

TECHNICAL MANUAL

TRANSPORTABILITY GUIDANCE

TRUCK TRACTOR, LINE-HAUL, M 915, 6x4, 14-TON
(NSN 2320-01-028-4395)

TRUCK TRACTOR, LINE-HAUL, M915A1, 6x4, 14-TON
(NSN 2320-01-125-2640)

TRUCK TRACTOR, LIGHT EQUIPMENT TRANSPORTER
(LET), M916, 6x6, 14-TON
NSN 2320-01-028-4396

TRUCK TRACTOR, MEDIUM EQUIPMENT TRANSPORTER
(MET), M920, 8x6, 20-TON
(NSN 2320-01-028-4397)

TECHNICAL MANUAL }

NO. 55-2320-273-14 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 11 August 1986**TRANSPORTABILITY GUIDANCE****(TRUCKS, 14- AND 20-TON M915 FAMILY OF
VEHICLES (FOV) SERIES)****TRUCK TRACTOR, LINE-HAUL, M915, 6x4, 14-TON
(NSN 2320-02-028-4395)****TRUCK TRACTOR, LINE-HAUL, M915A1 , 6x4, 14-TON
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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 M915 family of vehicles (FOV) 14- and 20-ton trucks, which include the M915, M916, and M920. It contains information considered appropriate for safe transport of the item. Also included are significant technical and physical characteristics, as well as safety considerations required for worldwide movement by various transportation modes. Where considered necessary, metric equivalents are given in parentheses following the dimensions or other measurements.

b. This manual is intended for transportation officers and other personnel responsible for movement or for providing transportation services.

1-2. Safety

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

1-3. 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. Instructions that, if not followed, could result in injury to or death of personnel.

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

c. Note. A brief statement for use as necessary to emphasize a particular operating procedure, condition, and so forth.

1-4. Reporting of Recommendations and Comments

Individual users of this manual are encouraged to submit comments and recommendations for its improvement. Reports should be prepared on DA Form 2028 (Recommended Changes to DA Publications and Blank Forms) and forwarded to Commander, Military Traffic Management Command Transportation Engineering Agency, ATTN: MTT-TRC, PO Box 6276, Newport News, VA 23606-0276. (Electrically transmitted messages should be addressed to CDR MTMC TEA FT EUSTIS VA//MTT-TRC//.) A reply will be furnished by this command.

CHAPTER 2

TRANSPORTABILITY DATA

Section I. GENERAL

2-1. Scope

This chapter provides a general description and identification photographs of the M915 FOV 14- and 20-ton trucks, as well as tabulated transportability data that are necessary for movement of these vehicles.

2-2. Description

The 14- and 20-ton trucks covered in this manual are the M915, M915A1, M916, and M920. All are truck tractors that may vary in size and weight.

a. The M915 is a commercial, diesel-engine-driven, 6x4, line-haul truck tractor with a gross vehicle weight of 50,000 pounds (fig 2-1).

b. The M915A1 is a commercial, diesel-engine-drive, 6x4, line-haul truck tractor with a gross vehicle weight of 50,000 pounds. The main difference between this truck and the M915 is the sliding fifth wheel, which can be moved 12 inches in total length. The sliding fifth wheel is designed to reduce interference in the M915A1/semitrailer combination (fig 2-2).

c. The M916 is a commercial, diesel-engine-driven, 6x6, light equipment transporter with a gross vehicle weight of 55,000 pounds (fig 2-3).

d. The M920 is a commercial, diesel-engine-drive, 6x8, medium equipment transporter with a gross vehicle of 75,000 pounds (fig 2-4).

Section II. CHARACTERISTICS AND RELATED DATA

2-3. General

The following data on the trucks are applicable to the model number or national stock number (NSN) shown. Data are based on empty trucks unless otherwise noted.

NOTE

All measurements are in inches.

a. M915 Truck Tractor, 50,000 GVWR, 6x4.

National stock number ,2320-01-028-4395

Line item number T61103

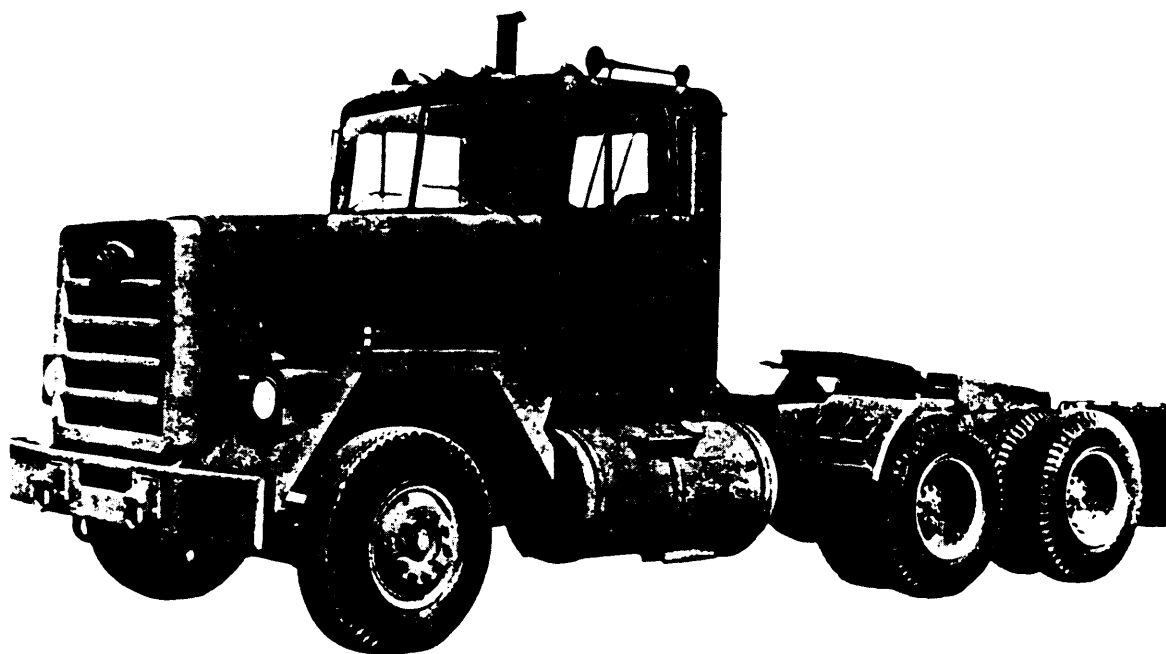


Figure 2-1. M915 truck tractor, line-haul, 14-ton, 6x4.

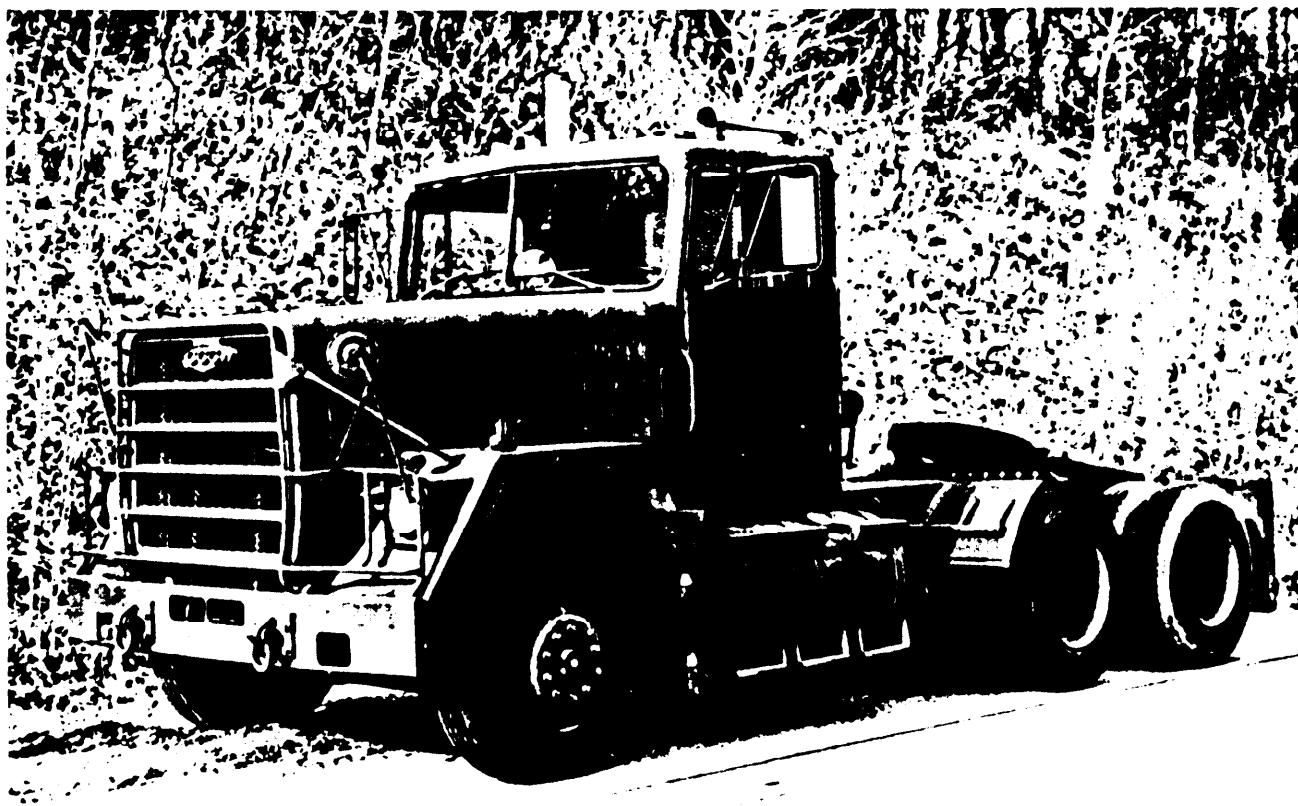


Figure 2-2. M915A1 truck tractor, line-haul, 6x4.

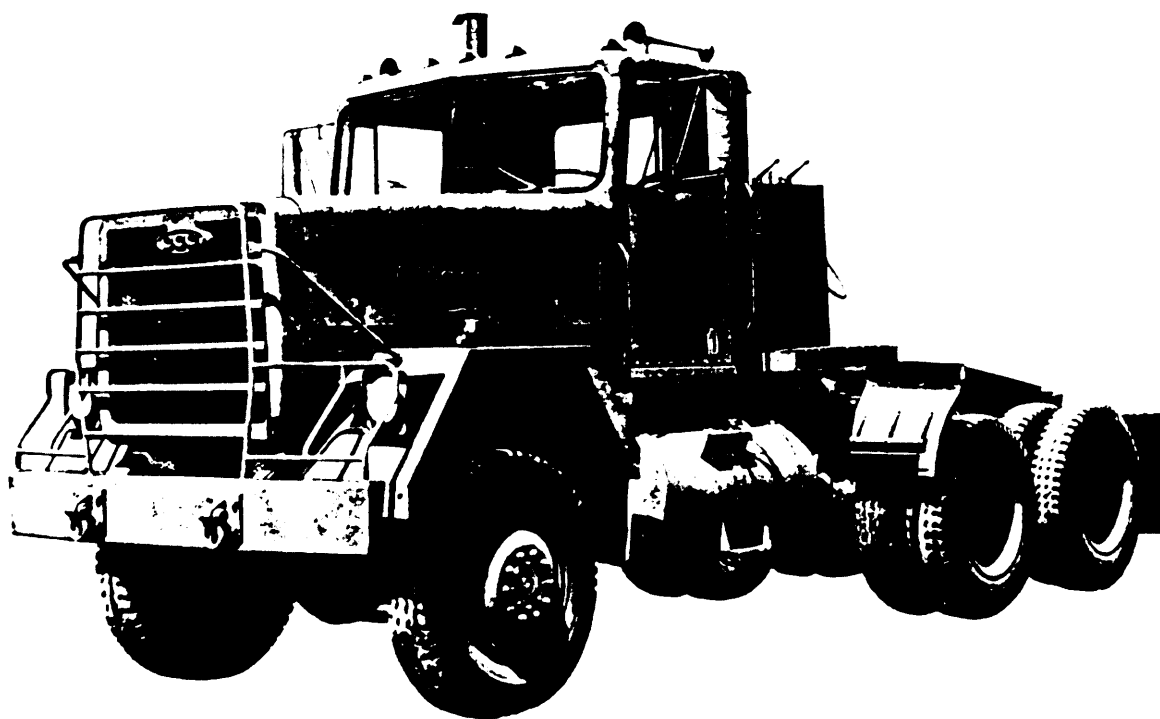


Figure 2-3. M916 truck tractor, 20-ton, 6x6.

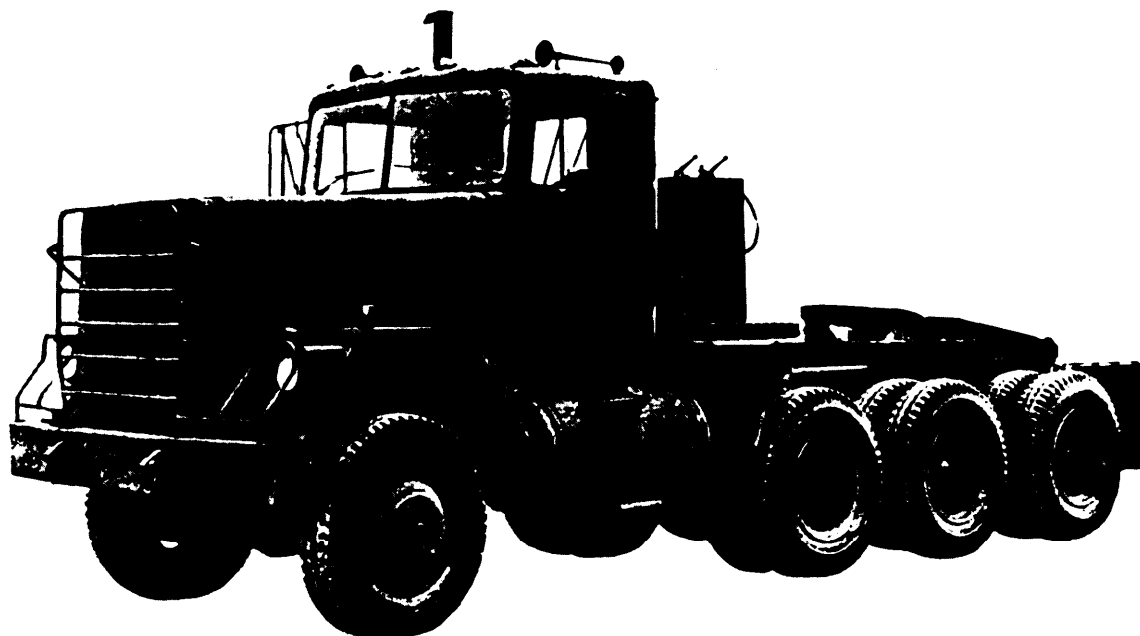


Figure 2-4. M920 truck tractor, 20-ton, 8x6.

Performance:

Maximum speed 55 mph (90 km)
 Maximum range. 280 mi (448 km)
 Fuel type Diesel
 Fuel tank capacity. 110 gal (4161)
 Turning radius 53.5 ft (16.31 m)
 Angle of approach 38°
 Ground clearance 10.1 in. (0.025m)

Dimensions and shipping data:

Length 269.00 in. (6.82 m)
 Width 96.00 in. (2.46 m)
 Height, operational 134.63 in. (3.42 m)
 Reduced 114.63 in. (2.91 m)
 Curb weight 18,621 lb(8446 kg)

Center of gravity

Longitudinally (forward of
 center of trunnion) 85 in. (2.16 m)
 Vertically (above center of
 trunnion) 21.87 in. (0.556 m)
 Laterally (left of centerline
 of vehicle) 1.0625in. (0.239 m)

b. M915A1 Truck Tractor, Line-Haul, 6x6.

National stock number 2320-01-125-2640

Performance:

Maximum speed 57 mph (91.2 km/h)
 Maximum range. 280 mi (448 km)
 Fuel tank capacity. 112 gal (424 l)
 Turning radius 53.5 ft (16.3 m)
 Angle of approach 38°
 Ground clearance. 10.4 in. (0.264 m)

Dimensions and shipping data:

Length 262 in. (6.65 m)
 Width 96 in. (2.43 m)
 Height, operational 142 in. (3.60 m)
 Reduced, 134 in. (3.42 m)
 Curb weight 19,720 lb (8945 kg)

Center of gravity:

Longitudinally (forward of center-
 line of trunnion) 86.5 in. (2.20 m)
 Vertically (above centerline of
 trunnion). 19.6 in. (0.498 m)
 Laterally (left centerline of
 vehicle) 1.3 in. (0.033 m)

c. M916 Truck Tractor, Light Equipment Transporter (LET), 55,000 G VWR, 6x6, With Winch.

National stock number . . . 2320-01-028-4396

Performance:

Maximum speed 59 mph (94.4 km/h)
 Maximum range. 280 mi (448 km)
 Fuel tank capacity 110 gal (4161)
 Turning radius 80.0 ft (24.4 m)
 Angle of approach 42°
 Ground clearance. 11.6 in. (29.5 m)

Dimensions and shipping data:

Length 310.00 in. (7.48 m)
 Width 96.00 in. (2.46 m)
 Height, operational. 142.00 in. (3.61 m)
 Reduced 128.00 in. (3.25 m)
 Weight 56,000 lb (25 402 kg)

Center of gravity:

Longitudinally (forward of center of trunnion). 91.25 in. (2.32 m)
 Vertically (above center of trunnion) 28.75 in. (0.730 m)
 Laterally (left of centerline of vehicle) 0.875 in. (0.022 m)

d. M920 Truck Tractor, Medium Equipment Transporter (MET), 7.5,000 GVWR, 826, With Winch.

National stock number 2320-01-028-4397

Performance:

Maximum speed. 59 mph (94.4 km)
 Maximum range. 280 mi (448 km)
 Fuel type Diesel
 Fuel tank capacity 110 gal (416l)
 Turning radius 89.5 ft (2.73 m)
 Angle of approach 42°
 Ground clearance. 11.6 in. (29.5 cm)

Dimensions and shipping data:

Length 319.30in. (8.11 m)
 Width 96.00 in. (2.46 m)
 Height, operational. 142.00 in. (3.61 m)
 Reduced (no load) 128 in. (3.25 m)
 Weight 24,971 lb (11 327kg)

Center of gravity:

Longitudinally (forward of center-

line of bogie axle). 104.12 in. (2.65 m)
 Vertically (above centerline of bogie axle) 26.25 in. (0.667 m)
 Laterally (left of centerline of vehicle) 0.625 in. (0.016 m)

2-4. Side and Rear Elevations

This chapter provides the necessary drawings (figs 2-5 through 2-8) for determining the loadability of the vehicles for movement by various transportation modes.

2-5. Unusual Characteristics

The M915 FOV trucks have no unusual characteristics that would require special attention be given to temperature, atmospheric pressure, or humidity variations during exposure to normal transportation environments.

2-6. Hazardous and Dangerous Characteristics

The M915 FOVs will not present any special hazardous or dangerous characteristics during exposure to normal transportation environments.

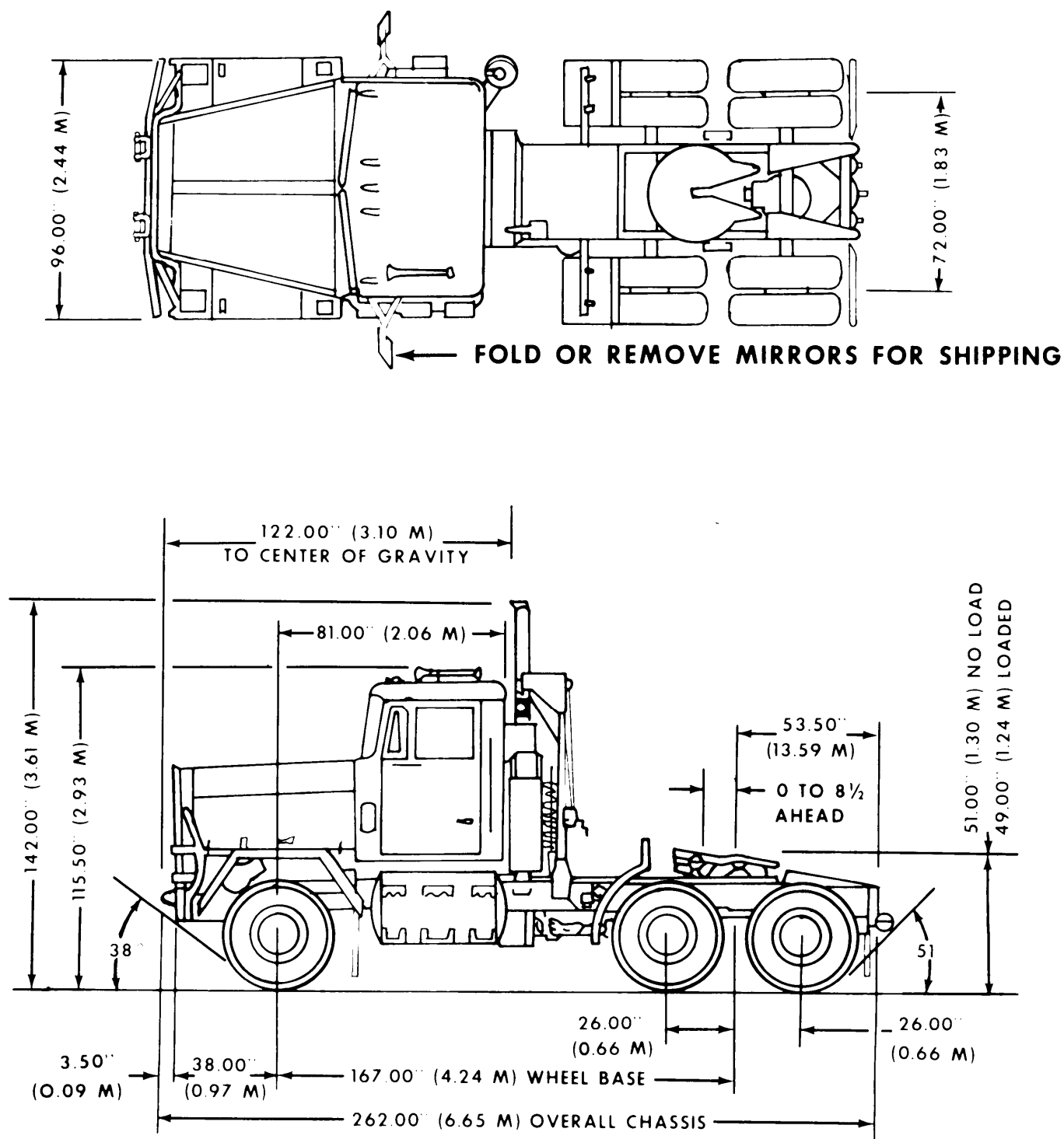


Figure 2-5. Elevation of M915.

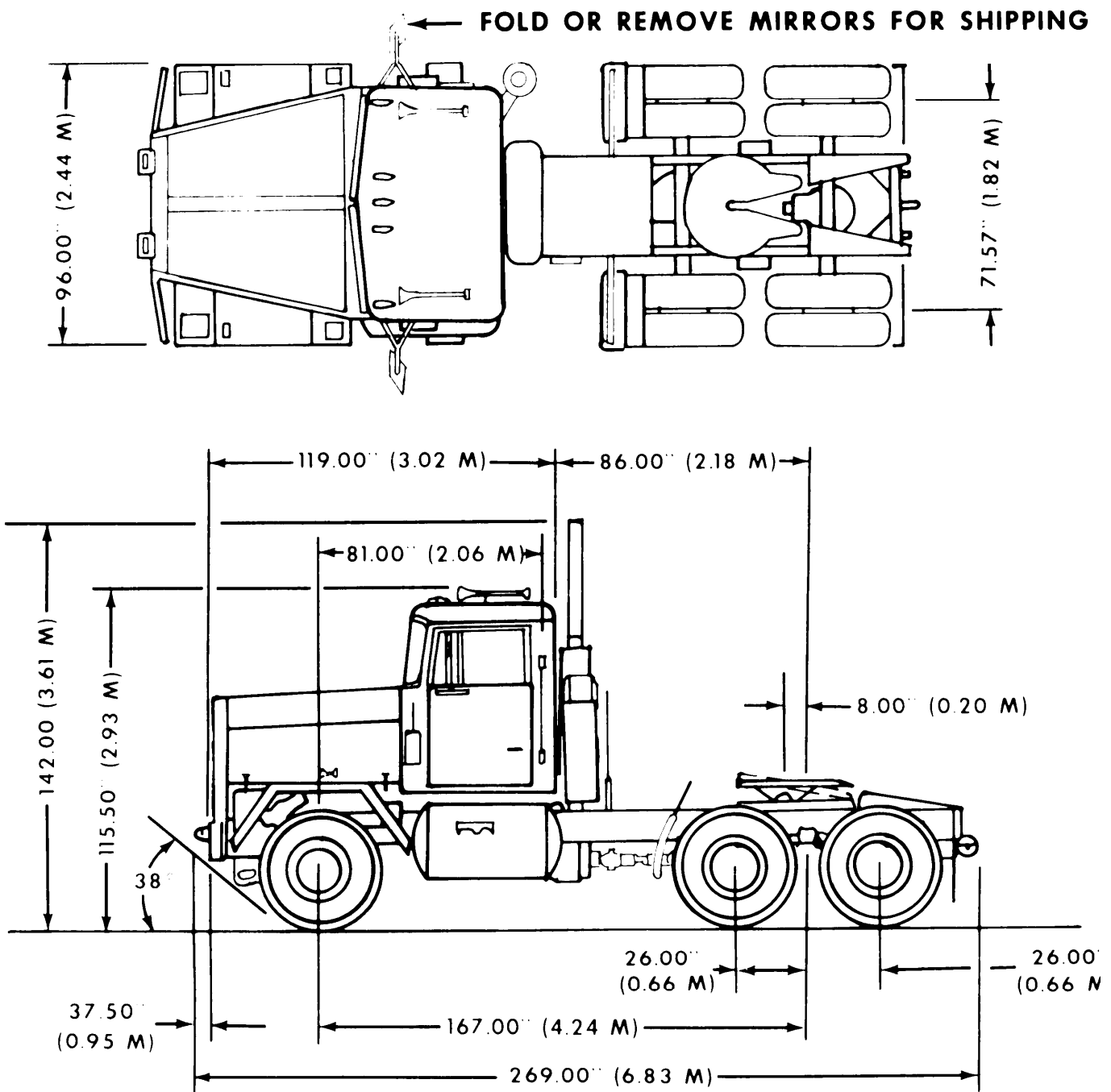


Figure 2-6. Elevation of M915A1.

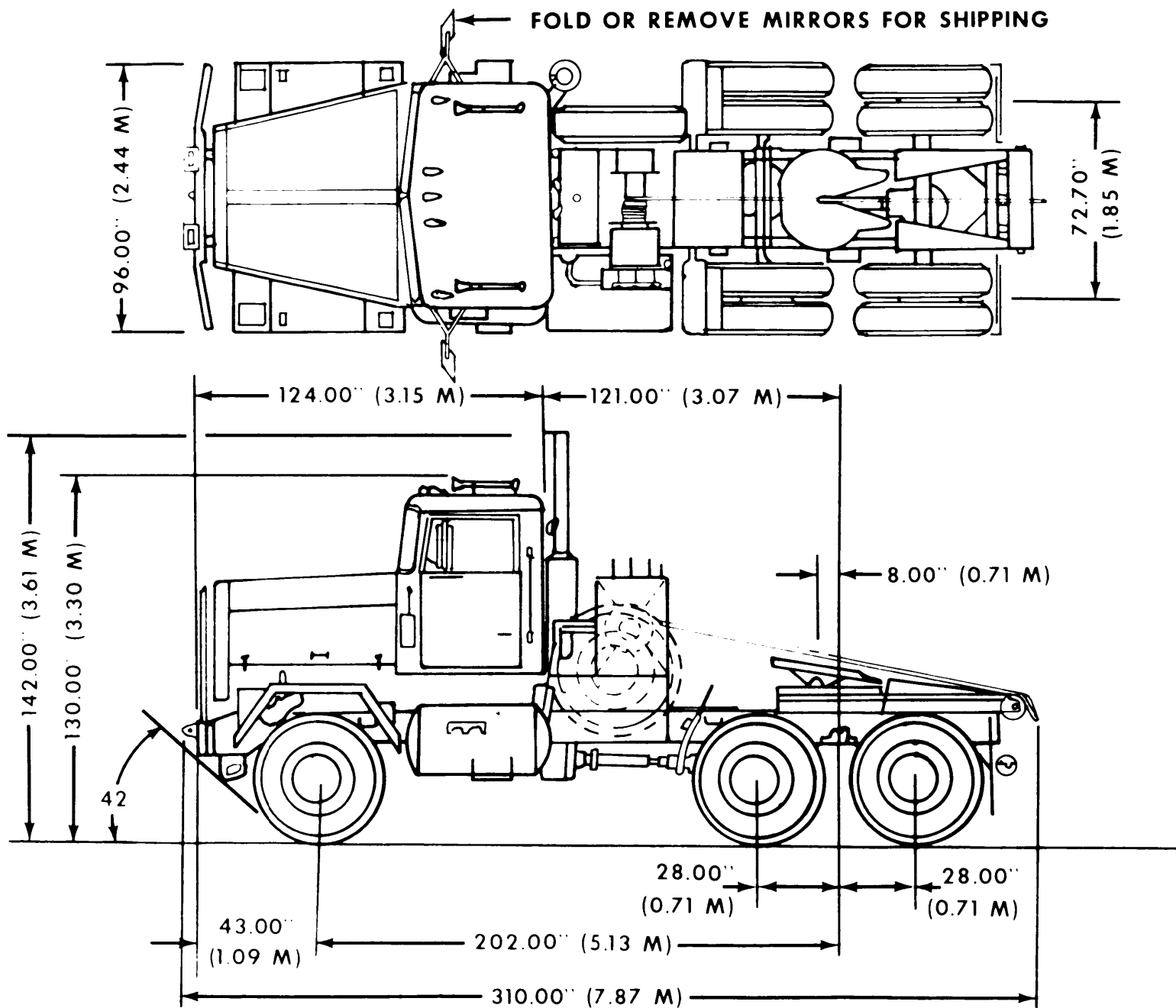
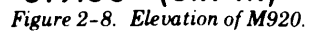


Figure 2-7. Elevation of M916.



CHAPTER 3

SAFETY

3-1. General

General safety considerations and precautions for movement are as follows:

- a.* Check each vehicle to ensure that all loose items are properly secured.
- b.* When backing the vehicle, ensure that no personnel or obstructions are behind it.

WARNING

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

WARNING

Proper ventilation must be provided during loading and unloading if the vehicle engine is used. Prolonged exposure to carbon monoxide fumes will produce adverse effects that may prove fatal.

3-2. Specific Safety Requirements

Specific safety requirements by individual modes are given where applicable in the appropriate chapters.

CHAPTER 4

AIR TRANSPORTABILITY GUIDANCE

4-1. Scope

This chapter provides air transportability guidance for movement of the 14- and 20-ton M915, M915A1, M916, and M920 truck tractors. It presents examples of tiedown diagrams and tiedown data for loading these vehicles on US Air Force aircraft.

4-2. Maximum Utilization of Aircraft

Additional cargo, including personnel within allowable load limits and restrictions prescribed by pertinent safety regulations, can be transported with these vehicles on US Air Force aircraft.

4-3. Safety

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

- a. The activity offering the vehicles for transport will notify the aircraft commander or his designated representative if ammunition or explosives are to be transported within a vehicle.
- b. Fuel tanks must not be more than one-fourth full.
- c. The vehicle must be restrained for air transport in accordance with the applicable procedures in section IV of US Air Force TO 1C-5A-9.
- d. Each vehicle must be checked carefully to ensure that all loose items are properly secured in accordance with restraint criteria.

WARNING

Proper ventilation must be provided during loading and unloading of the vehicles. 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 on loading ramps or inside aircraft.

NOTE

Cargo loads depicted in this manual are restrained to the required minimum of 3g's forward restraint.

NOTE

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

4-4. Responsibility

The loadmaster will ensure that loaded equipment is secured in accordance with restraint criteria outlined in TO 1C-5A-9.

4-5. Aircraft Capabilities

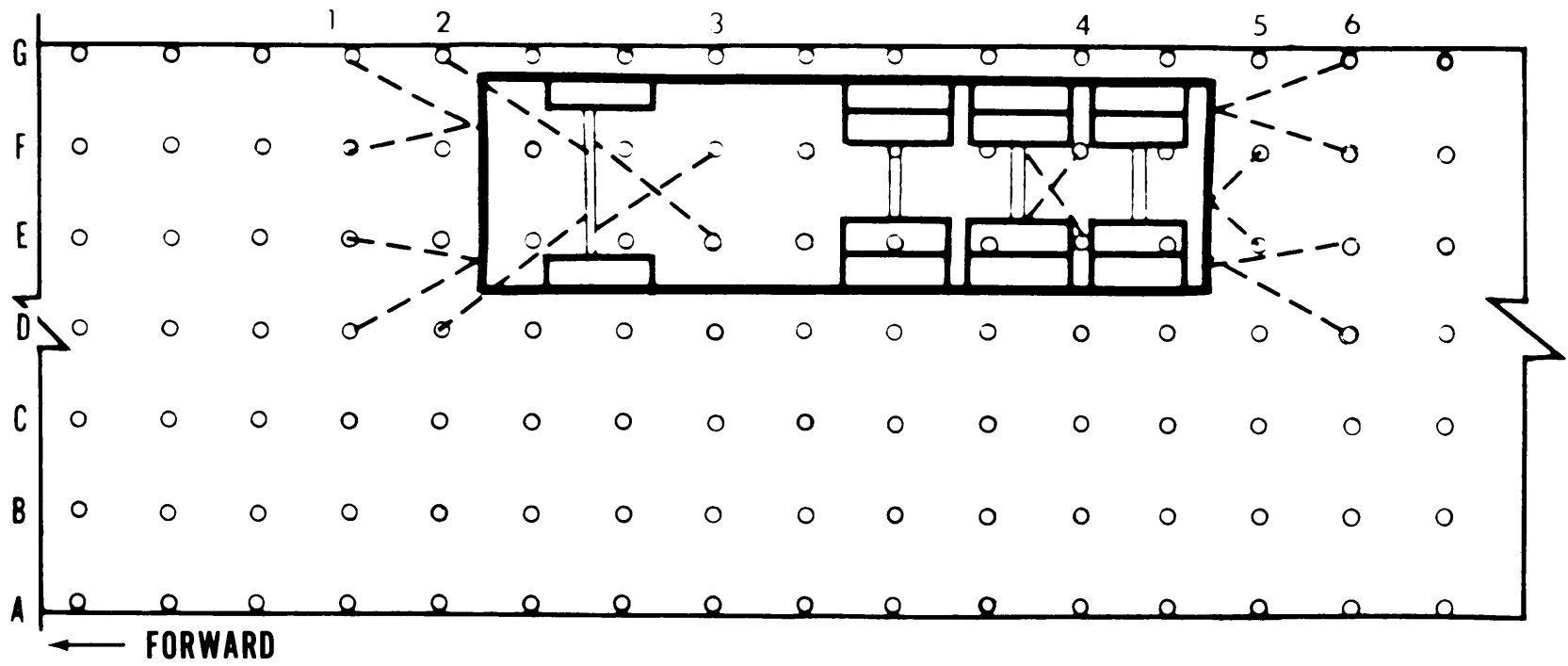
The 14- and 20-ton truck tractors can be transported only in the C-5 aircraft provided parking shoring, at least 1/2-inch thick, is used under the front wheels. Maximum tire pressure for airlift is restricted to 100 psi. Fuel tank and batteries must be prepared for airlift in accordance with the requirements of TM 38-250.

4-6. Typical Loads

The following tiedown diagrams (figs 4-1 through 4-2) and data tables (tables 4-1 through 4-2) are based on acceptable methods that can be used as a guide for loading and securing the 14- and 20-ton FOV aboard US Air Force aircraft. Loads are based on empty vehicles in reduced configuration.

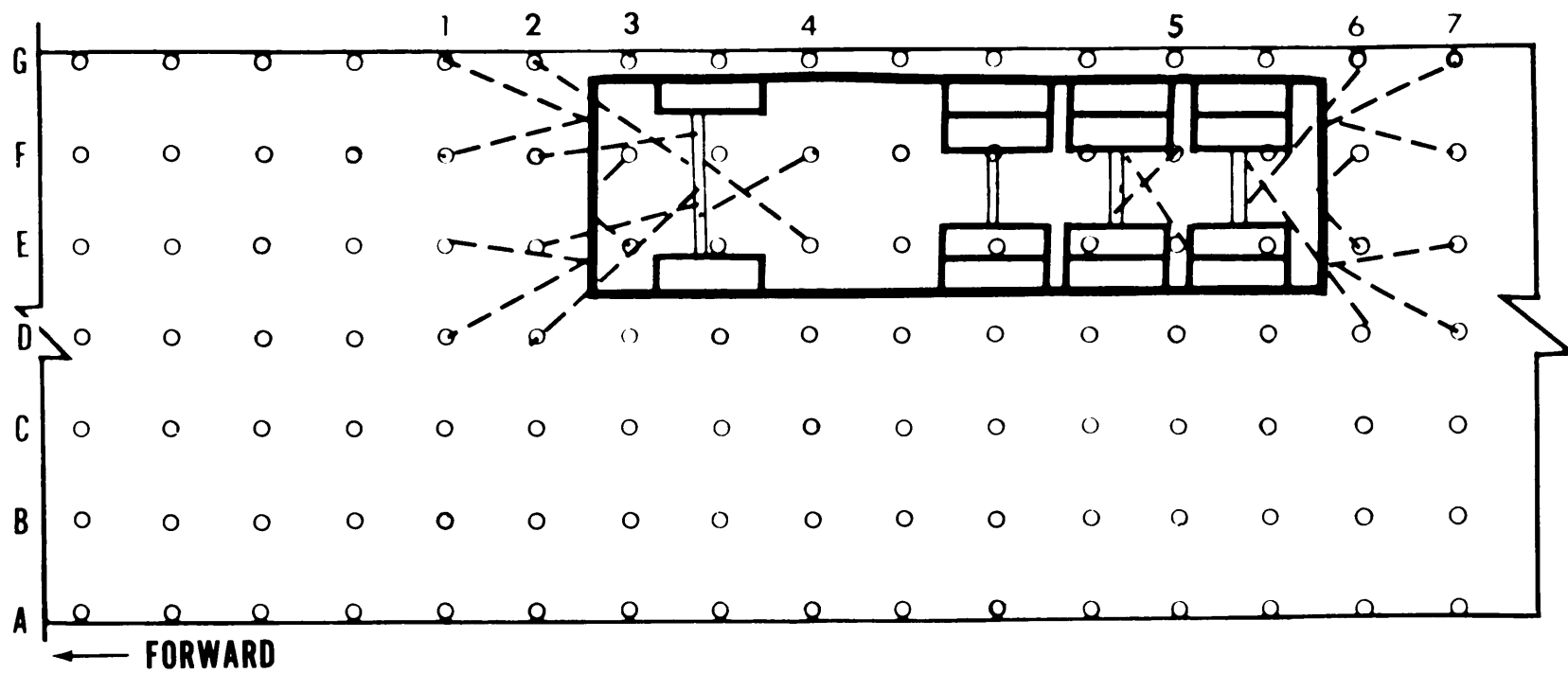
4-7. Transport by US Army Aircraft

The M915 FOV trucks exceed the size and weight limitations for transport by US Army fixed and rotary wing aircraft.



○ ALL CARGO TIEDOWN FITTING RATINGS 25000 LB EACH

Figure 4-1. Tiedown of M915 and M916 in C-5 aircraft.



○ ALL CARGO TIEDOWN FITTING RATINGS 25000 LB EACH

Figure 4-2. Tiedown of M920 in C-5 aircraft.

Table 4-1. Tiedown Data for M915 and M916 in C-5 Aircraft (fig 4-1)

Tiedown Fitting		Tiedown Device		
Designation	Capacity in 1,000 lb	Type	Capacity in 1,000 lb	Attach to Item
G1	25	MB2	25	Front lifting shackle, right side.
F1	25	MB2	25	Front lifting shackle, right side.
E1	25	MB2	25	Front lifting shackle, left side.
D1	25	MB2	25	Front lifting shackle, left side.
G2	25	MB2	25	First axle, around right side.
D2	25	MB2	25	First axle, around left side.
F3	25	MB2	25	First axle, around right side.
E3	25	MB2	25	First axle, around left side.
F4	25	MB2	25	Third axle, around right side.
E4	25	MB2	25	Third axle, around right side.
F5	25	MB2	25	Tow pintle.
E5	25	MB2	25	Tow pintle.
G6	25	MB2	25	Rear lifting shackle, right side.
F6	25	MB2	25	Rear lifting shackle, right side.
E6	25	MB2	25	Rear lifting shackle, left side.
D6	25	MB2	25	Rear lifting shackle, left side.

Table 4-2. Tiedown for M920 in C-5 Aircraft (Fig 4-2)

Tiedown Fitting		Tiedown Device		
Designation	Capacity in 1,000 lb	Type	Capacity in 1,000 lb	Attach to Item
G1	25	MB2	25	Front lifting shackle, right side.
F1	25	MB2	25	Front lifting shackle, right side.
E1	25	MB2	25	Front lifting shackle, left side.
D1	25	MB2	25	Front lifting shackle, left side.
G2	25	MB2	25	First axle, around right side.
D2	25	MB2	25	First axle, around left side.
F2	25	MB2	25	First axle, around right side.
E2	25	MB2	25	First axle, around left side.
F3	25	MB2	25	Frame, around right.
E3	25	MB2	25	Frame, around left.
F4	25	MB2	25	First axle, around left side.
E4	25	MB2	25	First axle, around right side.
F5	25	MB2	25	Third axle, around left side.
E5	25	MB2	25	Third axle, around right side.
G6	25	MB2	25	Fourth axle, around left side.
D6	25	MB2	25	Fourth axle, around right side.
F6	25	MB2	25	Tow pintle.
E6	25	MB2	25	Tow pintle.
G7	25	MB2	25	Rear lifting shackle, right side.
F7	25	MB2	25	Rear lifting shackle, right side.
E7	25	MB2	25	Rear lifting shackle, left side.
D7	25	MB2	25	Rear lifting shackle, left side.

CHAPTER 5

HIGHWAY AND OFFROAD TRANSPORTABILITY GUIDANCE

Section 1. GENERAL

5-1. Scope

This chapter provides highway and offroad transportability guidance for movement of the 14- and 20-ton truck tractors. It covers significant technical and physical characteristics, as well as safety considerations, and prescribes the materials and guidance required to prepare, load, and tie down these vehicles.

5-2. Safety

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

Section II. SELF-PROPELLED MOVEMENT

5-3. General

The 14- and 20-ton truck tractors can be moved under their own power either empty and/or towing a semitrailer as applicable to the vehicle considered. These vehicles exceed the legal width limitations for highway movement in CONUS and 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, Geneva, Switzerland.

5-4. Preparation of Trucks

For trucks that are moved under their own power, no special preparation is required other than organizational maintenance. Special preparation for transport by semitrailer of the 14- and 20-ton truck tractor may consist of reducing the vehicle to their lowest shipping configuration.

Section III. TRANSPORT OF SEMITRAILERS

5-5. General

The truck tractors in themselves are not a major problem. The major transportability problem occurs when these tractors and semitrailers with maximum payloads are combined.

5-6. M915 FOV Truck Tractor/M872 Semi-trailer

All of the M915 FOV truck tractors (M915, M915A1,

M916 and M920) when pulling a semitrailer with a maximum allowable payload will exceed the width and gross vehicle weight. This is a major transportability problem. When this problem occurs, special permits will be required both in CONUS and overseas. Procedures for obtaining special permits are found in AR 55-162 for CONUS and USARER Reg 55-1. Your ITO in CONUS and the TMO in the overseas area will assist you in getting these special permits.

CHAPTER 6

MARINE AND TERMINAL TRANSPORTABILITY GUIDANCE

6-1. Scope

This chapter provides marine and terminal transportability guidance for movement of the M915 FOV vehicles. It covers significant technical and physical characteristics, as well as 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 loading and discharge operations should be inspected for condition and adequate capacity.

c. All personnel should be cautioned not to work under vehicles being lifted.

d. All lifts should have two taglines attached to control the swing of the vehicle while suspended.

6-3. General

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 about 4 to 6 inches between outer vehicles and the sweatboards; breakable parts are protected; spare parts are stowed in or near the parent vehicle; brakes are on and brake lever is wire-tied; transmission is in neutral with control lever wired-tied; battery terminals are disconnected and taped; and fuel tank is drained. To secure the vehicles, the wheels should be blocked in front, in rear, and on both sides; also, the vehicles should be lashed with wire rope to chains to bulkhead, stanchions, or pad-eyes.

NOTES

1. When trucks are loaded on vessels that are adequately ventilated by power blowers, such as roll-on/roll-off vessels, gasoline tanks need not be drained.
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 ensure safe delivery without damage.

a. Lifting. The correct lifting points on the M915 FOV 14- and 20-ton truck tractors are the two shackles on the front bumper and the spring saddle and pin assembly on top of the rear spring assemblies. The bodies of these vehicles are reinforced near the spring saddle and pin assembly. A rectangular spreader bar, with steel wire-rope slings attached to front and rear lifting eyes to preclude damage to the engine hood and radiator (fig 6-1), should be used.

b. Loading. Vehicles are always loaded onto vessels in their minimum configuration, that is, reduced height and side view mirrors folded back or removed to reduce the width of the vehicle. The vehicles can be loaded onto landing craft, beach discharge and heavy amphibious lighters, and landing ships under their own power or by cranes of adequate capacity (38 tons minimum). Also, they can be loaded onto seagoing vessels by shoreside or floating cranes or by heavy-lift ship's gear. Figure 6-2 shows blocking and tiedown details. Tables 6-1 and 6-2 list materials and their application for blocking and tiedown.

c. Special design. Roll-on/roll-off ships, landing ships, and attack-cargo ships are equipped with patented lashing gear and pre-positioned fittings in the deck. The use of such equipment is adequate and no additional blocking and bracing is required.

6-4. Barge-Carrier Ships

Barge-carrier ships such as lighter aboard ships (LASH) and sea barges (SEABEE) can be used to transport the M915 FOV. If the LASH ship is used, the exhaust pipe must be removed and the hatch covers must be in place. The SEABEE can transport all M915 FOV in their fully operational configuration. When these vehicles are moved a great distance over rough water, they must be blocked and braced.

6-5. Lighterage

The M915 FOV can be transported by lighterage vessels. These vessels are normally used to support logistics-over-the-shore operations (LOTS). The vehicles can be transported on the following types of lighters: LARC-LX amphibian, landing craft mechanized (LCM-8), landing craft utility (LCU 1466-1646), and the beach discharge lighter (BDL-MR1). If these vehicles are moved a long distance in rough waters, they must be blocked and braced.

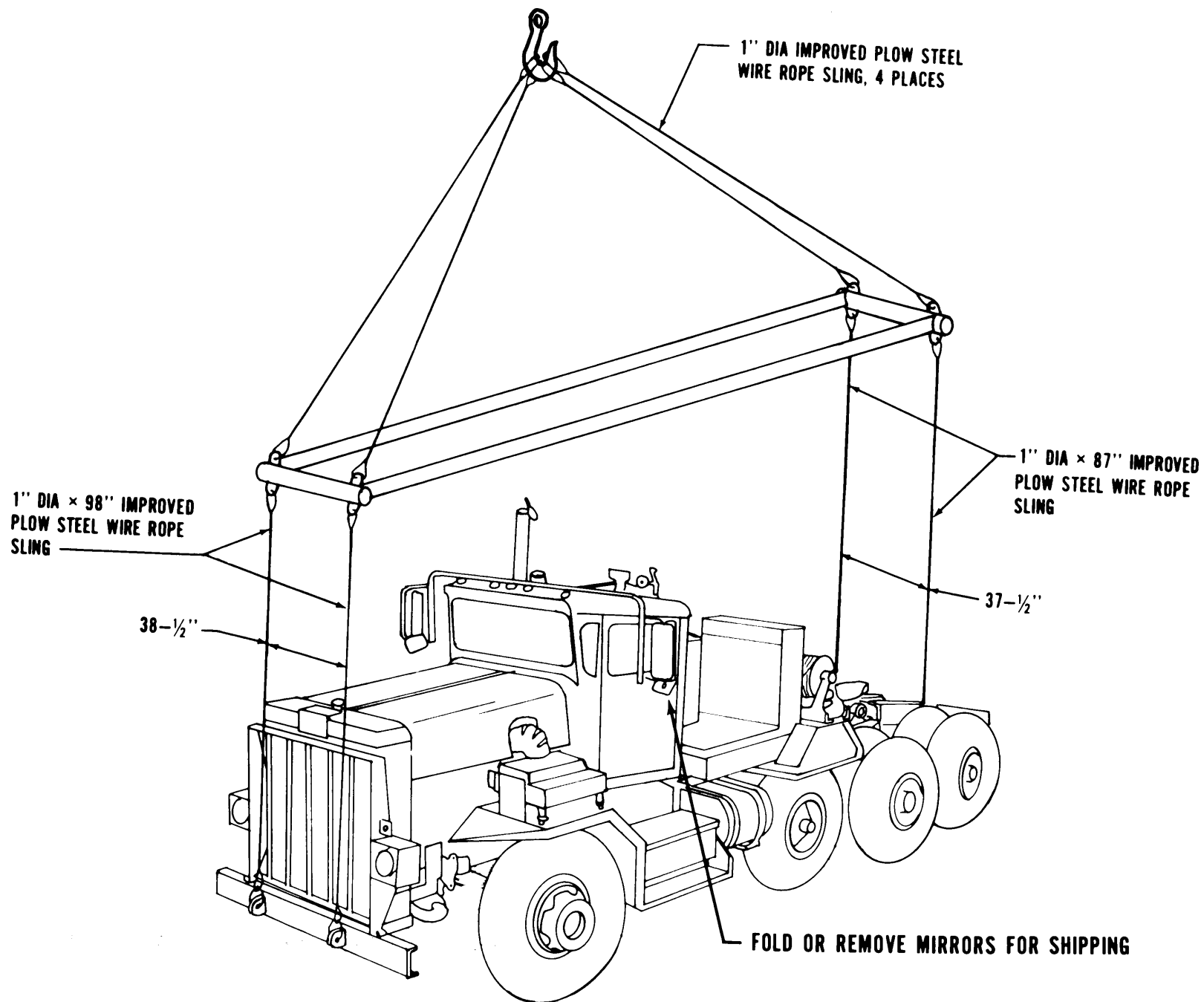


Figure 6-1. Lifting diagram for M915 FOV using rectangular spreader bar with steel wire cables.

FOLD OR REMOVE MIRRORS FOR SHIPPING

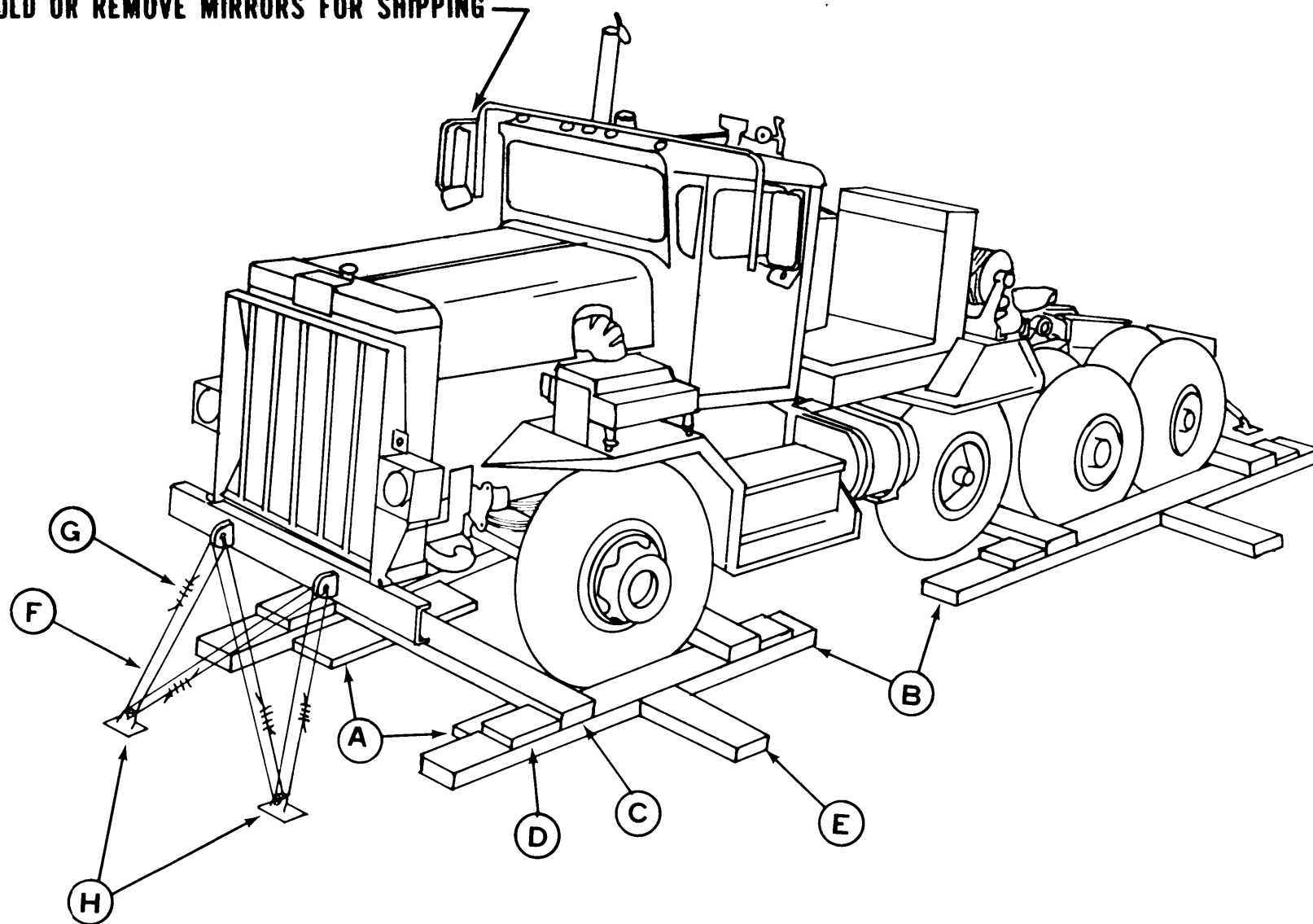


Figure 6-2. Blocking and tiedown of M915 truck tractor in general cargo vessel.

Table 6-1. Bill of Materials for Blocking and Tiedown of M915 FOV Truck Tractors, in General Cargo Vessel (Fig 6-2)

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

Table 6-2. Application of Materials for Blocking and Tiedown of M915 FOV Truck Tractors in General Cargo Vessel (Fig 6-2)

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

CHAPTER 7

RAIL TRANSPORTABILITY GUIDANCE

Section I. GENERAL

7-1. Scope

This chapter provides rail transportability guidance for movement of the M915 FOV vehicles. It covers significant technical and physical characteristics, as well as safety considerations, and prescribes the materials and guidance required to prepare, load, and tie down

the trucks on open-top flatcars.

7-2. Maximum Use of Railcar Capacity

Additional cargo, as approved by the activity offering the M915 FOV for transport, may be transported on a railcar with the vehicles provided the railcar weight and dimensional limitations are not exceeded.

Section II. TRANSPORT ON CONUS RAILWAYS

7-3. General

The transportability guidance contained in this section is applicable when the M915 FOV vehicles are transported on CONUS railways. Consideration is given to movement on railcars normally used for this type of equipment. The vehicles can be transported without restriction only at reduced height. Sectionalization or major disassembly is not required. The exhaust stack on the M915 FOV vehicles should be removed and stowed in the cab.

7-4. Preparation for Transport

The degree of preparation for the vehicles before they are transported by railcar is dependent on the operational commitment.

7-5. Loading of M915 FOV on General Purpose Flatcars

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

b. The load shown in figure 7-1 is based on a flatcar width of 10 feet 6 inches. Figure 7-2 provides detailed instructions for blocking and tiedown. Tables 7-1 and 7-2 provide the bill of materials and the instructions for their application to secure the system 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. The nailing pattern for an upper piece of lumber should be adjusted as required, so that a nail for that piece will not be driven into or against a nail in the lower piece of lumber.

Section III. TRANSPORT ON FOREIGN RAILWAYS

7-6. General

The transportability guidance contained in this section is applicable when the M915 FOVs are transported on foreign railways. Consideration is given to single and multiple vehicle movements for the type of flatcar normally used in the movement of this type of vehicle. When loaded on a suitable flatcar, the vehicle can be transported with restrictions. The M915 FOVs exceed the (PPI) Passe-Partout International gauge railways, due to height. Special permits must be obtained for movement of these vehicles. Because of the various designation system and clearances used by different countries, evaluation of transport capability must be

made on an individual basis. The transportation movement office (TMO) will provide assistance in obtaining permits to move these vehicles in overseas areas.

7-7. Loading of M915 FOV on Special Purpose Flatcars

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

b. Figure 7-3 shows the M915 FOV loaded on a flatcar equipped with center tiedown rails. Table 7-3 provides instruction for the application of chain tiedowns for securing vehicles on center tiedown flatcars.

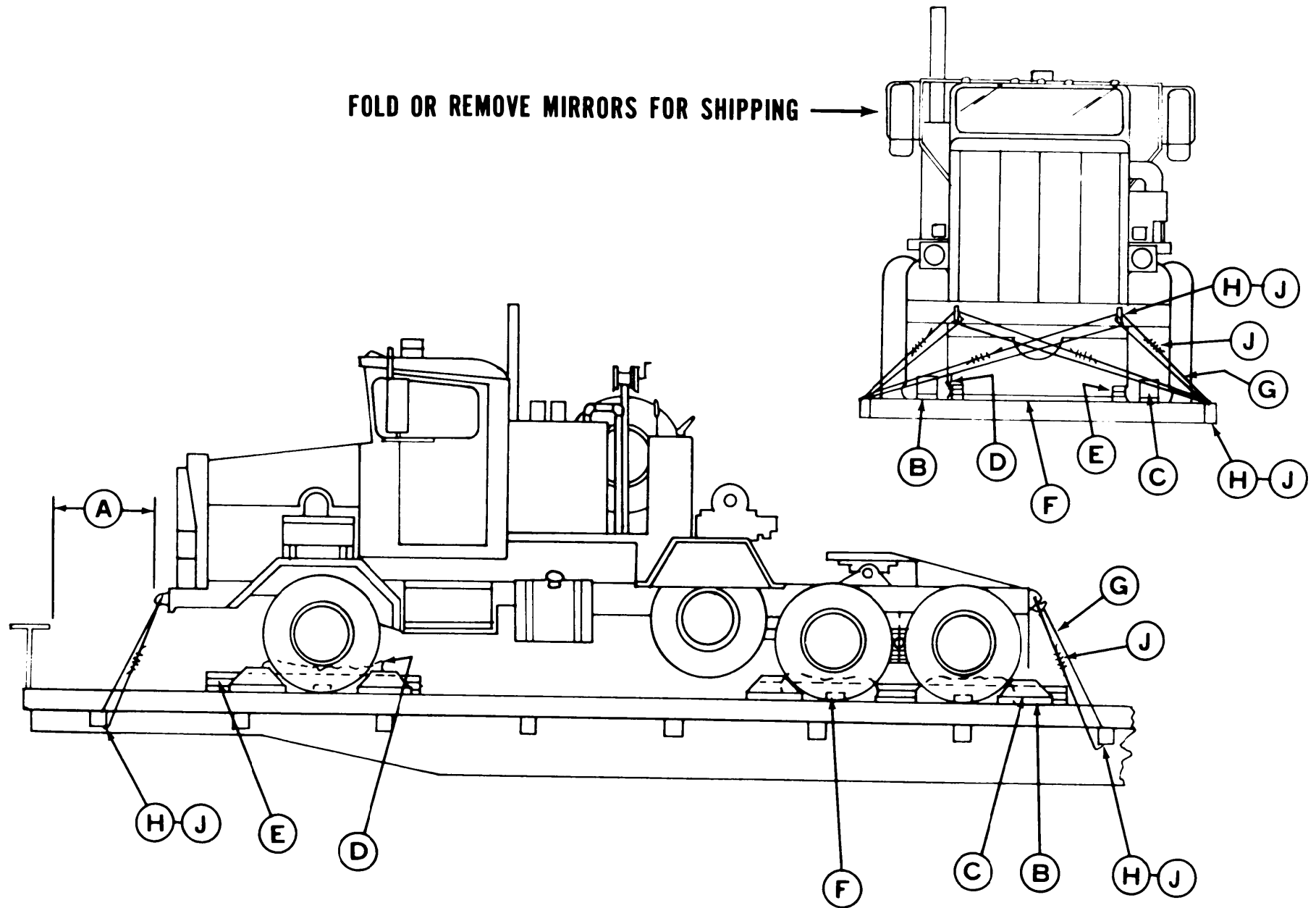


Figure 7-1. Blocking and tiedown diagram of M915 FOV on general purpose flatcar.

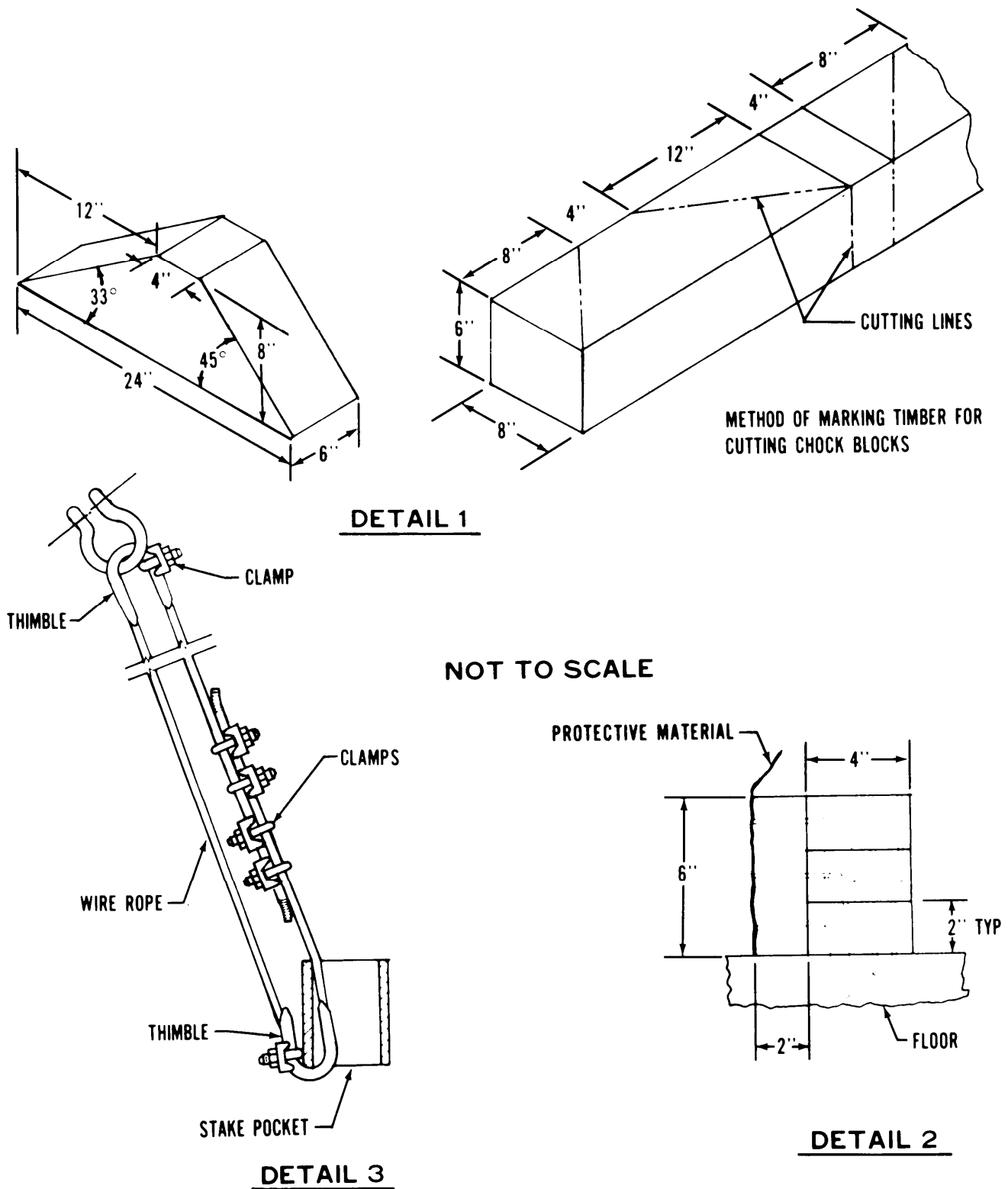


Figure 7-2. Blocking and tiedown detail diagram.

Table 7-1. Bill of Materials for Blocking and Tiedown of M915 FOV Truck Tractor on CONUS General-Purpose Flatcar (Fig 7-1)

Item	Description	Approximate Quantity
Lumber	Douglas-fir, or comparable; straight-grain, free from material defects; Fed Spec MM-L-751H: 2-x 4-inch 2-x 6-inch 6-x 8-inch	108 linear ft 77 linear ft 12 linear ft
Nails	Common, steel; flathead, bright or cement-coated: Fed Spec FF-N-105B: 12d 20d 40d	60 224 56
Thimbles	Standard, open-type, 5/8-inch	16
Clamps	Wire rope, U-bolt clips, saddled, single-grip, steel, Crosby heavy-duty, or equal; Fed Spec FF-C-450D: 5/8-inch	48
Wire rope	6 x 19, IWRC; improved plow steel; preformed, regular-lay: table X, Fed Spec RR-W-401C: 5/8-inch	120 feet
Cushioning material	Waterproof paper, burlap, or other suitable material	as required

Table 7-2. Application of Materials for Blocking and Tiedown of M915 FOV Truck Tractor on CONUS General-Purpose Flatcar (Fig 7-1)

Item	No. Required	Application
A		Brake wheel clearance. Minimum clearance required is 6 inches above, in back of, and on both sides of and 4 inches underneath wheel; 12 inches from end of car to load, which extends from center of brake wheel to side of car; and 6 feet above car floor (fig 7-1).
B	12	Blocks, Each to consist of one piece of 2- x 6- x 30-inch lumber, Locate on block against wheel as shown in figure 7-1, and nail to car floor with seven 20d nails.
C	12	Blocks (detail 1, fig 7-2). Each to consist of one piece of 6- x 8- x 24-inch lumber, cut as shown in detail 1. Locate one block on top of each item B with 45° side against tire. Nail heel of block to item B with three 40d nails. Toenail sides of block to car floor through item B with two 40d nails on each side.
D	1 ea item E	Cushioning material. Locate bottom portion under item E and between tire and item E so as to extend 2 inches above item E (detail 2, fig 7-2).
E	4	Side blocks. Two to consist of one piece of 2- x 6- x 30-inch lumber and three pieces of 2- x 4- x 30-inch lumber for the front tires, and two to consist of one piece of 2- x 6- x 90-inch lumber and three pieces of 2- x 4- x 90-inch lumber for the rear dual tires (detail 2, fig 7-2). Place against inside of front tires and cushioning material and nail to car floor through 2- x 4- x 36-inch piece with twelve 20d nails. Nail the other two 2- x 4- x 30-inch pieces to one below in same manner. Repeat this operation from the other front tire and the rear tires.
F	3	Brace. Each to consist of one piece of 2- x 6-inch x length-to-suit (about 60-inch) lumber. Locate one under each axle between items E. Nail to car floor with ten 20d nails.
G	8	Wire rope. Each to consist of one piece 5/8-inch, 6 x 19, IWRC wire rope, length as required (approximately 20 feet). Form a complete loop between tiedown shackle and appropriate stake pocket at a maximum angle of 45° (detail 3, fig 7-2). Wire rope ends should overlay about 24 inches.
H	16	Thimbles. Place one under wire rope at each place where rope passes over bottom edge of stake pocket and tiedown shackle. Secure each thimble to wire rope with one 5/8-inch clamp (detail 3, fig 7-2).
J	48	Clamps. Place four on each item H at overlap area. Space clamps 3-1/2 inches apart with a minimum of 6 inches from ends of wire rope (detail 3, fig 7-2). Place one on each item J as indicated above.

GENERAL INSTRUCTIONS

1. Set handbrakes, and block and wire levers in place.
2. Place and wire-tie gearshift levers in the neutral position.
3. For further details, see General Rules 1, 2, 3, 4, 5, 14, 15, 19A, and 19B, Section I of the *Rules Governing the Loading of Commodities on Open-Top Cars and Trailers*, published by the Association of American Railroads,
4. Tension wire rope with an applicable size come-along mechanical hoist or suitable tensioning device,

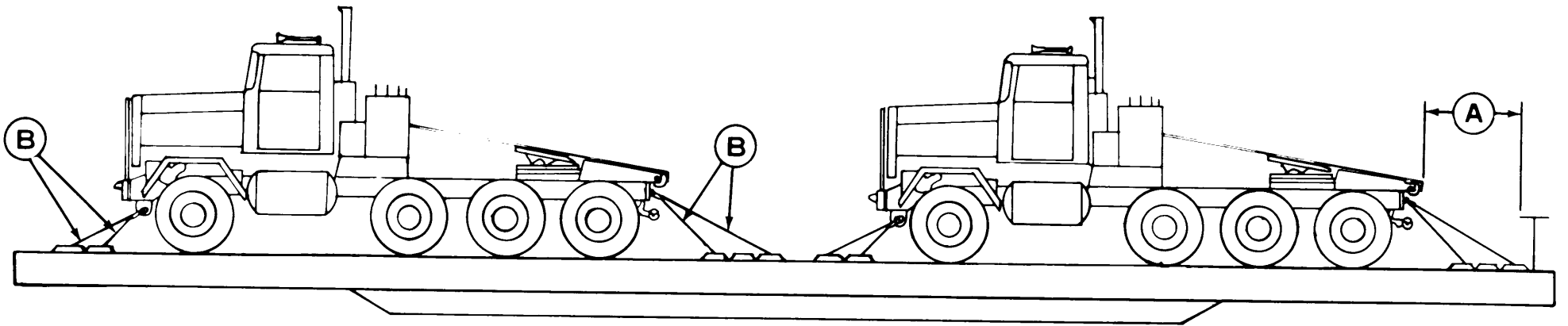


Figure 7-3. Tiedown of M915 FOV on center rail flatcar.

Table 7-3. Application of Chain Tiedown for Securing M915 FOV Trucks on Flatcars Equipped With Center Tiedown Rails (Fig 7-3)

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.
B	8 ea unit	1/2-inch diameter alloy steel chain proof-tested to minimum of 22,500 pounds for vehicles over 16,000 pounds and up to 25,000 pounds, inclusive. 1/2-inch diameter alloy steel chain, extra strength, proof-tested to minimum of 27,500 pounds for vehicles over 25,000 pounds and up to 40,000 pounds 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 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 the length of a vehicle loaded on an 89-foot car precludes facing all vehicles in the same direction, one vehicle may be reversed to ensure 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 be wire-tied in neutral position.
5. open hooks must be secured with wire over the opening to prevent the hook from being disengaged from chain link to which it is secured.
6. Turnbuckles used to tighten chains must be wired or locked to prevent them from turning during transit unless turnbuckles are equipped with self-locking devices.
7. When vehicles are shipped in a loaded configuration, the gross weight of the vehicle and cargo combined must be determined to assure that the proper size and/or number of tiedowns are used to secure the vehicles to the railcar.

APPENDIX A

CONVERSION TABLES

1. Common Metric Abbreviations.

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

2. Linear Measure.

1 mi = 1,609.35 m
 1 yd = 0.9144 m
 1 ft = 0.3048 m
 1 in. = 0.0254 m
 1m = 10 dm = 100cm = 1000 mm
 1 km = 0.6214 mi
 1 m = 1.0936 yd
 1 m = 3.2808 ft
 1 m = 39.3700 in.

3. Surface Measure.

1 yd² = 0.8361 m²
 1 ft² = 0.0929 m²
 1 in.² = 0.00065 m²
 1 m² = 1.196 yd²
 1 m² = 10.764 ft²
 1 m² = 1,550 in.²

4. Cubic Measure.

1 yd³ = 0.76455 m³
 1 ft³ = 0.02831 m³
 1 in.³ = 0.000016 m³
 1 m³ = 1.31 yd³
 1 m³ = 35.30 ft³
 1 m³ = 61,023 in.³

5. Weight.

1 STON = 907.185 kg
 1 lb = 0.45359 kg
 1 kg = 2.2046 lb
 1 MT = 1,000 kg
 1 MT = 2,204.62 lb

6. The following simplified conversion factors are ac-

curate 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.

7. The following conversions are provided for guidance for procurement of lumber, wire rope, or wire in areas that use the metric system. Lumber sizes are rounded 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. dia = 9.5-mm dia

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

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

3/4-in. dia = 19.0-mm dia

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

1-in. dia = 25.4-mm dia

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

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

Round to next higher whole mm of available wire rope sizes,

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

APPENDIX B

REFERENCES

1. Army Regulations (AR)

55-29	Military Convoy Operations in CONUS
55-162	Permits for Oversize, Overweight, or Other Special Military Movements on Public Highways in the United States
55-355	Military Traffic Management Regulation
70-39	Criteria for Air Transport and Airdrop of Material
95-16	Weight and Balance—Army Aircraft
385-40	Accident Reporting and Records

2. Field Manuals (FM)

1-100	Army Aviation Utilization
5-36	Route Reconnaissance and Classification
55-9	Air Movement Planning
55-13	Air Transport of Supplies and Equipment: Standard Loads in Air Force C-5 Aircraft
55-15	Transportation Reference Data

3. Supply Bulletins (SB)

700-20	Army Adopted/Other Items Selected for Authorization/List of Reportable Items
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4. Technical Manuals (TM)

9-2320-273-10	Operators Manual 900 Series Vehicles
5-330	Planning and Design of Roads, Airbases and Heliports in Theater of Operations
55-405-9	Army Aviation Maintenance Engineering Manual: Weight and Balance
55-450-10/1	Air Transport of Supplies and Equipment Standard Loads in US Air Force C-130E Aircraft
55-450-10/2	Air Transport of Supplies and Equipment Standard Loads in Air Force C-141 Aircraft
55-500	Marine Equipment Characteristics and Data
55-513	Military Stevedoring

5. Technical Orders (TO) (Air Force)

1-1B-40	Handbook of Weight and Balance Data
1C-5A-9	Cargo Loading Manual for USAF Series C-5 Aircraft
1C-130-9	Cargo Loading Manual for USAF Series C-130 Aircraft
1C-141A-9	Cargo Loading Manual for USAF Series C-141 Aircraft

NOTE

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

6. Other publications and Sources of Procurement

- a. Rail and Highway Shipment
 - Code of Federal Regulations*, Title 49—Transportation, Parts 170-179
 - Available from: Superintendent of Documents
 - US Government Printing Office
 - Washington, DC 20402

b. Association of American Railroads, Rules Governing the Loading of Commodities on Open-Top Cars

Section No. 1—General Rules

Section No. 6—Rules Governing the Loading of Department of Defense Material

Available from: Secretary, Mechanical Division

Association of American Railroads

ATTN: J. H. Bean

59 E. Van Buren St.

Chicago, IL 60605

c. 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, DC 20036

d. 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, DC 20036

e. Water Shipment

Code of Federal Regulations, Title 46—Shipping, Part 146

Available from: Superintendent of Documents

US Government Printing Office

Washington, DC 20402

f. Agent 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, DC 20036

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