
TECHNICAL MANUAL

TRANSPORTABILITY GUIDANCE

TRUCKS, 5-TON, 6x6, M39 SERIES CHASSIS

TRUCK, DUMP: M51, M51A1, M51A2

TRUCK, TRACTOR: M52, M52A1, M52A2

TRUCK, CARGO: M54, M54A1, M54A2, M55, M55A1, M55A2

TRUCK, CARGO, DROPSIDE: M54A1C, M54A2C

TRUCK, WRECKER: M62, M543, M543A1, M543A2

TRUCK, TRACTOR, WRECKER: M246, M246A1, M246A2

TRUCK, STAKE, BRIDGE TRANSPORTING: MOUNTED ON M139 CHASSIS, M328A1

TRUCK, VAN EXPANSIBLE: M291A1, M291A2, M291A1C, M291A2C, M291A1D, M291A2D

TRUCK, BOLSTER: M748A1

CHANGE }
NO. 1 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 18 August 1986

TRANSPORTABILITY GUIDANCE
TRUCKS, 5-TON, 6x6, M39-SERIES CHASSIS
TRUCK, DUMP: M51, M51A1, M51A2
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TRUCK, VAN, EXPANSIBLE: M291A1, M291A2, M291A1C, M291A2C, M291A1D
M291A2D TRUCK, BOLSTER: M748A1

TM 55-2320-211-15-1, 3 November 1975, is changed as follows:

1. New or changed material is indicated by a bar in the margin. Remove old pages and insert new pages as indicated below:

<i>Remove pages</i>		<i>Insert pages</i>	
4-1 through	4-4	4-1 through	4-4
6-1 through	6-5	6-1 through	6-7
7-1 through	7-6	7-1 through	7-5
A-1 through	A-3	1 through	A-2

2. File this change sheet in the front of the publication for reference purposes.

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Chief of Staff

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M291A2D TRUCK, BOLSTER: M748A1

		Paragraph	Page
CHAPTER	1 . INTRODUCTION		
	Purpose and scope	1-1	1-1
	Reporting of recommendations and comments	1-2	1-1
	Safety	1-3	1-1
	Definitions of warnings, cautions, and notes	1-4	1-1
	2. TRANSPORTABILITY DATA		
Section	I. General		
	Scope	2-1	2-1
	Descriptions	2-2	2-1
	II. Characteristics and Related Data		
	General	2-3	2-4
	Side and rear elevation drawings	2-4	2-9
	Reduced configuration	2-5	2-10
	Unusual characteristics	2-6	2-11
	Hazardous and dangerous characteristics	2-7	2-11
	Sensitivity	2-8	2-13
	CONUS freight classification	2-9	2-13
CHAPTER	3. SAFETY		
	General	3-1	3-1
	Specific safety requirements	3-2	3-1
	4. AIR TRANSPORTABILITY GUIDANCE		
Section	I. General		
	Scope	4-1	4-1
	Maximum utilization of aircraft	4-2	4-1
	Safety	4-3	4-1
	Responsibility	4-4	4-1
	II. Transport by US Air Force Aircraft		
	Aircraft capabilities	4-5	4-2
	Typical loads	4-6	4-2
	III. Transport by US Army Aircraft		
	Fixed wing aircraft	4-7	4-2
	Rotary wing aircraft	4-8	4-2
CHAPTER	5 . HIGHWAY AND OFF-ROAD TRANSPORTABILITY GUIDANCE		
Section	I. General		
	Scope	5-1	5-1
	Safety	5-2	5-1
	II. Movement on Own Wheels		
	General	5-3	5-1
	Preparation of trucks	5-4	5-1
	III. Transport by Semitrailer		
	General	5-5	5-1
	Loading on flatbed semitrailers	5-6	5-1

* This manual supersedes TB55-6, 1 May 1963; TM 55-2320-211-10-1, 15 April; TM55 2320-211-10-2, 1 February 1968; TM55-2320-211-10-3, 8 March 1966; TM 55-2320-211-10-4, 24 June 1966; TM 55-2320-211-10-5, 29 August 1968; TM 55-2320-211-20.3, 29 March 1968; TM 55-2510-200-10-1, 1 April 1964.

	Paragraph	Page
CHAPTER 6. MARINE AND TERMINAL TRANSPORTABILITY GUIDANCE		
Scope	6-1	6-1
Safety	6-2	6-1
General rules for stowing	6-3	6-1
Special design vessels	6-4	6-4
7. RAIL TRANSPORTABILITY GUIDANCE		
Section I. General		
Scope	7-1	7-1
Maximum utilization of railcars.	7-2	7-1
II. Transport on CONUS Railways		
General	7-3	7-1
Preparation of vehicles	7-4	7-1
Loading trucks on general-purpose flatcars	7-5	7-1
Loading trucks on special-purpose flatcars	7-6	7-1
III. Transport on Foreign Railways		
General	7-7	7-4
Transport on US Army-owned foreign service flatcars	7-8	7-4
APPENDIX A. REFERENCES		A-1
B. CONVERSION TABLES.		B-1

LIST OF ILLUSTRATIONS

Figure No.	Title	Page
2-1	Truck, dump, 5-ton, 6x6, M51	2-1
2-2	Truck, tractor, 5-ton, 6x6, M52	2-2
2-3	Truck, cargo, 5-ton, 6x6, M54	2-2
2-4	Truck, cargo, 5-ton, 6x6, M55	2-3
2-5	Truck, wrecker, 5-ton, 6x6, M62	2-3
2-6	Truck, wrecker, 5-ton, 6x6, M543	2-4
2-7	Truck, tractor, wrecker, 5-ton, 6x6, M246	2-4
2-8	Truck, stake, bridge transporting, 5-ton, 6x6, mounted on M139 chassis	2-5
2-9	Truck, van, expansible, 5-ton, 6x6, M291A2	2-5
2-10	Truck, bolster, 5-ton, 6x6, M748A1	2-6
2-11	Side elevation, truck, dump, WWN and WOWN, M51	2-9
2-12	Rear elevation, truck, dump, M51.	2-10
2-13	Side elevation, truck, tractor, WWN and WOWN, M52	2-11
2-14	Rear elevation, truck, tractor, M52	2-12
2-15	Side elevation, truck, cargo, WWN and WOWN, M54	2-13
2-16	Rear elevation, truck, cargo, M54.	2-14
2-17	Side elevation, truck, cargo, dropside, WWN and WOWN, M54A2C.	2-15
2-18	Rear elevation, truck, cargo, dropside, M54A2C	2-16
2-19	Side elevation, truck, cargo, WWN and WOWN, M55	2-17
2-20	Rear elevation, truck, cargo, M55	2-18
2-21	Side elevation, truck, wrecker, WWN, M543	2-19
2-22	Rear elevation, truck, wrecker, M543	2-20
2-23	Side elevation, truck, tractor, wrecker, WWN, M246.	2-21
2-24	Rear elevation, truck, tractor, wrecker, M246	2-22
2-25	Side elevation, truck, stake, bridge transporting, WWN, mounted on M139 chassis	2-23
2-26	Rear elevation, truck, stake, bridge transporting mounted on M139 chassis	2-24
2-27	Side elevation, truck, van, expansible, M291A2	2-24
2-28	Rear elevation, truck, van, expansible, M291A2	2-25
2-29	Side elevation, truck, bolster, WWN, M748A1	2-26
2-30	Rear elevation, truck, bolster, M748A1	2-27
4-1	Tiedown diagram for M51 in C-130 aircraft	4-2
4-2	Tiedown diagram for M55 in C-141 aircraft	4-3
4-3	Tiedown diagram for M543 in C-5 aircraft	4-4
5-1	Blocking and tiedown of M54 truck on semitrailer, 12-ton, M127A1C	5-2
5-2	Rear view of blocking and tiedown of M54 truck on semitrailer, 12-ton, M127A1C	5-3
5-3	Blocking and tiedown details	5-4
5-4	Tracking diagram for semitrailer, 12-ton, M127A1C, towed by truck, tractor, M52	5-5
5-5	Blocking and tiedown of M55 truck on semitrailer, 12-ton, M270A1	5-5
5-6	Tracking diagram for semitrailer, 12-ton, M270A1, towed by truck, tractor, M52	5-6

Figure No.	Title	Page
6-1	Lifting diagram for M51 using eight-wire sling and two spreader bars.	6-2
6-2	Lifting diagram for M543 using eight-wire sling and two spreader bars.	6-3
6-3	Lifting diagram for M52 using six-wire sling and one spreader bar	6-4
6-4	Lifting diagram for M291A2 using eight-wire sling and two spreader bars	6-5
6-5	Typical blocking and tiedown of 5-ton, 6x6 truck in general cargo vessel	6-5
7-1	Blocking and tiedown diagram of a typical 5-ton, 6x6 truck on CONUS general-purpose flatcar	7-2
7-2	Blocking and tie down details	7-5
7-3	Securing 5-ton, 6x6 trucks on a flatcar equipped with center tiedown rails	7-6

LIST OF TABLES

	Title	Page
2-1	Characteristics and Related Data.	2-7
2-2	Reducible Items of M39-Series Trucks.	2-11
4-1	Tiedown Data for M51 in C-130 Aircraft	4-2
4-2	Tiedown Data for M55 in C-141 Aircraft	4-3
4-3	Tiedown Data for M543 in C-5 Aircraft	4-4
5-1	Bill of Materials for Blocking and Tiedown of M54 Truck on Semitrailer, 12-Ton, M127A1C	5-1
5-2	Application of Materials for Blocking and Tiedown of M54 Truck on Semitrailer, 12-Ton, M127A1C	5-2
5-3	Bill of Materials for Blocking and Tiedown of M55 Truck on Semitrailer, 12-Ton, M270A1	5-3
5-4	Application of Materials for Blocking and Tiedown of M55 Truck on Semitrailer, 12-Ton, M270A1	5-3
6-1	Bill of Materials for Blocking and Tiedown of Typical 5-Ton, 6x6 Truck in Hold of General-Cargo Vessel	6-2
6-2	Application of Materials for Blocking and Tiedown of Typical 5-Ton 6x6 Truck in Hold of General Cargo Vessel	6-3
7-1	Bill of Materials for Blocking and Tiedown of Typical 5-Ton, 6x6 Truck on CONUS General-Purpose Flatcars	7-2
7-2	Application of Materials for Blocking and Tiedown of Typical 5-Ton, 6x6 Truck on CONUS General-Purpose Flatcar	7-2
7-3	Application of Chain Tiedown for Securing 5-Ton, 6x6 Trucks on Flatcars Equipped With Center Tiedown Rails	7-3
7-4	Quantity of M39-Series Trucks That Can Be Loaded on Railroad Cars With Center Tiedown Rails	7-3
7-5	Characteristics of US Army-Owned European Flatcars Available for Transporting Vehicles	7-4

CHAPTER 1

INTRODUCTION

1-1. Purpose and Scope

a. This manual provides transportability guidance for logistical handling and movement of the M39-series trucks, 5-ton, 6x6.

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. Conversion tables are contained in appendix B. References are contained in appendix A.

1-2. Reporting of Recommendations and Comments

The reporting of errors, omissions, and recommendations for improving this manual by the individual user 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, ATTN: MTT-TRP, PO Box 6276, Newport News, VA 23606.

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 M39-series 5-ton trucks, identification photographs, tabulated transportability characteristics, and data that are necessary for movement of the vehicles.

2-2. Descriptions

The trucks, 5-ton, 6x6, covered in this manual are of various wheel bases and body styles; all have a tandem rear axle, dual rear tires, and are powered by gasoline, diesel, or multifuel engines. The vehicles are designed for use over all types of roads, highways, and cross-country terrain, in all types of weather. For detailed description and operating instructions refer to TM 9-2320-211-10 and TM 9-2320-211-20. A brief description, together with an identification photograph, of the various chassis and body types follows:

a. Truck, Dump, M51 (fig 2-1). The M51 truck has a 167-inch wheel base with a 5-cubic-yard-capacity dump body and twin-cylinder hoist assembly. The M51A1 and the M51A2 trucks are identical except for different types of engines.

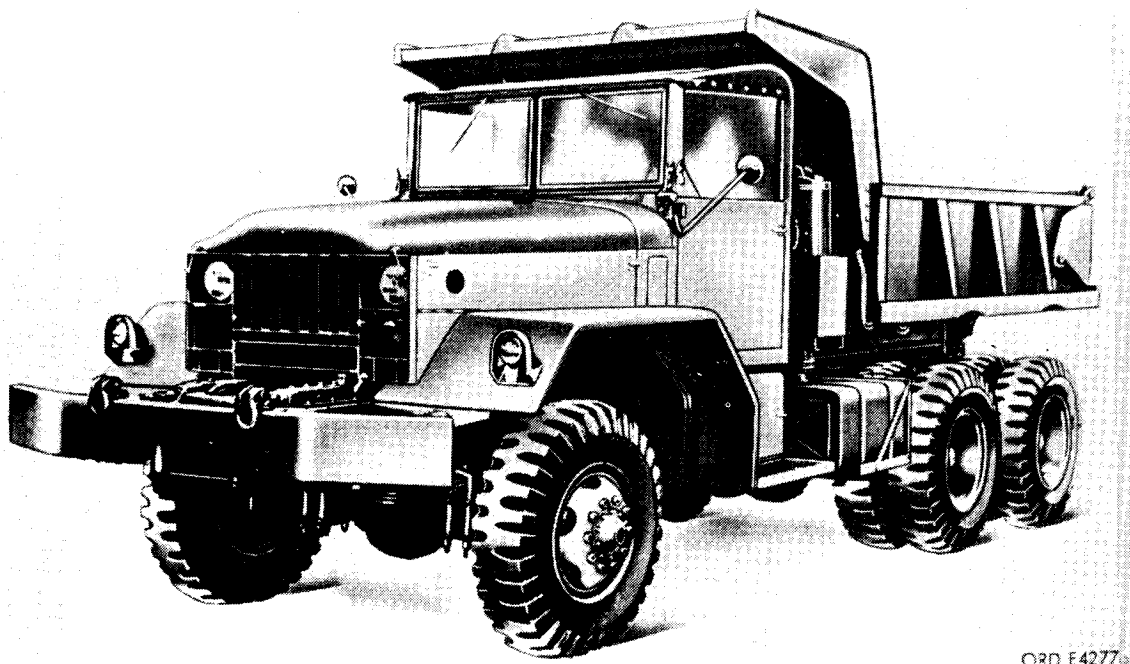
b. Truck, Tractor, M52 (fig 2-2). The M52 truck has a 167-inch wheel base designed to haul various trailers. The M52A1 and the M52A2 trucks are identical except for different types of engines.

c. Truck, Cargo, M54 (fig 2-3). The M54 truck has a 179-inch wheel base with a 14-foot flatbed cargo body designed for use as a general-purpose cargo and troop carrier. The M54A1 and the M54A2 trucks are identical except for different types of engines.

d. Truck, Cargo, Drop side, M54A1C and M54A2C. These trucks are identical to the M54 except for the dropside feature that permits side loading from each side, and both models are also equipped with different types of engines.

e. Truck, Cargo, M55 (fig 2-4). The M55 truck has a 215-inch wheel base with a 20-foot flatbed cargo box. The M55A1 and the M55A2 trucks are identical except for different types of engines.

f. Truck, Wrecker, M62 (fig 2-5). The M62 truck has a 179-inch wheel base, with a 20,000-pound-capacity hydraulically operated crane and a 10- to 18-foot boom. This vehicle differs from



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Figure 2-1. Truck, dump, 5-ton, 6x6, M51.

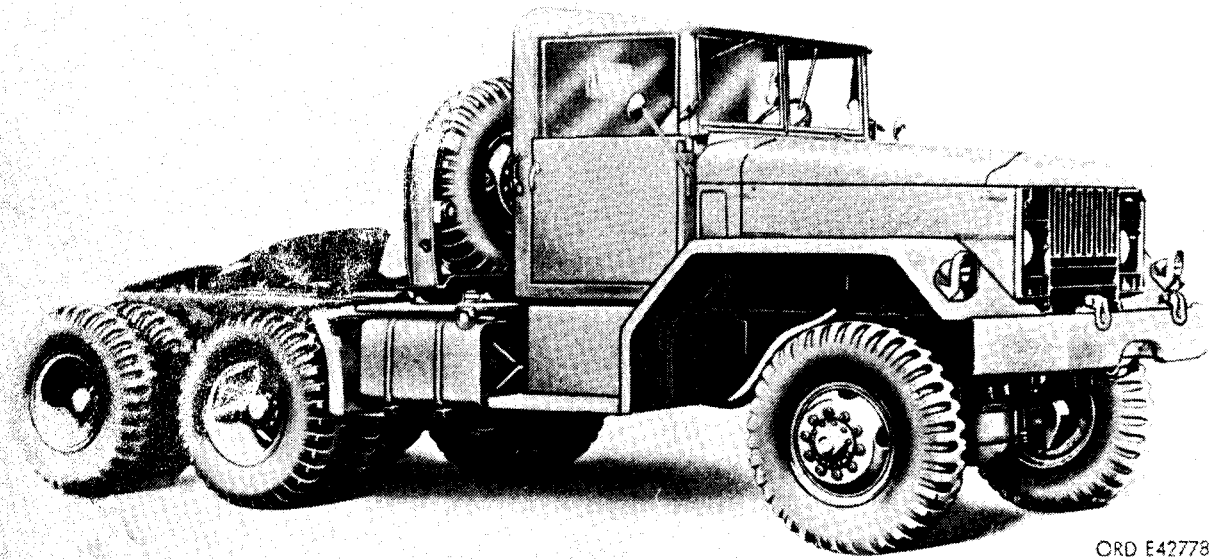


Figure 2-2. Truck, tractor, 5-ton, 6x6, M52.

the M543 only in respect to design variations in wrecker crane equipment.

g. Truck, Wrecker, M543 (fig 2-6). The M543 truck has a 179-inch wheel base and differs from the M62 only in respect to design variations in wrecker crane equipment. The M543A1 and the M543A2 trucks are identical except for different, types of engines.

h. Truck, Tractor, Wrecker, M246 (fig 2-7). The M246 truck has a 216.5-inch wheel base, with a 20,000-pound-capacity hydraulically operated crane and a 11.5- to 26-foot boom. The M246A1

and the M246A2 trucks are identical except for different types of engines.

i. Truck, Stake, Bridge Transporting, Mounted on M139 Chassis (fig 2-8). This truck has a 215-inch wheel base with a specifically designed stake body for transporting bridge-building equipment.

j. Truck, Stake, Bridge Transporting, M328A1. The M328A1 truck has a 215-inch wheel base and is similar to the truck, stake, bridge transporting, mounted on M139 chassis.

k. Truck, Van, Expansible, M291A2 (fig 2-9).

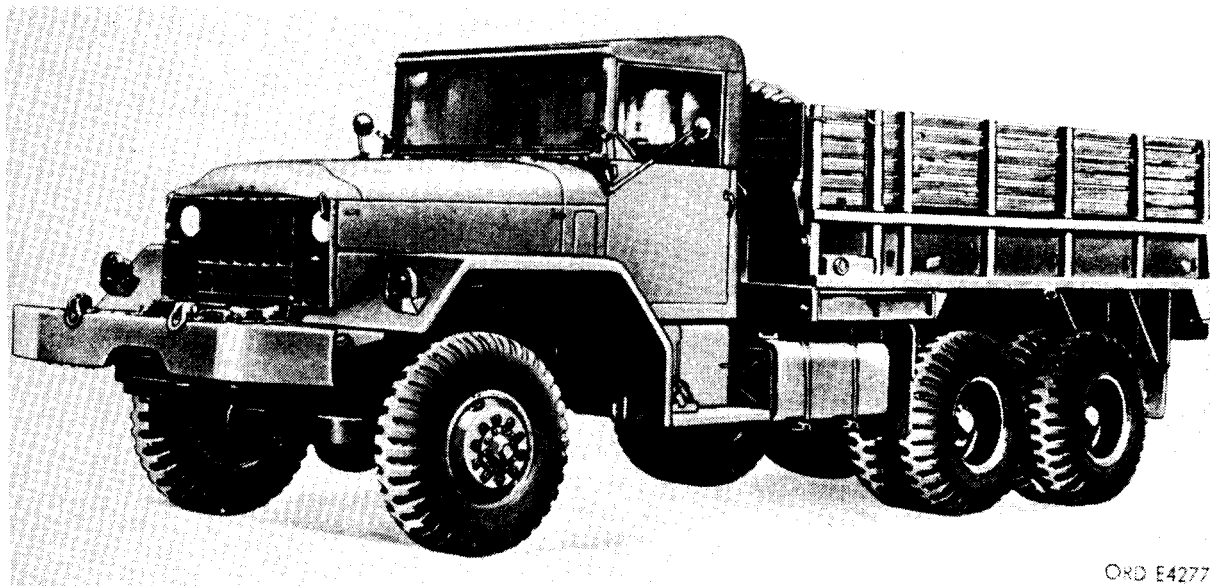


Figure 2-3. Truck, cargo, 5-ton, 6x6, M54.

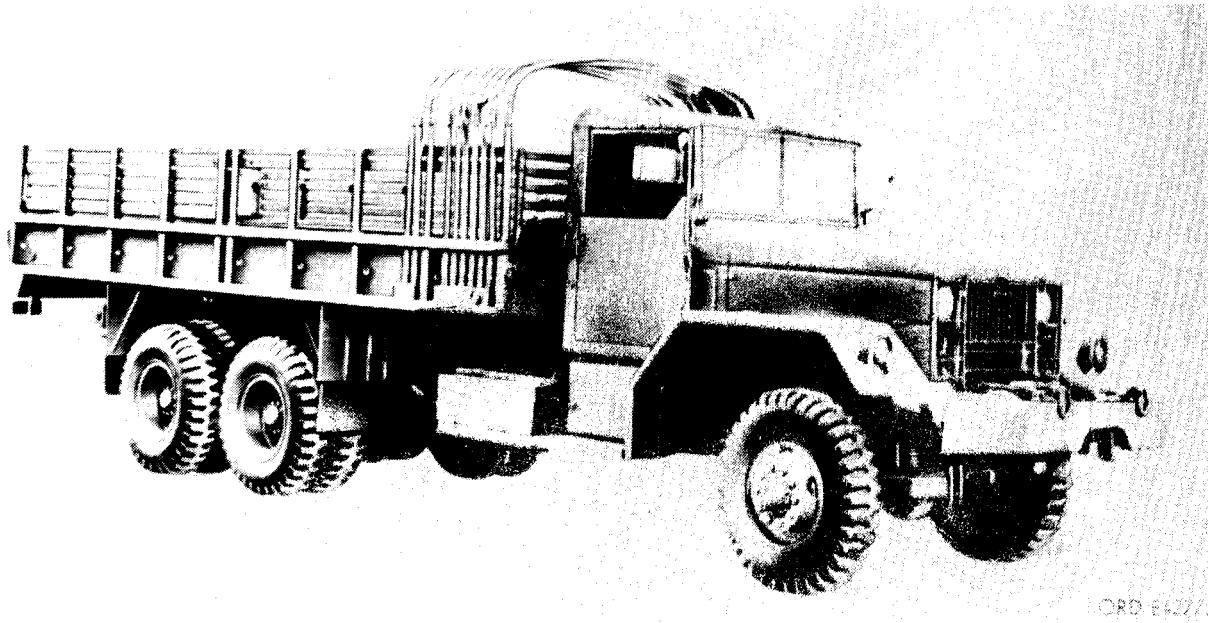


Figure 2-4. Truck, cargo, 5-ton, 6x6, M55.

The M291A2 truck has a 215-inch wheel base and is basically the same as the other models within the M291 series. The M291A1C and M291A2C van bodies are equipped without windows and contain tactical imagery-interpretation equipment; the M291A1D and M291A2D models are equipped with a power lift gate mounted on the

rear.

1. Truck, Bolster, M748A1 (fig 2-10). The M748A1 truck has a 179-inch wheel base and is normally used in conjunction with the P14 bolster trailer for transporting utility poles, bridging sections, and so forth.

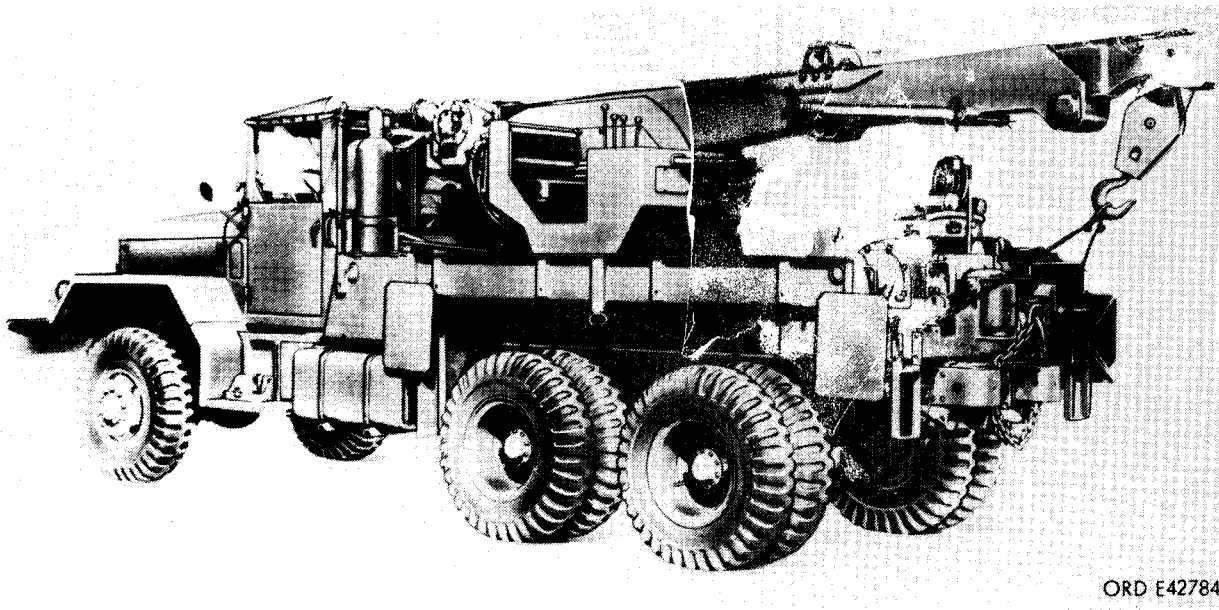
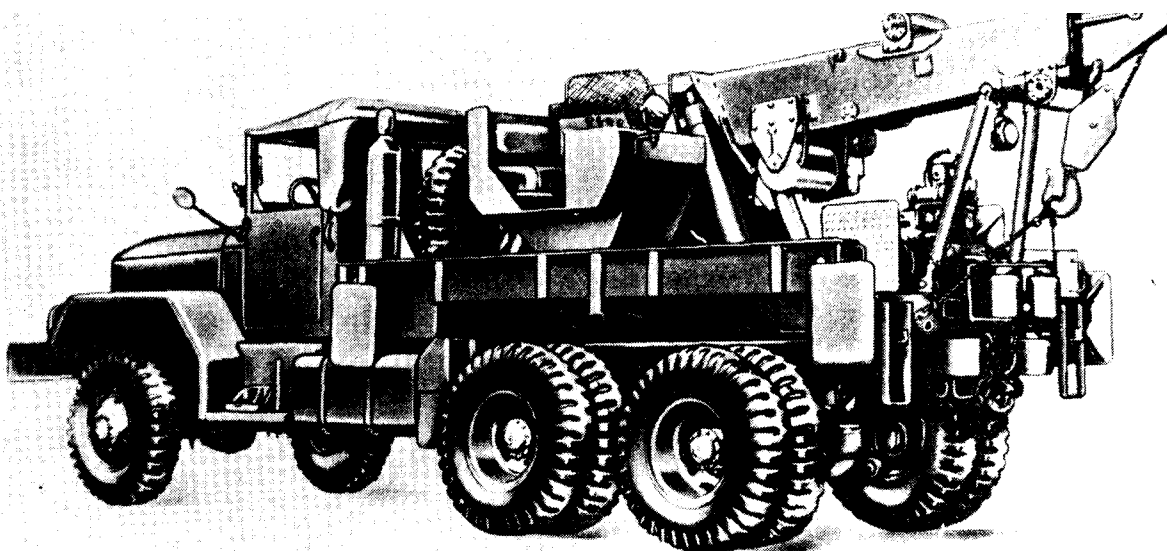


Figure 2-5. Truck, wrecker, 5-ton, 6x6, M62.



ORD E42786

Figure 2-6. Truck, wrecker, 5-ton, 6x6, M543.

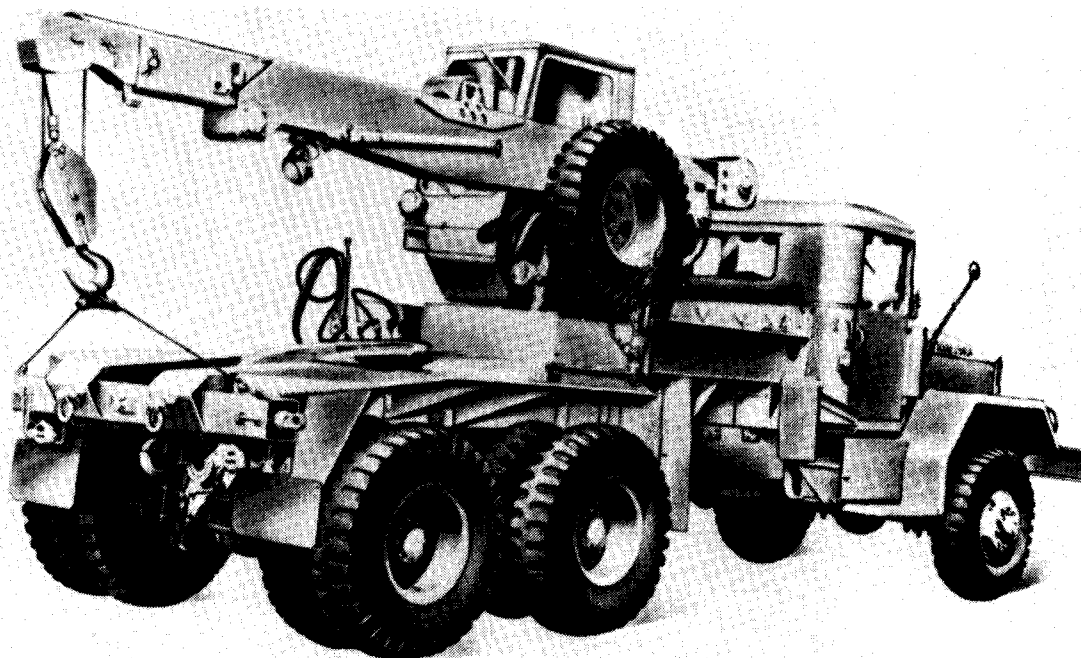


Figure 2-7. Truck, tractor, wrecker, 5-ton, 6x6, M246.

Section II. CHARACTERISTICS AND RELATED DATA

2-3. General

Table 2-1 provides an overview of truck 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 trucks as related to the guidance shown in this manual. Data are based on empty trucks unless otherwise noted.

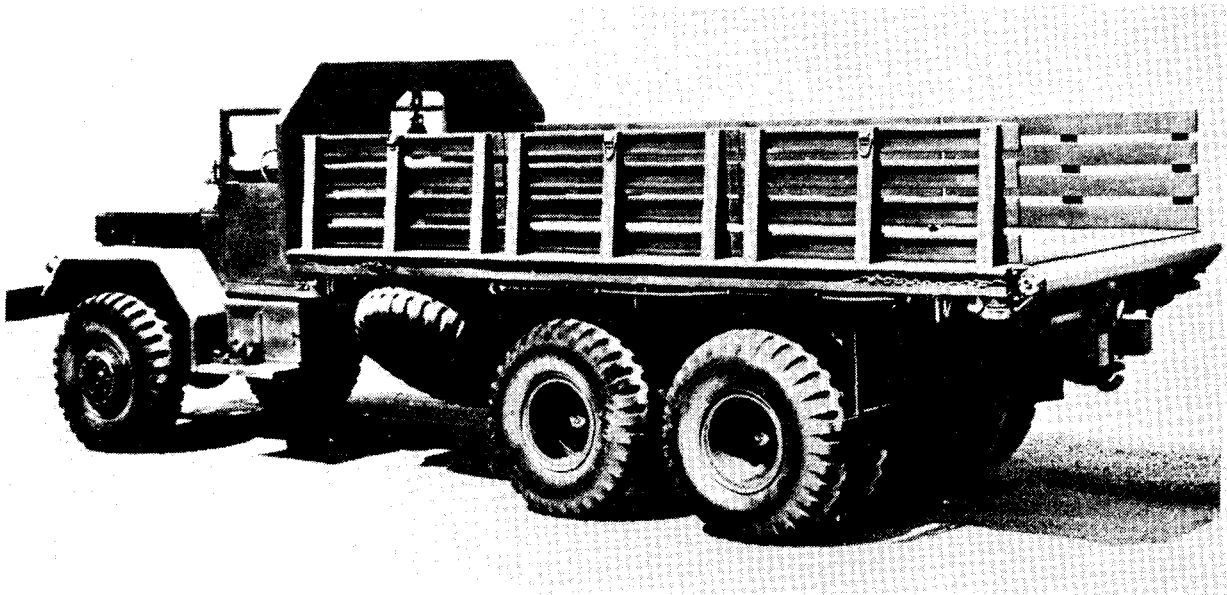


Figure 2-8. Truck, stake bed transporting, 5-ton, 6x6, mounted on M139 chassis.



Figure 2-9. Truck, van, expansible, 5-ton, 6x6, M291A2.



Figure 2-10. Truck, bolster, 5-ton, 6x6, M748A1.

Table 2-1. Characteristics and Related Data

						Table 2-1. Characteristics and Related Data									
Nomenclature (5-Ton, 6x6)		TOE LIN	NSN (2320—00—)	Weight lb (kg)		Volume, cu ft (cu m)				Reduced dimensions, in (m)					
						operational		reduced		length		width		height	
Truck, cargo															
M54 *	WWN	X40968	835-8335	20,619	(9,353)	2,332.3	(66.0)	1,520.1	(43.0)	313.5	(7.96)	98.0	(2.49)	85.5	(2.17)
	WOWN	X40831	835-8348	19,905	(9,029)	2,209.5	(62.5)	1,440.1	(40.8)	297.0	(7.54)	98.0	(2.49)	85.5	(2.17)
M54A1	WWN	X40968	086-7482	20,696	(9,388)	2,332.3	(66.0)	1,520.1	(43.0)	313.5	(7.96)	98.0	(2.49)	85.5	(2.17)
	WOWN	X40831	086-7481	19,882	(9,018)	2,209.5	(62.5)	1,440.1	(40.8)	297.0	(7.54)	98.0	(2.49)	85.5	(2.17)
M54A2	WWN	X40968	055-9265	20,782	(9,427)	2,332.3	(66.0)	1,520.1	(43.0)	313.5	(7.96)	98.0	(2.49)	85.5	(2.17)
	WOWN	X40831	055-9266	20,068	(9,103)	2,209.5	(62.5)	1,440.1	(40.8)	297.0	(7.54)	98.0	(2.49)	85.5	(2.17)
Truck, cargo, dropside.															
M54A1C	WWN	X40931	880-4612	20,912	(9,486)	2,319.8	(65.7)	1,532.8	(43.4)	314.5	(7.99)	98.5	(2.50)	85.5	(2.17)
	WOWN	X40794	880-4614	20,179	(9,153)	2,196.6	(62.2)	1,451.4	(41.1)	297.8	(7.56)	98.5	(2.50)	85.5	(2.17)
M54A2C *	WWN	X40931	926-0874	20,660	(9,371)	2,319.8	(65.7)	1,532.8	(43.4)	314.5	(7.99)	98.5	(2.50)	85.5	(2.17)
	WOWN	X40794	761-2854	19,946	(9,048)	2,196.6	(62.2)	1,451.4	(41.1)	297.8	(7.56)	98.5	(2.50)	85.5	(2.17)
Truck, cargo															
M55 *	WWN	X41242	391-0570	23,465	(10,644)	2,911.2	(82.4)	1,881.8	(53.3)	389.0	(9.88)	98.0	(2.49)	85.3	(2.17)
	WOWN	X41105	200-1878	22,751	(10,320)	2,814.6	(79.7)	1,819.4	(51.5)	376.1	(9.55)	98.0	(2.49)	85.3	(2.17)
M55A1	WWN	X41242	880-4634	23,347	(10,590)	2,955.6	(83.6)	1,881.8	(53.3)	389.0	(9.88)	98.0	(2.49)	85.3	(2.17)
	WOWN	X41105	880-4635	22,633	(10,266)	2,857.5	(80.9)	1,819.4	(51.5)	376.1	(9.55)	98.0	(2.49)	85.3	(2.17)
M55A2	WWN	X41242	055-9259	23,347	(10,590)	2,955.6	(83.6)	1,881.8	(53.3)	389.0	(9.88)	98.0	(2.49)	85.3	(2.17)
	WOWN	X41105	073-8476	22,633	(10,266)	2,857.5	(80.9)	1,819.4	(51.5)	376.1	(9.55)	98.0	(2.49)	85.3	(2.17)
Truck, dump															
M51*	WWN	X43845	835-8337	22,760	(10,324)	2,323.2	(65.7)	1,414.8	(40.0)	281.5	(7.15)	97.8	(2.48)	86.0	(2.18)
	WOWN	X43708	835-8336	22,046	(10,000)	2,195.2	(62.1)	1,336.9	(37.8)	266.0	(6.76)	97.8	(2.48)	86.0	(2.18)
M51A1	WWN	X43845	045-7132	22,860	(10,369)	2,323.2	(65.7)	1,414.8	(40.0)	281.5	(7.15)	97.8	(2.48)	86.0	(2.18)
	WOWN	X43708	045-7131	22,146	(10,045)	2,195.2	(62.1)	1,336.9	(37.8)	266.0	(6.76)	97.8	(2.48)	86.0	(2.18)
M51A2	WWN	X43845	055-9263	22,958	(10,414)	2,323.2	(65.7)	1,414.8	(40.0)	281.5	(7.15)	97.8	(2.48)	86.0	(2.18)
	WOWN	X43708	055-9262	22,244	(10,090)	2,195.2	(62.1)	1,336.9	(37.8)	266.0	(6.76)	97.8	(2.48)	86.0	(2.18)
Truck, tractor															
M52*	WWN	X59463	835-8329	18,865	(8,557)	1,721.6	(48.7)	1,324.7	(37.5)	273.0	(6.93)	98.3	(2.50)	85.3	(2.17)
	WOWN	X59326	835-8326	17,948	(8,141)	1,636.8	(46.3)	1,253.4	(35.5)	258.3	(6.56)	98.3	(2.50)	85.3	(2.17)
M52A1	WWN	X59463	086-7480	19,130	(8,677)	2,052.1	(58.1)	1,324.7	(37.5)	273.0	(6.93)	98.3	(2.50)	85.3	(2.17)
	WOWN	X59326	086-7479	18,560	(8,419)	1,941.6	(54.9)	1,253.4	(35.5)	258.3	(6.56)	98.3	(2.50)	85.3	(2.17)
M52A2	WWN	X59463	055-9261	18,430	(8,360)	2,167.1	(61.3)	1,334.0	(37.8)	273.0	(6.93)	98.3	(2.50)	85.9	(2.18)
	WOWN	X59326	055-9260	17,960	(8,147)	2,050.4	(58.0)	1,262.2	(35.7)	258.3	(6.56)	98.3	(2.50)	85.9	(2.18)

*Identifies trucks illustrated in figures 2-11 through 2-30.

Table 2-1. Characteristics and Related Data—Continued

Nomenclature (5-Ton, 6x6)		TOE LIN	NSN (2320—00—)	Weight lb (kg)		Volume, cu ft (cu m)				Reduced dimensions, in (m)				
						operational		reduced		length		width		height
Truck, tractor, wrecker														
M246	WWN	X60696	835-8639	32,745	(14,853)	2,898.5	(82.0)	2,291.5	(64.8)	353.5	(8.98)	98.0	(2.49)	114.3 (2.90)
M246A1	WWN	X60696	695-9375	32,745	(14,853)	2,898.5	(82.0)	2,291.5	(64.8)	353.5	(8.98)	98.0	(2.49)	114.3 (2.90)
M246A2	WWN	X60696	073-8251	32,990	(14,964)	2,898.5	(82.0)	2,291.5	(64.8)	353.5	(8.98)	98.0	(2.49)	114.3 (2.90)
Truck, wrecker														
M62	WWN	X63299	835-8325	32,270	(14,638)	2,631.8	(74.5)	2,067.2	(58.5)	348.4	(8.85)	98.3	(2.50)	104.3 (2.65)
M543 *	WWN	X63299	445-0866	34,478	(15,639)	2,486.0	(70.4)	2,076.3	(58.8)	349.0	(8.86)	98.0	(2.49)	104.9 (2.66)
M543A1	WWN	X63299	880-4618	34,178	(15,503)	2,486.0	(70.4)	2,076.3	(58.8)	349.0	(8.86)	98.0	(2.49)	104.9 (2.66)
M543A2	WWN	X63299	055-9258	33,998	(15,421)	2,486.0	(70.4)	2,076.3	(58.8)	349.0	(8.86)	98.0	(2.49)	104.9 (2.66)
Truck bolster														
M748A1 *	WWN	X39187	880-4615	19,180	(8,700)	2,442.6	(69.1)	2,116.5	(59.9)	311.0	(7.90)	98.0	(2.49)	120.0 (3.05)
Truck, stake, bridge transporting Mounted on M139 Chassis *														
M328A1	WWN	X56586	200-1682	27,542	(12,493)	2,938.5	(83.2)	2,859.3	(80.9)	372.3	(9.46)	115.1	(2.92)	115.3 (2.93)**
	WWN	X56586	880-4652	26,791	(12,152)	2,938.5	(83.2)	2,859.3	(80.9)	372.3	(9.46)	115.1	(2.92)	115.3 (2.93)
Truck, van, expansible														
M291A1	WOWN	X62237	880-4642	26,736	(12,127)	3,278.6	(92.8)	2,793.2	(79.0)	353.8	(8.99)	99.0	(2.51)	137.8 (3.50)
M291A2 *	WOWN	X62237	907-0706	26,270	(11,916)	3,278.6	(92.8)	2,793.2	(79.0)	353.8	(8.99)	99.0	(2.51)	137.8 (3.50)
M291A1C	WOWN	-	880-4646	25,060	(11,367)	2,928.3	(82.9)	2,722.7	(77.1)	353.0	(8.97)	98.0	(2.49)	136.0 (3.45)
M291A2C	WOWN	-	907-0707	25,060	(11,367)	2,928.3	(82.9)	2,722.7	(77.1)	353.0	(8.97)	98.0	(2.49)	136.0 (3.45)
M291A1D	WOWN	X62271	880-4647	28,355	(12,862)	3,213.3	(90.9)	2,804.2	(79.4)	364.1	(9.25)	98.0	(2.49)	135.8 (3.45)
M291A2D	WOWN	X62271	907-0708	27,850	(12,633)	3,213.3	(90.9)	2,804.2	(79.4)	364.1	(9.25)	98.0	(2.49)	135.8 (3.45)

* Identifies trucks illustrated in figures 2-11 through 2-30.

**Reducible in accordance with TB ENG 330.

2-4. Side and Rear Elevation Drawings

This section provides drawings (fig. 2-11 through 2-30) that are 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 M39-series 5-ton trucks.

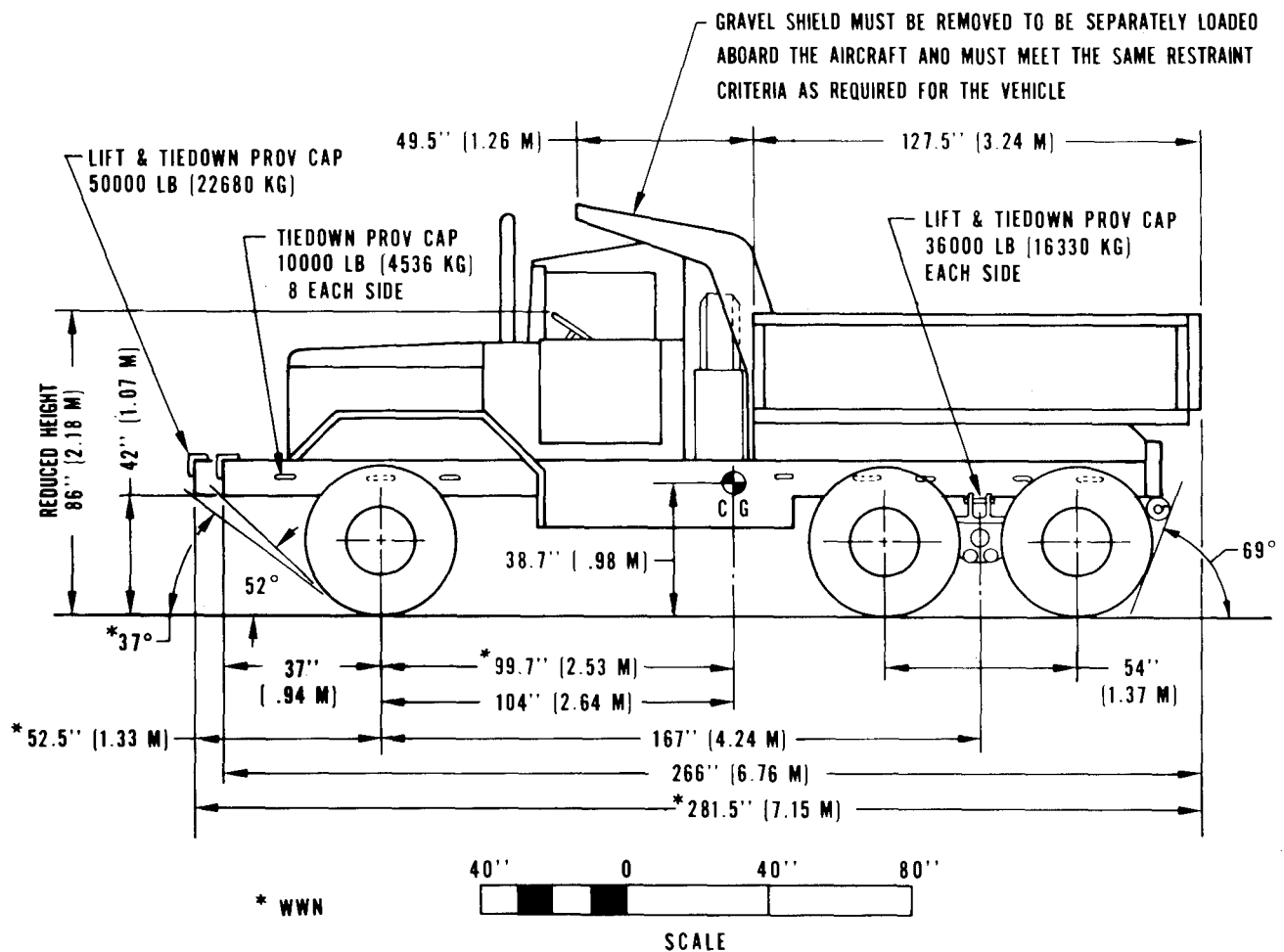


Figure 2-11. Side elevation, truck, dump, WVN and WOWN, M51.

2-5. Reduced Configuration

Transportation economies can be obtained by reducing each vehicle to its minimum dimensions for transport. Removable items such as bows, tarpaulins, and exhaust pipe extensions should be stowed within the confines of the vehicle cargo compartment. Cargo transported in the vehicle

should not exceed the minimum dimensions or weight limitation of the vehicle. Table 2-2 shows items (marked X) which are removable or can be folded in order to reduce the vehicle dimensions so that minimum shipping volume can be obtained. Summary of reduced dimensions for length, width, and height are shown in table 2-1.

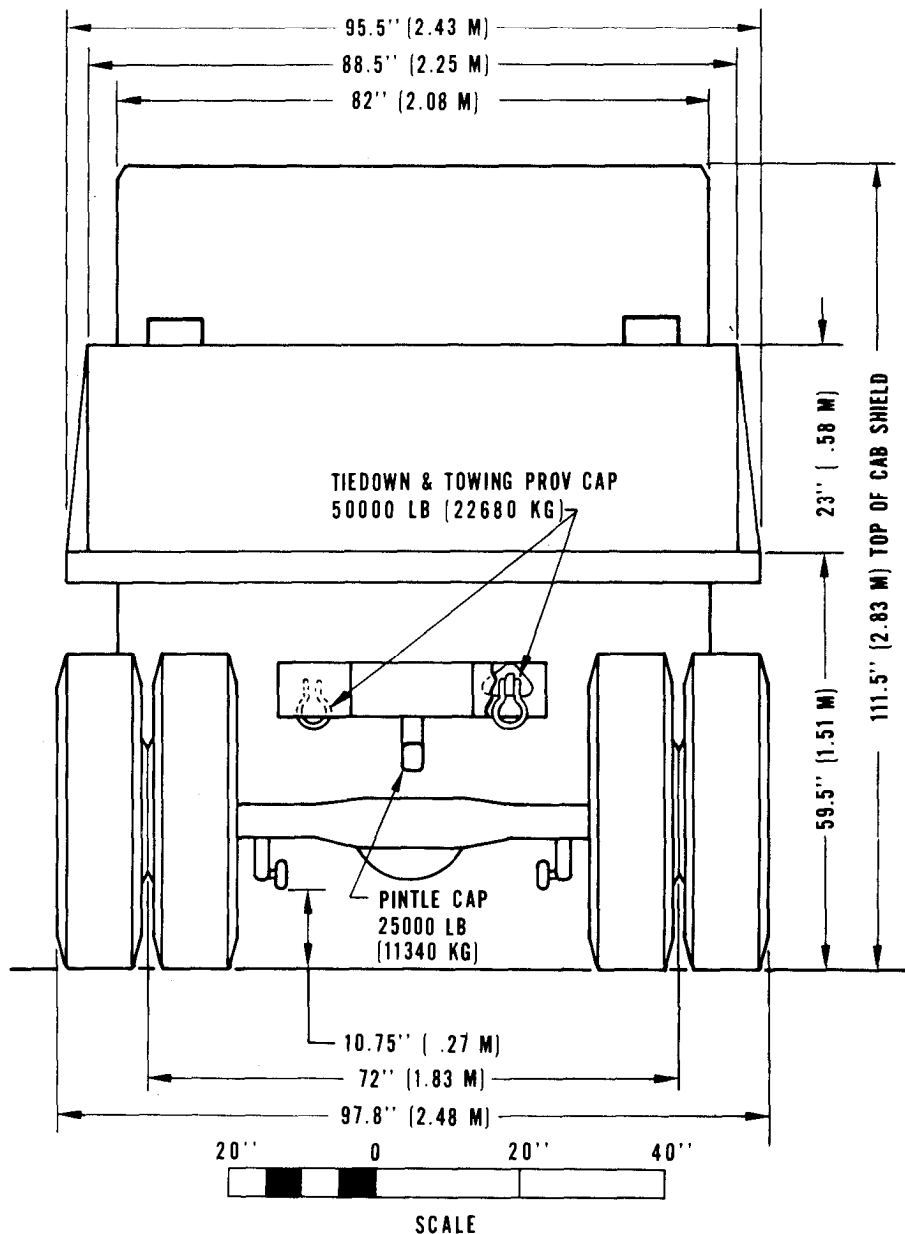


Figure 2-12. Rear elevation, truck, dump, M51.

Table 2-2. Reducible Items of M39-series Trucks-Continued

Model*	M51	M52	M54	M55	M62	M246	Bridge transporting on M139 chassis**	M543
Shipper braces	X	X	X
Boom roller	X	X	X
Operator's cab	X		
Boom at min height	X	X	X

*Applicable to all models within the model number series.

****Major sectionalization is necessary to achieve reduced height configuration. Height reduction may be accomplished by either removing the truck body from the chassis, or by**

removing the steel bulkhead behind the truck cab and removing the truck body stakes. The latter method requires compliance with TB ENG 330 (app A).

NOTE:

TAIL PIPE EXTENSION M52A2 ONLY

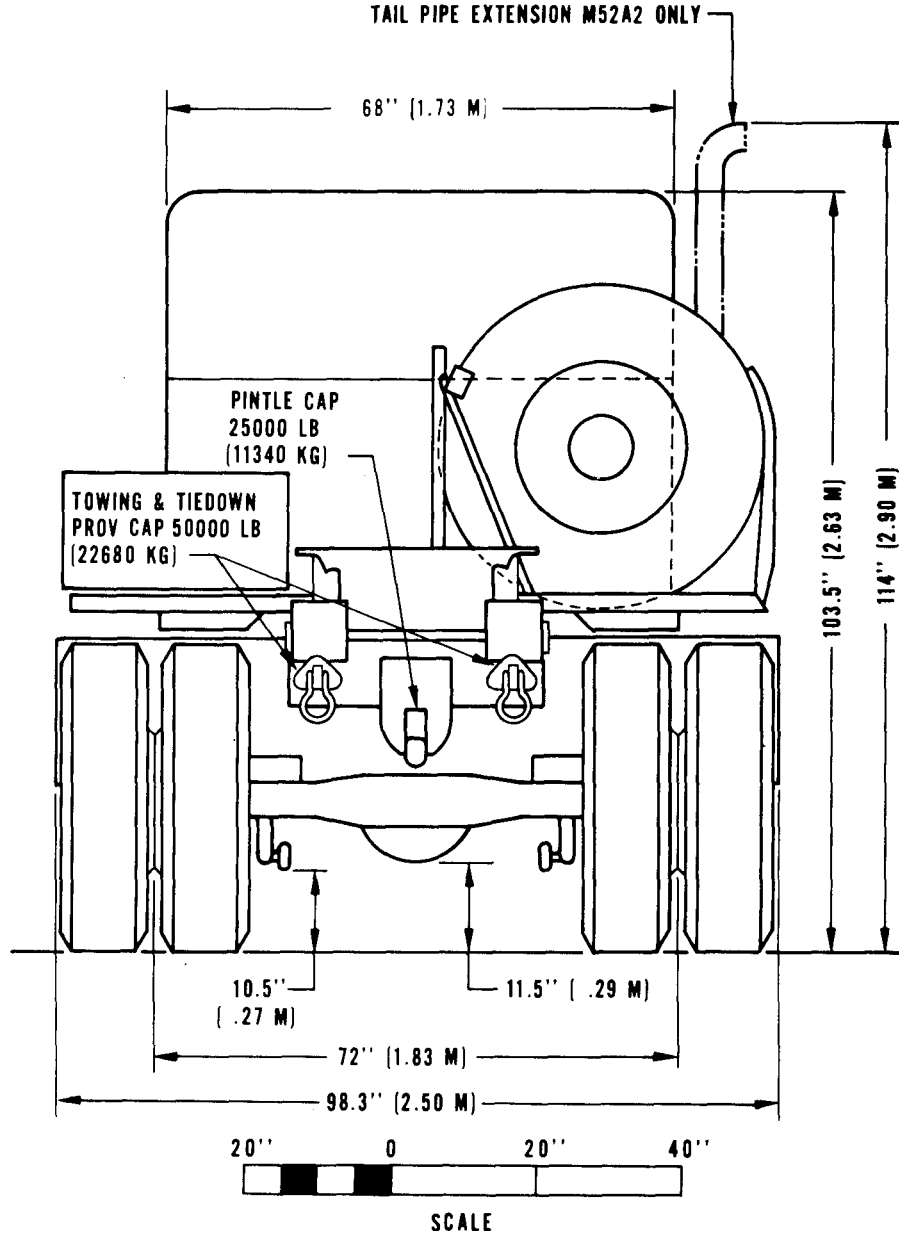


Figure 2-14. Rear elevation, truck, tractor, M52.

2-8. Sensitivity

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

2-9. CONUS Freight Classification

Rail and motor freight classification descriptions and item numbers will be determined in accordance with chapter 211 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.

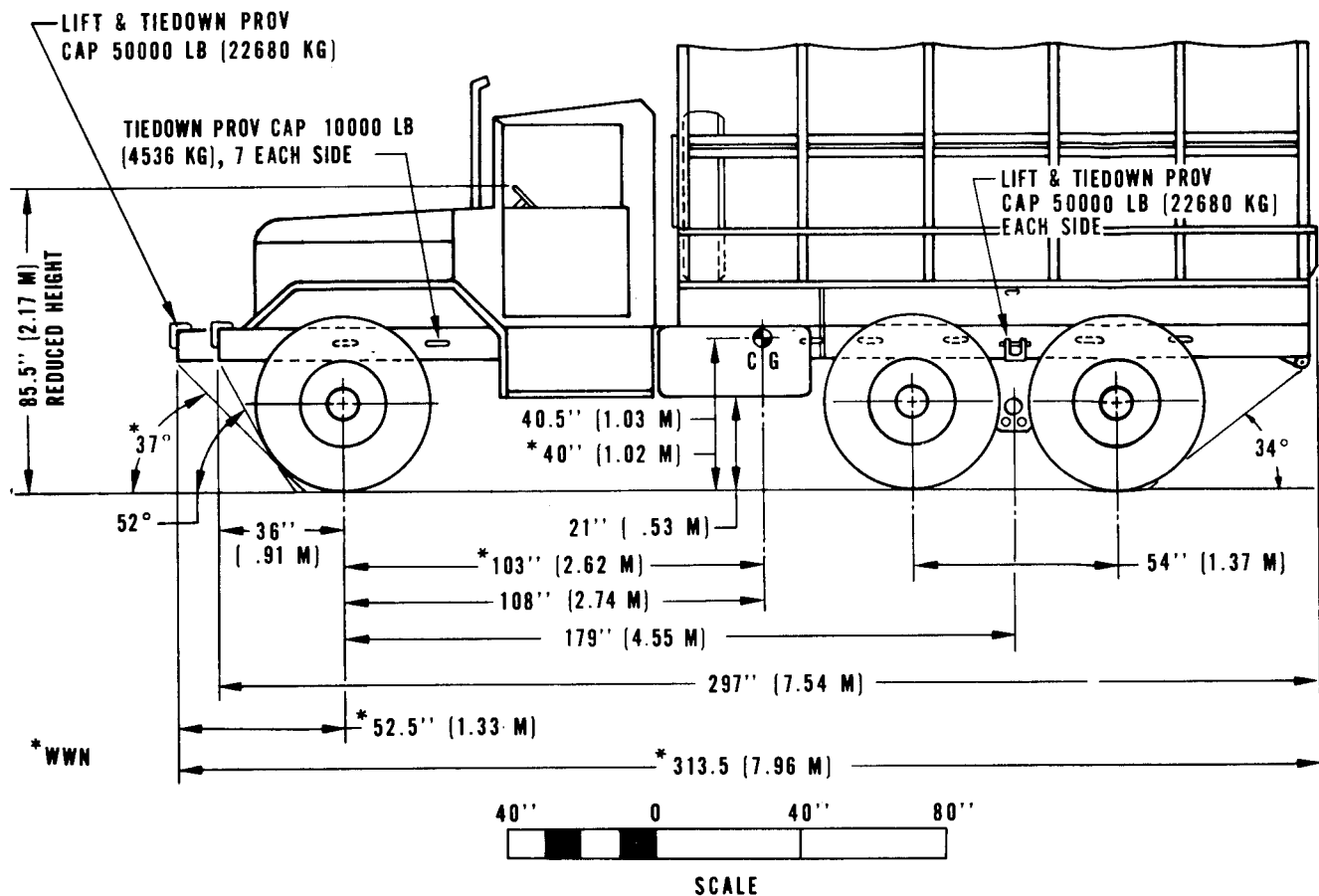


Figure 2-15. Side elevation, truck, cargo, WWN and WOWN, M54.

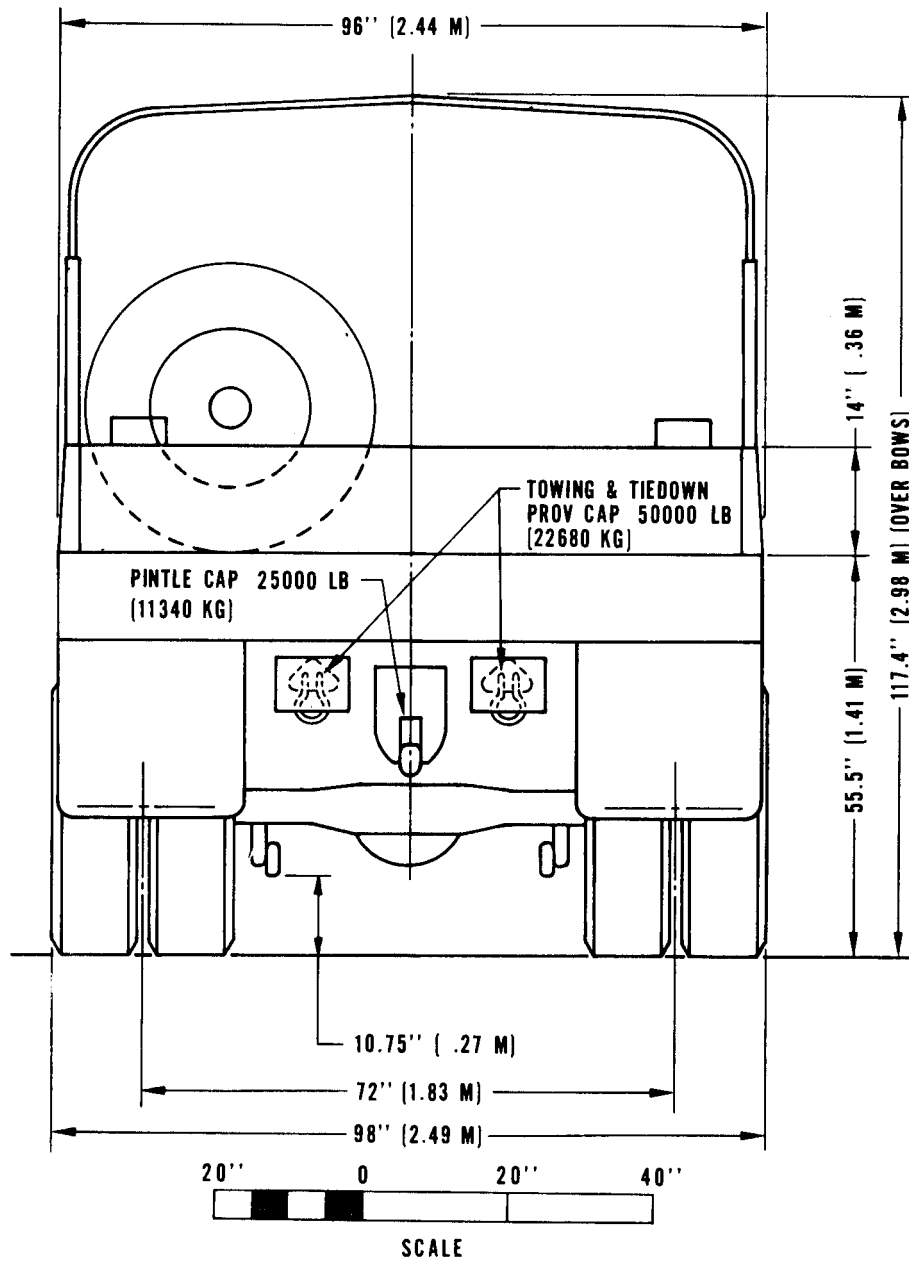


Figure 2-16. Rear elevation, truck, cargo, M54.

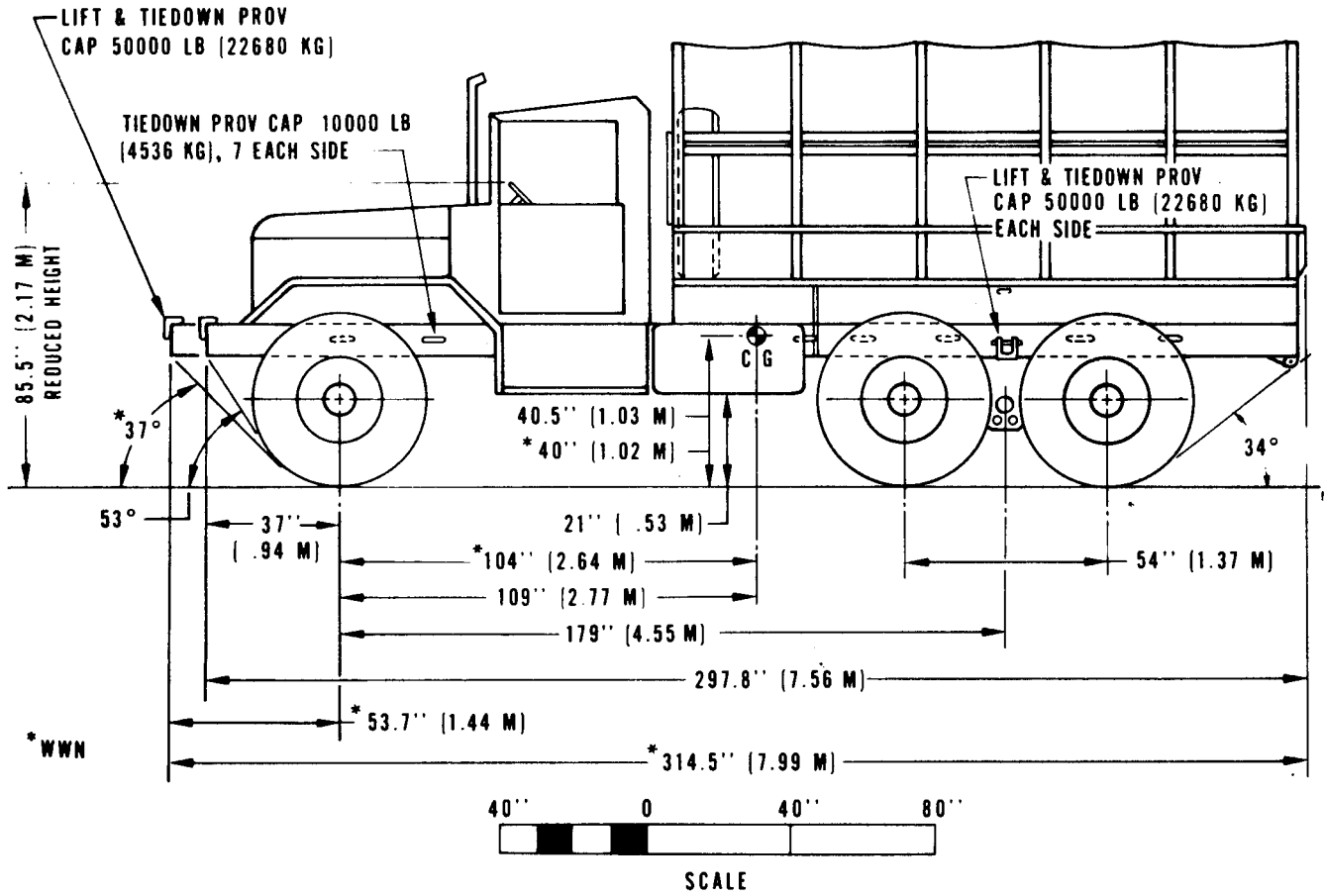


Figure 2-17. Side elevation, truck, cargo, dropside, WWN and WOWN, M54A2C.

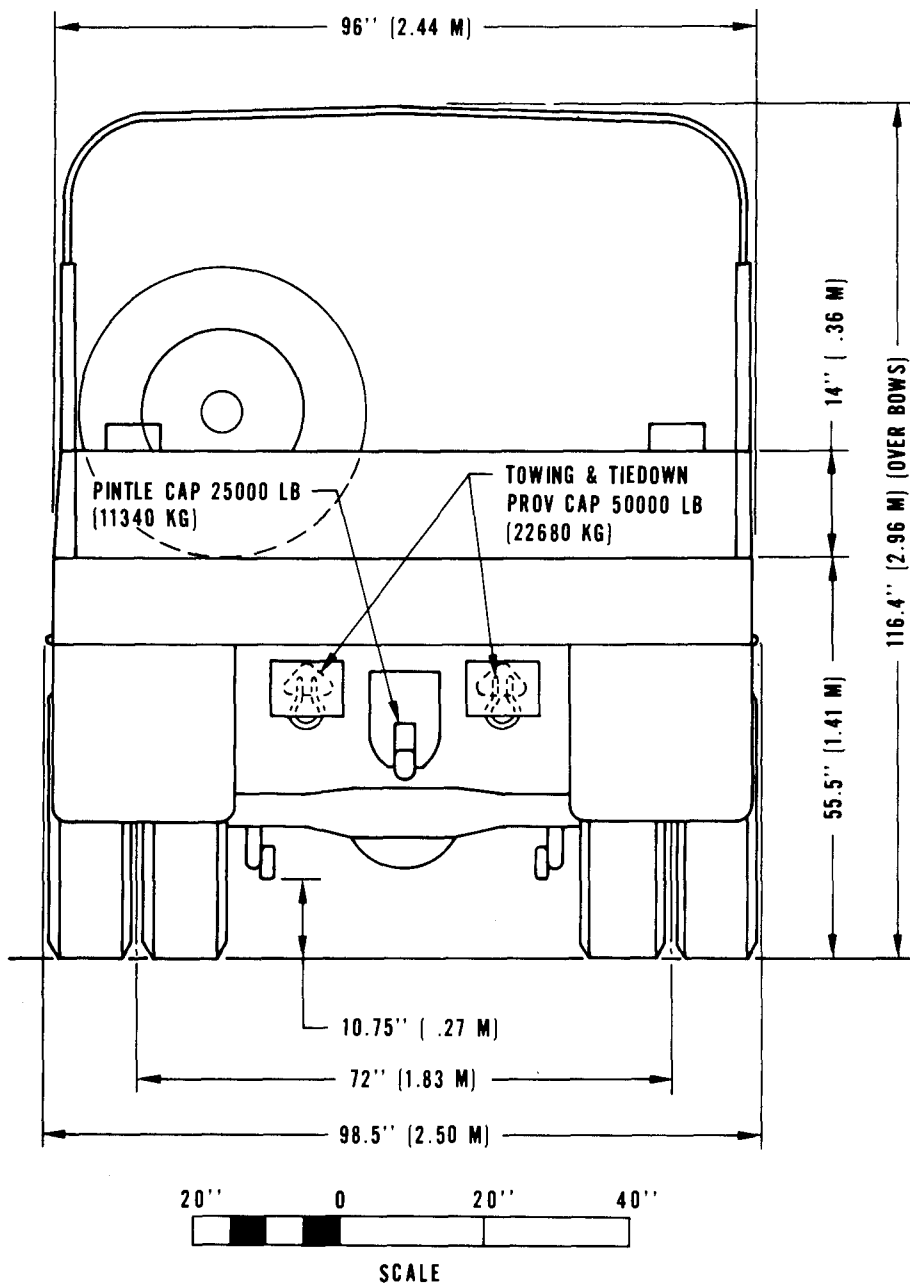


Figure 2-18, Rear elevation, truck, cargo, dropside, M54A2C.

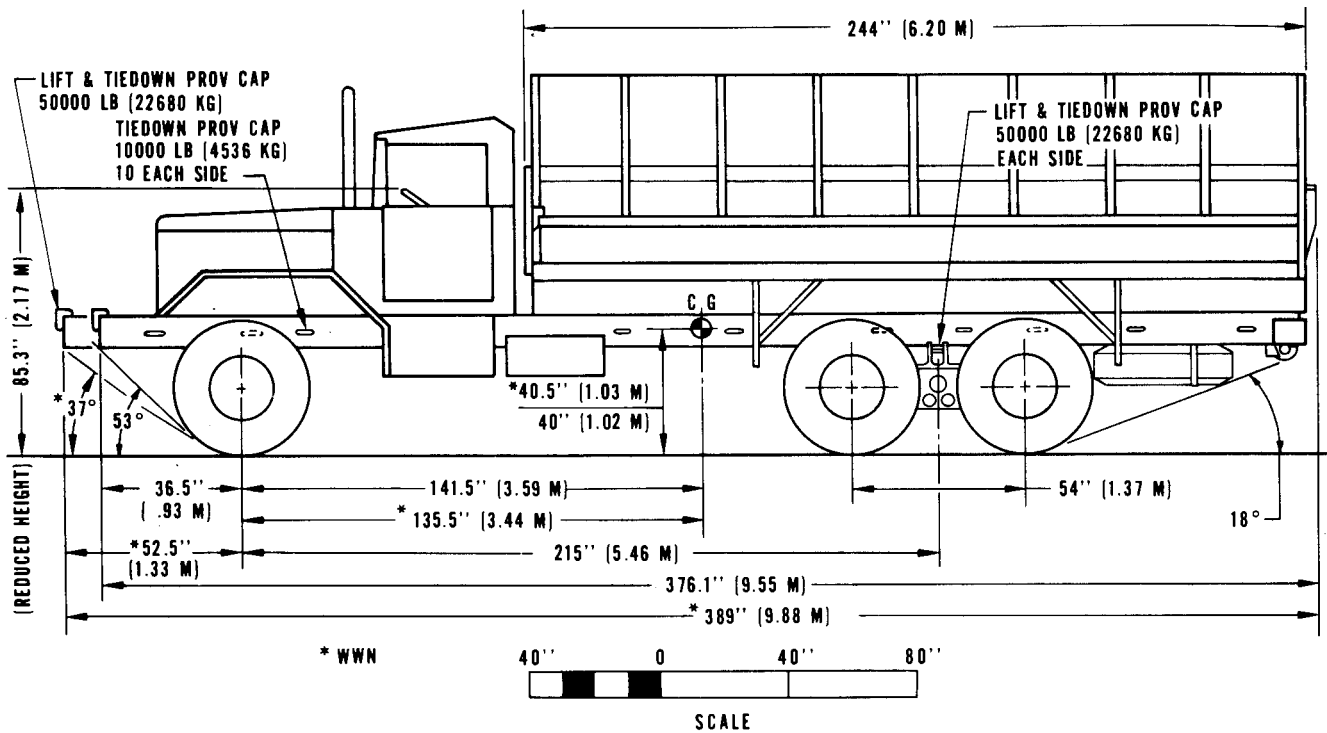


Figure 2-19. Side elevation, truck, cargo, WWN and WOWN, M55.

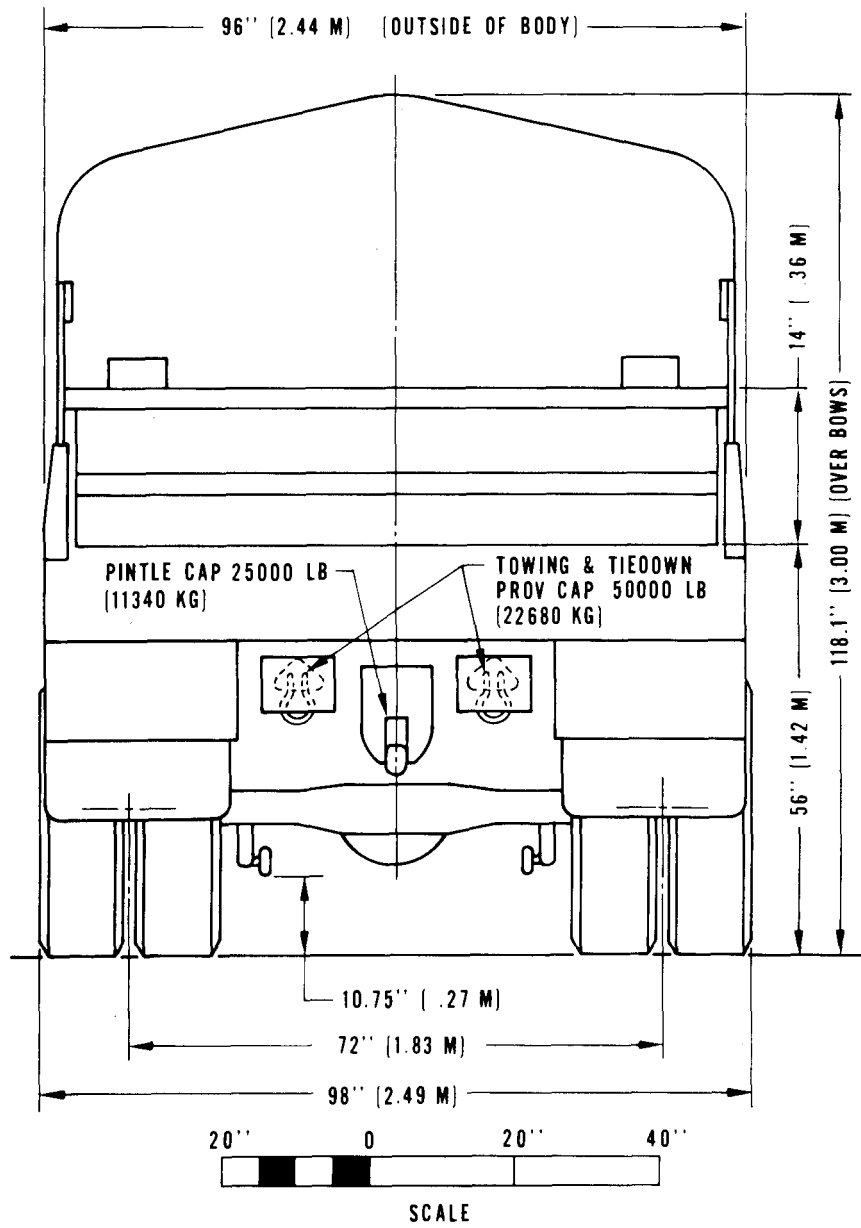


Figure 2-20. Rear elevation, truck, cargo, M455.

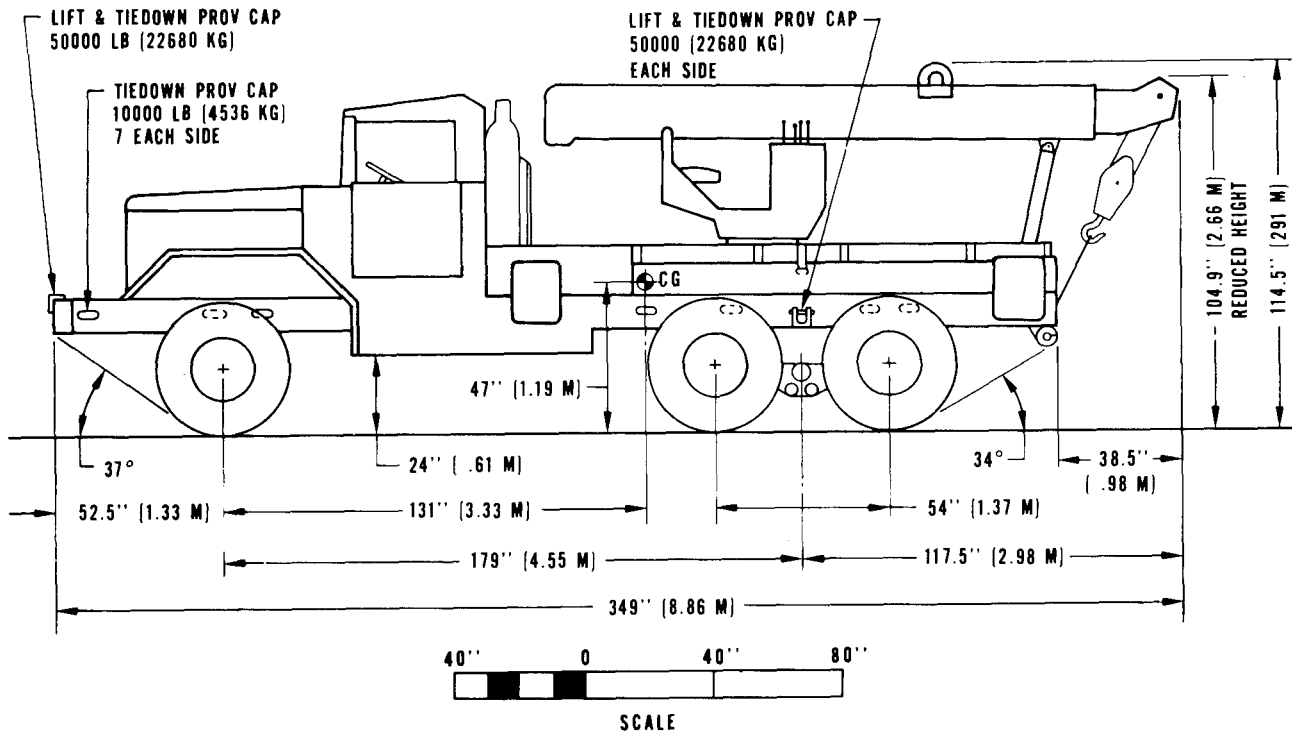


Figure 2-21. Side elevation, truck, wrecker, WWN, M543.

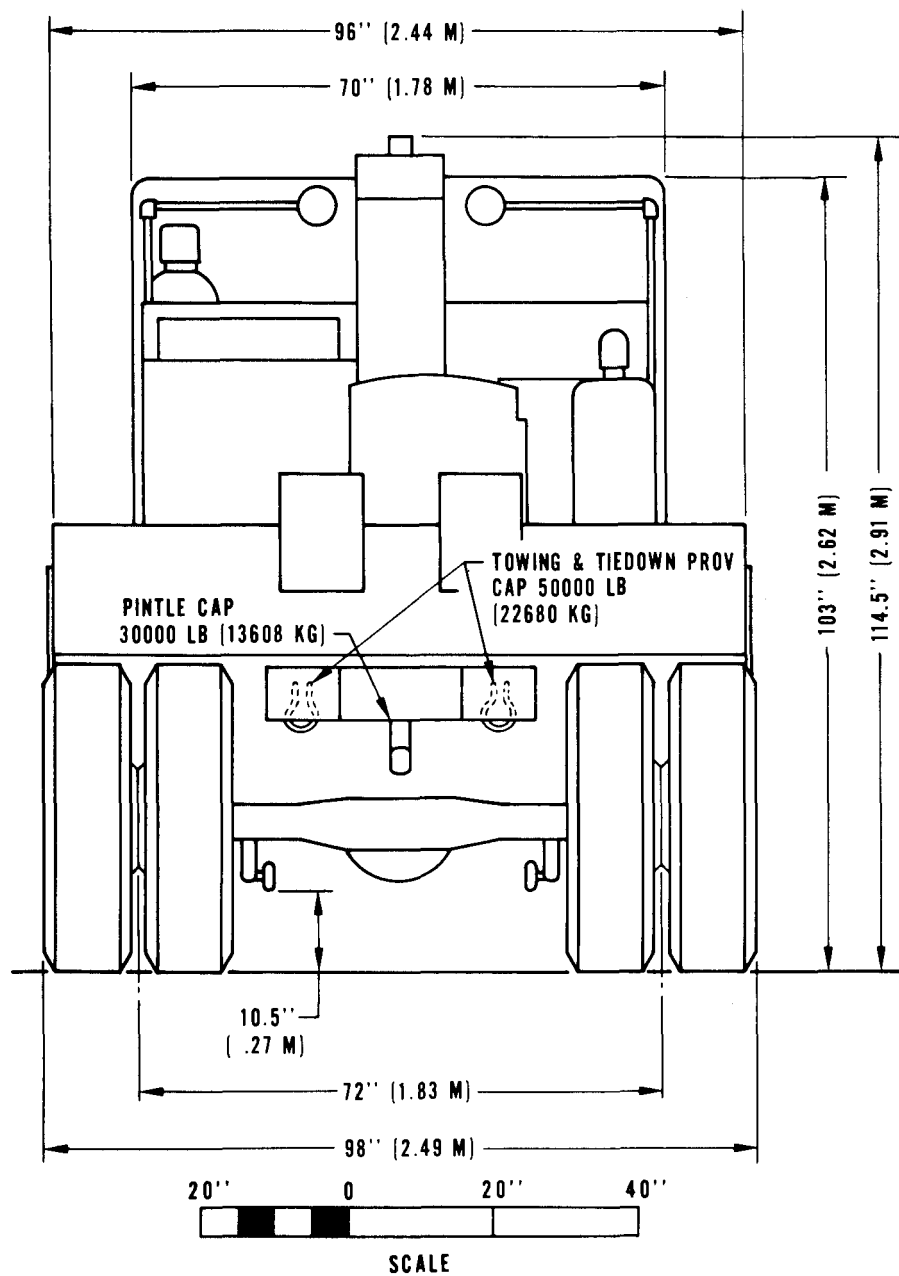


Figure 2-22. Rear elevation, truck, wrecker, M543.

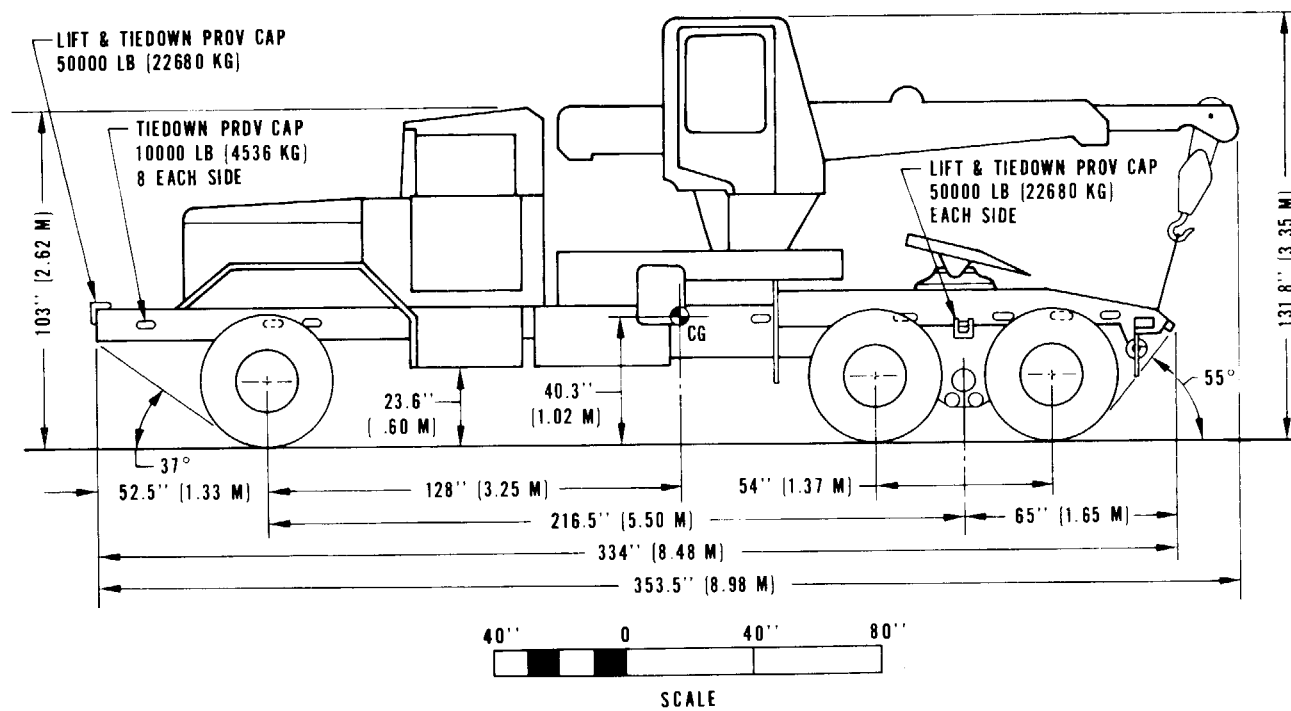


Figure 2-23. Side elevation, truck, tractor, wrecker WWN, M246.

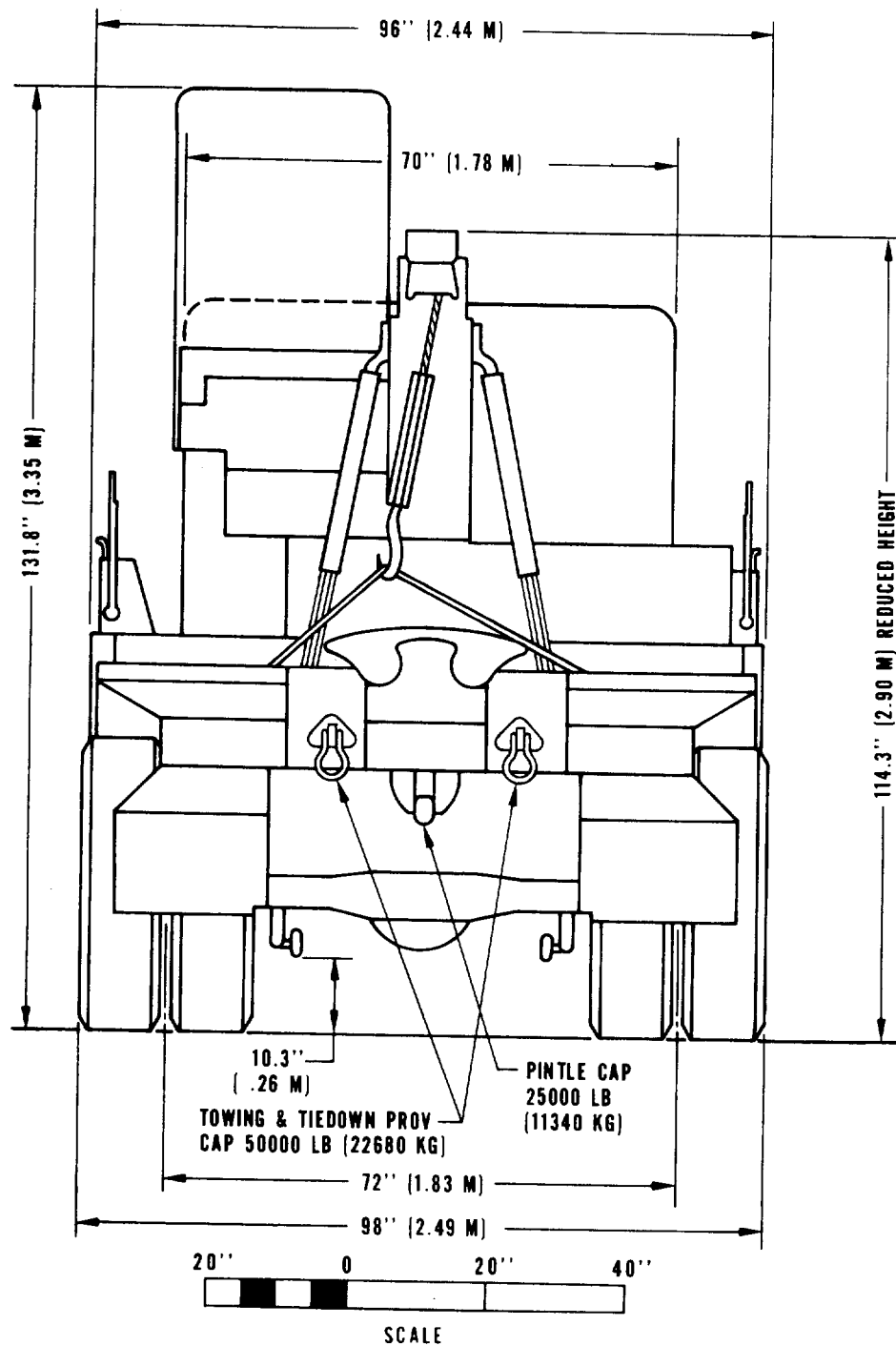


Figure 2-24. Rear elevation, truck, tractor, wrecker, M246.

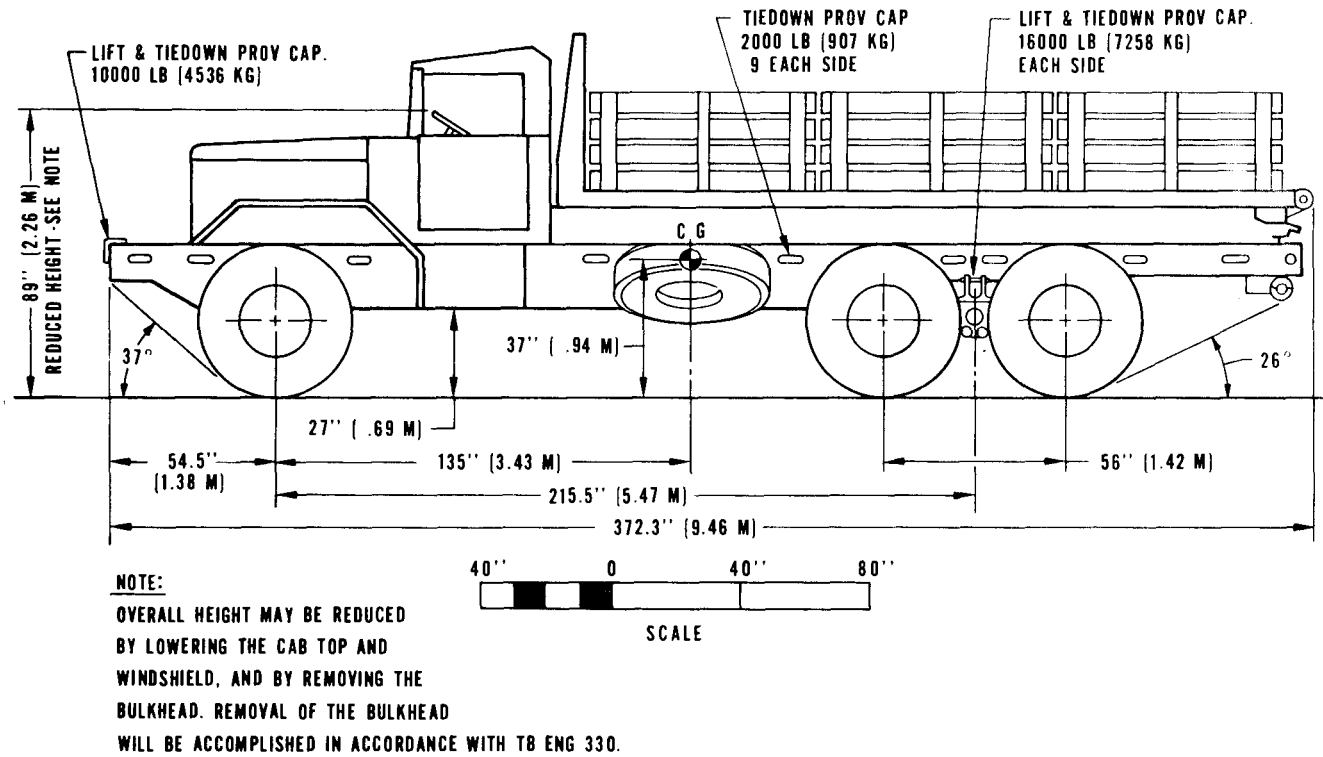


Figure 2-25. Side elevation, truck, stake, bridge transporting, WWN, mounted on M139 chassis.

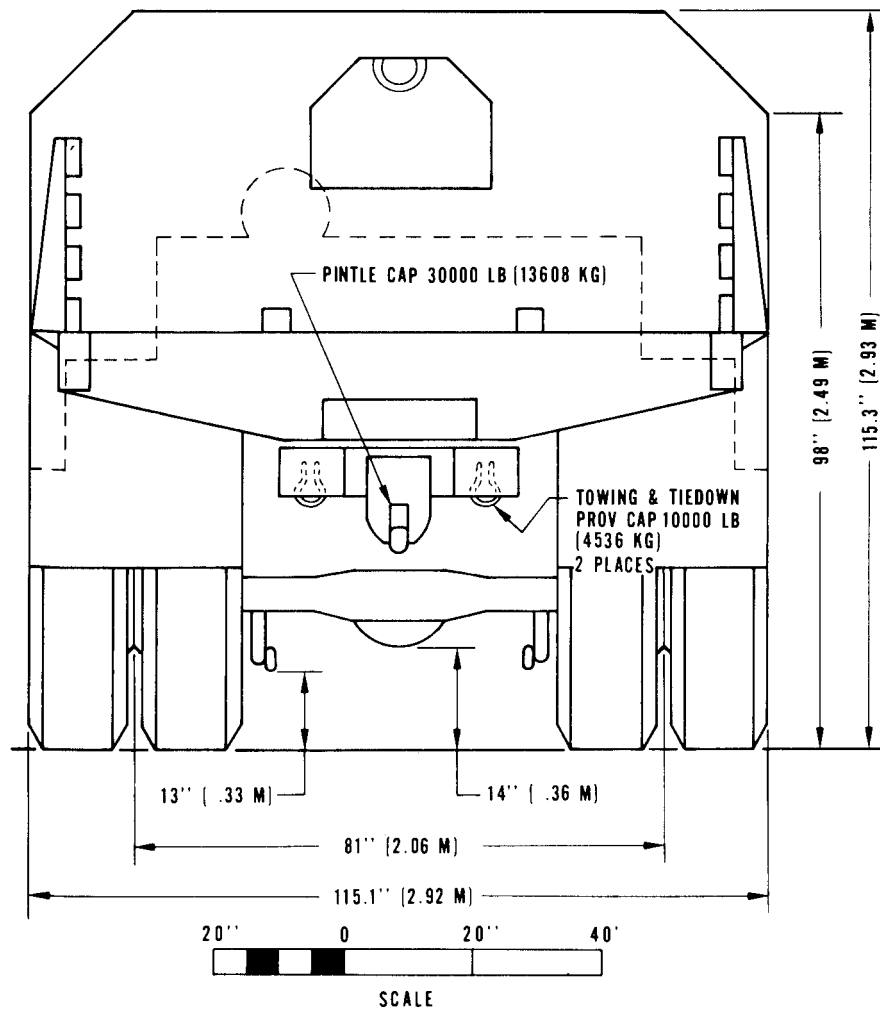


Figure 2-26. Rear elevation, truck, stake, bridge transporting, mounted on M139 chassis.

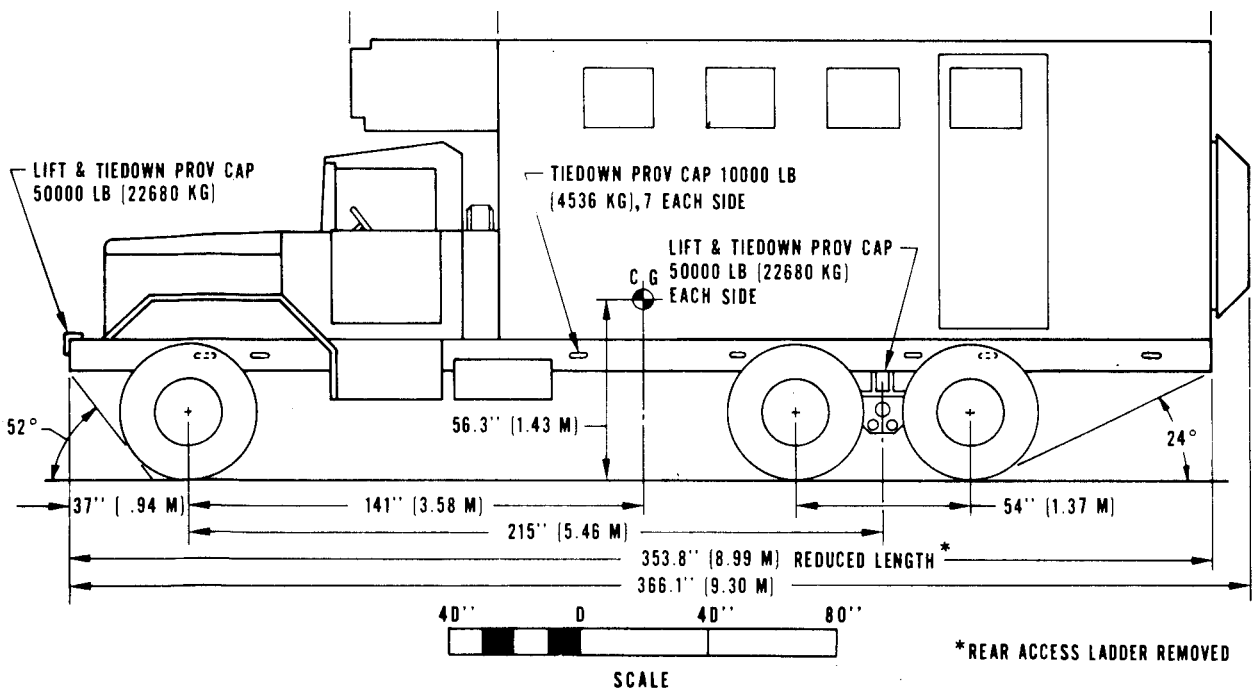


Figure 2-27. Side elevation, truck, van, expansible, M291A2.

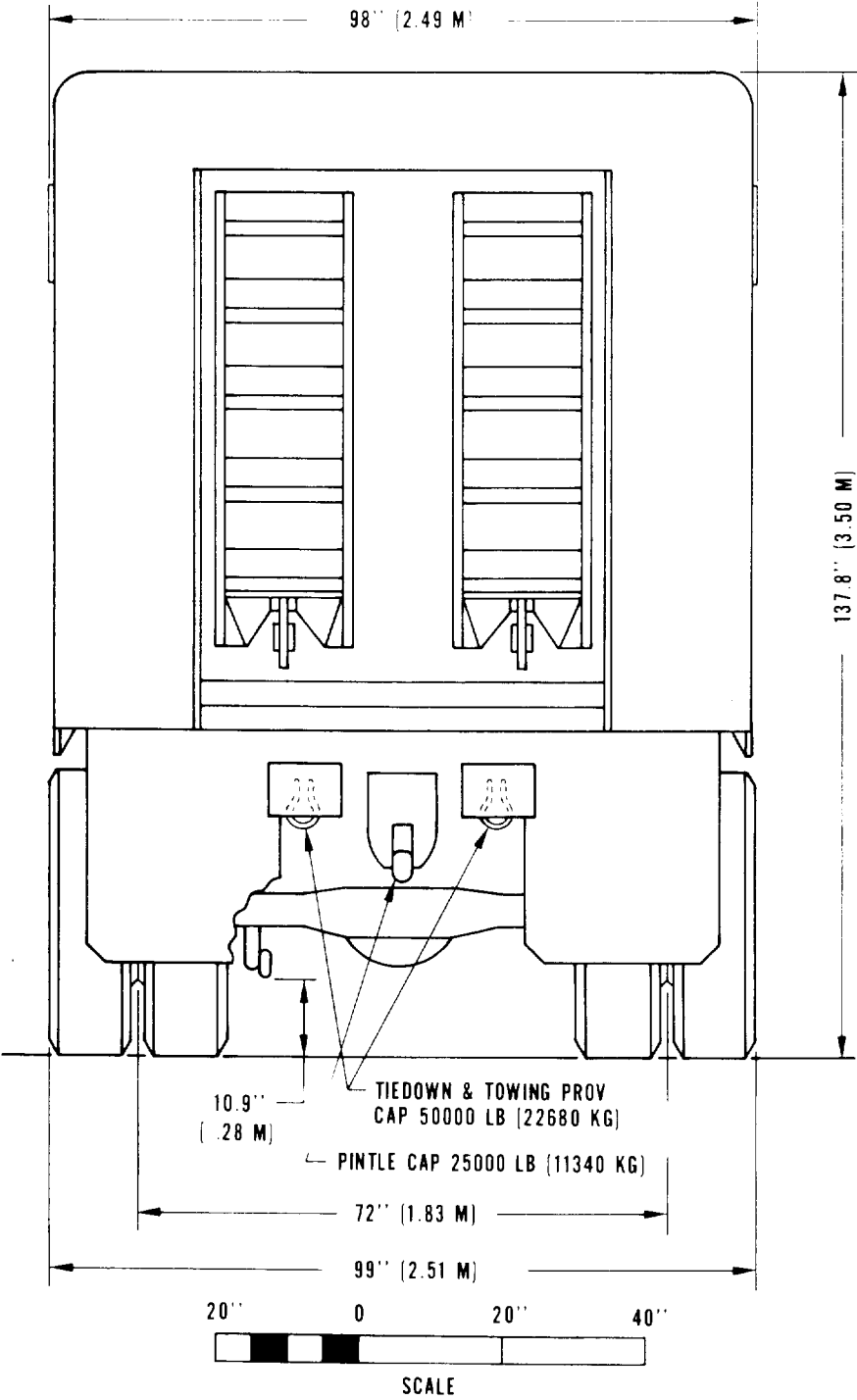


Figure 2-28. Rear elevation, truck, van, expansible, M291A2.

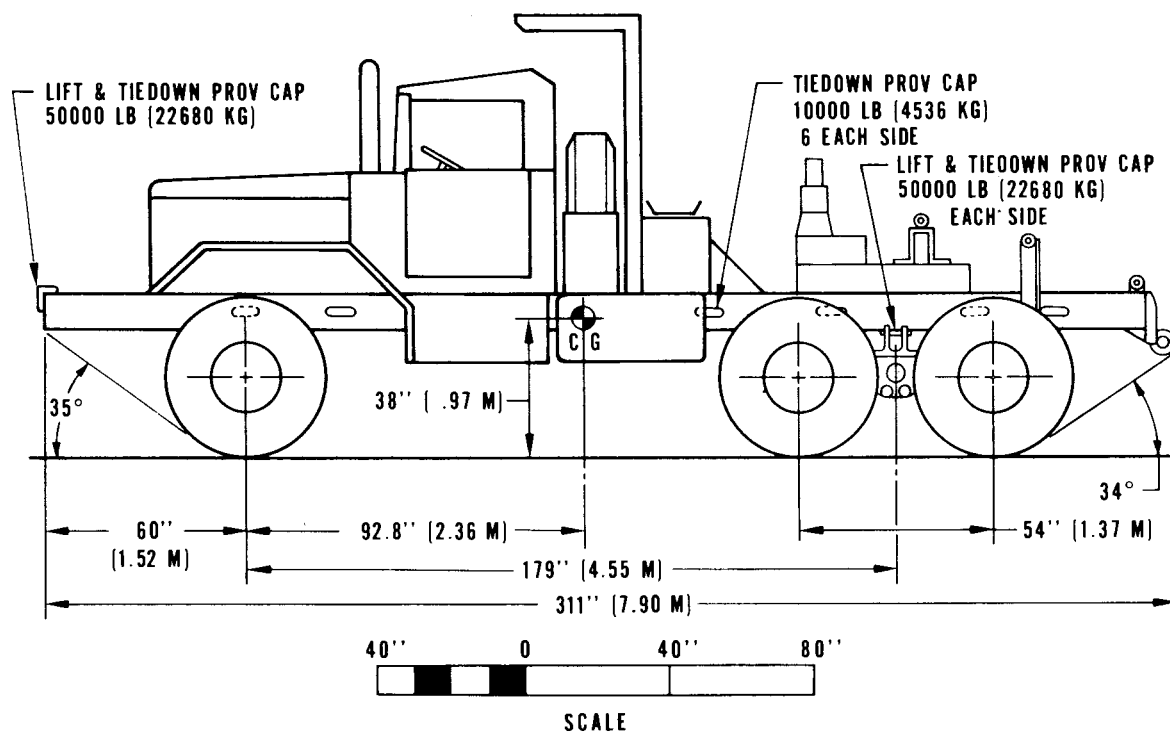


Figure 2-29. Side elevation, truck, bolster, WWN, M748A1.

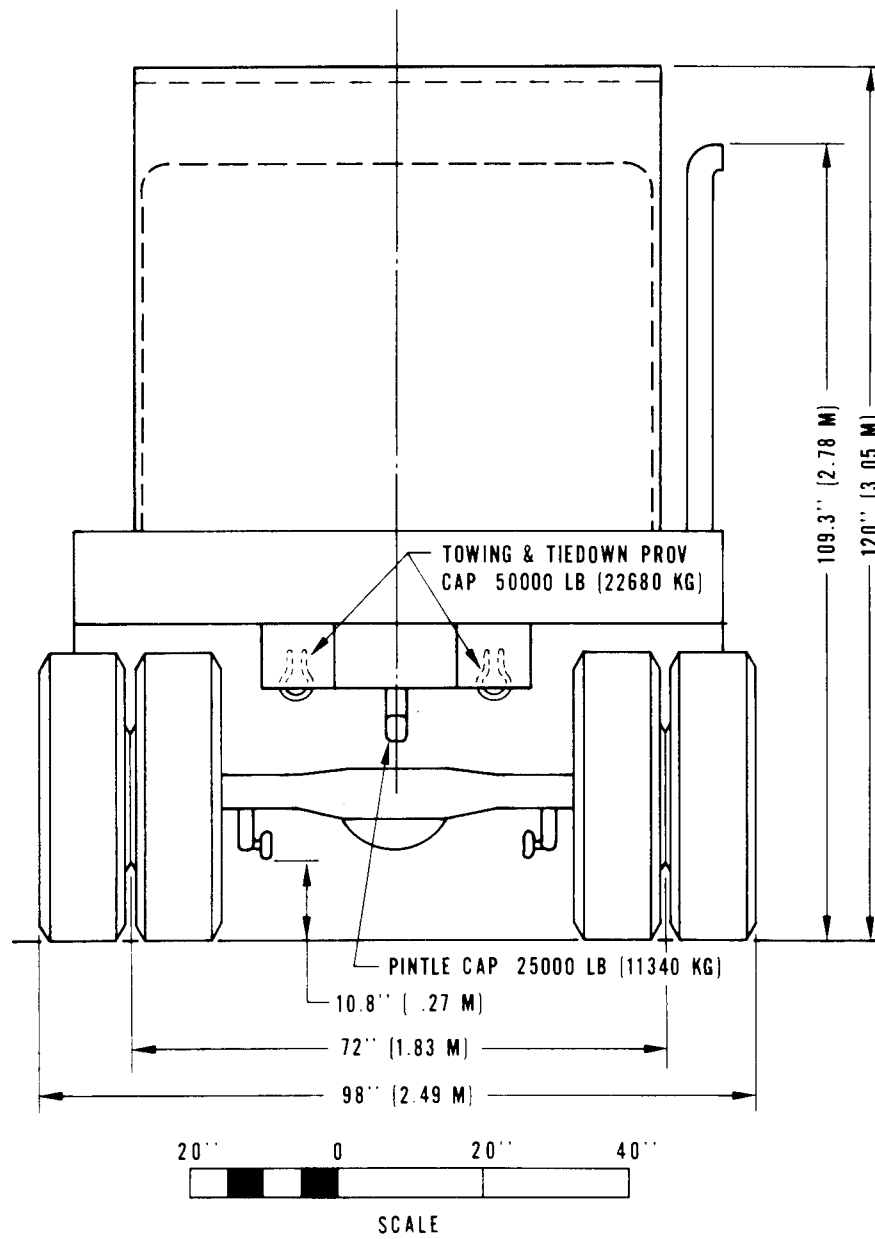


Figure 2-30. Rear elevation, truck, bolster, M748A1.

CHAPTER 3

SAFETY

3-1. General

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

- a. Check the entire vehicle to insure that all loose items are properly secured.
- b. Make sure no personnel or obstacles are in the way before moving the vehicle.
- c. When backing or moving the vehicle in confined areas make sure appropriate guides to assist are visibly posted.
- d. Comply with other operational safety precautions as outlined in the operator's manual (app A).

WARNING

Fire extinguishers must be readily

available during all loading and unloading.

WARNING

Proper ventilation must be provided when loading and unloading if vehicle 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 M39-series trucks, 5-ton, 6x6. It covers significant technical and physical characteristics and safety considerations; prescribes the materials required to prepare, load, and unload the vehicles as internal loads aboard US Air Force aircraft; and provides examples of tiedown diagrams and tiedown data tables for loading these vehicles in C-130, C-141, and C-5 aircraft.

4-2. Maximum Utilization of Aircraft

Cargo may be carried in the bed of a cargo truck when specific approval has been obtained by the Air Force. Such cargo must be securely restrained in the vehicle bed by either attachment to the vehicle or the aircraft floor and must meet the same restraint criteria as required for the vehicle. When cargo is loaded and secured in the vehicles, the load must not exceed the maximum rated load capacity of 5 tons (10,000 pounds), and consideration must be given to the aircraft allowable cargo load (ACL) and compatibility of cargo items. The weight of the vehicle plus the weight of any cargo it may contain must be accurate. The vehicle and its cargo are considered as one package, and the gross weight is used to determine tiedown requirements in accordance with chapter 4, FM 55-9. If the cargo truck is to carry any cargo when it is in the aircraft, the truck must be loaded and then weighed before it is loaded into the aircraft. The weight of any cargo loaded on a vehicle will change the center of gravity (CG) of the vehicle, as shown in chapter 2. The new CG will be determined in accordance with chapter 5, FM 55-9. Chapters 4 and 5, FM 55-9 contain detailed instructions for air movement of cargo trucks. Dump trucks will be air-transported with the gravel shield removed. The shield must be loaded separately aboard the aircraft and must meet the same restraint criteria as required for the vehicle.

4-3. Safety

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

a. The activity offering the vehicles or items for air transport will notify the aircraft commander or his designated representative if ammunition or explosives are to be transported within a vehicle.

b. Vehicle fuel tanks must be at least one-fourth and not more than three-fourths full.

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

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

WARNING

Proper ventilation must be provided during 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 MIL-A-8421F, the following 5-ton, 6x6 trucks can be transported, without a waiver, by the type of aircraft listed:

- a. C-130 and C-141: M51, M52, M54, and M55.
- b. C-5: All M39-series trucks, 5-ton, 6x6.

4-6. Typical Loads

The following tiedown diagrams (figs 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 the loading and securing of the 5-ton, 6x6 trucks aboard US Air Force aircraft. Loads are based on empty vehicles in a reduced con-

figuration *without* major sectionalization. Figures show a typical tiedown pattern of a representative 5-ton truck for each type of aircraft. Tables list the type and capacity of

tiedown devices required, location points on the trucks, and aircraft fittings to which the devices are secured.

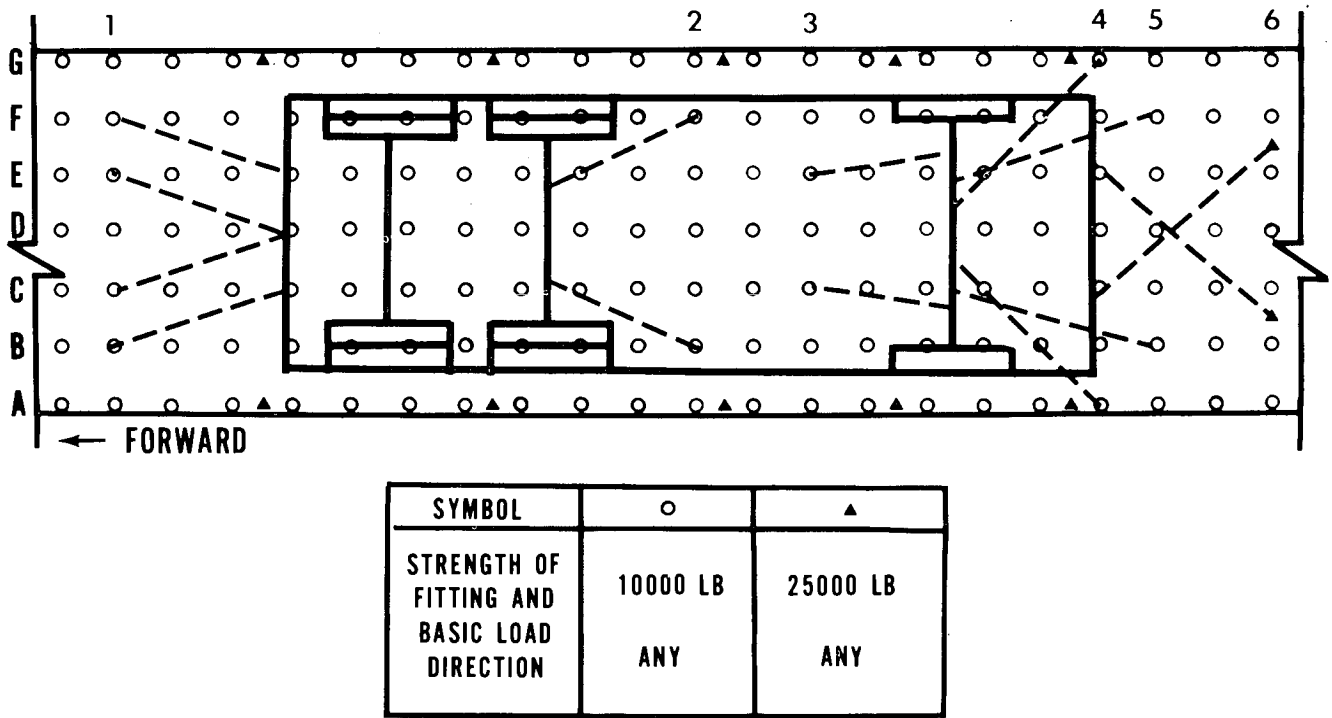


Figure 4-1. Tiedown diagram for M51 truck in C-130 aircraft.

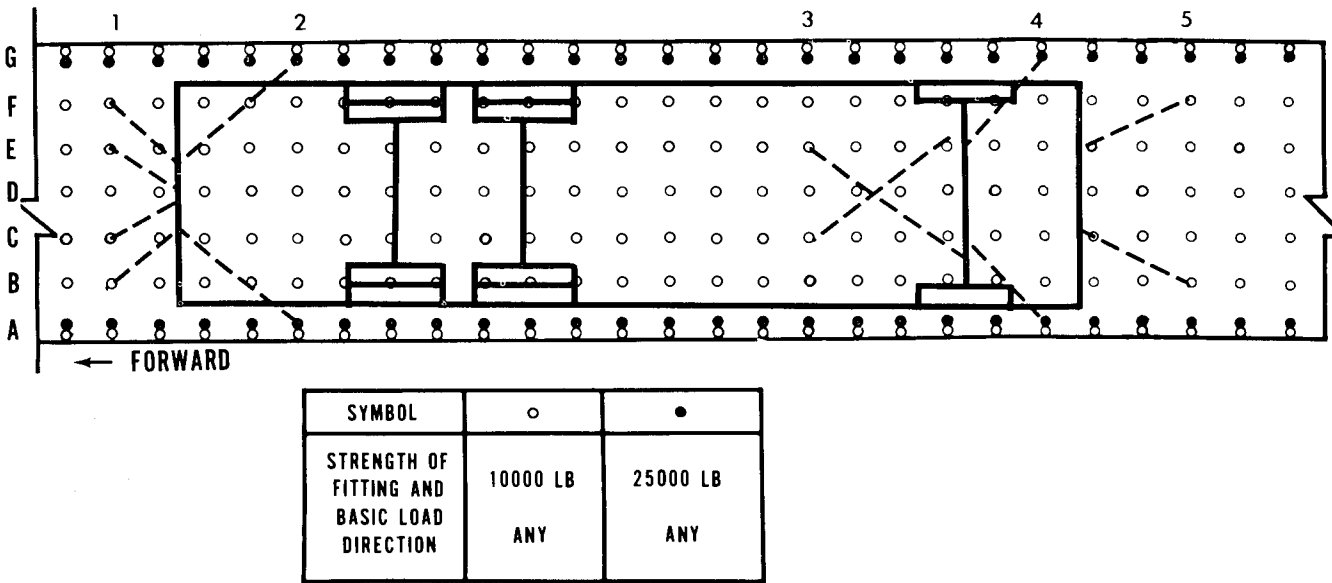
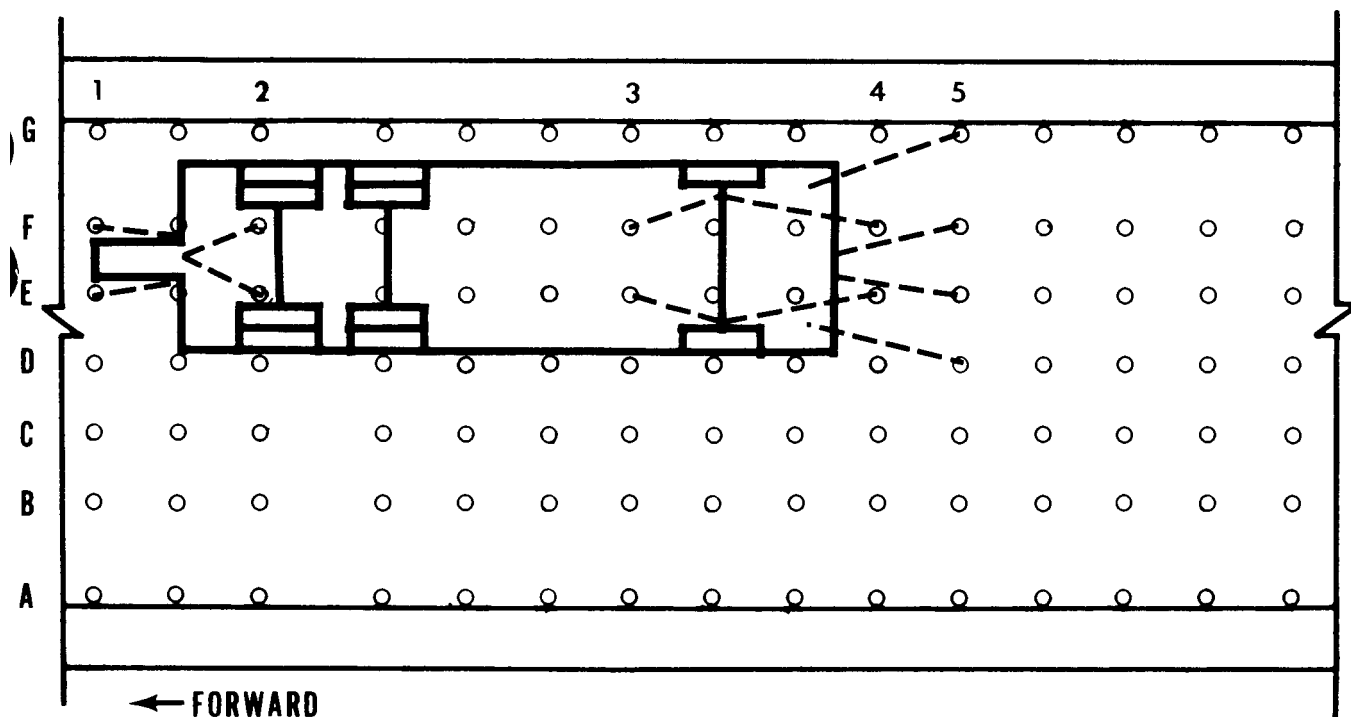


Figure 4-2. Tiedown diagram for M55 truck in C-141 aircraft.



○ ALL CARGO TIEDOWN FITTING RATINGS 25000 LB EACH

Figure 4-3. Tiedown diagram for M543 truck in C-S aircraft.

Table 4-1. Tiedown Data for M51 Truck 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	M -1	10	Lifting shackle, left side
F1	10	MB-1	10	Lifting shackle, right side
E1	10	MB-1	10	Tow pintle
C1	10	MB-1	10	Tow pintle
B2	10	MB-1	10	Rear intermediate axle, around right side
F2	10	MB-1	10	Rear intermediate axle, around left side
C3	10	MB-1	10	Front axle around right side
E3	10	MB-1	10	Front axle around left side
A4	10	MB-1	10	Front axle, right side
G4	10	MB-1	10	Front axle, left side
F5	10	MB-1	10	Front axle, left side
B5	10	MB-1	10	Front axle, right side
E6	10	MB-1	10	Lift shackle, right side
C6	10	MB-1	10	Lift shackle, left side

Table 4-2. Tiedown Data for M55 Truck 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	Rear shackle, right side
F1	10	MB-1	10	Rear shackle, left side
A2	25	MB-2	25	Bumperette, right side
G2	25	MB-2	25	Bumperette, left side
C3	10	MB-1	10	Front axle, around left side
E3	10	MB-1	10	Front axle, around right side
C1	10	MB-1	10	Tow pintle
E1	10	MB-1	10	Tow pintle
A4	25	MB-2	25	Front axle, around left side
G4	25	MB-2	25	Front axle, around right side
B5	10	MB-1	10	Lifting shackle, around right side
F5	10	MB-1	10	Lifting shackle, around left side

Table 4-3. Tiedown Data for M543 Truck in C-5 Aircraft

Tiedown fitting		Tiedown device		Attach to item
Designation	Capacity in 1,000 lb	Type	Capacity in 1,000 lb	
E1	25	MB-2	25	Rear shackle, right side
F1	25	MB-2	25	Rear shackle, left side
E2	25	MB-2	25	Pintle
F2	25	MB-2	25	Pintle
E3	25	MB-2	25	Front axle, right side
F3	25	MB-2	25	Front axle, left side
E4	25	MB-2	25	Front axle, right side
F4	25	MB-2	25	Front axle, left side
E5	25	MB-2	25	Frame behind bumper, around right side
F5	25	MB-2	25	Frame behind bumper, around left side

Section III. TRANSPORT BY US ARMY AIRCRAFT

4-7. Fixed Wing Aircraft

All 5-ton, 6x6 trucks exceed size and weight limitations for transport by US Army fixed wing aircraft.

4-8. Rotary Wing Aircraft

All 5-ton, 6x6 trucks exceed size limitations for internal transport by US Army rotary wing aircraft. The CH-47A helicopter external lift capability is *16,000* pounds, and the CH-47B and C helicopters, *20,000* pounds. The external lift capability of the CH-54A and B helicopters is *20,000* and *25,000* pounds, respectively. Refer to table 2-1 to determine which vehicles are within these limitations. Rigging instructions for external loads are contained in FM 55-450-1.

CHAPTER 5

HIGHWAY AND OFF-ROAD TRANSPORTABILITY GUIDANCE

Section I. GENERAL

5-1. Scope

This chapter provides transportability guidance for highway and off-road movement of the M39-series trucks, 5-ton, 6x6. It covers significant technical and physical characteristics and safety considerations and prescribes the material and guidance required to prepare, load, and tie down the vehicles.

5-2. Safety

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

Section II. MOVEMENT ON OWN WHEELS

5-3. General

The M39-series trucks can be moved under their own power either empty or carrying a payload. The vehicles exceed CONUS legal width limitations of 96 inches, and therefore require special highway permits. This restriction also applies to highway movement overseas. The procedures for obtaining special permits in CONUS are outlined in AR 55-162. Legal limitations of overseas areas are identified in "Limits of Motor Vehicle Sizes and Weights, "

International Road Federation, 1023 Washington Building, Washington, D. C. 20005.

5-4. Preparation of Trucks

No special preparation of the trucks is required for movement under their own power. However, all loose items should be secured within the vehicles. Any cargo transported in the trucks should be secured so that it does not extend beyond the end and side limits of the cargo body.

Section III. TRANSPORT BY SEMITRAILER

5-5. General

The M39-series trucks can be transported over highways by semitrailers of adequate capacity and size. Both in CONUS and overseas, permits will be required, because the transported item will exceed highway width and axle load limitations. In addition, depending upon the tractor-trailer combination used for transport, overall length and/or height limitations may be exceeded and permits will be required.

5-6. Loading on Flatbed Semitrailers

Vehicles to be transported by semitrailer will be reduced in height and width to their lowest shipping configuration as indicated in table 2-2. The trucks may then be placed in the tiedown

position on the semitrailers by a crane or from a loading ramp. After placement at the tiedown position, the items will be secured in accordance with figures 5-1, 5-2, and 5-3. Figure 5-4 shows the tracking diagram of the M127A1C semitrailer pulled by M52 truck, tractor. Figure 5-5 shows a blocking and chain tiedown schematic of an M55 truck on M270A1 semitrailer. Figure 5-6 is the tracking diagram for the M270A1 semitrailer pulled by M52 truck, tractor. Tables 5-1 and 5-2, bill of and application of materials for blocking and tiedown, are used in conjunction with figures 5-1, 5-2, and 5-3. Tables 5-3 and 5-4, bill of and application of materials for blocking and tiedown, are applicable with figures 5-3 and 5-5.

Table 5-1. Bill of Materials for Blocking and Tiedown of M54 Truck on Semitrailer, 12-Ton, M127A1C(Fig 5-1, 5-2, and 5-3)

Item	Description	Approximate quantity
Lumber	Douglas-fir, or comparable, straight-grain, free from material defects; Fed Spec: MM-L-751H:	
	2- x 4-in.	24 linear ft
	2- x 6-in.	12 linear ft
	6- x 8-in.	16 linear ft

Table 5-1. Bill of Materials for Blocking and Tiedown of M54 Truck on Semitrailer, 12-Ton, M127A1C (Fig 5-1, 5-2, and 5-3) - Continued.

Item	Description	Approximate quantity
Nails	Common, steel; flathead, bright or cement-coated; para 3.6.11.2, Fed Spec FF-N-105B:	
	20d	48
	30d	52
	40d	16
Wire	No. 8 gage, black annealed; Fed Spec QQ-W-461g	200 ft
Cushioning material	Waterproof paper, or suitable material	as required

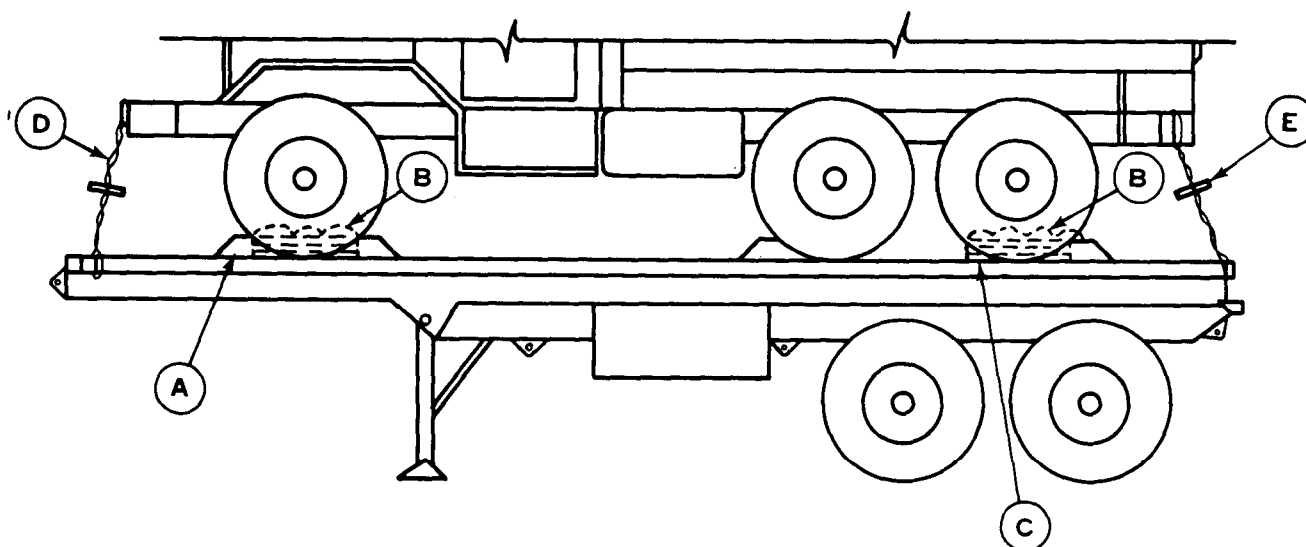


Figure 5-1. Blocking and tiedown of M54 truck on semitrailer, 12-ton, M127A1C.

Table 5-2. Application of Materials for Blocking and Tiedown of M54 Truck on Semitrailer, 12-Ton, M127A1C (Fig. 5-1, 5-2, and 5-3)

Item	No. required	Application
A	8	Chock block (detail 1, item A, fig 5-3). Locate 33° portion against front of front and intermediate wheels and against rear of front and rear wheels. Toenail heel of block (near bottom edge) to semitrailer floor with one 20d nail. Additionally, drive two 40d nails into heel of block, perpendicular to semitrailer floor. Toenail each side of block to semitrailer floor with two 30d nails on each side.
B	as required	Protective material (detail 2, item B, fig 5-3) such as waterproof paper or burlap, should be located under bottom edge of 2- x 4- x 36-in. piece and between tire and 2- x 6- x 36-in. piece to extend 2 in. above blocking.
C	4	Side blocking (detail 2, item C, fig 5-3). Each to consist of one piece of 2- x 6- x 36-in. lumber and two pieces of 2- x 4- x 36-in. lumber. Nail 2- x 6- x 36-in. piece to edge of lower 2- x 4- x 36-in. piece with five 20d nails. Place 2- x 6- x 36-in. piece against tire, and nail to semitrailer floor through 2- x 4- x 36-in. piece with five 20d nails in staggered pattern. Nail other 2- x 4- x 36-in. piece to one below in like manner with five 30d nails.
D	4	Eight strands of No. 8 gage black annealed wire. Attach to front and rear tiedown provisions on vehicles and semitrailer as indicated (fig 5-1 and 5-2). Substitute, if desired, 1/2- or 5/8-in. IWRC wire rope in a complete loop, and secure with four cable clips spaced approximately 4-in. apart (see sketch 1, fig 7-2).
E	4	Wire twisters (sketch 1, fig 5-3). Use 2- x 2-in. lumber by length-to-suit (metal rod or bolt may be used in lieu of lumber). After twisting wire taut, rod, bolt, or lumber should be left in place and secured to prevent unwinding.

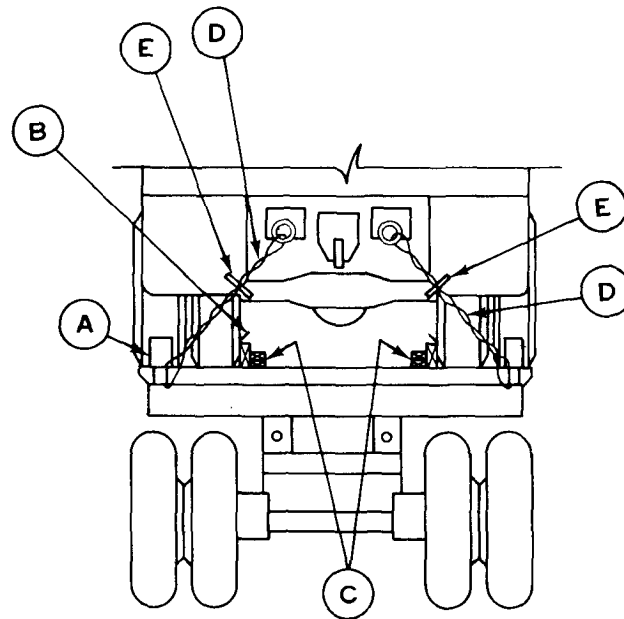


Figure 5-2. Rear view of blocking and tiedown of M54 truck on semitrailer, 12-ton, M127A1C.

Table 5-3. Bill of Materials for Blocking and Tiedown of M55 Truck on Semitrailer, 12-Ton, M270A1 (Fig 5-5)

Item	Description	Approximate quantity
Lumber	Douglas-fir, or comparable, straight-grain, free from material defects; Fed Spec: MM-L-751H: 6- x 8-in.	6 linear ft
Nails	Common, steel; flathead, bright or cement-coated; para 3.6.11.2, Fed Spec FF-N-105B:	
	20d	10
	30d	20
	40d	10
Chain	General service, S-leg, alloy steel, ¼- to ½-in. size, 10-ft length, with two grabhooks.	6
Load binder	Type I, plain, 18½-in. operating lever, with two grabhooks designed for ¼-in. to ½-in. chain, 8-ton capacity. Fed Spec: GGG-B-325A. NSN: 3990-00-171-9774.	6

Table 5-4. Application of Materials for Blocking And Tiedown of M55 Truck on Semitrailer, 12-Ton, M270A1 (Fig 5-3 and 5-5)

Item	No. required	Application
A	4	Chock block (detail 1, item A, fig 5-3). Locate 33 ° portion against front of front wheels and against rear of rear outside wheels. Drive block securely under wheels with sledge hammer. Toenail heel of block (near bottom edge) to semitrailer floor with two 20d nails. Additionally, drive two 40d nails into heel of block, perpendicular to semitrailer floor. Toenail each side of block to semitrailer floor with two 30d nails on each side.
B	4	Chain, general service, S-leg, alloy steel, ¼- to ½-in. size, 10-ft length, with two grabhooks. Pass one end of chain through tiedown shackles at each end of vehicle and engage grabhooks on convenient chain link. Pass other end of chain through stake pockets on same side of semitrailer forming a 45 ° angle.
	2	Pass one end of chain around lifting pin located between intermediate and rear wheels and through nearest stake pocket on side of semitrailer.
C	6	Load binder, lever operated, with two grabhooks designed for ¼- or ½-in. chain. Engage one grabhook into link of chain coming from vehicle securement points. Pull chain through stake pocket and engage other grabhook into a convenient link. Pull lever down, and lock into secured position. A piece of pipe may be required to depress lever in locking position to insure sufficient depression on vehicle tires.

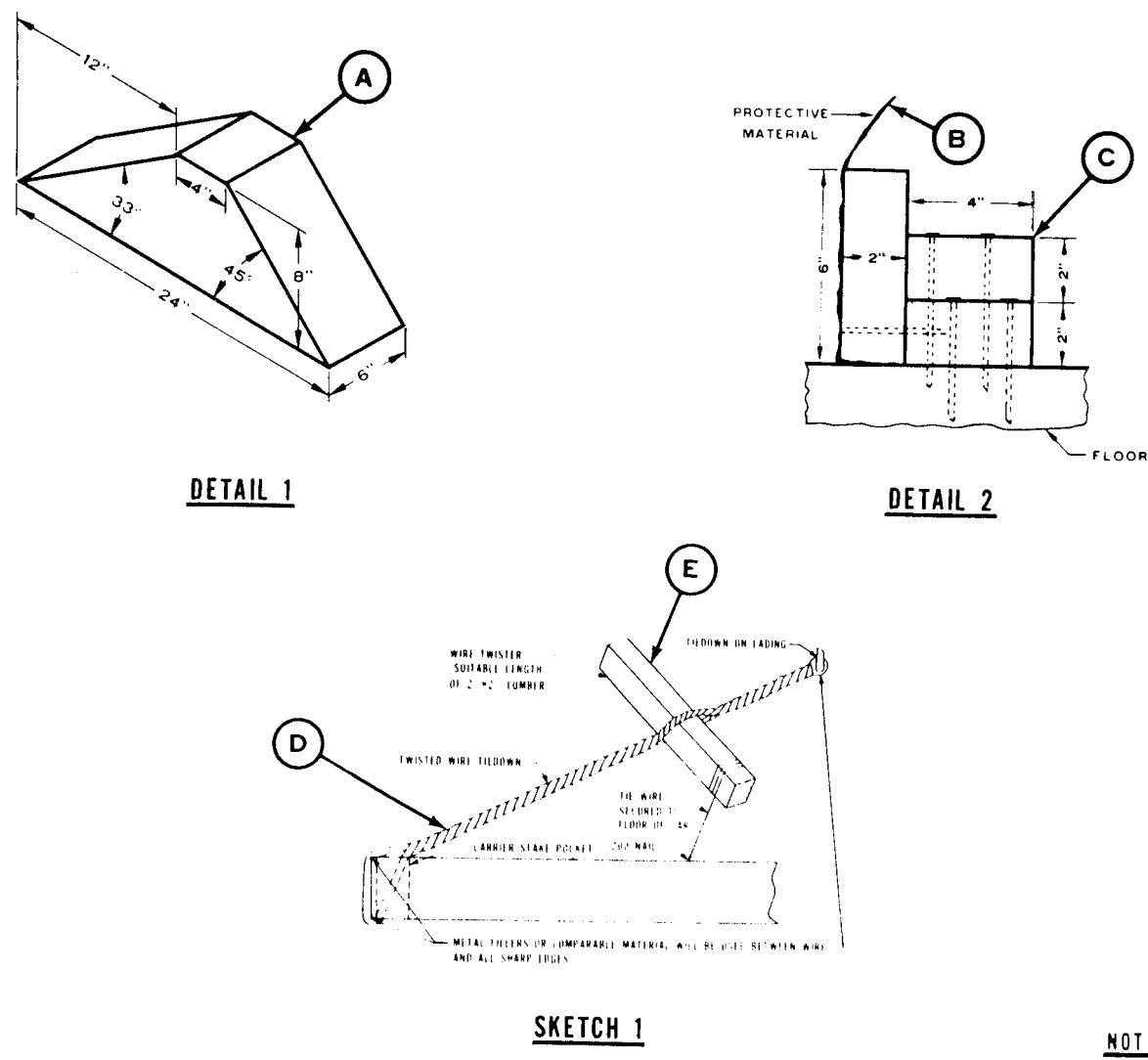


Figure 5-3. Blocking and tiedown details.

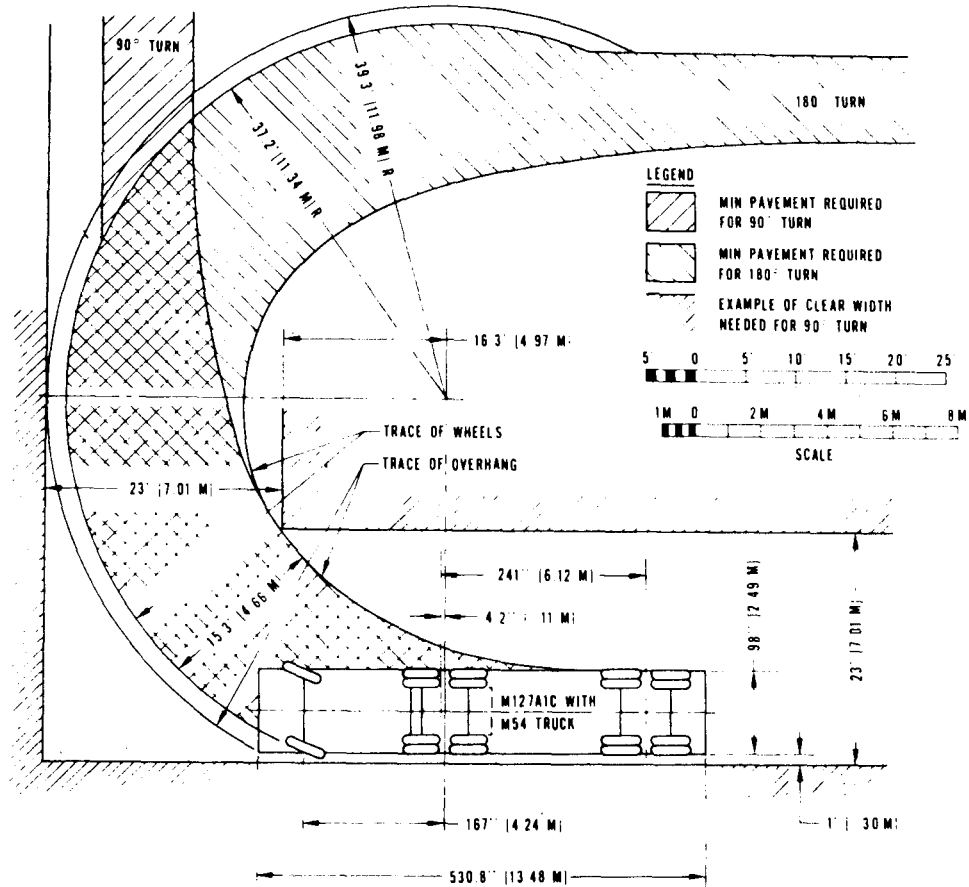


Figure 5-4. Tracking diagram for simitrailer, 12-ton, M127A1C, towed by truck, track, M52.

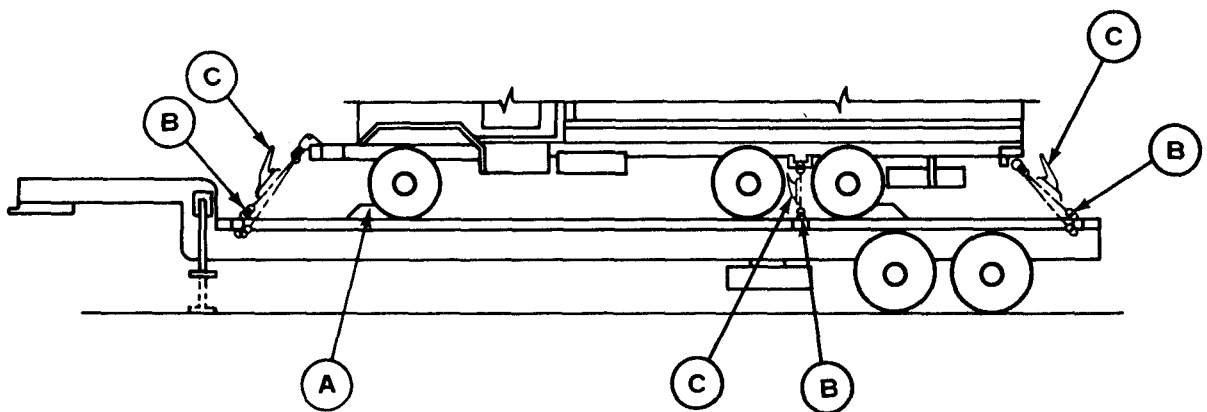


Figure 5-5. Blocking and tiedown of M55 truck on semitrailer, 12-ton, M270A1.

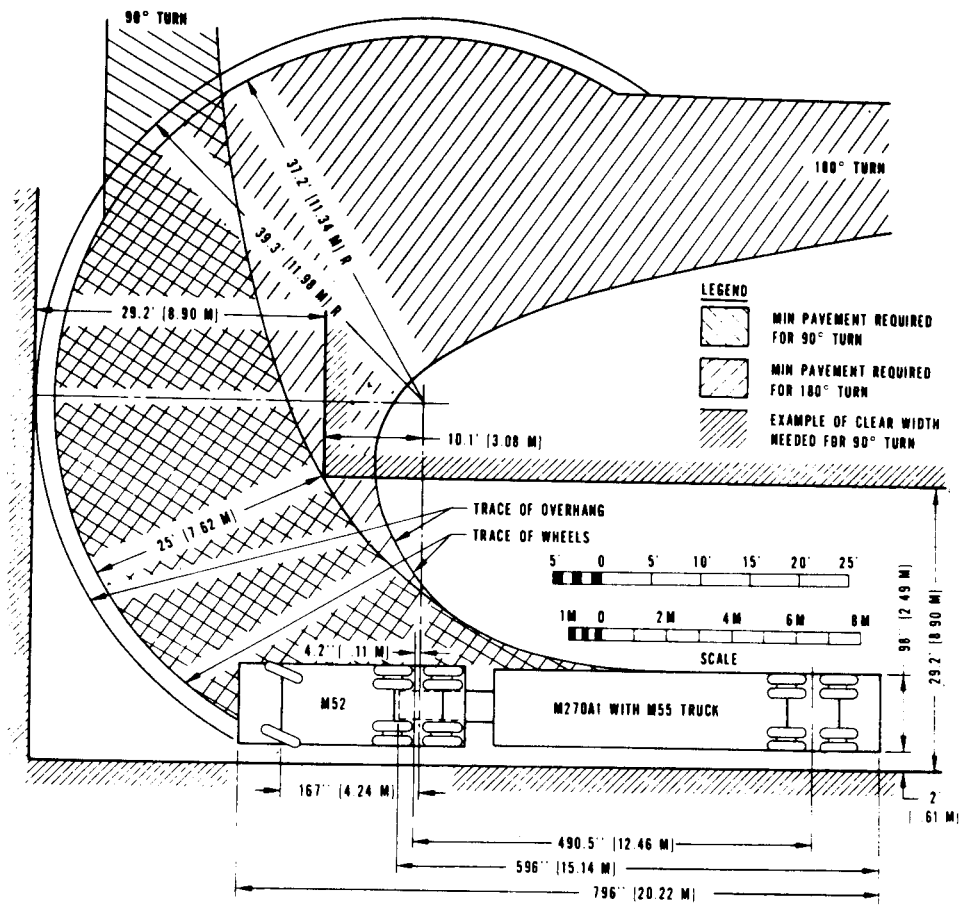


Figure 5-6. Tracking diagram for semitrailer, 12-ton, M270A1, towed by truck, tractor, M52.

CHAPTER 6

MARINE AND TERMINAL TRANSPORTABILITY GUIDANCE

6-1. Scope

This chapter provides transportability guidance for marine and terminal movement of the M39-series trucks, 5-ton, 6x6. It covers significant technical and physical characteristics and safety considerations; prescribes blocking materials; and provides guidance 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 vehicles being lifted.
- d. Lifting rings and shackles on each vehicle should be inspected to insure that they are complete and not damaged.
- e. All lifts should have at least two tag lines attached to control the swing of the vehicle while suspended.
- f. Vehicle fuel tanks must be drained and battery terminals disconnected and taped.
- g. Vehicle transmission must be placed and wire-tied in the neutral position.
- h. Handbrakes must be firmly set with brake lever wire-tied.

6-3. General Rules for Stowing

Whenever possible, vehicles should receive the protection of below-deck stowage. In general, good stowage of vehicles means having them placed fore and aft as close together as practical, with minimum spacing between outer vehicles and the sweatboards (about 4 to 6 inches). Breakable parts, spare parts, and OEM (on-equipment materiel), if not shipped on the vehicle, should be protected and properly identified as to location or disposition during shipment. Vehicles in the ship's hold should be blocked in front, in 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. All vehicles should be lashed with wire rope or chains to nearby bulkheads, stanchions, or padeyes.

NOTES

1. When vehicles are loaded on vessels that are adequately ventilated by power blowers, such as those commonly found on roll-on/roll-off vessels, fuel tanks need not be drained and battery terminals may remain connected.
2. 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.*

(1) The installed lifting shackles on the front bumper of 2 ½-ton, 6x6 trucks should not be used. Instead, a 6-foot-length assembly of ¾ -inch diameter, or larger, 6x19, IWRC wire rope with a loop and thimble in each end will be used. The loop with thimble may be made with a splice or a swage fitting. Also, zinc-poured fittings with an eye large enough to fit sling leg hook or shackle may be used in place of loop with thimble. The wire rope will be passed down the front side, under the bumper, up and over the frame, and under and up the front side of the bumper. The loop will be placed in sling hook, or it will be shackled with first loop. To use existing lifting shackle as a cable guide, the pin will be removed, the wires will be placed in the shackle, and the pin will be reinstalled, as shown in isolated view of figures 6-1 through 6-4. These procedures will be repeated for the opposite front lifting attachment. Malleable sheet metal or hard cushioning strips will be used at sharp corners and edges to prevent the wire rope from cutting or frame edges from bending.

NOTE

Other methods such as chains of adequate size and strength may be substituted provided they will not damage vehicle components and can be readily adapted to sling leg. A lifting bar of adequate size and strength also may be substituted provided it does not contact any component of the vehicle beneath the frame, such as the winch, engine, steering gear or so forth.

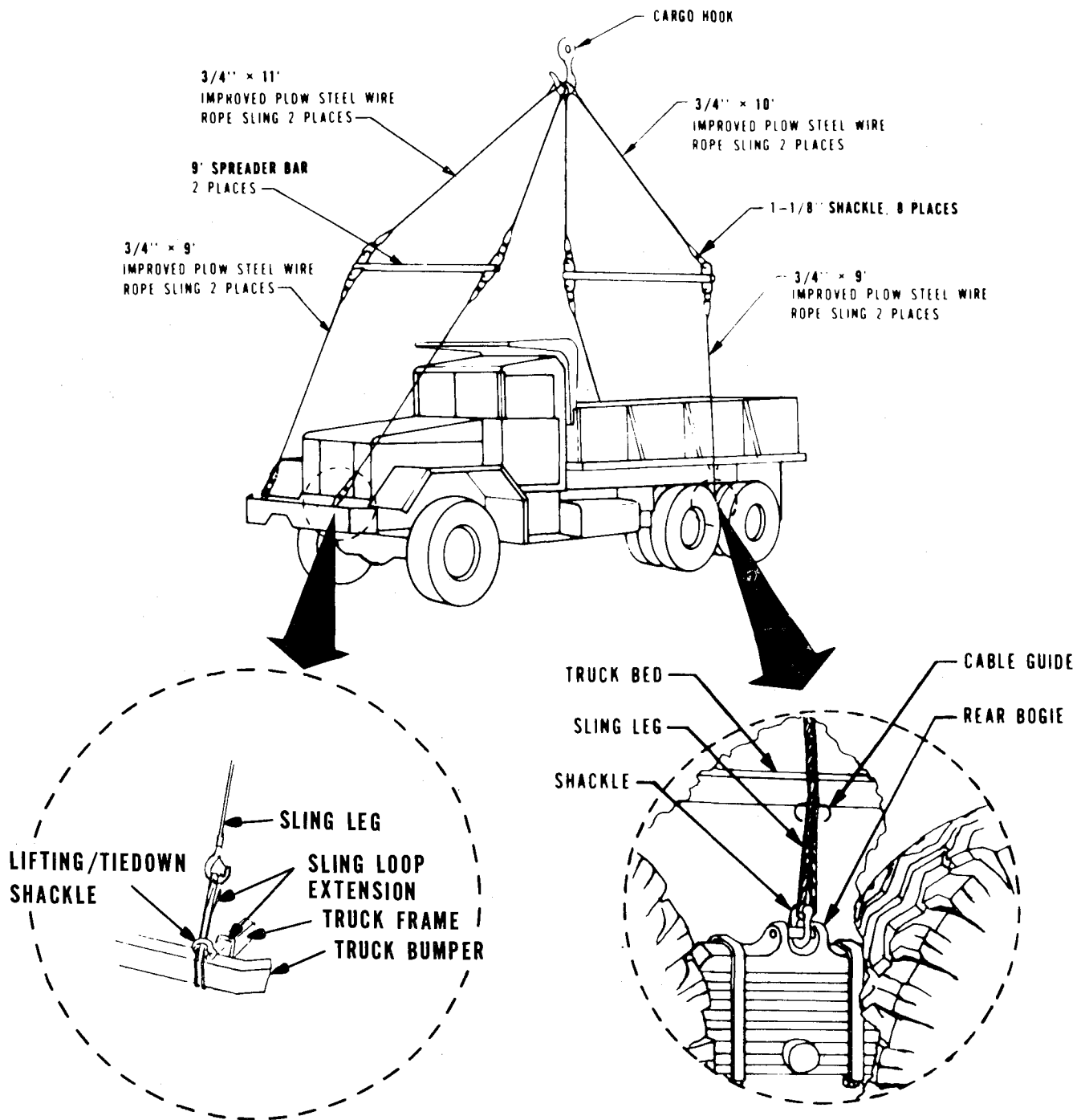


Figure 6-1, Lifting diagram for M51 with eight-wire sling and two spreader bars.

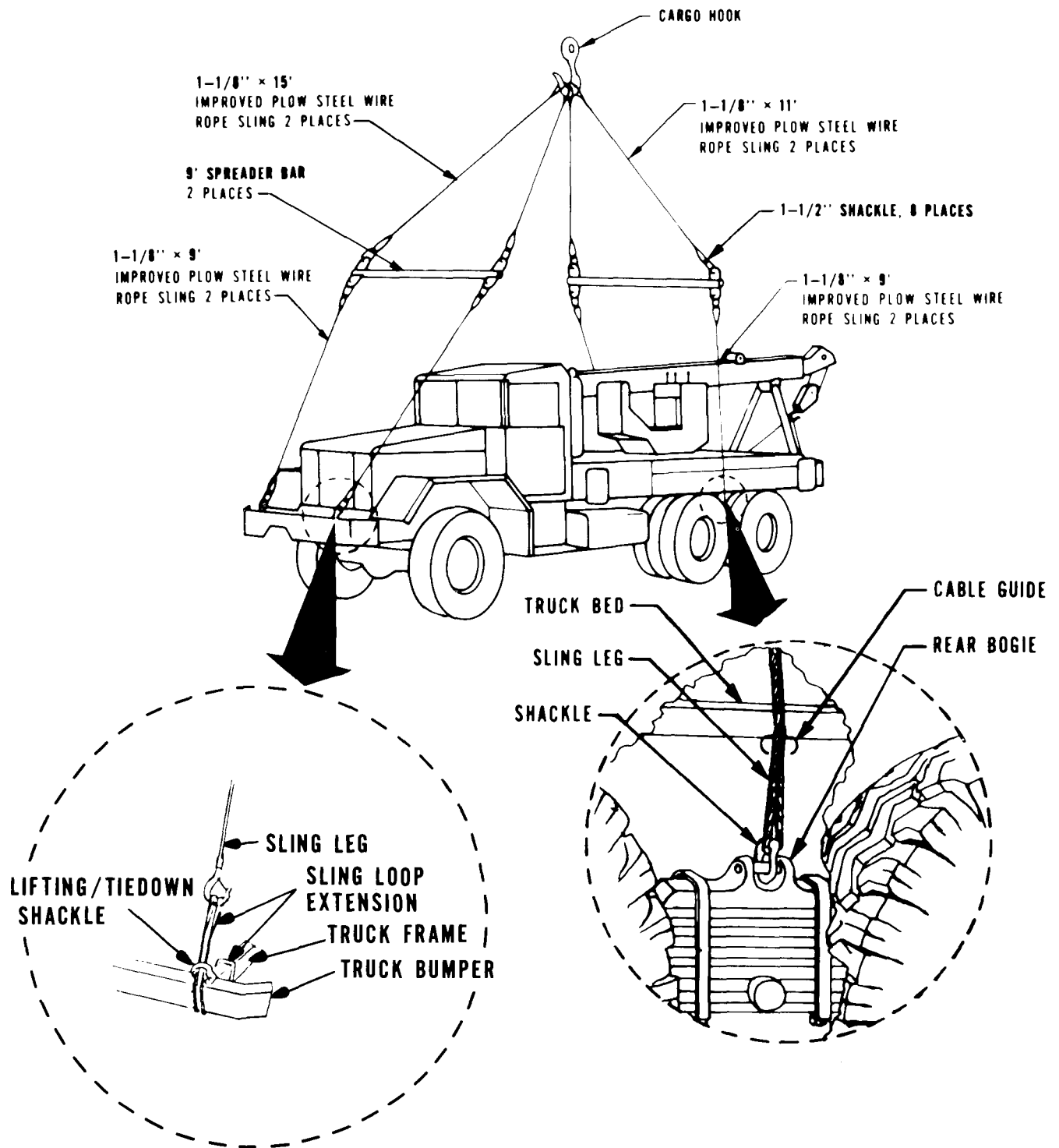


Figure 6-2. Lifting diagram for M543 with eight wire sling and two spreader bars.

NOTE

Nylon slings of adequate capacity may be substituted for the wire rope looped around the

frame and front bumper. A rubber hose, such as a used fire hose, should be used as cushioning material between the nylon sling and truck frame.

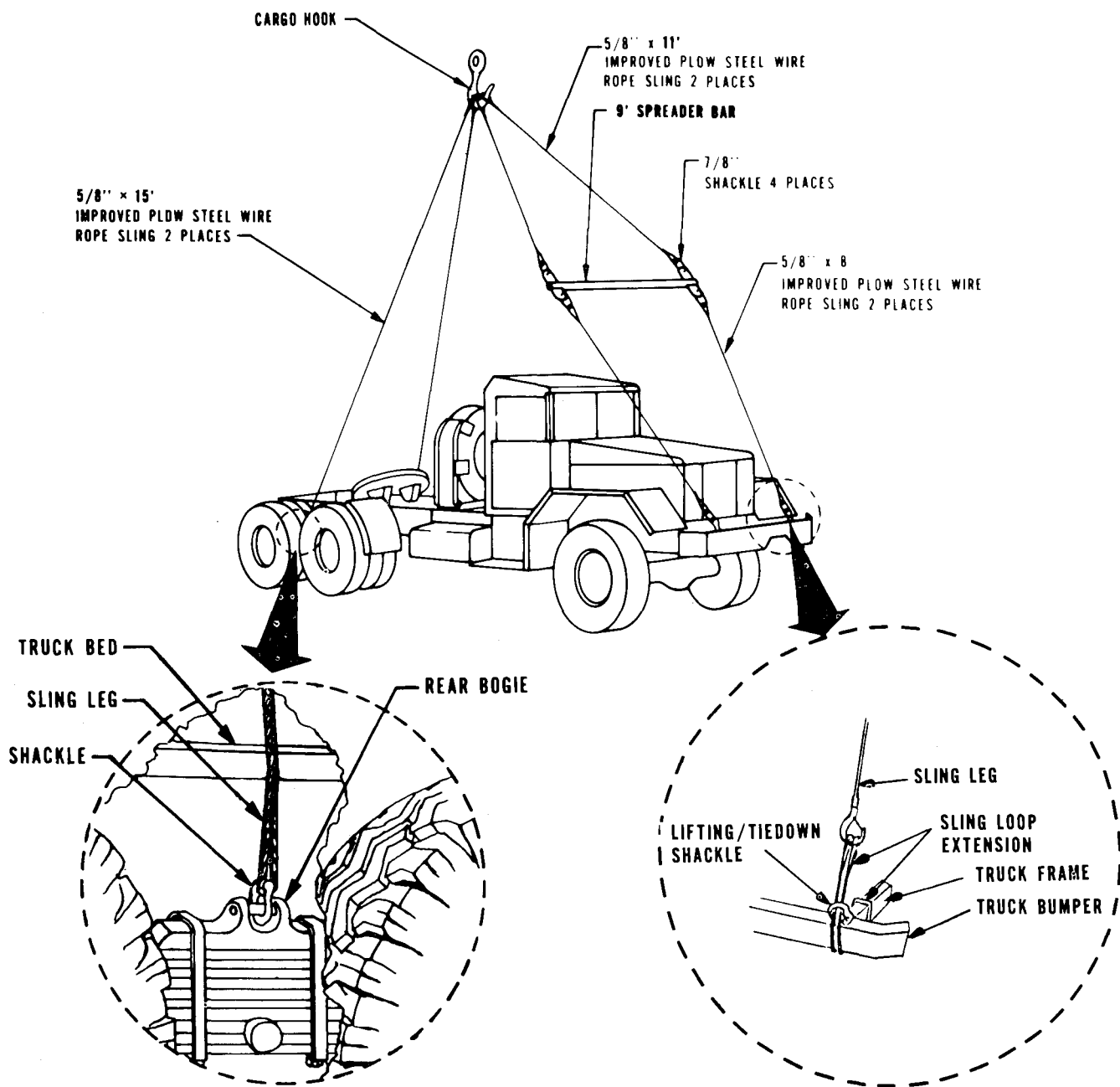


Figure 6-3, Lifting diagram for M52 with six-wire sling and one spreader bar.

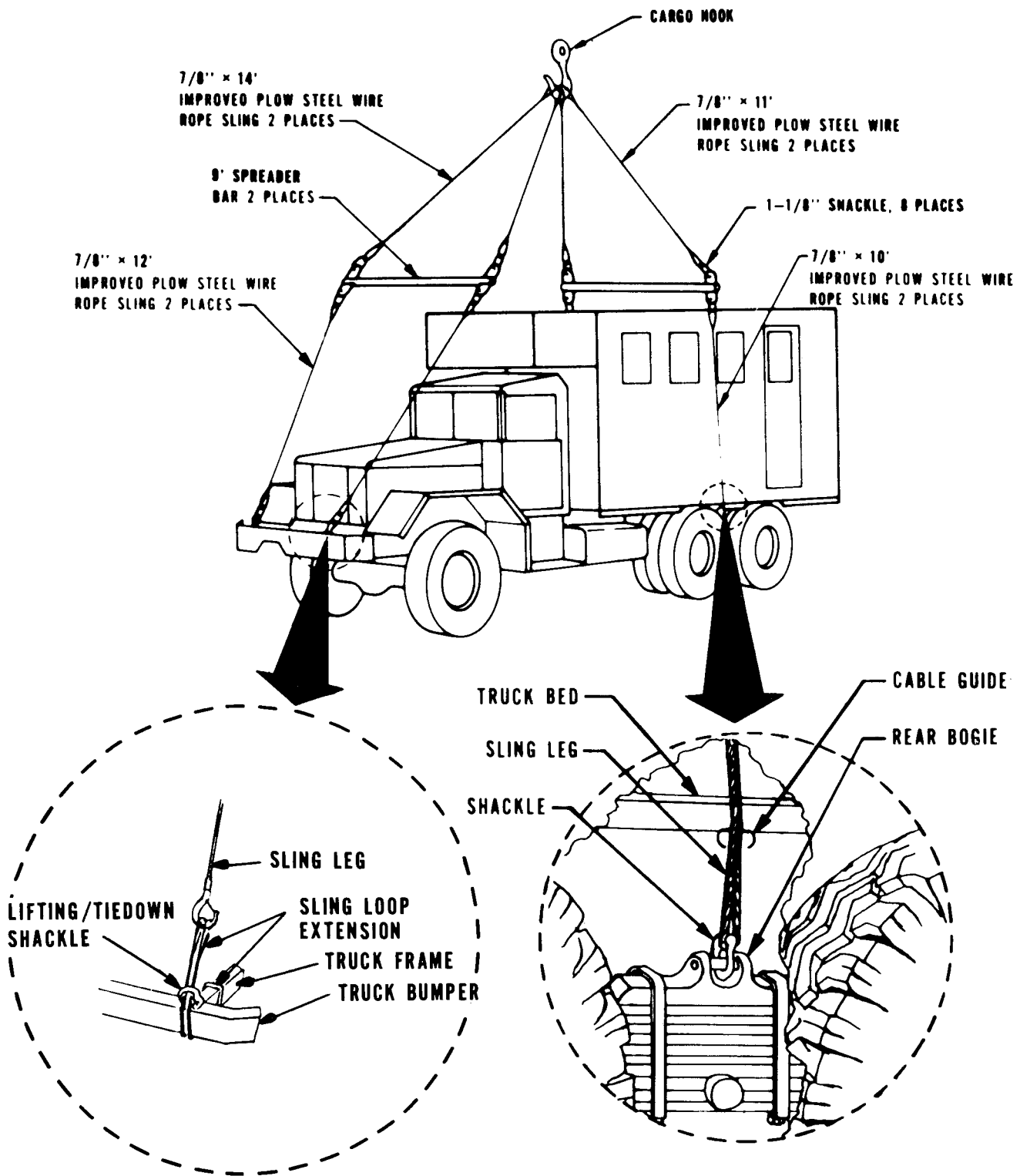


Figure 6-4. Lifting diagram for M291A2 with eight-wire sling and two spreader bars.

CAUTION

The two front shackles on top of the front bumper must not be used for lifting.

(2) The rear lifting points are located on the spring saddle and pin assembly located on top of the rear springs. Bodies are reinforced near the spring and pin assembly. The

sling leg is passed through the cable guide attached to the bottom outside edge of the cargo body, to eliminate the possibility of lifting slings shifting during lifting operations. The rear sling-leg eyes are attached directly to the pin in the spring saddle with a shackle. Typical lifting diagrams are shown in figures 6-1 through 6-4.

b. **Loading.** Vehicles are always loaded onto vessels in their minimum configuration—that is, reduced height, with

or without cargo, and side view mirrors folded back or removed to reduce the width of the vehicles. The vehicles 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) under their own power or by crane. They can be loaded under their own power also onto the deck of barges from a pier when tidal conditions are suitable and ramps are available. The vehicles can be loaded onto seagoing vessels by shoreside or floating cranes. Jumbo booms and heavy-lift ship's gear may be used

in loading vehicles on vessels. The vehicles can also be loaded on roll-on/roll-off vessels either under their own power or by towing. Figure 6-5 shows typical blocking and tiedown details of a representative 5-ton truck in the hold of a general cargo vessel.

c. *Material.* Table 6-1 is the approximate bill of materials for blocking and tiedown. Table 6-2 provides data concerning the application of materials required to restrain the vehicle.

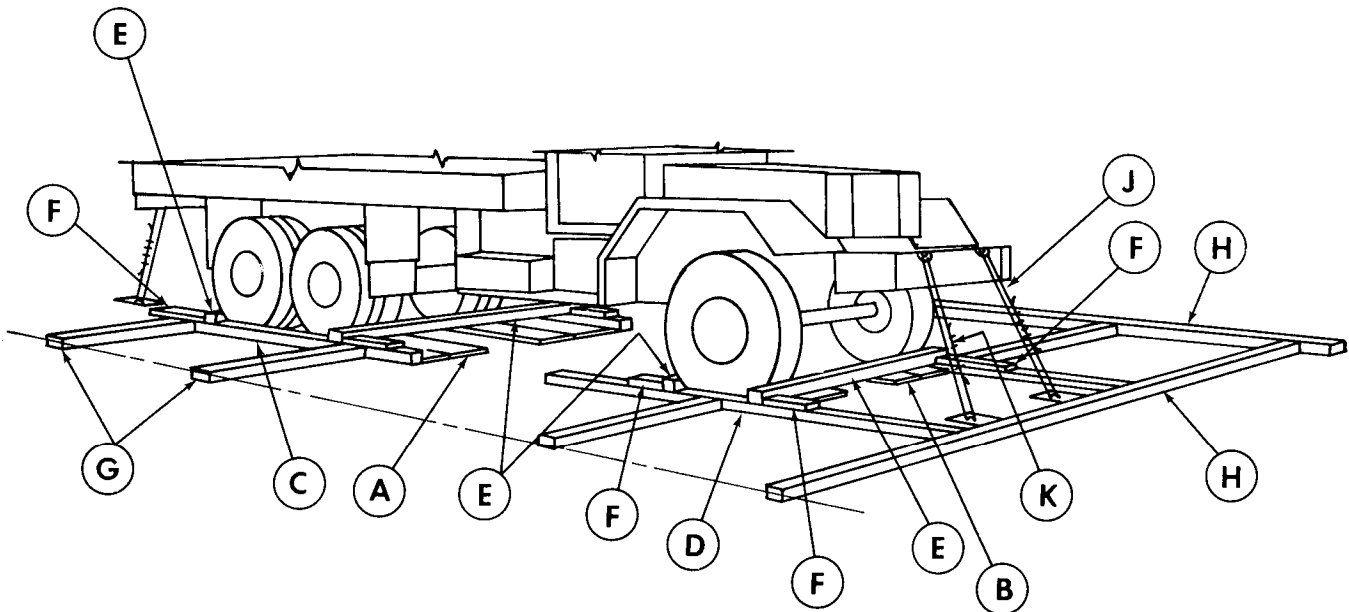


Figure 6-5. Typical blocking and tiedown of 5-ton truck in general cargo vessel.

Table 6-1. Bill of Material for Blocking and Tiedown of Typical 5-Ton, 6x6 Truck in Hold of General Cargo Vessel (fig 6#5).

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.	16 linear ft
	2- x 12-in.	72 linear ft
	4- x 6-in.	90 linear ft
Nails	Common, steel; flathead, bright or cement-coated; para 3.6.11.2, Fed Spec FF-N-105B:	
	12d	40
	30d	50
	60d	16
Wire Rope	Type I, general purpose; class 2, 6 x 19, improved plow steel, wire strand core or IWRC; Fed Spec RR-W-410C: 5/8-in.	100 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.	16

Table 6-2. Application of Materials for Blocking and Tiedown of Typical 5-Ton, 6x6 Truck in Hold of General Cargo Vessel (fig 6-5)

Item	No. Required	Application
A	6	Flooring, 2- x 12- x 96-in. lumber. Locate under rear wheels.
B	4	Flooring, 2- x 12- x 72-in. lumber. Locate under front wheels.
C	2	Side blocking for rear wheels, 4- x 6- x 108-in. lumber. Locate at side of rear wheels.
D	2	Side blocking for front wheels, 4- x 6- x 54-in. lumber. Locate at side of front wheels.
E	4	Blocks, 4- x 6- x 108-in. lumber. Locate one in front of front and intermediate wheels and in back of front and rear wheels. Toenail each end to side blocking with two 60d nails.
F	8	Cleats, 2- x 4- x 24-in. lumber. Locate against blocks (item E) as indicated in figure 6-5, and secure each to side blocking (item D) with five 12d nails.
G	as required	Bracing, 4- x 6-in. x random-length lumber, cut-to-fit. Place ends against side blocking and blocking of other cargo, side of ship, or other ship's structure, and secure each end with four 30d nails.
H	as required	Blocking, 4- x 6-in. x random-length lumber. Place around truck and against other blocking, side of vessel, or other ship's structure to assist in holding bracing in place.
J	4	Wire rope, 5/8-in. Each cable will form a complete loop between vehicle tiedown shackle and deck padeye.
K	16	Clamps, 5/8-in. Place four clamps over each cable loop at the overlap area and space 3 1/2-in. apart, with a minimum of 6 in. from ends of cable. See sketch 1, figure 7-2.

6-4. Special Design Vessels

Seatrain/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 vehicles are to be transported aboard such vessels, use of the

on board restraint equipment will be adequate, and no further blocking or bracing will be required. For movement by barge or similar lighterage, the vehicles must be blocked and braced. When vehicles are to be transported aboard landing craft and amphibious lighters extended distances on water, they 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 M39-series trucks, 5-ton, 6x6. It covers significant technical and physical characteristics and safety considerations; prescribes the materials and provides

guidance to prepare, load, tie down, and unload the vehicles.

7-2. Maximum Utilization of Railcars

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

Section II. TRANSPORT ON CONUS RAILWAYS

7-3. General

The transportability guidance contained in this section is applicable when the trucks are transported on CONUS railways. Consideration is given to single and multiple movements on the types of railcars normally used for the movement of these vehicles. The vehicles, when loaded on suitable railcars, can be transported without sectionalization or major disassembly, except for the M291-series expansible vans, which have a nonreducible maximum height of 137.8 inches. These vehicles will require special routing under the provisions of restricted rail movements. All other vehicles, when at their respective reduced heights, are transportable within 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 vehicles before being transported by railcar is dependent upon the operational commitment.

7-5. Loading Trucks on General Purpose Flatcar

a. Trucks may be placed in the tiedown position on the railcar by a crane, or they may be driven or towed onto the railcar provided 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 5-ton trucks except for the trucks, stake, bridge-transporting, which will require a car minimum width of 10 feet 6 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 a tiedown of the vehicles, and table 7-2 provides data concerning the application of materials required for securing vehicles 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.

7-6. Loading Trucks on Special -Purpose Flatcars

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

b. Figure 7-3 shows 5-ton trucks loaded on a flatcar equipped with center tiedown rails. Table 7-3 provides instructions for the application of chain tiedowns for securing vehicles on center tiedown flatcars. Table 7-4 gives the quantity of trucks that can be loaded on cars with center tiedown rails.

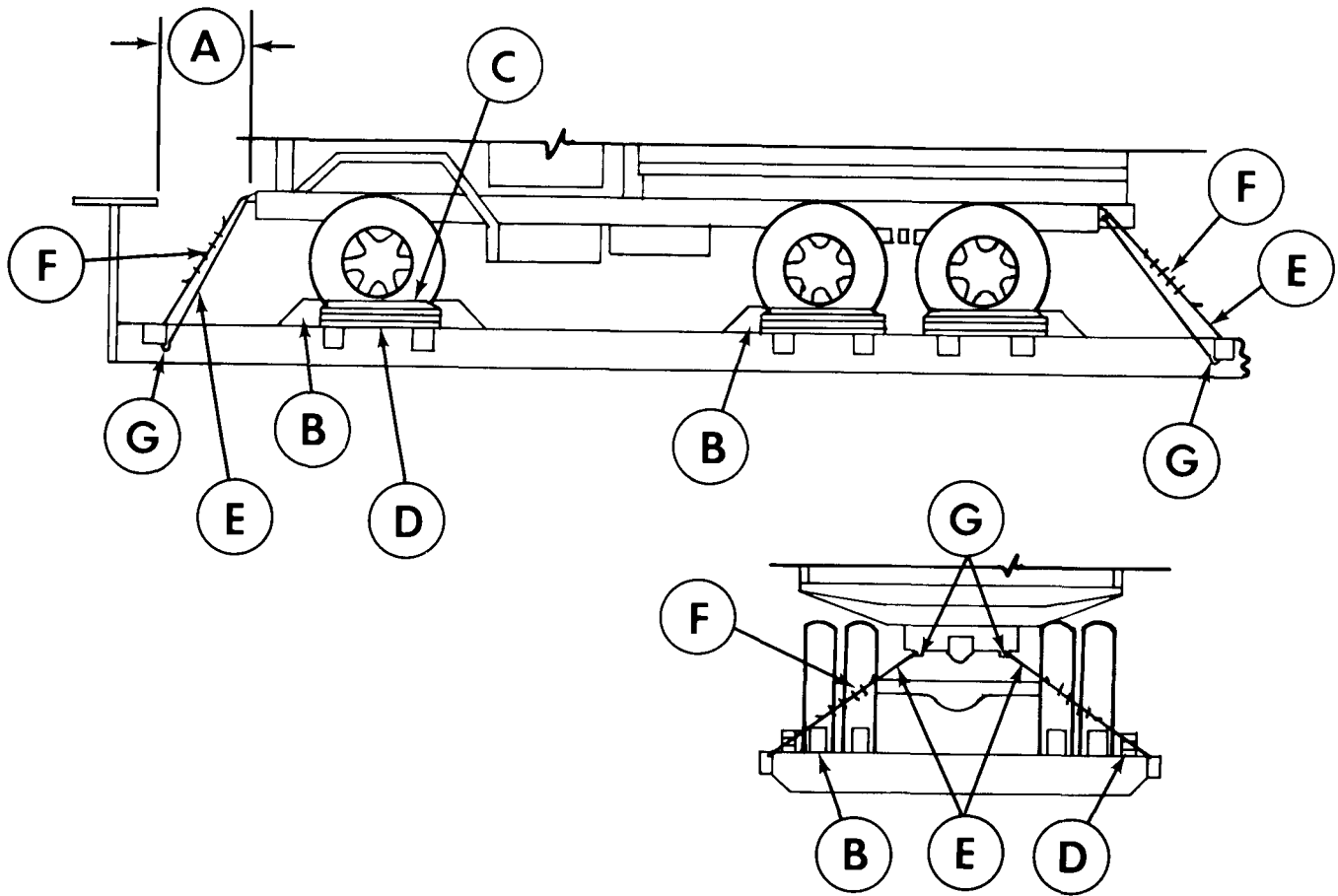


Figure 7-1. Blocking and tiedown diagram of 5-ton, 6 x 6 truck on CONUS general-purpose flatcar.

Table 7-1. Bill of Materials for Blocking and Tiedown of Typical 5-Ton, 6 x 6 Truck 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.	54 ft
	2- x 6-in.	18 ft
Nails	6- x 8-in.	18 ft
	Common, steel; flathead, bright, or cement-coated; para 3.6.11.2, Fed Spec FF-N-105B:	
	12d	30
Wire Rope	20d	72
	40d	60
Clamps	Type I, general purpose; class 2, 6x19, improved plow steel, wire strand core or IWRC; Fed Spec RR-W-410C:	
	1/2-in.	100 ft
	Wire rope, U-bolt clips, saddled, single-grip, forged steel, Crosby heavy-duty, or equal; Fed Spec FF-C-450D:	
Thimbles	1/2-in.	24
Cushioning material	Standard, open-type: 1/2-in	8
Blocks	Waterproof paper, or suitable material	as required
	Chock block; see detail 1, figure 7-2	12

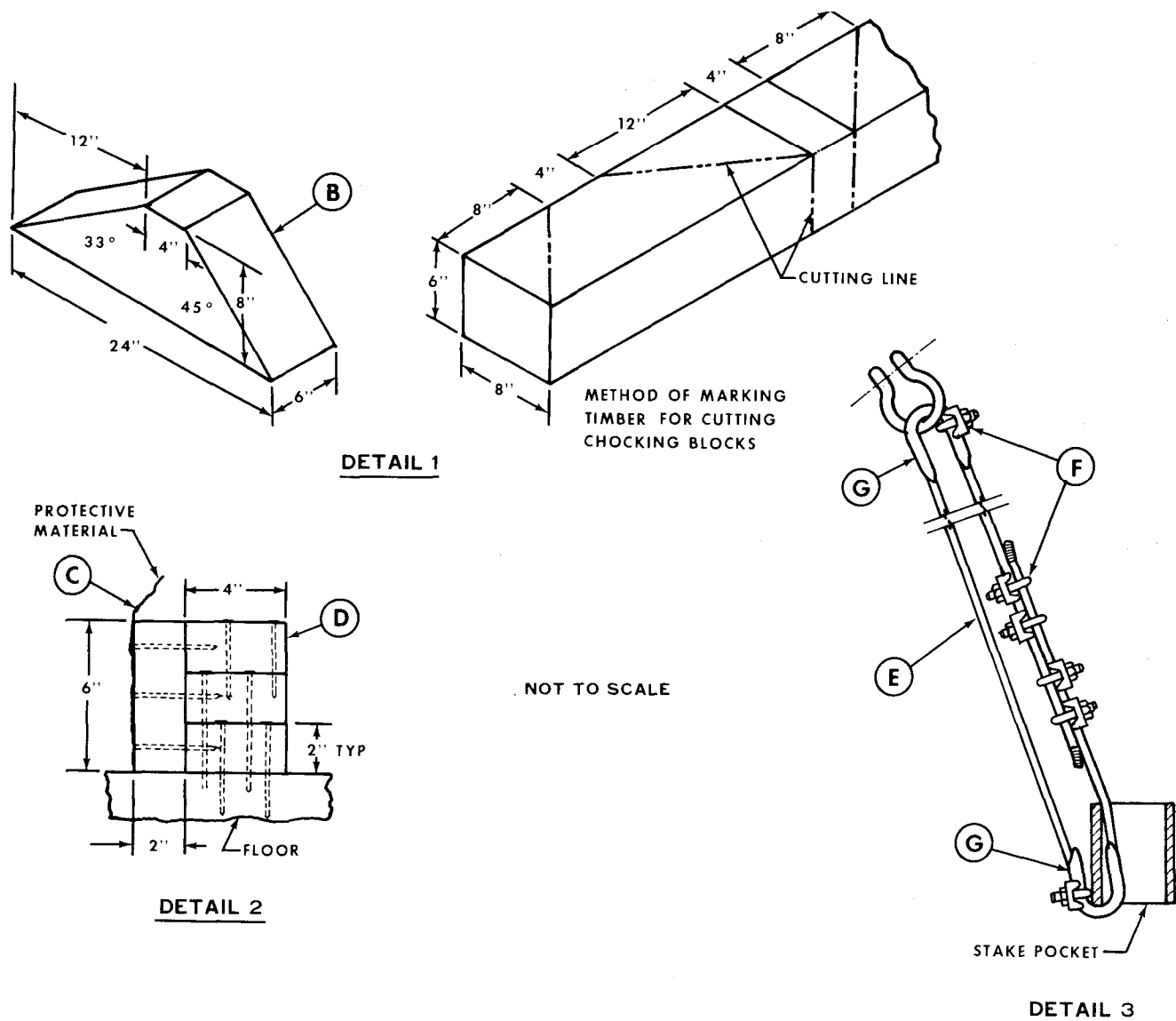


Figure 7-2. Blocking and tiedown details.

Table 7-2. Application of Materials for Blocking and Tiedown of Typical 5-Ton, 6x6 Truck on CONUS General-Purpose Flatcar (figs 7-1 and 7-2)

Item	No. Required	Application
A		Brake-wheel clearance. Minimum clearance required is 6 in. above, in back of, and on both sides of and 4 in. underneath wheel (fig. 7-1).
B	12	Chock blocks (detail 1, fig 7-2). Locate 45° portion of block against front and rear of front wheels, in front of inside and outside intermediate wheels, and in back of inside and outside rear wheels. Nail heel of block to car floor with three 40d nails, and toenail that portion of block under tire to car floor with two 40d nails before items 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	Blocks, each consist of one piece of 2- x 6- x 36-in. lumber and three pieces of 2- x 4- x 36-in. lumber (detail 2, fig 7-2). Nail one 2- x 6- x 36-in. piece to the edge of one of the 2- x 4- x 36-in. pieces with five 12d nails. Place against tire with item C in place, and nail to car floor through 2- x 4- x 36-in. piece with four 20d nails. Nail other two 2- x 4- x 36-in. pieces to one below in like manner (detail 2, fig 7-2).
E	4	Wire rope, ½-in. Attach through the vehicle tiedown shackle, in a complete loop, through the stake pocket on the same side of the car (sketch 1, item E, fig 7-2). Place a thimble at the bottom of each stake pocket and secure thimble to wire rope with cable clip (clamp) (sketch 1, item G, fig 7-2).
F	24	Clamps, ½-in. Secure the ends of the wire rope, at the overlap area, with four clamps each, and space 3 ½-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 shackle and stake pocket (sketch 1, item F, fig 7-2).
G	8	Thimble, open-type, ½-in. Place one at bottom of each stake pocket and through each vehicle tiedown device (sketch 1, item G, fig 7-2).

GENERAL INSTRUCTIONS

1. All handbrakes are to be firmly set with the hand levers wired or blocked. Gearshift levers for automatic or conventional transmissions must be placed and wire-tied in neutral position.
2. Tires are to be inflated to 10 psi above highway operating pressures.

3. See General Rules 2, 3, 4, 5, 7, 9, 10, 14, 15, 19A 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.

Table 7-3, Application of Chain Tiedown for Securing 5-Ton, 6x6 Trucks on Flatcars Equipped With Center Tiedown Rail (fig 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.
B	4 ea unit	½-in. dia. alloy steel chain proof-tested to minimum of 22,500 lb for vehicles over 16,000 lb and up to 25,000 lb, inclusive. ½-in. dia. alloy steel chain, extra strength, proof-tested to minimum of 27,500 lb for vehicles over 25,000 lb and up to 40,000 lb, inclusive.

GENERAL INSTRUCTIONS

1. Shippers should specify cars equipped with tiedown devices in the quantity shown in Item B when ordering specialized railway equipment. When carriers furnish cars that do not have built-in chains and tensioning devices, chains and turnbuckles of appropriate size and strength will be used for securement of vehicles. Load binders are not to be used in lieu of turnbuckles to tension tiedown chains.
2. Vehicles must face in the same direction and be uniformly spaced along the length of the car to allow sufficient space at each end of the car and between the vehicles for securement. Apply tiedowns parallel to each other at the same end of the vehicle and from the vehicle tiedown point to the car tiedown facility. The angle of the tiedown should be as close to 45° as possible. When length of vehicles loaded on a 75-ft car precludes facing all in the same direction, one vehicle may be reversed to insure application of tiedown at a floor angle of 45°.
3. Handbrakes must be set.
4. Gearshift levers on vehicles equipped with automatic or

standard transmissions must have the gearshift lever wire-tied in neutral position.

5. Open hooks must be secured with wire over the opening to prevent the hook from becoming disengaged from chain link to which it is secured.
6. Turnbuckles used to tighten chains must be wired or locked to prevent the turnbuckles from turning during transit, unless turnbuckles are equipped with self-locking devices.
7. When vehicles are shipped in a loaded configuration, the gross weight of the vehicle and cargo combined must be determined in order to assure that the proper size and/or number of tiedowns are used to secure the vehicles to the railcar. The "weight" column of table 2-1 may be used as a base figure to determine the new restraint requirements imposed by the additional weight of the cargo.
8. Method of loading as shown is applicable to vehicles weighing up to 40,000 lb each. Vehicles in the quantity shown in table 7-4 can be loaded on 60-ft, 75-ft, 85-ft, and 89-ft cars.

Table 7-4. Quantity of M39-Series Trucks That Can Be Loaded on Railroad Cars With Center Tiedown Rails

Model	Description (truck, 5-ton, 6 × 6)	Quantity per car			
		60-ft.	75-ft.	85-ft.	89-ft.
M54	Cargo	2	2	3	3
M54A1C	Cargo, dropside	2	2	3	3
M55	Cargo	1	2	2	2
M51	Dump	2	3	3	3
M52	Tractor	2	3	3	3
M246	Tractor, wrecker	1	2	2	2
M62	Wrecker	1	2	2	2
M543	Wrecker	1	2	2	2
M748A1	Bolster	2	2	3	3
M139 chassis	Stake, bridge transporting	1	2	2	2
M328A1	Stake, bridge transporting	1	2	2	2
M291	Van, expansible	1	2	2	2

Section III. TRANSPORT ON FOREIGN RAILWAYS

7-7. General

The transportability guidance contained in this section is applicable when the M39-series trucks 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. The vehicles, except the M62, M246, M291, M543, M748A1, and all trucks, stake, bridge transporting, 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 most of the countries in the Middle East as well as to South America, Australia, India, and Pakistan. Because of the height of the above-mentioned vehicles, 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, India, and Pakistan, wide- or broad-gauge railways provide greater

clearances and fewer 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 elevation of transport capability must be made on an individual basis.

7-8. Transport on Foreign Service Flatcars

a. *General.* The vehicles can be transported on a number of foreign service flatcars.

h. *Materials.* The materials required for blocking and tiedown of the vehicles on foreign service flatcars are essentially the same as those used for CONUS railcars. For general guidance, refer to figures 7-1 and 7-2 and tables 7-1 and 7-2. Detailed guidance is contained in the 4th Transportation Command Pamphlet 55-2, *Tiedown Guide for Rail Movements*.

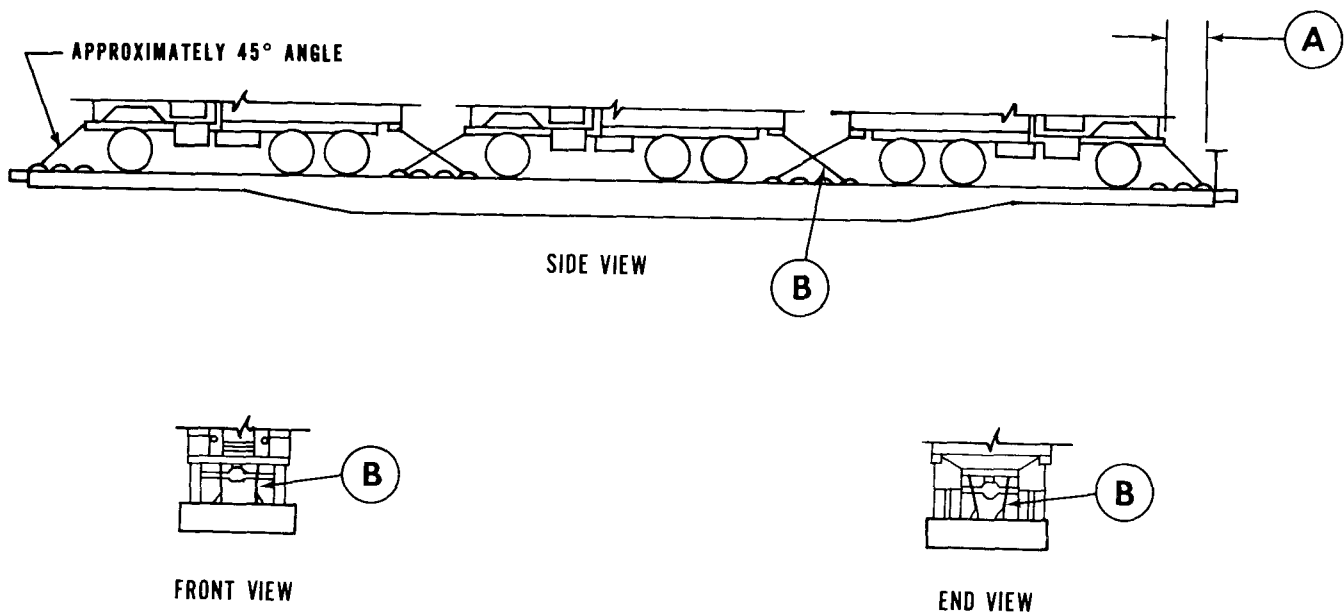


Table 7-3. Application of Chain Tiedown for securing 5-Ton, 6x6 Truck, on Flatcars Equipped With Center Tiedown Rails (fig 7-3)

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
53-355	Military Traffic Management Regulation
70-47	Engineering for Transportability
385-40	Accident Report and Records
746-1	Packaging of Army Materiel for Shipment and Storage

A-3. Field Manuals (FM)

1-100	Army Aviation Utilization
5-36	Route Reconnaissance and Classification.
55-9	Unit Air Movement Plan
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 Bulletins (TB)

55-46-1	Standard Characteristics (Dimensions, Weight, and Cube) for Transportability of Military Vehicles and Other Outsize/ Overweight Equipment
ENG 330	Air Movement Instructions (Grouping, Modification, Disassembly, and Reassembly) for Truck, Stake, 5-Ton, 6x6, Military Bridging on Ordnance M139 Chassis

A-6. Technical Manuals (TM)

5-725	Rigging
9-2320-211-10	Operator's Manual for Truck, Chassis: 5-Ton, 6 x 6 M39 Series
9-2320-211-20	Organizational Maintenance for Truck, Chassis: 5-Ton, M39 Series
38-236 (AFP 71-8)	Preparation of Freight for Air Shipment
38-250 (AFR 71-4)	Packaging and Materials Handling: Preparation of Hazardous Materials for Military Air Shipment
55-405-9	Army Aviation Maintenance Engineering Manual: Weight and Balance
55-450-10/2 (AFM 76-4)	Air Transport of Supplies and Equipment: Standard Loads in Air Force C- 141 Aircraft
55-500	Marine Equipment Characteristics and Data
55-600	Transportation Services at Continental United States (CONUS) Installations
55-601	Railcar Loading Procedures
55-603 (AFR 75-5)	Movement of Military Impedimenta by Commercial Carriers
55-2200-001-12	Transportability Guidance for Application of Blocking Bracing, and Tiedown Materials for Rail Transport
55-2320 -260-15-1	Transportability Guidance: Trucks, 5-Ton, 6 x 6, M809-Series

A-7. Technical Orders (TO)

1-1B-40	Handbook of Weight and Balance Data
1C-5A-9	Loading Instructions, USAF Series C-5A Airplane
1C-130A-9	Loading Instructions, USAF Series C-130 Aircraft
1C-141B-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 systems 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. I - General Rules

Section No. 6 - Rules Governing the Loading of Department of Defense Materiel

Available from: Secretary, Mechanical Division
Association of American Railroads
ATTN: U. 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. 20056

APPENDIX B

CONVERSION TABLES

B-1. *Common Metric Abbreviations.*

m = meter	cm = centimeter	kg = kilogram	t = metric ton
dm = decimeter	mm = millimeter	km = kilometer	

B-2. *Linear Measure.*

1 mi = 1,609.35 m	1 ft = 0.3048 m	1 km = 0.6214 mi	1 m = 3.2808 ft
1 yd = 0.9144 m	1 in = 0.0254 m	1 m = 1.0936 yd	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 in = 0.00065 sq m	1 sq m = 10.764 sq ft
1 sq ft = 0.0929 sq m	1 sq m = 1.196 sq yd	1 sq m = 1,550 sq in

B-4. *Cubic Measure.*

1 MTON = 1.1328 cu m	1 cu in = 0.000016 cu m	1 cu m = 35.31 cu ft
1 cu yd = 0.76455 cu m	1 cu m = 0.883 MTON	1 cu m = 61,023 cu in
1 cu ft = 0.02832 cu m	1 cu m = 1.31 cu yd	

B-5. *Weight.*

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

B-6. The following simplified conversion factors are accurate to within 2 percent for quick computations:

- Inches to centimeters* — Multiply in. by 10 and divide by 4.
- Yards to meters* — Multiply yd by 9 and divide by 10.
- Miles to kilometers* — Multiply mi by 8 and divide by 5.
- 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. 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. diam = 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:

Official:

PAUL T. SMITH

Major General, United States Army

The Adjutant General

FRED C. WEYAND

*General, United States Army
Chief of Staff*

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