

c. Materials. Table 6-1 is the approximate bill of materials for blocking and tiedown of a 12-ton semitrailer. Table 6-2 provides data concerning the

application of materials required to restrain the vehicle.

Table 6-1. Bill of Materials for Blocking and Tiedown of Typical 12-Ton Semitrailer in Hold of General Cargo Vessel (Fig 6-2)

Item	Description	Approximate quantity
Lumber	Douglas-fir, or comparable lumber, straight-grain, free from material defects; Fed Spec MM-L-751H:	
	2- x 4-in.	72 linear ft
	2- x 12-in.	54 linear ft
	4- x 6-in	52 linear ft
Nails	Common, steel; flathead, bright or cement-coated; para 3.6.11.2, Fed Spec FF-N-105B:	
	12d	24
	30d	120
	60d	10
Wire rope	Type I, general-purpose; class 2, 6x19, improved plow steel, wire strand core or IWRC; Fed Spec RR-W-410C:	
	5/8-in.	150 ft
Clamps	Wire rope, U-bolt clips, saddled, single-grip, forged-steel, Crosby heavy-duty, or equal; Fed Spec FF-C-450D:	
	5/8-in.	24

Table 6-2. Application of Materials for Blocking and Tiedown of Typical 12-Ton Semitrailer in Hold of General Cargo Vessel (Fig 6-2)

Item	No. required	Application
A	6	Flooring, 2- x 12- x 96-in. lumber. Locate under rear wheels.
B	1	Flooring, 2- x 12- x 72-in. lumber. Locate under landing legs.
C	2	Side blocking for tandem-axle wheels, 4- x 6- x 108-in. lumber. Locate at side of rear wheels.
D	2	Blocks, 4- x 6- x 108-in. lumber. Locate one in front and one in back of tandem-axle wheels. Toenail each end to side blocking with two 60d nails.
E	4	Cleats, 2- x 4- x 24-in. lumber. Locate against block (item D) as indicated in figure 6-2, and secure each to side blocking (item C) with five 12d nails.
F	as required	Bracing, 4- x 6-in. x random-length lumber, cut-to-fit. Place ends against side blocking of other cargo, side of ship, or other ship's structure, and secure each end with four 30d nails.
G	as required	Stanchion, 2- x 4-in. x random-length lumber. Construct stanchion as shown using 30d nails. Place under kingpin for additional support.
H	6	Wire rope, 5/8-in. Each cable will form a complete loop between vehicle tiedown provisions and deck padeye.
J	24	Clamps, 5/8-in. Place four clamps over each cable loop at the overlap area and space 3½ in. apart with a minimum of 6 in. from ends of cable (detail 4, fig. 7-2).

6-4. Special Design Vessels

Seatrail/trailer vessels, roll-on/roll-off ships, landing ships and attack-cargo vessels are equipped with patented lashing gear and prepositioned fittings in the deck. When transporting semitrailers aboard such vessels, use of the onboard restraint equipment is adequate, and no further blocking or

bracing is required. For movement by barge or similar lighterage, the trailers must be blocked and braced. When transporting semitrailers over extended distances on rough water, semitrailers loaded aboard landing craft and amphibious lighters should be lashed, blocked, and braced.

CHAPTER 7

RAIL TRANSPORTABILITY GUIDANCE

Section I. GENERAL

7-1. Scope

This chapter provides transportability guidance for rail movement of the semitrailers described in chapter 2. It covers significant technical and physical characteristics and safety considerations and prescribes the materials and guidance to prepare, load, tie down, and unload the semitrailers.

7-2. Maximum Utilization of Railcars

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

Section II. TRANSPORT ON CONUS RAILWAYS

7-3. General

The transportability guidance contained in this section is applicable when the semitrailers are transported on CONUS railways. Consideration is given to single multiple movements on the types of railcars normally used for the movement of these semitrailers. The semitrailers, when loaded on suitable railcars, can be transported without major sectionalization or major disassembly, except for the M128- and M129-series semitrailers, which have a nonreducible height limitation requiring verification of line clearances. These semitrailers, therefore, will require special routing under the provisions of restricted rail movements. All other semitrailers, when at their respective reduced heights, are transportable when within the limits of the Association of American Railroads "Outline Diagram for Single Loads, Without End Overhang, on Open-Top Cars," as shown in both the *Railway Line Clearance Publication* and the *Official Railway Equipment Register*.

7-4. Preparation of Vehicles

The degree of preparation for the semitrailers prior to being transported by railcar is dependent upon the operational commitment.

7-5. Loading Semitrailers on General-Purpose Flatcars

a. Semitrailers may be placed in the tiedown position of the railcar by a crane or side loader, or they may be driven or towed onto the railcar, if a suitable ramp or bridge is available.

b. The load shown in figure 7-1 is based on a flatcar minimum width of 9 feet 6 inches, which will accommodate all semitrailers described in chapter 2 except for the semitrailers, low-bed, M172 and M172A1, which will require a car minimum width of 10 feet 3 inches. Figure 7-2 is a blocking and tiedown detail diagram for figure 7-1. Table 7-1 is a bill of materials for blocking and tiedown of the semitrailers, and table 7-2 provides data concerning the application of materials required for securing semitrailers on general-purpose flatcars.

NOTE

A staggered nailing pattern should be used when lumber or laminated lumber is nailed to the floor of the railcar. Additionally, the nailing pattern for an upper piece of laminated lumber will be adjusted as required so that a nail for that piece will not be driven through, onto, or right beside a nail in the lower piece of lumber.

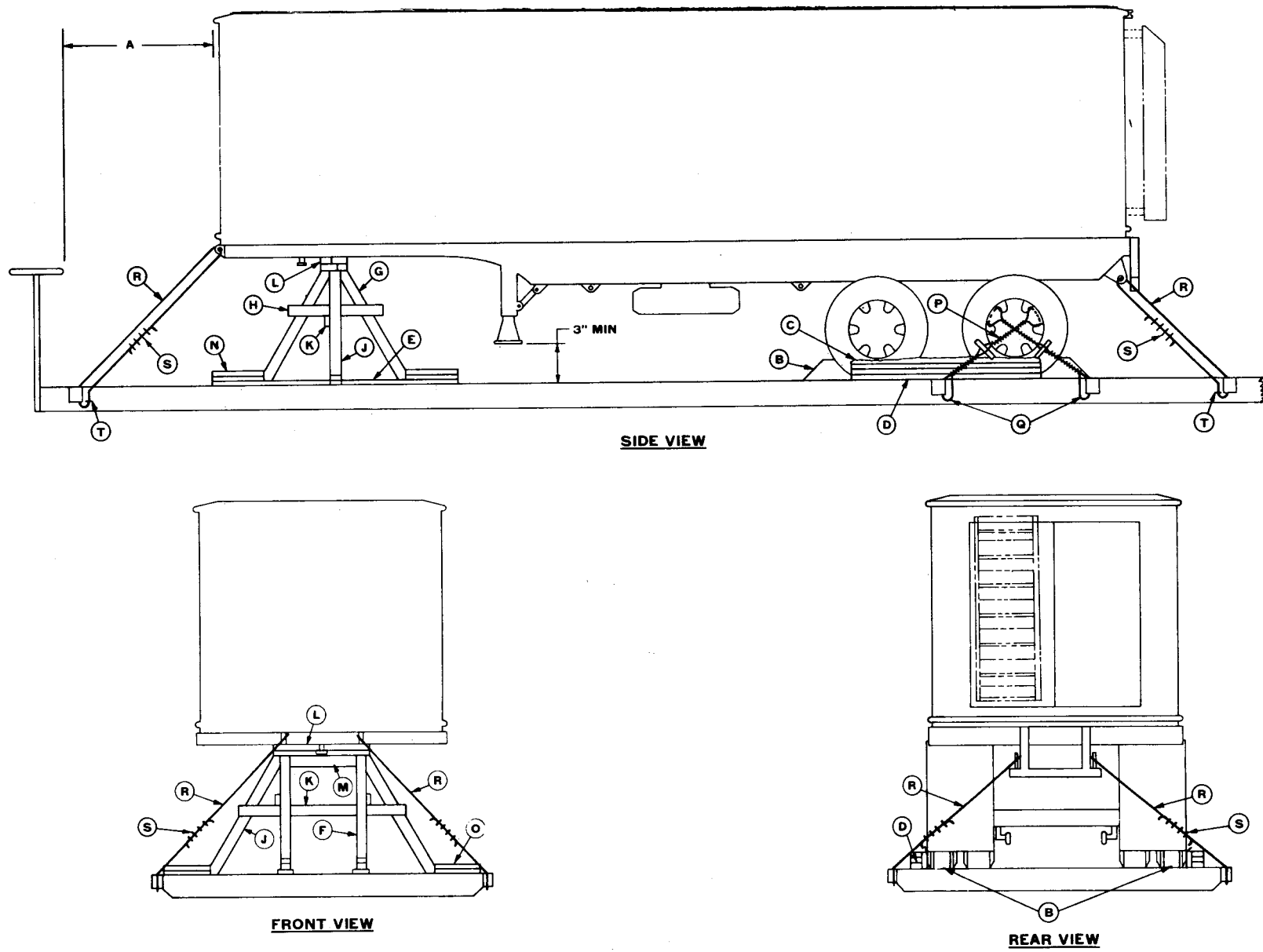
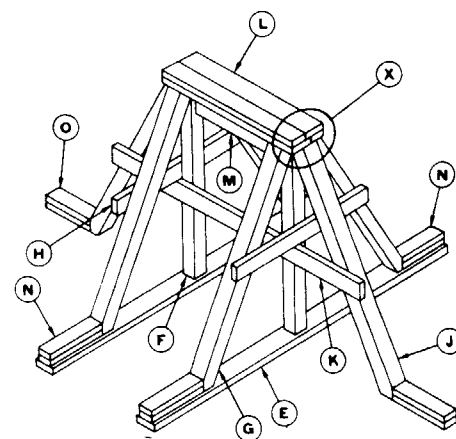
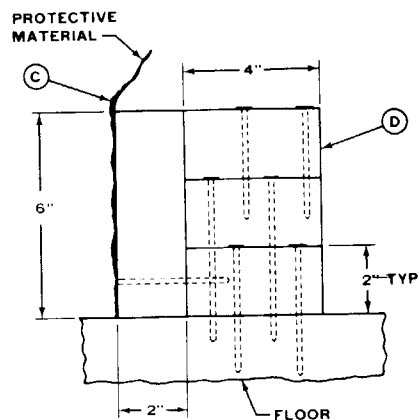
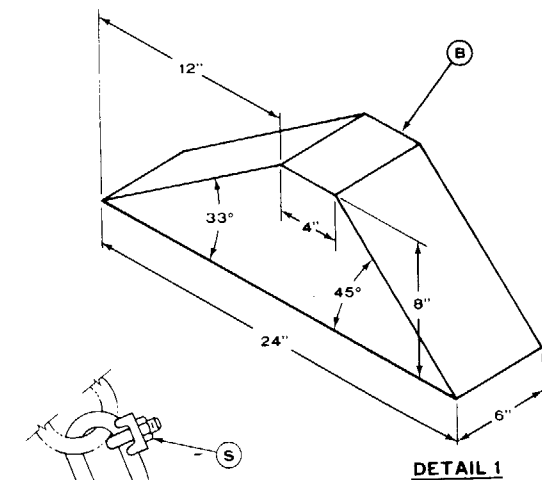


Figure 7-1. Blocking and tiedown diagram of a typical 12-ton semitrailer on CONUS general-purpose flatcar.



NOT TO SCALE

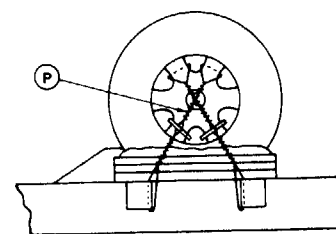
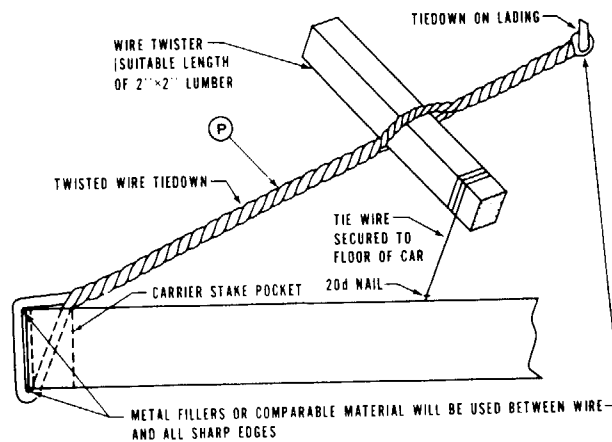
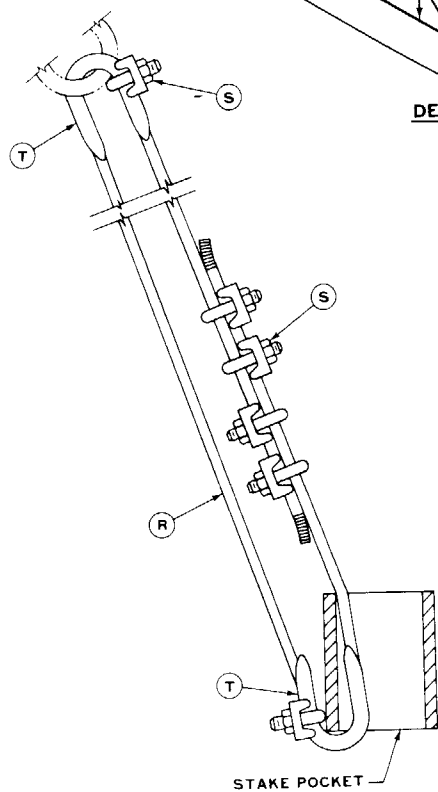


Figure 7-2. Blocking and tiedown details.

7-6. Loading Semitrailers on Special-Purpose Flatcars

a. Semitrailers can be shipped more efficiently on specialized railroad freight equipment such as the TTX-type flatcars with retractable hitches (fig 7-3). Whenever possible, shippers should request this type of flatcar when shipping semitrailers.

b. Loading may be accomplished in the same manner as outlined in paragraph 7-5a above.

c. This method of loading is applicable to other types of semitrailers weighing up to 40,000 pounds

providing that the kingpin height is between 47 inches minimum and 52 inches maximum.

d. Figures 7-4 and 7-5 show typical loads of semitrailers on a flatcar with retractable hitches.

CAUTION

Insure that retractable hitch is securely locked in UP position. Securement of the trailer on the retractable hitch will be in accordance with the car owner's instructions. Check to insure that trailer kingpin is locked in place on the hitch.

Table 7-1. Bill of Materials for Blocking and Tiedown of Typical 12-Ton Semitrailer on CONUS General-Purpose Flatcars (Fig 7-1 and 7-2)

Item	Description	Approximate quantity
Lumber	Douglas-fir, or comparable lumber, straight-grain, free from material defects; Fed Spec MM-L-751H:	
	2- x 4-in.	68 ft
	2- x 6-in.	36 ft
	4- x 4-in.	45 ft
	6- x 8-in.	8 ft
Nails	Common, steel; flathead, bright or cement-coated; para 3.6.11.2, Fed Spec FF-N-105B:	
	12d.	80
	16d.	32
	20d.	48
	30d.	68
	40d.	20
Wire	No. 8 gage, black, annealed; Fed Spec QQ-W-461G	200 ft
Wire rope	Type I, general-purpose; class 2, 6x19, improved plow steel, wire strand core or IWRC; Fed Spec RR-W-410C:	
	½-in.	100 ft
Clamps	Wire rope, U-bolt clips, saddled, single grip, forged steel, Crosby heavy-duty, or equal; Fed Spec FF-C-450D:	
	½-in.	24
Thimbles	Standard, open-type: ½-in.	8
Cushioning material	Waterproof paper, or suitable material	as required

Table 7-2. Application of Materials for Blocking and Tiedown of Typical 12-Ton Semitrailer on CONUS General-Purpose Flatcars (Fig 7-1 and 7-2)

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 (fig 7-1).
B	4	Chock blocks (detail 1, fig 7-2). Locate 45° portion of block against outside front of front wheels and against outside rear of rear wheels. Nail heel of block to car floor with three 40d nails, and toenail that portion of the block under tire to car floor with two 40d nails before item C and D are applied.
C	1 ea per item D	Suitable material such as waterproof paper or burlap. Locate bottom portion under item D. The top portion should extend 2 in. above item D (detail 2, fig 7-2).
D	6	Side blocking, each to consist of one piece of 2- x 6- x 72-in. lumber and three pieces of 2- x 4- x 72-in. lumber (detail 2, fig 7-2). Nail one edge of the 2- x 6- x 72-in. piece to the bottom 2- x 4- x 72-in. piece with eight 12d nails. Then place against tire with item C in place, and nail to car floor through the 2- x 4- x 36-in. piece, with eight 20d nails. Nail the other two 2- x 4- x 72-in. pieces to the one below in like manner.
		For items E through O, following below, refer to forward bracing detail (detail 3, fig 7(2)).
E	2	Lumber, 2- x 6- x 92-in. Nail to car floor with one 30d nail every 8 inches in vicinity under trailer kingpin. See fig 7-1 for exact location.

Table 7-2. Application of Materials for Blocking and Tiedown of Typical 12-Ton Semitrailer on CONUS General-Purpose Flatcars (Fig 7-1 and 7-2) – Continued

Item	No. required	Application
F	2	Lumber, 4- x 4-in. x length-to-suit. Toenail to item E with four 16d nails.
G	4	Lumber, 4- x 4-in. x length-to-suit. Double bevel each end. Cut to insure full bearing for item L. Toenail to items E and F with two 16d nails at each end.
H	2	Lumber, 2- x 4- x 30-in. Nail to items F and G with three 12d nails at each joint.
J	2	Lumber, 4- x 4-in. x length-to-suit. Double bevel each end. Cut to insure full bearing for item L. Toenail to item F and to car floor with two 16d nails at each end.
K	1	Lumber, 2- x 4- x 62-in. Nail to items F and J with three 12d nails at each joint.
L	2	Lumber, each to consist of one piece, 2- x 4- x 37-in. and one piece, 2- x 6- x 37-in. Nail lower pieces to top of items F, G, and J with two 12d nails in each of the items. Offset vertical joints as shown in detail 3, circle insert X, figure 7-2, and nail top pieces to lower with six 12d nails each.
M	1	Lumber, 2- x 6- x 24-in. Nail to item L with six 12d nails.
N	4	Lumber, each to consist of two pieces, 2- x 4- x 18-in. Nail first piece to item E with four 30d nails. Nail second piece to first in the same manner.
O	2	Lumber, each to consist of two pieces, 2- x 4- x 12-in. Nail first piece to car floor, against item J, with three 30d nails. Nail the second piece to the first in the same manner.
P	4	No. 8 gage black annealed wire, six strands. Pass through the spokes or holes in the rear wheels and through the car stake pockets (detail 6, item P, fig 7-2). Wires should be attached to wheel above the midpoint and the twisted wire tiedowns installed so they form an X across face of wheel. Twist taut with a rod, bolt, or suitable length of 2- x 2-in. lumber, and secure to preclude unwinding (detail 5, item P, fig 7-2).
Q	4	Metal fillers sufficient to provide a suitable radius must be used to protect wire at stake pockets and applied to prevent dislodgement (detail 5, fig 7-2).
R	4	Wire rope, ½-in. Attach through the semitrailer front and rear tiedown provision, in a complete loop, through the stake pocket on the same side of the car (detail 4, item R, fig 7-2). A thimble is to be placed at the bottom of each stake pocket and secured to wire rope with cable clip (clamp) (detail 4, item T, fig 7-2).
S	24	Clamps, ½-in. Secure the ends of the wire rope, at the overlap area, with four clamps each, and space 3½-in. apart with a minimum of 6 in. from ends of cable. Place one additional clamp to secure thimble and wire rope together at each tiedown provision and stake pocket (detail 4, item S, fig 7-2).
T	8	Thimble, open type, ½-in. Place one at bottom of each stake pocket and through each vehicle tiedown device (detail 4, item T, fig 7-2).
X		See item L above.

GENERAL INSTRUCTIONS

1. Tires are to be inflated to 10 psi above highway operating pressures.
2. When No. 8 gage, black, annealed wire is used for tiedown purposes, the wire is to be threaded in a continuous length until all the required number of strands are formed (one complete loop consists of two strands).
3. If semitrailers are shipped in a loaded condition and the combined weight of the vehicle and cargo exceeds 18,000 pounds, additional securement will be required as follows: Increase the wheel tiedowns to eight strands of No. 8 gage black, annealed wire (P). Add chock blocks (item B) against front and rear of each inside wheel.
4. Item L should be positioned 6 inches behind kingpin of semitrailer.
5. Trailer landing legs (landing gear) shall be raised to provide a minimum of 3 inches of clearance between the landing legs and car.
6. See General Rules 2, 3, 4, 5, 7, 9, 10, 14, 15, and 19B appearing in section I of the General Rules Governing the Loading of Commodities on Open Top Cars and Trailers published by the Association of American Railroads for further details.

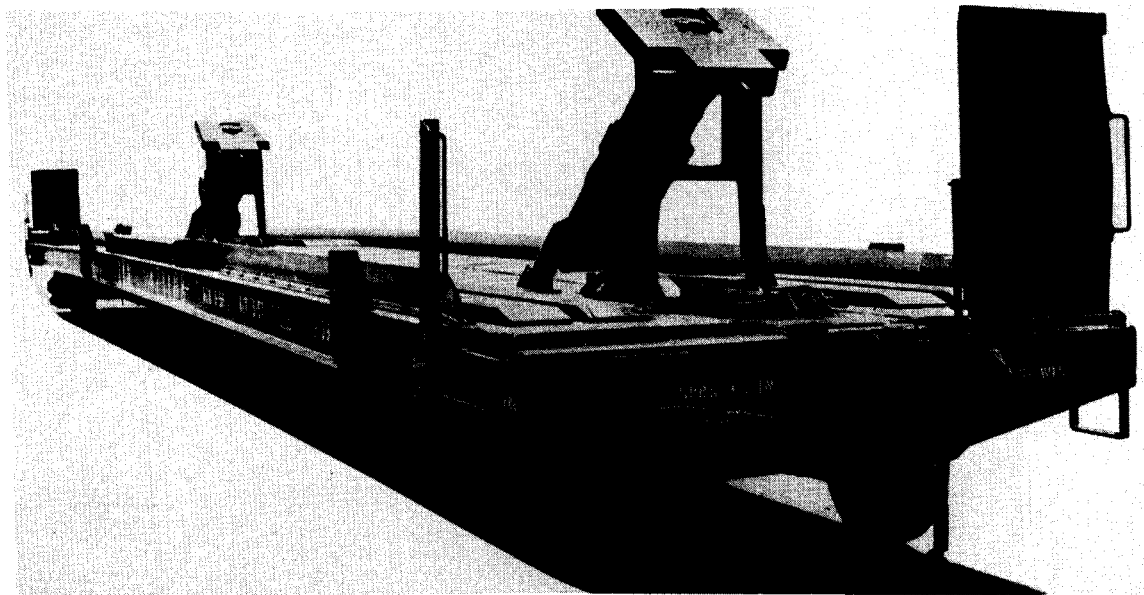


Figure 7-3. Example of a 75-foot TTX flatcar with retractable hitches.

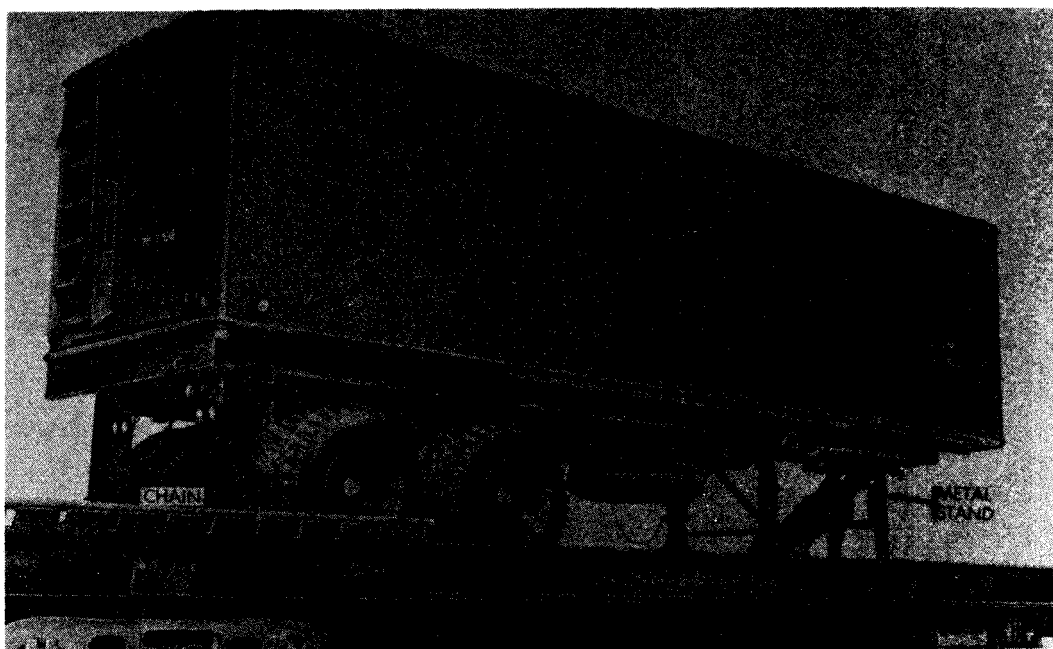


Figure 7-4. Example of a semitrailer loaded on a flatcar with retractable hitches.

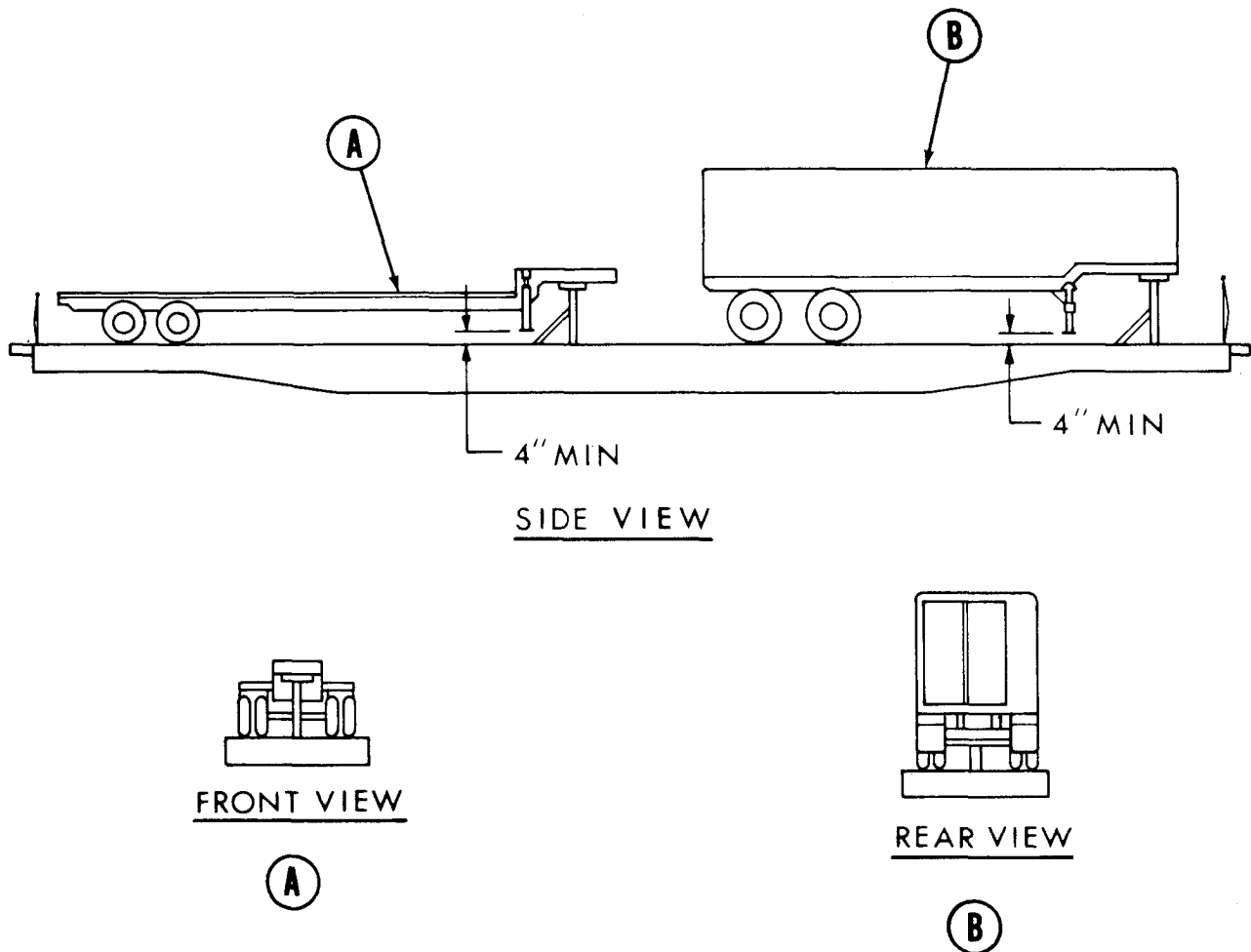


Figure 7-5. Typical load of semitrailers on a flatcar with retractable hitches.

7-7. Double-Decking of Semitrailers

a. The M127, M172, M269, and M270 series flatbed semitrailers, when reduced to their minimum height, can be double-decked on top of another in an inverted position. The removed side, rear, and front panels or body cargo stakes should be properly banded and can then be accommodated and secured on top of the lower semitrailer and/or car floor.

b. For this type of load, hardwood separators (2-in. x 6-in. x length-to-suit) should be located

crosswise between the gooseneck and trailer body. Two such blocks should be placed at each end.

c. The double-decked trailers should be secured to each other by 10 pair (5 on each side) of ties looped through the trailer stake pockets. Each tie consists of eight strands of No. 8 gage black, annealed wire (fig 7-6). A substitute for this wire can be 3/8-inch wire rope, attached in a complete loop in the same manner and secured with three 3/8-in. cable clips (clamps).

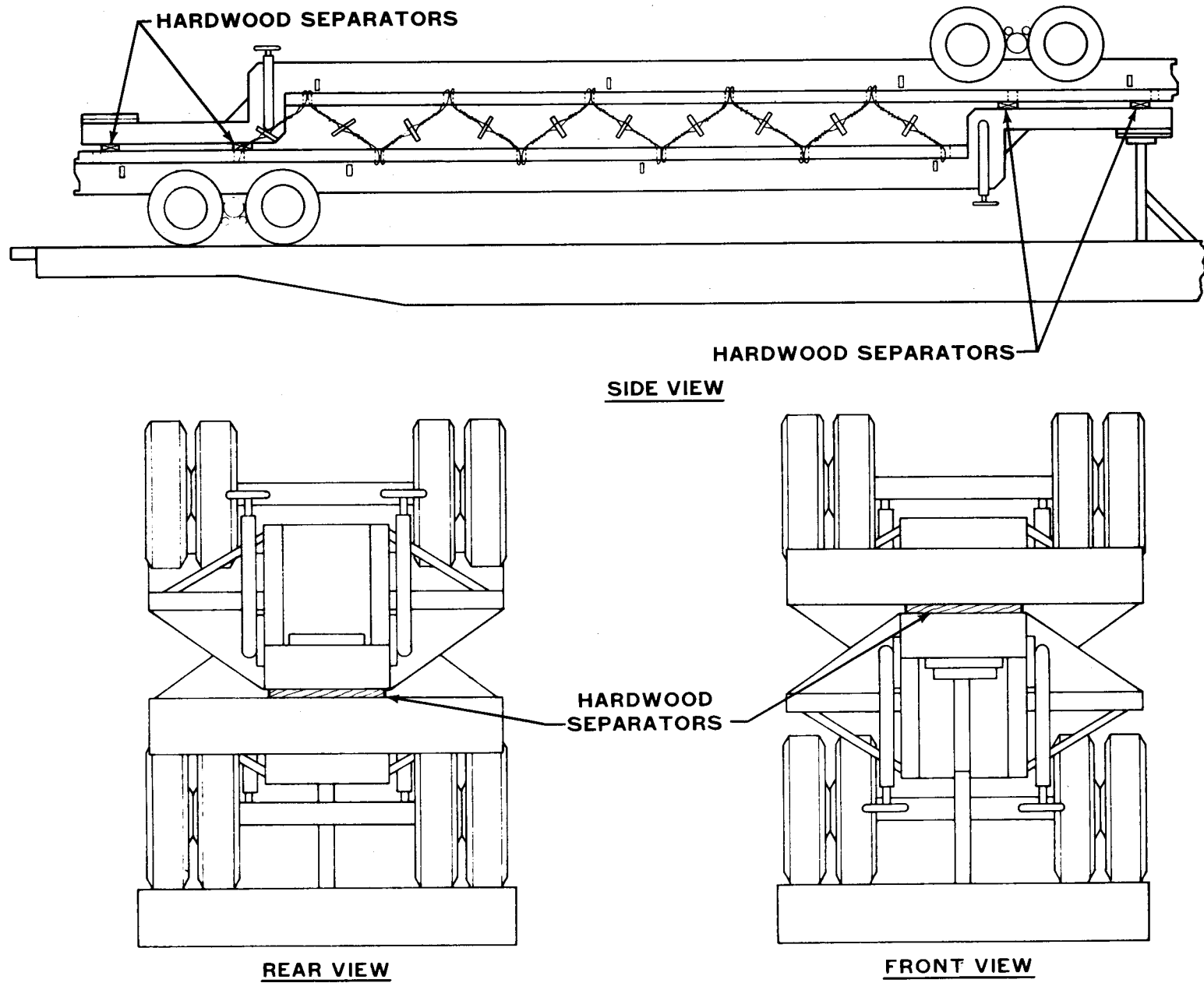


Figure 7-6. Example of double-decked semitrailers.

Section III. TRANSPORT ON FOREIGN RAILWAYS

7-8. General

The transportability guidance contained in this section is applicable when the semitrailers described in chapter 2 are transported on foreign railways. Consideration is given to single and multiple movements on the types of railcars normally used for the transport of this type of equipment. All semitrailers, except the M128-, M129-, and M131-series, can be transported in their reduced height configuration within European countries complying with the International Loading Gauge (formerly Berne International) without restrictions; this also applies to the majority of the countries in the Middle East as well as to South America, Australia, India, and Pakistan. Because of the height of the M128-, M129-, and M131-series semitrailers, special clearance will be required for local railway authorities. In the Middle East and South America the clearances vary, 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 used by different countries, foreign railcars are difficult to classify. In addition, clearances vary between countries and within a country. Consequently, careful evaluation of transport capability must be made on an individual basis.

7-9. Transport on US Army-Owned Foreign Service Flat cars

a. General. The semitrailers can be transported on a number of US Army-owned foreign service flatcars. These flatcars are provided exclusively for the transport of US military materiel. Table 7-3 represents a few of the flatcars available in Europe that are suitable for transporting this equipment.

Table 7-3. Characteristics of US Army-Owned 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 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)
FFLM	90-ton (81.65 MTON)	46-ft 8-in. (14.42 m)	10-ft 3-in. (3.12 m)	4-ft 2¾-in. (1.29 m)

^a Above top of rail.

^b German-owned SSY cars are designated RLMMP.

b. Materials. The materials required for blocking and tiedown of vehicles on US Army foreign service flatcars are essentially the same as those used within

CONUS. For general guidance, refer to figures 7-1 and 7-2, and tables 7-1 and 7-2.

APPENDIX A

REFERENCES

A-1. Department of Defense Publications

MIL-STD-100	Military Standard, Engineering Drawing Practices.
MIL-A-8421F	Military Specification, Air Transportability Requirements, General Specification for.

A-2. Army Regulations (AR)

55-15	Land Transportation within areas outside the Continental United States.
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.
55-355	Military Traffic Management Regulation.
70-47	Engineering for Transportability.
385-40	Accident Reporting and Records.
746-1	Color, Marking, and Preparation of Equipment for Shipment.

A-3. Field Manuals (FM)

1-100	Army Aviation Utilization.
5-36	Route Reconnaissance and Classification.
55-13	(AFM 76-12) Air Transport of Supplies and Equipment: Standard Loads in Air Force C-5 Aircraft.
55-15	Transportation Reference Data.
55-60	Army Terminal Operations.

A-4. Supply Bulletin (SB)

700-20	Army Adopted/Other Items Selected for Authorization/List of Reportable Items.
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A-5. Technical Bulletin (TB)

55-46-1	Standard Characteristics (Dimensions, Weight, and Cube) for Transportability of Military Vehicles and Other Outsize/Overweight Equipment.
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A-6. Technical Manuals (TM)

5-725	
9-2330-207-14	Operator, Organizational, Direct Support and General Support Maintenance Manual for Chassis, Semitrailer: 12-Ton, 4-Wheel, M126, M126A1, M1261C, and M126A2C; Semitrailer, Stake: 12-Ton, 4-Wheel, M127, M127A1, M127A1C, and M127A2C; Semitrailer, Van: Cargo, 12-Ton, 4-Wheel, M128A1, M128A1C, and M128A2C; Semitrailer, Van: Supply, 12-Ton, 4-Wheel, M129A1, M129A1C, and M129A2C.
9-2330-208-15	Operator, Organizational, Field and Depot Maintenance Manual for Semitrailer, Tank: Fuel-Servicing, 5,000-Gallon, 4-Wheel, M131A3C; Semitrailer, Tank: Gasoline, 12-Ton, 4-Wheel, M131, M131A1, and M131A2.
9-2330-211-14	Operator, Organizational, Direct and General Support Maintenance Manual for Semitrailer; Low-Bed: 15-Ton, 4-Wheel, M172; Semitrailer, Low-Bed: 25-Ton, 4-Wheel, M172A1.
9-2330-272-14	Operator's, Organizational, Direct Support, and General Support Maintenance Manual for Semitrailer, Tank: Fuel, 5,000-Gallon, 4-Wheel, M131A4; Semitrailer, Tank: Fuel-Servicing, 5,000-Gallon, 4-

	Wheel, M131A4C; Semitrailer, Tank: Fuel, 5,000-Gallon, 4-Wheel, M131A5; and Semitrailer, Tank: Fuel-Servicing, 5,000-Gallon, 4-Wheel, M131A5C.
38-236(AFP 71-8)	Preparation of Freight for Air Shipment.
38-250 (AFM 71-4)	Packaging and Handling of Dangerous Materials for Transport by Military Aircraft.
55-405-9	Army Aviation Maintenance Engineering Manual: Weight and Balance.
55-450-8	Air Transport of Supplies and Equipment: External-Transport Procedures.
55-450-10/1 (AFM 76-3)	Air Transport of Supplies and Equipment: Standard Loads in US Air Force C-130E Air Force C-130E Aircraft.
55-450-10/2 (AFM 76-4)	Air Transport of Supplies and Equipment: Standard Loads in Air Force C-141 Aircraft.
55-450-11	Air Transport of Supplies and Equipment: Helicopter External Loads Rigged with Air Delivery Equipment.
55-450-12	Air Transport of Supplies and Equipment: Helicopter External Loads for Sling, Nylon and Chain, Multiple Leg (15,000-lb capacity) FSN 1670-902-3080.
55-450-15	Air Movement of Troops and Equipment (Nontactical).
55-450-19	Air Transport of Supplies and Equipment: Helicopter External Lift Rigging Materiel, Techniques and Procedures.
55-500	Marine Equipment Characteristics and Data.
55-600	Transportation Services at Continental United States (CONUS) Installations.
55-601	Railcar Loading Procedures.
55-603 (AFM 75-5)	Movement of Military Impedimenta by Commercial Carriers.
55-650	Highway Transportability Criteria for the United States.
55-2200-001-12	Transportability Guidance: Application of Blocking, Bracing, and Tiedown Materials for Rail Transportation Open-Top and Closed RailCar Loading Rules.
55-2320-211-15-1	Transportability Guidance: Trucks, 5-Ton, 6x6, M39-Series Chassis.
55-2320-260-15-1	Transportability Guidance: Trucks, 5-Ton, 6x6, M809-Series.

A-7. Air Force Manuals (AFM)

TO 1-IB-40 Handbook of Weight and Balance Data.
 TO 1C-5A-9 Loading Instructions, USAF Series C-5 Aircraft.
 TO 1C-130A-9 Loading Instructions, USAF Series C-130 Aircraft.
 TO 1C-141A-9 Loading Instructions, 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's Office in accordance with AR 310-71.

A-8. Other Publications and Source of Procurement

Code of Federal Regulations(CFR):

Title 46- Shipping, Part 146

Title 49- Transportation, Parts 170-179

Available from: Superintendent of Documents

US Government Printing Office

Washington, D. C. 20402

Association of American Railroads *General 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

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

R. M. Graziano's Water Carrier Tariff No. 28 (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, D. C. 20036

R. M. Graziano's Tariff No. 29 (or reissues thereof) - *Hazardous Materials
Regulations of the Department of Transportation, Including Specifications for
Shipping Containers*

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

American Trucking Association, Inc., Agent

Publication ICC ATA 111-A/FMC. F-1-15 (or reissues thereof) -*Department of
Transportation Regulations Governing Transportation of Hazardous Materials
by Motor, Rail and Water, Including Specifications for Shipping Containers*

Available From: Richard H. Hinchcliff, Issuing Officer
1616 P Street NW
Washington, D. C. 20036

Limits of Motor Vehicles Sizes and Weights- prepared by International Road
Federation, 1023 Washington Building, Washington, D. C. 20005

APPENDIX B

CONVERSION TABLES

B-1. Common Metric Abbreviations

m = meter
 dm = decimeter
 cm = centimeter
 mm = millimeter

kg = kilogram
 km = decimeter
 t = metric ton

B-2. Linear Measure

1 mi = 1,609.35 m	1 km = 0.6214 mi
1 yd = 0.9144 m	1 m = 1.0936 yd
1 ft = 0.3048 m	1 m = 3.2808 ft
1 in. = 0.0254 m	1 m = 39.37 in.
1 m = 10 dm = 100 cm = 1000 mm	

B-3. Surface Measure

1 sq yd = 0.8361 sq m	1 sq m = 1.196 sq yd
1 sq ft = 0.0929 sq m	1 sq m = 10.764 sq ft
1 sq in. = 0.00065 sq m	1 sq m = 1,550 sq in.

B-4. Cubic Measure

1 MTON = 1.1328 cu m	1 cu m = 0.883 MTON
1 cu yd = 0.76455 cu m	1 cu m = 1.31 cu yd
1 cu ft = 0.02832 cu m	1 cu m = 35.91 cu ft
1 cu in. = 0.000016 cu m	1 cu m = 61,023 cu in.

B-5. Weight

1 LTON = 1,016.05 kg	1 lb = 0.45359 kg
1 t = 1,000 kg	1 t = 2,204.63 lb
1 STON = 907.18 kg	1 kg = 2.2046 lb

B-6. Simplified Conversions

The following simplified conversion factors are accurate to within 2 percent for quick computations:

- a. *Inches to Centimeters*—Multiply in. by 10 and divide by 4.
- b. *Yards to Meters*—Multiply yd by 9 and divide by 10.
- c. *Miles to Kilometers*—Multiply mi by 8 and divide by 5.
- d. *Pounds to Kilograms*—Multiply lb by 5 and divide by 11.

Paragraph 7-37, FM 55-15 and paragraph 2-15, TM 55-450-15 contain additional detailed conversion factors.

B-7. Other Conversions

The following conversions are provided for guidance when procuring lumber, wire rope, or wire in areas that use the metric system. Lumber sizes are rounded off to nearest 1/2 cm.

a. Lumber.

2-in. x 4-in. x desired length = 5-cm x 10-cm x desired length
 1-in. x 6-in. x desired length = 2.5-cm x 15-cm x desired length
 6-in. x 8-in. x desired length = 15-cm x 20-cm x desired length
 1-in. x 12-in. x desired length = 2.5-cm x 30-cm x desired length
 (length normally expressed in ft or m).

b. Wire Rope.

3/8-in. diam = 9.5-mm diam

1/2-in. diam = 12.7-mm diam

5/8-in. diam = 15.8-mm diam

3/4-in. diameter = 19.0-mm diam

7/8-in. diam = 22.2-mm diam

1-in. diam = 25.4-mm diam

1-1/4-in. diam = 31.7-mm diam

1-1/2-in. diam = 38.1-mm diam

Round off to next higher whole mm of available wire rope sizes.

c. Wire. No. 8 gauge annealed (11/64-in. diam) = 4.37-mm diam. Round off as in *b* above.

B-8. Remarks

It should be noted that standard abbreviations used on drawings, specifications, and technical documents, in some instances, are not in agreement with AR 310-50. Such abbreviations are governed by MIL-STD 12.

By Order of the Secretary of the Army:

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