

TECHNICAL MANUAL

TRANSPORTABILITY GUIDANCE

TANK, COMBAT,

FULL-TRACKED, M60-SERIES

M60

2350-00-678-5773

105-MM GUN

M60A1

2350-00-756-8497

105-MM GUN

M60A2

2350-00-930-3590

152-MM GUN

M60A3

2350-00-148-6548

105-MM GUN

HEADQUARTERS, DEPARTMENT OF THE ARMY

OCTOBER 1983

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*This manual supersedes TM 55-2350-215-10-15, 31 August 1973.

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CHAPTER 1

INTRODUCTION

1-1. Purpose and Scope

a. This manual provides transportability guidance for logistic handling and movement of the tanks, combat, full-tracked, M60-series.

b. The intent of this manual is to provide transportation officers down to division level and other personnel engaged in or responsible for movement or providing transportation services with appropriate information to insure safe transport of the system items. Included are significant technical and physical characteristics as well as safety considerations required for worldwide movement by the various modes of transportation. When considered necessary, metric equivalents are given in parentheses following the dimension or other measurement.

1-2. Safety

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

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

b. Caution. Instructions which, 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

Users of the manual are invited to send comments and suggested improvements, on DA Form 2028 (Recommended Changes to Publications and Blank Forms), to Commander, Military Traffic Management Command Transportation Engineering Agency, ATTN: MTT-TRC, PO Box 6276, Newport News, Virginia 23606. Electrically transmitted comments should be sent to CDRMTMCTEA FT EUSTIS VA//MTT-TRC//.

CHAPTER 2

TRANSPORTABILITY DATA

Section I. GENERAL

2-1. Scope

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

2-2. Description.

a. General. The M60-series tanks are full-track-laying, heavily armored combat vehicles operated by a four-man crew: driver, gunner, loader, and tank commander. The vehicles are powered by air-cooled compression ignition engines. Power is transmitted to the final drive through a cross drive transmission

differential, steering, and braking unit. The vehicles are supported by a torsion-bar suspension system.

b. M60 (fig 2-1). The M60 armament includes a 105-mm gun (M68) mounted in a combination gun mount (M116), with a coaxially mounted 7.62mm machine gun mounted on the combination gun mount, and a caliber .50 machine gun mounted in the commander's cupola (M19).

c. M60A1 (fig 2-2). The M60A1 armament includes a 105mm gun (M68) mounted in a combination gun mount (M140), with a coaxially mounted 7.62mm machine gun mounted on the combination mount and CA1; furnisher a caliber .50 machine gun mounted in the commander's cupola (M19).

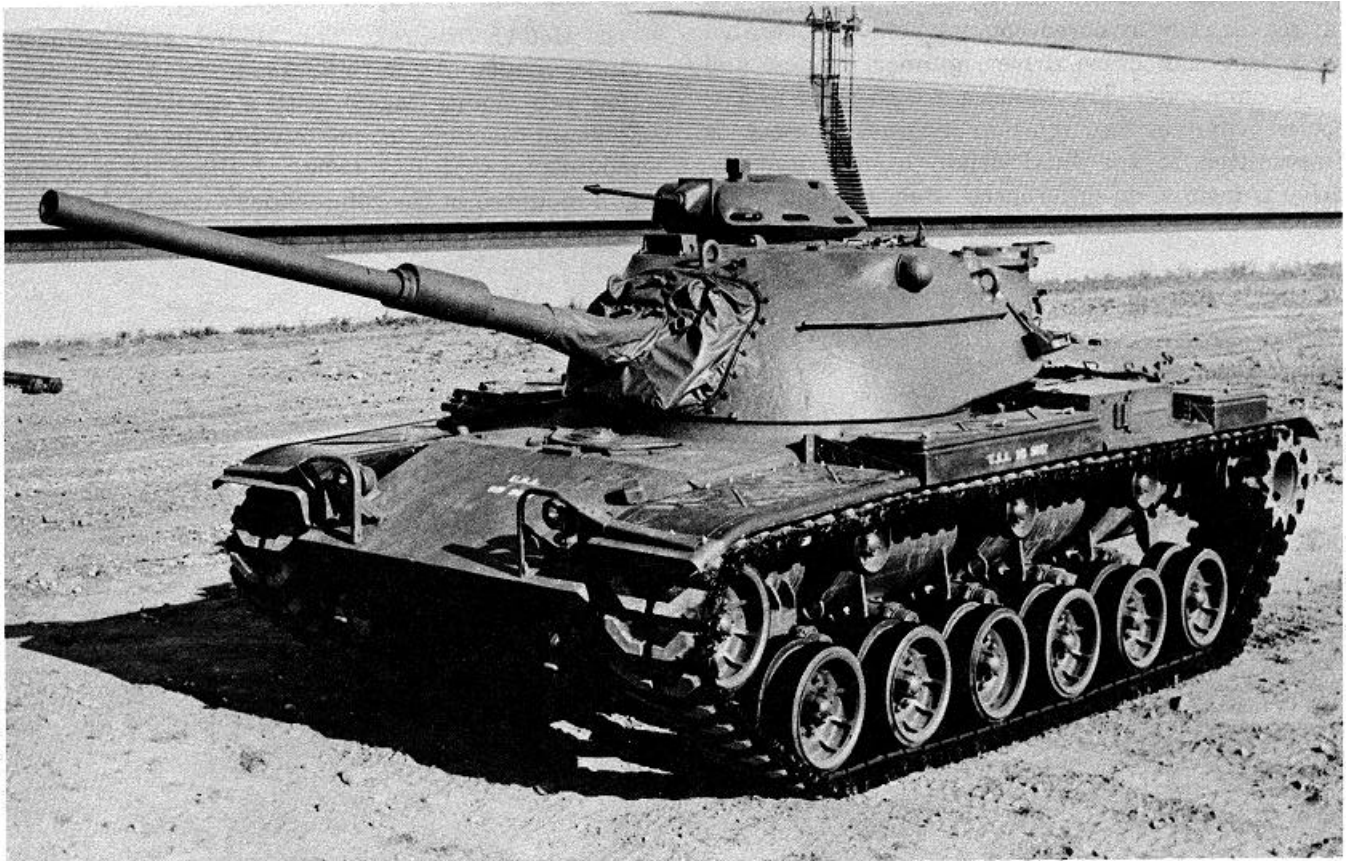


Figure 2-1. Tank, combat, full-tracked, 105-mm-gun, M60.

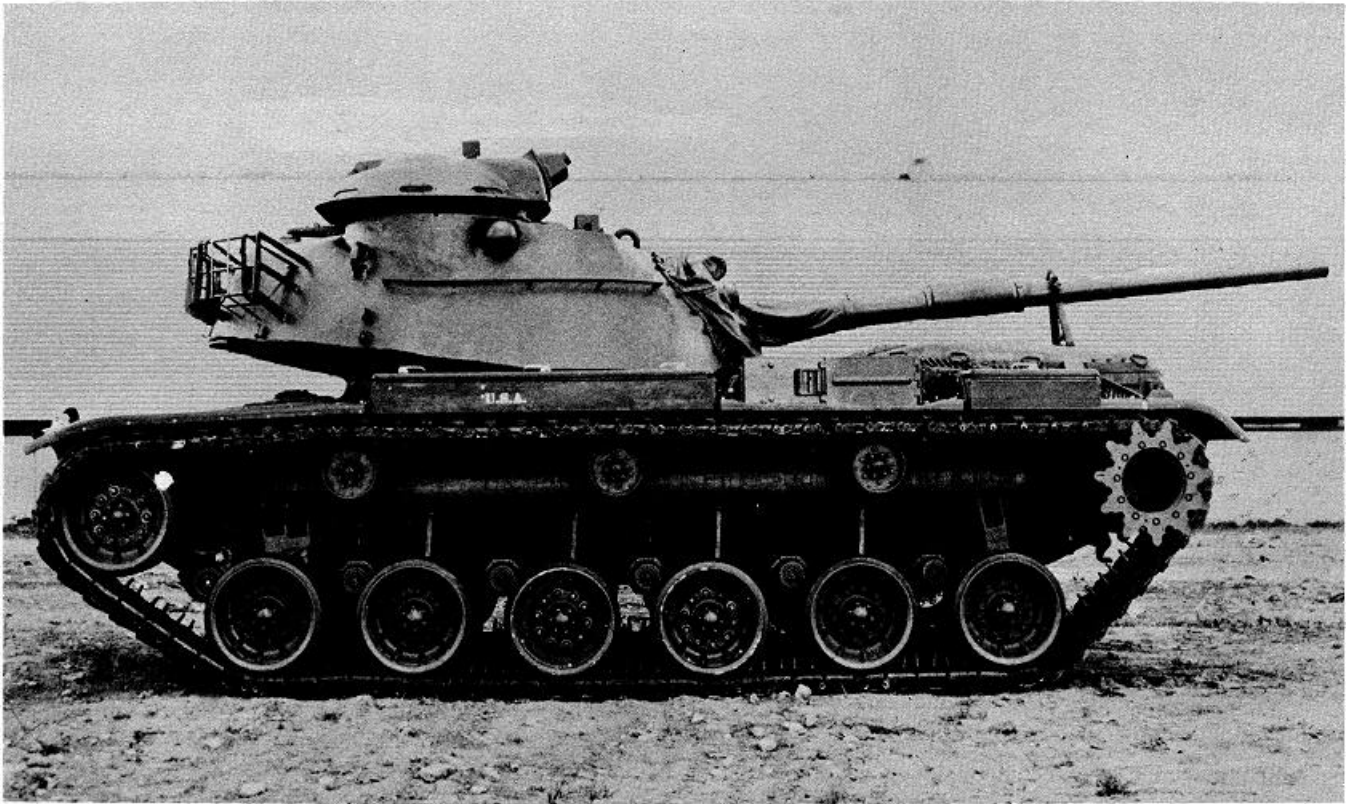


Figure 2-2. Tank, combat, full-tracked, 105-mm-gun, M60A1.

d. *M60A2 (fig 2-3)*. The M60A2 armament, which includes a 152-mm gun launcher (M162), capable of firing either conventional ammunition or missiles, is mounted to the turret in a combination mount with a

coaxially mounted 7.62-mm machine-gun (M219); a cupola-mounted caliber .50 machine-gun and two firing stations, one on each side of the turret bustle, each capable of storing and launching four M226 grenades.

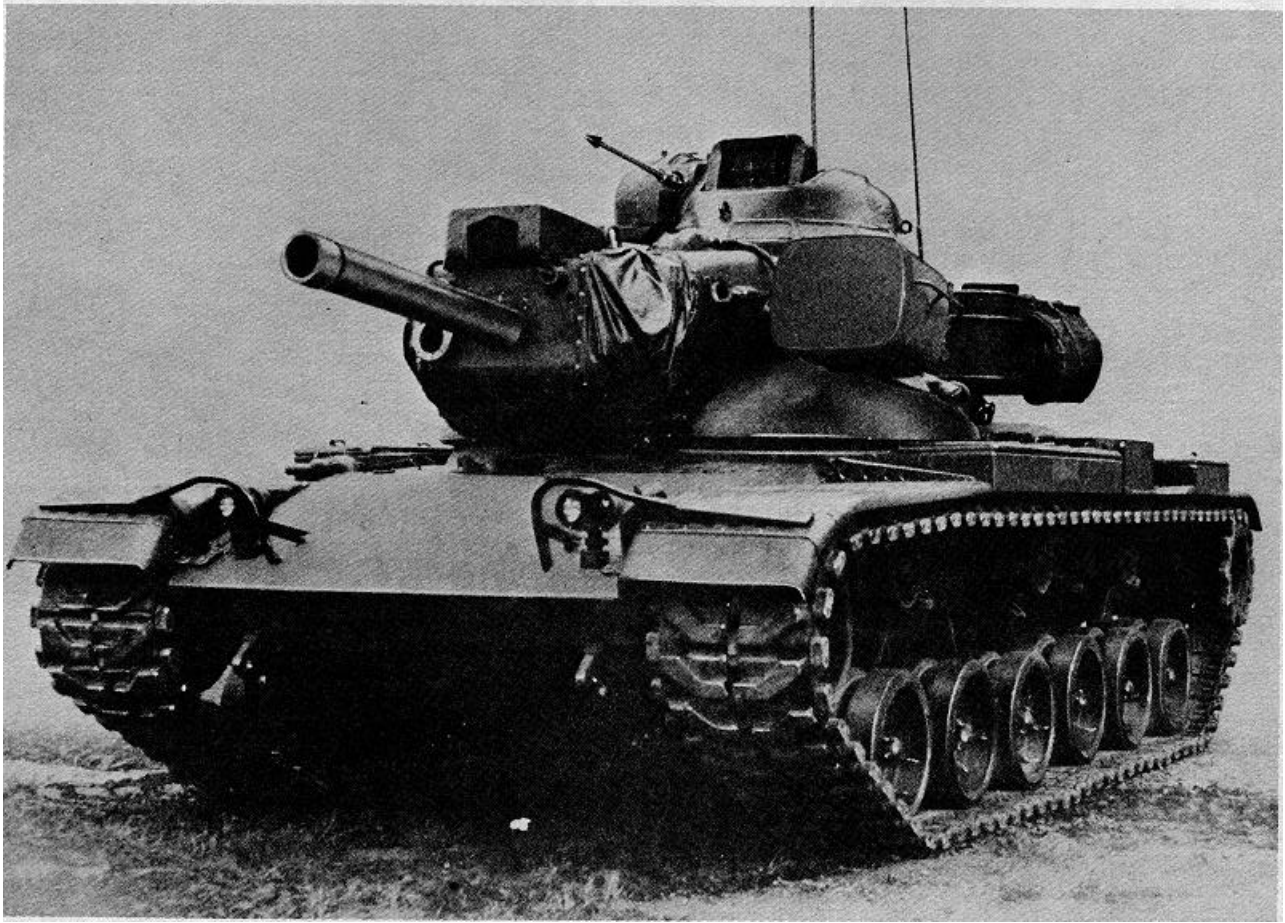


Figure 2-3. Tank, combat, full-tracked, 152-mm-gun-launcher, M60A2.

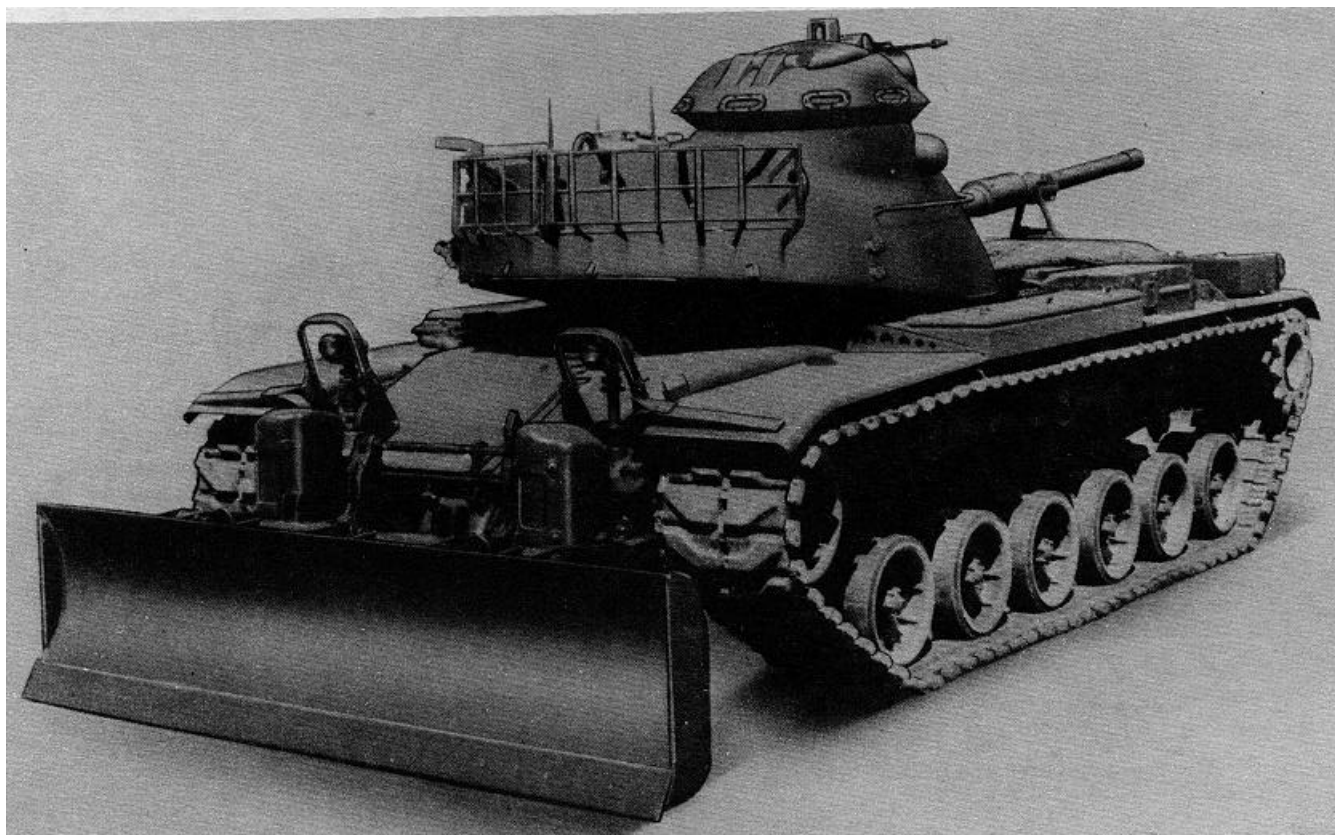


Figure 2-4. Tank, combat, full-tracked, 105-mm-gun, M60A3, equipped with bulldozer, M9.

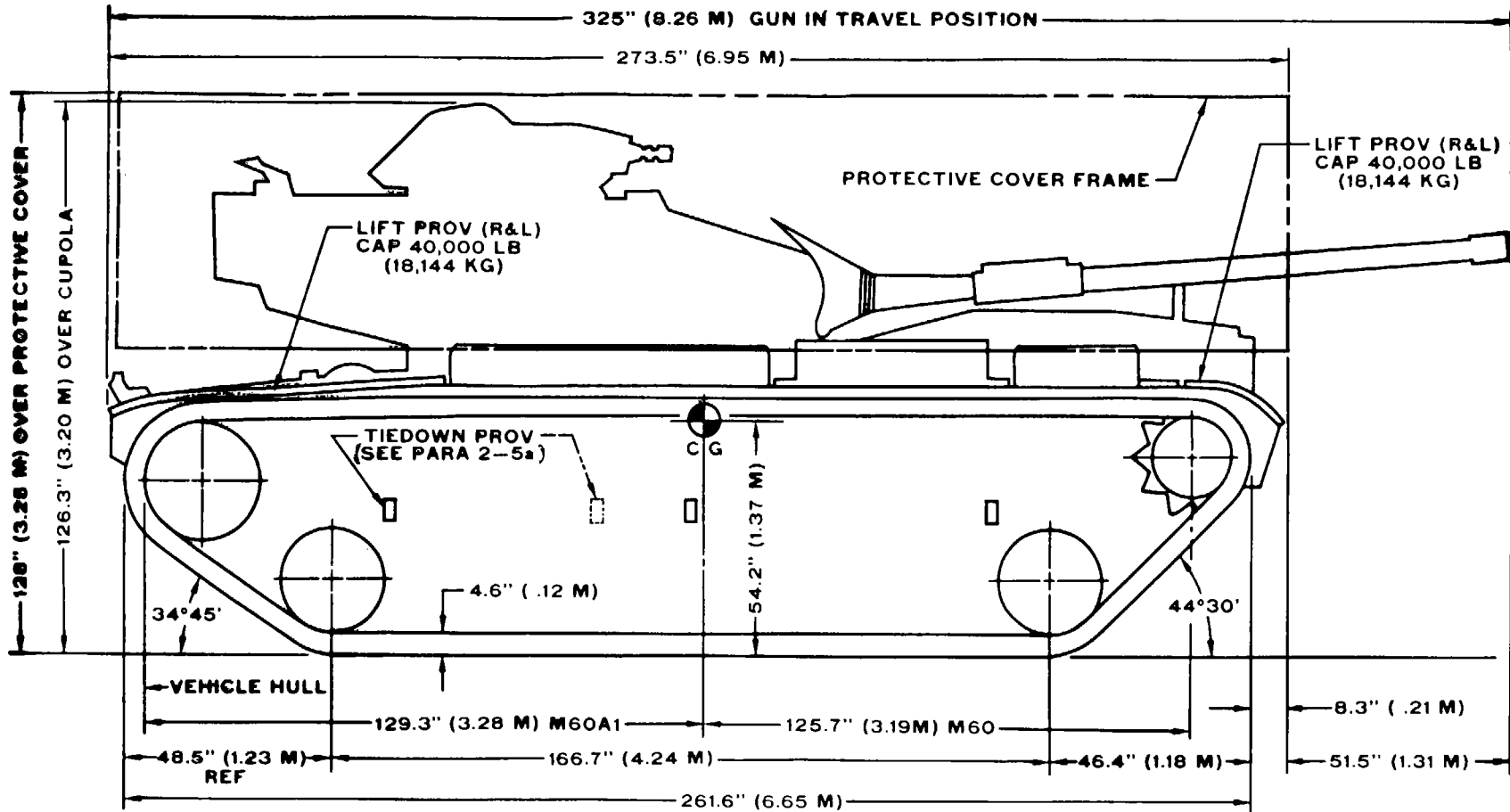
2-3. Transportability Drawings

Detailed side- and end-elevation transportability drawings of M60-series combat tanks with dimensions and tiedown and lift provision loadrating capacities are shown in figures 2-5 through 2-10.

2-4. Closure Kit

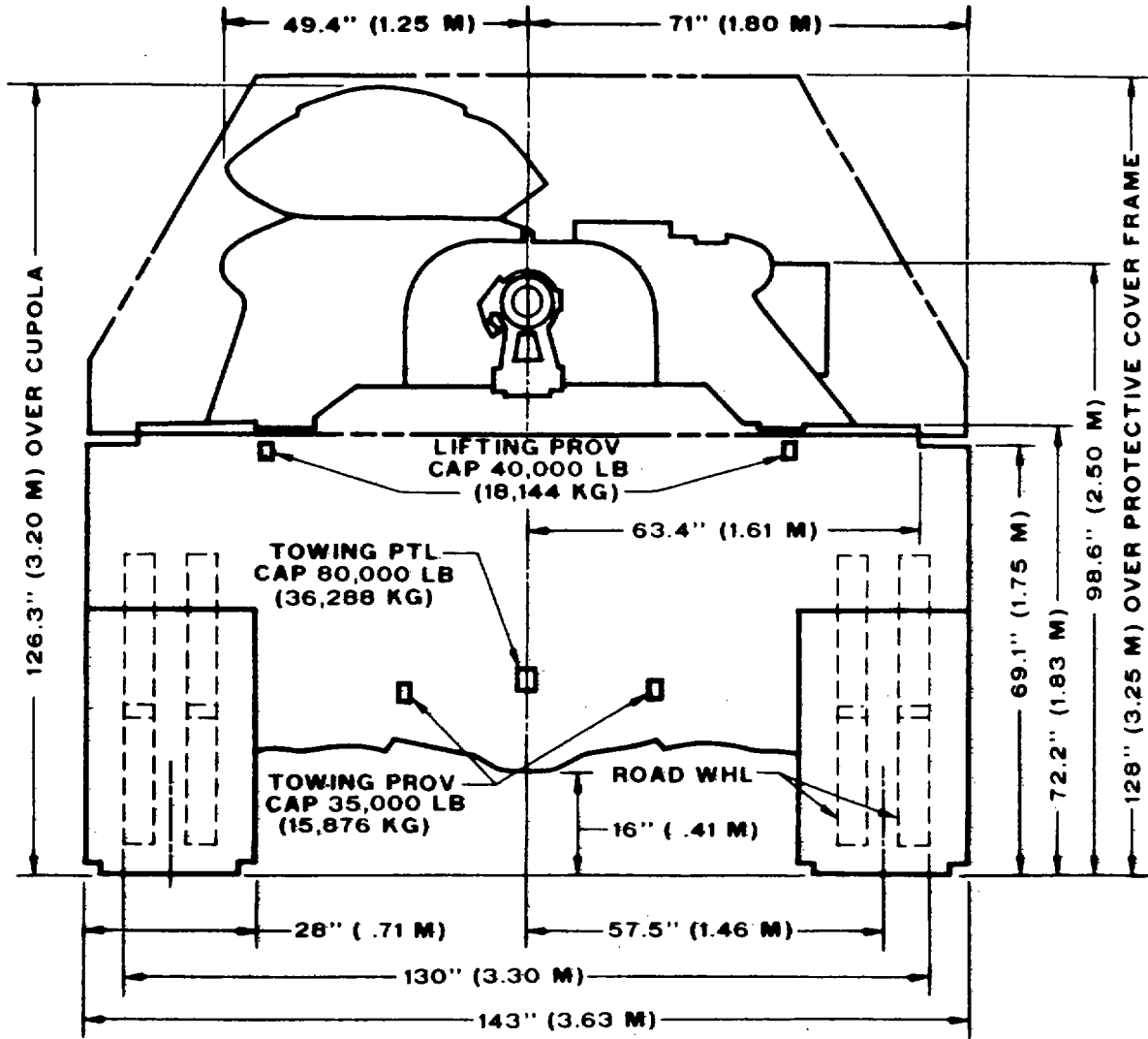
Vehicles are normally shipped equipped with a closure kit. The kit consists of a metal frame over which a waterproof cover is stretched to provide environmental protection and reduced pilferage during logistical transport. The vehicle closure kit is shown on transportability drawings in dotted lines, and the frame and cover arrangement is illustrated in the center photograph of figure 6-1.

2-7



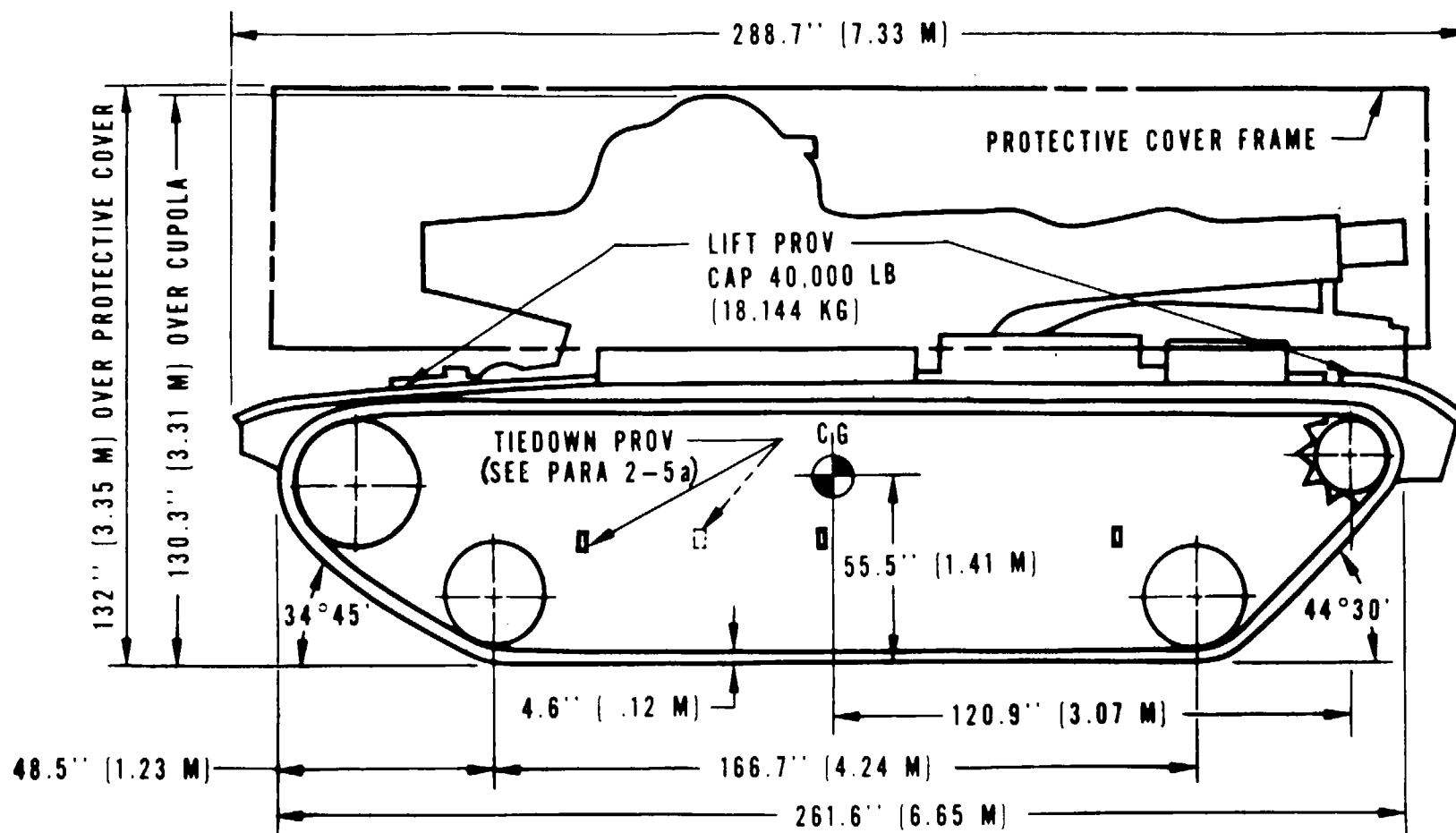
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Figure 2-5. Transportability drawing left-side elevator, M60, M60A1, or M60A3.



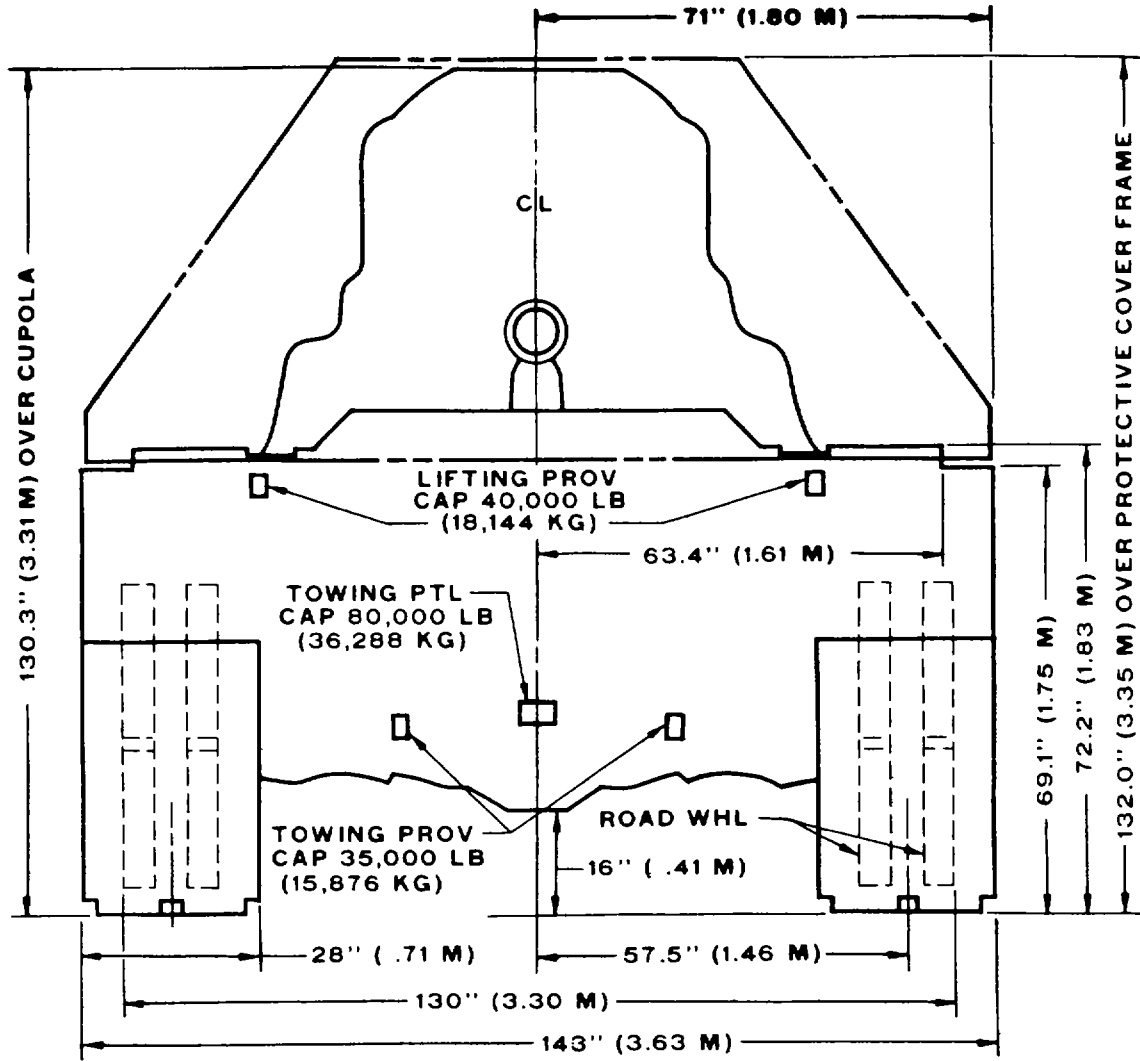
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Figure 2-6. Transportability drawing rear-end elevation, M60, M60A1, or M60A3.



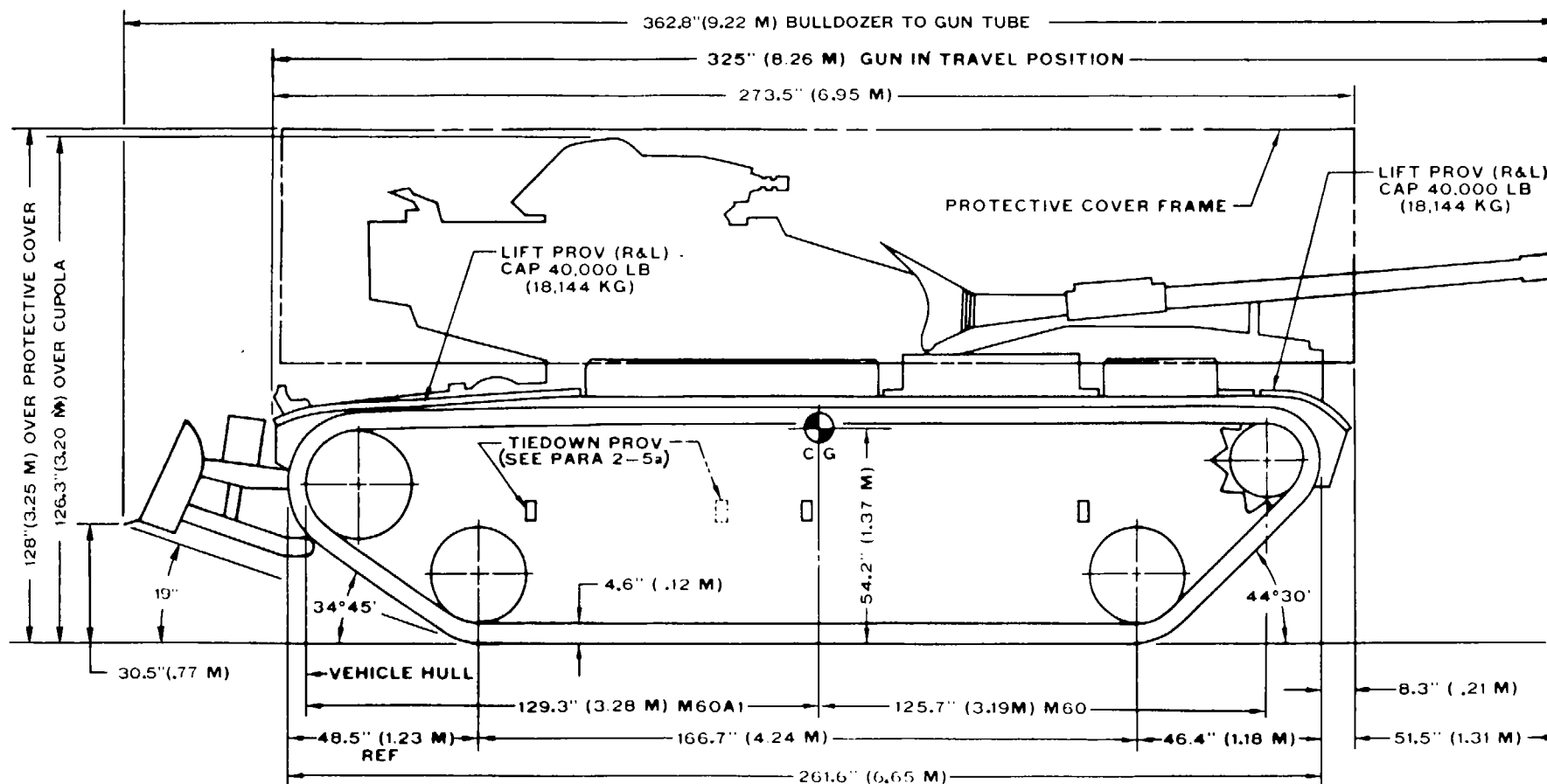
SCALE 1/40

Figure 2-7. Transportability drawing, left-side elevation, M60A2.



SCALE 1/30

Figure 2-8. Transportability drawing, rear-end elevation, M60A2.



SCALE 1/40

Figure 2-9. Transportability drawing, left-side elevation, M60, M60A1, or M60A3, with bulldozer, M9.

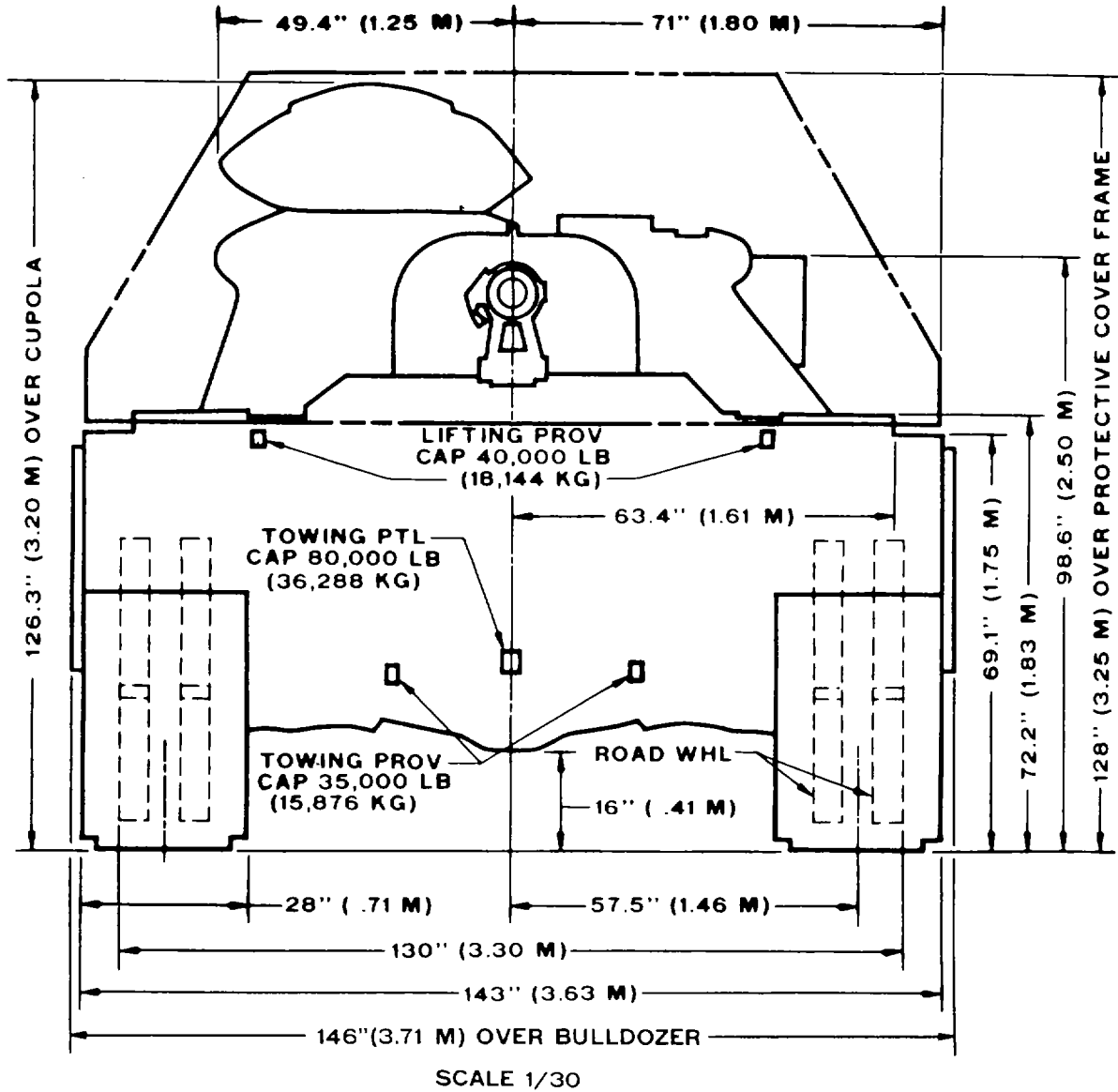


Figure 2-10. Transportability drawing, rear-end elevation, M60, M60A1, or M60AS, with bulldozer, M9.

Section II. CHARACTERISTICS AND RELATED DATA

2-5. General Transportability Characteristics

Data contained herein are applicable to model number of national stock number (NSN) shown. Changes in model number or NSN may affect the loadability of the item as related to the guidance shown in this manual. Transportability data pertaining to movement of items when loaded on highway vehicles will be found in chapter 5.

a. *Side Tiedown Eyes.* The three tiedown eyes on each side of the M60 and M60A1 models, to and including serial number 5025, have a side-load rating of 20,000 pounds each. M60A1, serial numbers 5026 and subsequent, and M60A2 serial numbers 4426 and subsequent, have four tiedown eyes on each side that are rated at 490,000 pounds each side load and 413,000 pounds each oblique load. It is planned to delete the middle two eyes, leaving only the fore and aft eyes on future production models. When this is accomplished, subsequent serial numbers will be added to this publication.

b. *Tank, Combat, Full-Tracked. 105-mm-Gun, M60.*

National stock number.....	2350-00-678-5773
Line item number	V13101
Type classification	Standard A
Vehicle classification:	
Unloaded (curb weight plus crew)	45
Combat weight	50
Ground pressure:	
Unloaded (curb weight plus crew)	9.9 psi (0.70 kg/sq cm)
At combat weight	10.8 psi (0.76 kg/sq cm)
Ground contact area	65.0 sq ft (6.05 sq m)
Track type.....	80 steel, rubber bushed, pinlink shoe
Size	28 in. (0.71 m)
Pitch.....	6 15/16 in. (0.17 m)
Grouser depth	1.5 in. (0.04 m)
Axleload	(Not applicable; see chap 5, sec II, for axleloads on transporter.)
Performance:	
Maximum speed (forth range).....	30 mph (48.3 km/hr)
Maximum speed (reverse)	5 mph (8.0 km/hr)
Maximum grade	60 percent
Maximum range at 20 mph	310 miles (500 km)
Fuel tank capacity (40 cetane, Fed	

Spec VV-F-800, or CITE).....	375 US gal
Turning radius	Pivot
Angle of approach	34°45'
Angle of departure.....	44°30'
Ground clearance	16.0 in. (0.41 m)
Dimensions and shipping data:	
Length operational	366.5 in. (9.31 m)
With gun tube in travel position	325.0 in. (8.26 m)
Reduced with gun tube removed	273.5 in. (6.95 m)
With closure kit (gun tube removed).....	273.5 in. (6.95 m)
Width operational	143.0 in. (3.63 m)
Reduced	143.0 in. (3.63 m)
With closure kit	143.0 in. (3.63 m)
Height operational	126.3 in. (3.20 m)
Reduced	126.3 in. (3.20 m)
With closure kit	128.0 in. 3.25 m)
Area operational	363.9 sq ft (38.81 sq m)
With gun tube in travel position	317.8 sq ft (29.52 sq m)
Reduced, with gun tube removed	271.6 sq ft (25.23 sq m)
With closure kit (gun tube removed).....	271.6 sq ft (25.23 sq m)
Cube operational	3,830.6 cu ft (108.41 cu m)
With gun in travel position	3,344.6 cu ft (94.65 cu m)
Reduced, with gun tube removed	2,858.6 cu ft (80.89 cu m)
With closure kit (gun kit removed)	2,897.1 cu ft (81.99 cu m)
Center of gravity:	
At curb weight:	
Above ground	54.2 in. (1.37 m)
From centerline of drive sprocket	125.7 in. (3.19 m)
Weights:	
Unloaded (curb weight).....	92,500 lb (41,958 kg)
With combat load	101,000 lb (45,813 kg)
c. <i>Tank, Combat, Full-Tracked, 105-mm-Gun, M60A1.</i>	

National stock number.....2350-00-756-8497
 Line item numberV13101
 Type classificationStandard A
 Vehicle classification:
 Unloaded (curb weight plus crew)52
 Combat weight54
 Ground pressure:
 Unloaded (curb weight plus crew) 10.4 psi (0.73 kg/sq cm)
 At combat weight 11.4 psi (0.80 kg/sq cm)
 Ground contact area 65.0 sq ft (6.05 sq m)
 Track type 80 steel, rubber bushed, pinlink shoe
 Size28 in. (0.71 m)
 Pitch6 15/16 in. (0.17 m)
 Grouser depth 1.5 in. (0.04 m)
 Axleloads (Not applicable; see chap 5, sec II, for axleloads on transporter)
 Performance:
 Maximum speed (fourth range)30 mph (48.3 km/hr)
 Maximum speed (reverse).....5 mph (8.0 km/hr)
 Maximum grade60 percent
 Maximum range at 20 mph310 miles (500 km)
 Fuel tank capacity (40 cetane, Fed Spec VV-F-800, or CITE).....375 US gal
 Turning radiusPivot
 Angle of approach34° 45'
 Angle of departure44° 30'
 Ground clearance16.0 in. (0.41 m)
 Dimensions and shipping data:
 Length operational371.5 in. (9.44 m)
 With gun tube in travel position325.0 in. (8.26 m)
 Reduced, with gun tube removed273.5 in. (6.95 m)
 With closure kit (gun tube removed).....273.5 in. (6.95 m)
 Width operational143.0 in. (3.63 m)
 Reduced143.0 in. (3.63 m)
 With closure kit143.0 in. (3.63 m)
 Height operational126.3 in. (3.20 m)
 Reduced126.3 in. (3.20 m)
 With closure kit128.0 in. (3.25 m)
 Area operational368.9 sq ft (34.27 sq m)
 With gun tube in travel position322.7 sq ft (29.98 sq m)
 Reduced, with gun tube removed271.6 sq ft (25.23 sq m)

With closure kit (gun tube removed).....271.6 sq ft (25.23 sq m)
 Cube operational3,882.9 cu ft (109.88 cu m)
 With gun tube in travel position3,396.9 cu ft (96.13 cu m)
 Reduced, with gun tube removed2,858.6 cu ft (80.89 cu m)
 With closure kit (gun tube removed).....2,897.1 cu ft (81.99 cu m)
 Center of gravity:
 At curb weight:
 Above ground54.2 in. (1.37 m)
 From front of vehicle hull129.3 in. (3.28 m)

Weights:
 Unloaded (curb weight).....107,100 lb (48.580 kg)
 With combat load115,100 lb (52.209 kg)
d. Tank, Combat, Full-Tracked, 155-mm-Gun, M60A2.

National stock number.....2350-00-930-3590
 Line item numberV13270
 Type classificationStandard A
 Vehicle classification:
 Unloaded (curb weight plus crew)52
 Combat weight55
 Ground pressure:
 Unloaded (curb weight plus crew) 12.3 psi (0.87 kg/sq cm)
 At combat weight 13.2 psi (0.93 kg/sq cm)
 Ground contact area 65.0 sq ft (6.05 sq m)
 Track type..... 80 steel, rubber bushed, pinlink shoe
 Size28.0 in. (0.71 m)
 Pitch6 15/16 in. (0.17 m)
 Grouser depth 1.5 in. (0.04 m)
 Axleloads(Not applicable; see chap 5, sec II, for axleloads on transporter)

Performance:
 Maximum speed (fourth range)30 mph (48.3 km/hr)
 Maximum speed (reverse).....5 mph (8.0 km/hr)
 Maximum grade60 percent
 Maximum range at 20 mph310 miles (500 km)

Fuel tank capacity
(40 cetane, Fed
Spec VV-F-800, or
CITE)375 US gal

Turning radiusPivot

Angle of approach34°45'

Angle of departure40°30'

Ground clearance 16.0 in. (0.41 m)

Dimensions and shipping data:

Length operational288.7 in. (7.33 m)
With closure kit288.7 in. (7.33 m)

Width operational 143 in. (3.63 m)
With closure kit 143 in. (3.63 m)

Height operational 130.3 in. (3.31 m)
With closure kit 132.0 in. (3.35 m)

Area operational286.7 sq ft (26.63 sq m)
With closure kit286.7 sq ft (26.63 sq m)

Cube operational3,113.0 cu ft (88.10 cu
m)
With closure kit3,153.6 cu ft (89.25 cu
m)

Center of gravity:
At curb weight:
Above ground55.5 in. (1.41 m)
From centerline of
drive sprocket 120.9 in. (3.07 m)
Above ground55.8 in. (1.42 m)
From centerline of
drive sprocket 120.9 in. (3.07 m)
At combat weight:
Above ground55.8 in. (1.42 m)
From centerline of
drive sprocket 120.9 in. (3.07 m)

Weights:
Unloaded (curb
weight) 109,980 lb (49,887 kg)
With combat load 114,000 lb (51,710 kg)
*e. Tank, Combat Pull-Tracked, 105-mm-Gun,
M60A3.*

National stock number.....2360-00-148-6548

Line item numberV1310

Type classification Standard A

Vehicle classification:
Unloaded (curb
weight plus crew)53
Combat weight55

Ground pressure:
Unloaded (curb
weight plus crew) 10.4 psi (0.73 kg/sq cm)
At combat weight 11.4 psi (0.80 kg/sq cm)
Ground contact area65.0 sq ft (6.05 sq m)
Track type80 steel, rubber bushed,
pinlink shoe
Size28 in. (0.71 m)
Pitch.....615/16 in. (0.17 m)
Grouser depth 1.5 in. (0.04 m)

Axleloads(Not applicable; see
chap 5, sec II, for

axleloads on
transporter)

Performance:

Maximum speed
(fourth range)30 mph (48.3 km/hr)

Maximum speed
(reverse).....5 mph (8.0 km/hr)

Maximum grade60 percent

Maximum range at
20 mph310 miles (500 km)

Fuel tank capacity
(40 cetane, Fed
Spec VV-F-800, or
CITE).....375 US gal

Turning radiusPivot

Angle of approach34°45'

Angle of departure44°30'

Ground clearance 16.0 in. (0.41 m)

Dimensions and shipping data:

Length operational371.5 in. (9.44 m)
With gun tube in
travel position325.0 in. (8.26 m)
Reduced, with gun
tube removed273.5 in. (6.95 m)
With closure kit
(gun tube
removed).....273.5 in. (6.95 m)

With operational 143.0 in (3.63 m)
Reduced 143.0 in. (3.63 m)
With closure kit 143.0 in. (3.63 m)

Height operational 126.3 in. (3.20-m)
Reduced 126.3 in. (3.20 m)
With closure kit 128.0 in. 3.25 m)

Area operational368.9 sq ft (34.27 sq m)
With gun tube in
travel position322.7 sq ft (29.98 sq m)
Reduced, with gun
tube removed271.6 sq ft (25.23 sq m)
With closure kit
(gun tube
removed)271.6 sq ft (25.23 sq
m)

Cube operational3,882.9 cu ft (109.88 cu
m)
With gun tube in
travel position3,396.9 cu ft (9&13 cu
m)
Reduced, with gun
tube removed2,858.6 cu ft (80.89 cu
m)
With closure kit
(gun kit gun
tube removed).....2,897.1 cu ft (81.99 cu
m)

Center of gravity:
At curb weight:
Above ground54.2 in. (1.37 m)

From front of vehicle hull 129.3 in. (3.28 m)

Weights:

Unloaded (curb weight) 105,900 lb (48,036 kg)

With combat load 113,900 lb (51,665 kg)

f. Tank, Combat, Full-Tracked, 105-mm-Gun, M60A3, with Bulldozer, M9.

National stock number.....2350-00-148-6548

Line item numberV13101

Type classification Standard A

Vehicle classification:

Unloaded (curb weight plus crew) 55

Combat weight 57

Ground pressure:

Unloaded (curb weight plus crew) 11.3 psi (77.90 KPa)

At combat weight 12.2 psi (84.11 KPa)

Ground contact area 65.0 sq ft (6.05 sq m)

Track type.....80 steel, rubber bushed, pinlink shoe

Size 28 in. (0.71 m)

Pitch..... 6 15/16 in. (0.17 m)

Grouser depth 1.5 in. (0.04 m)

Axleloads.....(Not applicable; see chap 5, sec II, for axleloads on transporter.)

Performance:

Maximum speed (fourth range) 30 mph (48.3 km/hr)

Maximum speed (reverse)..... 5 mph (8.0 km/hr)

Maximum grade 60 percent

Maximum range at 20 mph 310 miles (500 km)

Fuel tank capacity (40 cetane, Fed Spec W-F-800, or CITE)..... 375 US gal

Turning radius Pivot

Angle of approach 19°

Angle of departure..... 44°30'

Ground clearance 16.0 in. (0.41 m)

Dimensions and shipping data:

Length operational 371.5 in. (9.44 m)

With gun tube in travel position 362.8 in. (9.22 m)

Reduced, with gun tube removed 311.3 in. (7.90 m)

With closure kit

(gun tube removed)..... 311.3 in. (7.90 m)

Width operational 146.0 in. (3.71 m)

Reduced 146.0 in. (3.71 m)

With closure kit 146.0 in. (3.71 m)

Height operational 126.3 in. (3.20 m)

Reduced 126.3 in. (3.20 m)

With closure kit 128.0 in. (3.25 m)

Area operational 376.6 sq ft (34.65 sq m)

With gun tube in travel position 367.8 sq ft (33.84 sq m)

Reduced, with gun tube removed 315.6 sq ft (29.04 sq m)

With closure kit (gun tube removed) 315.6 sq ft (29.04 sq m)

Cube operational 3,964.3 cu ft (112.19 cu m)

With gun tube in travel position 3,871.5 cu ft (109.56 cu m)

Reduced, with gun tube removed 3,321.9 cu ft (94.01 cu m)

With closure kit (gun tube removed) 3,366.7 cu ft (95.28 cu m)

Center of gravity:

At curb weight:

Above ground 53.0 in. (1.35 m)

From front of vehicle hull 115.5 in. (2.93 m)

Weights:

Unloaded (curb weight)..... 114,800 lb (52 073 kg)

With combat load 122,800 lb (55 702 kg)

g. Bulldozer, Earthmoving, Tank-Mounting, M.9, for M6-Series Tanks.

National stock number.....2590-00-708-3563

Line item number C36120

Type classification Standard A

Shipping configuration, boxed:

Length 160.8 in. (4.08 m)

Width..... 78.5 in. (1.99 m)

Height..... 35.5 in. (.90 m)

Weight..... 10,4301 lb (4,731 kg)

NOTE

The M9 bulldozer installed on the M60-series tank will increase the vehicle weight by 8,900 lb (4,037 kg) and decrease its angle of approach from 34° to 19°.

2-6. Unusual Characteristics

The vehicles do not have any unusual characteristics requiring that special attention be given to temperature, atmospheric pressure, or humidity variations during their exposure to normal transportation environments. The vehicle closure kits, which are normally used during transportation, provide adequate protection from varying climatic conditions.

2-7. Hazardous and Dangerous Characteristics

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

NOTE

Those regulations and/or transportation procedures normally associated with vehicles containing diesel fuel will apply (appendix).

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.

CHAPTER 3

SAFETY

3-1. General

General safety guidelines and precautions for movement are as follows:

- a. Each vehicle must be checked to insure that all loose items are appropriately secure in accordance with applicable regulations (appendix).
- b. When the driver's seat is being raised or lowered, the body weight must be kept on the seat.
- c. When the vehicle is driven, the driver's sliding hatch cover must be secured in the fully open or fully closed position.
- d. When the vehicle is in drive-on/dive-off operations, ground guides must be used.
- e. The vehicle must not be left unattended while the engine is running.
- f. If the track is thrown while the vehicle is being operated, the brakes must not be applied unless

absolutely necessary. The vehicle should be allowed to coast to a stop.

- g. All personnel must be clear of the vehicle when the turret is traversed, and the area must be clear of obstacles.

- h. When the cupola is traversed, the loader's hatch cover must be in fully open or fully closed position, and the turret area must be clear.

WARNING

The M8A3 air filter unit will not protect user against carbon monoxide.

3-2. Specific Safety Requirements

Pertinent safety requirements by individual mode are given in the appropriate chapters of this manual.

CHAPTER 4

AIR TRANSPORTABILITY GUIDANCE

4-1. Scope

This chapter provides air transportability guidance for the movement of the tanks, combat, fulltracked, M60-series. It includes significant technical and physical characteristics, as well as safety considerations, and prescribes the manpower, materials, and time required to prepare, load, tie down, and unload the vehicle as internal loads on US Air Force cargo aircraft.

4-2. Maximum Utilization of Aircraft

- a. The loads described in this section are not maximum loads.
- b. Additional cargo and/or personnel within allowable load limits and restrictions, prescribed in pertinent safety regulations (appendix), can be transported.

4-3. Applicability

- a. US Air Force Aircraft. The M60-series tanks are transportable only in the C-5 airplane. Procedures in this manual and those prescribed in section VI, TO 1C-5A-9, apply.
- b. Tiedown Devices. The vehicle is tied down in accordance with the procedures established in TO 1C-5A-9.
- c. Responsibilities of the Airplane Commander. The airplane commander or his representative will insure that the vehicle is secured in accordance with restraint criteria outlined in TO 1C-5A-9.

4-4. Safety

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

- a. The activity offering the vehicles for air transport must notify the airplane commander or his or her designated representative when ammunition or explosives are to be transported within the vehicle.
- b. The vehicle fuel tanks must not be more than three-fourths full.
- c. The vehicle must be tied down in accordance with procedures in this manual and TO 1C-5A-9.
- d. Each vehicle or component must be checked carefully to insure that all loose items are properly secured.

WARNING
Fire extinguishers must be readily

available during all loading and unloading operations.

WARNING
Proper ventilations must be provided when loading and unloading. Prolonged exposure to carbon monoxide fumes may be fatal.

CAUTION
Vehicle speed must not exceed 3 miles per hour inside aircraft or on the loading ramps.

4-5. Preparation of Vehicle

- a. Turret traverse and gun-elevating mechanism must be in travel position, locked, and wire-tied to prevent rotation.
- b. Antennae must be tied down or removed, hatches placed in closed position, and loose gear secured with nylon cord or suitable substitute.
- c. Machine-gun and mount must be removed and secured in the location provided.

4-6. Transport of M60-Series Vehicle by US Air Force C-5 Airplane

- a. *Materials.* None required. When pads are worn to the extent that deflection of the pads will cause the metal grousers to contact the aircraft ramps or floor during loading or flight, rolling and parking shorin must be used.
- b. Loading.

- (1) Ammunition boxes and grenades must be secure.

WARNING
TM 38-250 (AFR 71-4) must be consulted to insure compatibility of any additional cargo being considered for loading with the vehicle.

- (2) All externally and internally stowed equipment must be secured.

- (3) The vehicle should be loaded as indicated in figure 4-1.

- (4) The vehicle transmission must be placed in neutral, and the brakes set.

(5) For acceptable restraint, the vehicle must be tied down in accordance with the pattern shown in figure 4-1 and data given in table 4-1.

c. Time Required. Four men can prepare, load, and tie down the vehicle in approximately 45 minutes.

d. Unloading. Three men can remove restraint and unload the vehicle in approximately 15 minutes.

4-7. Internal and External Transport by US Army Aircraft

The M60-series tanks exceed the size and weight for either internal or external transport by US Army fixed-wing aircraft or rotary-wing helicopters.

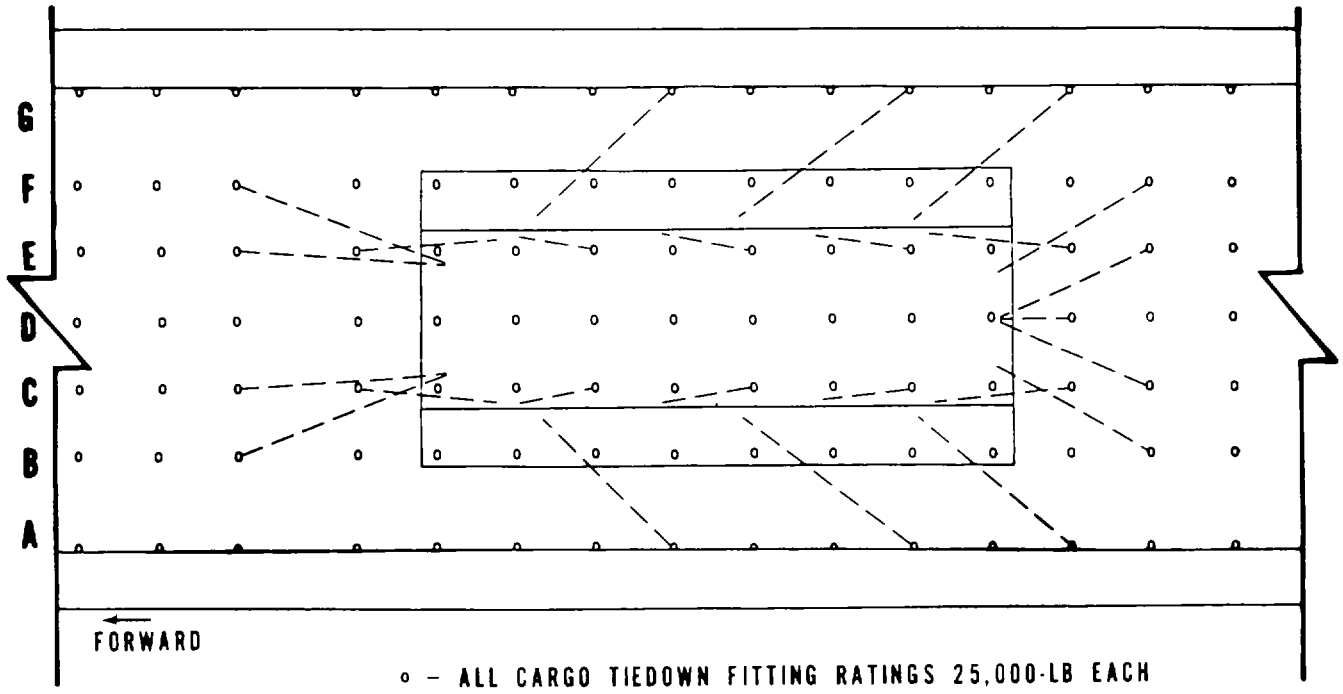


Figure 4-1. Tiedown diagram for M60-series tank in US Air Force C-5 airplane.

Table 4-1. Tiedown Data for M60-Series Tank in US Air Force C-5 Airplane

Tiedown Fitting		Tiedown Device			
Designation	Capacity in 1,000 lb	Type	Capacity in 1,000 lb	Attach to Item	
B	25	MB-2	25	Left front tiedown	
C	25	MB-2	25	Left front tiedown	
E	25	MB-2	25	Right front tiedown	
F	25	MB-2	25	Right front tiedown	
C	25	MB-2	25	Left No. 1 idler wheel arm	
E	25	MB-2	25	Right No. 1 idler wheel arm	
C	25	MB-2	25	Left No. 1 idler wheel arm	
E	25	MB-2	25	Right No. 1 idler wheel arm	
A	25	MB-2	25	Left front hull tiedown	
G	25	MB-2	25	Right front hull tiedown	
C	25	MB-2	25	Left No. 3 idler wheel arm	
E	25	MB-2	25	Right No. 3 idler wheel arm	
A	25	MB-2	25	Left center hull tiedown	
C	25	MB-2	25	Left No. 5 idler wheel arm	
E	25	MB-2	25	Right No. 5 idler wheel arm	
G	25	MB-2	25	Right center hull tiedown	
A	25	MB-2	25	Left rear hull tiedown	
C	25	MB-2	25	Left No. 6 idler wheel arm	
D	25	MB-2	25	Towing pintle	
E	25	MB-2	25	Right No. 6 idler wheel arm	
G	25	MB-2	25	Right rear hull tiedown	
B	25	MB-2	25	Left rear tiedown	
C	25	MB-2	25	Towing pintle frame	
E	25	MB-2	25	Towing pintle frame	
F	25	MB-2	25	Right rear tiedown	

CHAPTER 5 HIGHWAY TRANSPORTABILITY GUIDANCE

Section I. GENERAL

5-1. Scope

This chapter provides highway transportability guidance for movement of the M60-series tanks. It includes significant technical and physical characteristics and safety considerations and prescribes the materials and guidance required to prepare, load, tie down, and unload the vehicles.

5-2. Safety

Movement of the M60-series tanks is subject to the safety precautions contained in chapter 3, as well as the same safety laws, rules, and regulations applicable to

commercial carriers. Overseas, such movements are governed by theater regulations.

5-3. General

The vehicles are considered self-deliverable only in limited emergencies and under appropriate tactical situations. Although the tracks of vehicles are rubber bushed, movement over paved public highways will be limited to contingencies or mobilization and must have approval of civil highway authorities. The weight of the M60-series tanks is considered excessive for many bridges. Their width and height exceed limitations in CONUS and overseas.

Section II. TRANSPORT BY SEMITRAILER

5-4. Transport of M60-Series Tank by Semitrailer

The M60 Tank, when loaded on heavy equipment transporters (HETs), can be transported over public highways; however, highway movements should be made only when other transport modes cannot be used. Normally, highway movements are made with the vehicle loaded on military or commercial low-bed HETs of adequate capacity. As identified in paragraphs 5-5 and 5-6, the M60 series, when loaded on a HET, exceeds length, width, height, and weight limitations in CONUS and overseas. Except for certain emergency conditions, special permits, special routing, and/or a "certification of essentiality to national defense" are required for movements in CONUS (AR 55-80 and AR 55-162). Special permits and routing are also required overseas. Military or commercial HETs with capabilities equal to or greater than those of the M747 are generally satisfactory for transporting the M60-series tank. Some States will not allow routine movement of the M747 HET when loaded with the M60-series tank. A typical loading, with the M747 as the transport vehicle towed by a truck tractor, is contained in this chapter.

5-5. Preparation of M60-Series Tank

Preparation of the M60 tank for transport includes the following procedures:

a. Turret traverse and gun-elevating mechanism must be in travel position and locked and wire-tied to prevent rotation.

b. Antennae must be tied down or removed, hatches placed in closed position, and loose gear secured with nylon cord or suitable substitute.

c. External machine guns must be removed and secured in locations provided.

5-6. Transport of M60-Series Tank on M747 Semitrailer, Towed by Truck Tractor (M746 or M911) of the Heavy Equipment Transporter (HET) System

a. *General.* The combined weight and axle spacing of M747 HET poses the greatest problem to highway movement. The air-bag suspension of the M747 causes excessive overloading of axles when traversing horizontal or vertical curves. Therefore, some States will not allow routine movements with the M747. Also, the combined length of the tractor and semitrailer, 61 feet, exceeds the generally accepted CONUS and overseas unrestricted length of 55 feet. The width of the tractor/semitrailer combination exceeds the legal limits for CONUS and overseas. The legal limits for CONUS are published in chart form by the American Association of State Highway and Transportation Officials. Those for overseas are given in the Limits of Motor Vehicle Sizes and Weights, published by International Road Federation, Geneva, Switzerland. Movement of the loaded HET system with a payload (M60 tank) over public highways in CONUS and overseas is normally limited to emergencies or when other transport modes are not available or

practical. Civil highway permit officials should be consulted to determine specific permit requirements for the state or country in which the movement is planned.

b. Bridge Limitations. The high tandem axleloads and suspension characteristics may overstress typical bridge structures in the United States. Most States will permit tandem axleloads of up to 50,000 pounds under special conditions. Accordingly, all highway movements of the M60-series tank on the HET system may be refused or required to have a "certification of essentiality to national defense." The certification is issued to the appropriate State highway department by the major command making the move and is required prior to movement.

c. Loaded Characteristics. Characteristics of the loaded system are shown in individual axle weights in figure 5-1. The HET transport system's tandem axles, that is, the two adjacent axles pivoting at a single suspension point, are over the 50,000-pound tandem-axleload limit recommended by AASHTO. When the M60-series tank is positioned on the M747 semitrailer so that the load is equally distributed to all axles, the

tandem axleload limit is exceeded. The rear two axles of the M746 semitrailer are retractable pusher axles. When extended, they can be adjusted to push against the surface to distribute the load to all four axles of the semitrailer. The M746 truck tractor has two sets of tandem axles. The M911 truck tractor has one set of driving tandem axles, a single steering axle, and a single pusher axle just forward of the tandem axles. The pusher axle may be extended to distribute the load when the fifth-wheel load increases the tandem axleload to greater than acceptable limits. Placement of the M60A3 tank's center of balance 243 inches from the kingpin of the M747 semitrailer, with the semitrailer pusher axles properly extended (when towed by the M746 truck tractor), will achieve the individual axleloads shown in figure 5-1. Placement of the M60A3 tank's center of balance 237 inches from the kingpin of the M747 semitrailer, with the tractor pusher axle and the semitrailer pusher axles properly extended (when towed by the M911 truck tractor), will achieve individual axleloads shown in figure 5-1.

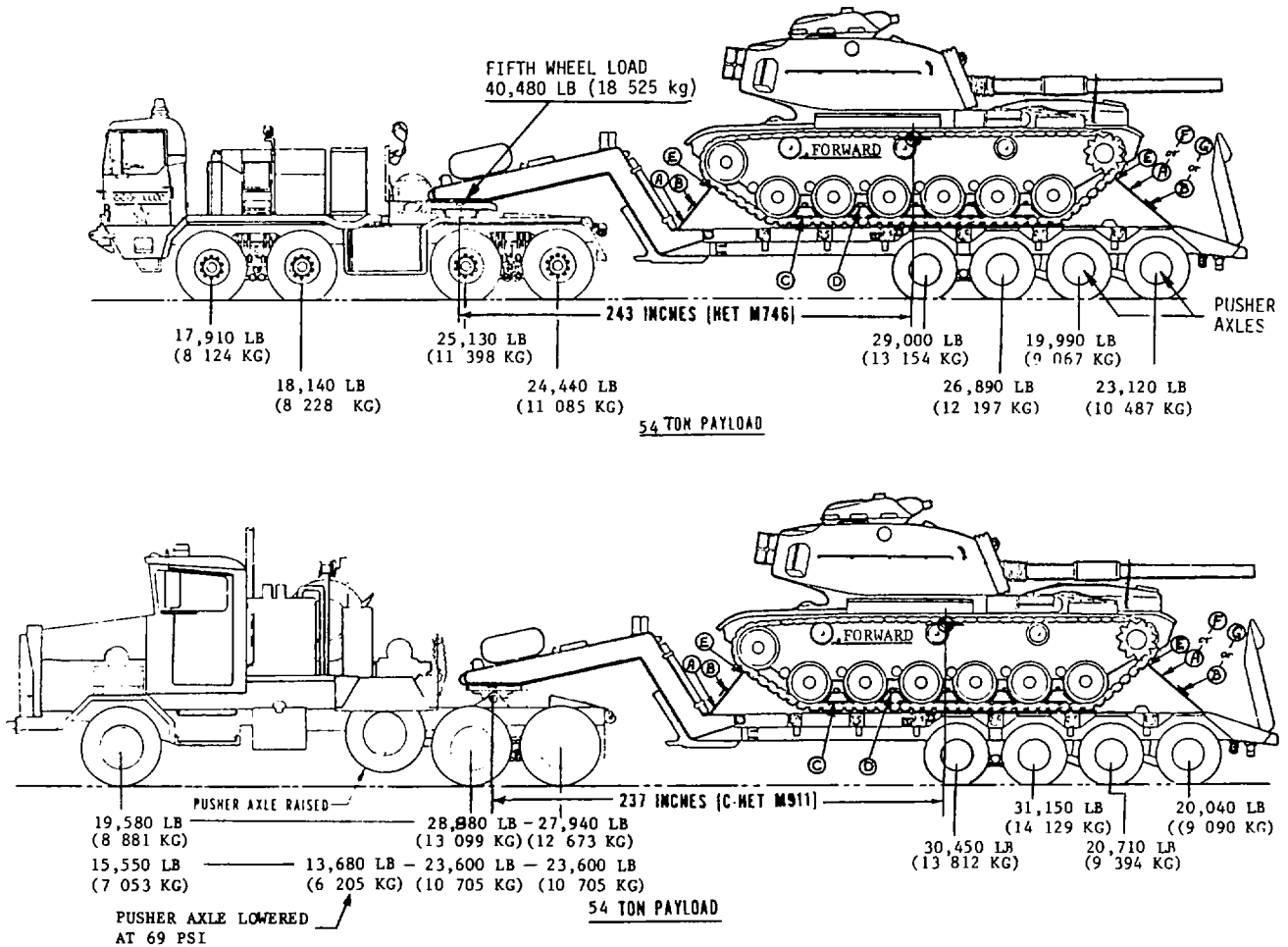


Figure 5-1. Characteristics of the loaded M60A3 tank on the M747 semitrailer, towed by either the HET (M746) or the C-HET (M911) truck tractor, and tiedown diagram.

d. *Suspension Characteristics.* The HET-loaded transport vehicle produces lower impact forces on highway bridges when compared with other types of similarly loaded highway vehicles. However, the appropriate State permit official should determine the system's potential detrimental effect upon each highway route requested by the major command.

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

f. *Materials.* The bill of materials for blocking and tiedown of the M60-series vehicle on the M747 semitrailer is shown in table 5-1.

g. *Loading.*

(1) The vehicle may be driven to the tiedown position on the semitrailer or towed on the semitrailer over the ramp by use of the winches on the HET truck tractor.

(2) The M747 inside-track restraints must be adjusted to receive tracks of the vehicle.

(3) After the vehicle is placed at the tiedown position, the vehicle transmission must be placed in the neutral position, and the brakes should be set.

(4) A tiedown diagram compatible with standard loading practices that will offer adequate restraint against the forces encountered during movements at normal speeds is provided in figure 5-1.

(5) Data concerning the application of materials required to restrain the vehicle are provided in table 5-2.

Table 5-1. Bill of Materials for Blocking and Tiedown of the MO60-Series Tanks on the M747 Semitrailer

Item	Description	Approximate Quantity
Lumber	Douglas fir, or comparable, straight-grain, free from material defects; Fed Spec MM-L-751: 2- x 4-in. 6- x 6-in.	24 linear ft 36 linear ft
Nails	Common steel; flathead; bright or cement-coated; table X1-b, Fed Spec FF-N-105:20d	98
Wire rope	6 x 19, IWRC; improved plow steel; preformed, regular-lay; table X, Fed Spec RR-W410: 5/8in.	64 ft.
Clamps	Wire rope, U-bolt clips, saddled, single-grip, steel, Crosby heavy-duty, or equal; MIL-STD 16842: 5/8in.	16
Chain*.....	1/2 in 10-ft-long,-type-I, grade C, class 2; welded steel, high-test chain; Fed Spec RR-C-271; with grabhooks equal to or better than the strength of the chain; not required if wire rope and clamps are used	8
Loadbinders*..	Double-hook, heavy duty, 4-in, eccentric takeup, with chain grabhooks, for 1/4- to 1/2-in. chain; 16,000-lb safe working rating; 18 1/2-in. large lever, with two swivels, NSN 3990-00-171-9744; not required if wire rope and clamps are used	8
Thimbles	Standard, open-type, 5/8 in.	8
Shackles	Anchor 1 3/8 in.-diameter pin, 2-in. opening, NSN 4030-00-162-7545, or equal	8

*Chains and loadbinders may be substituted for 5/8-in. wire rope and clamps.

Table 5-2. Application of Materials for Tiedown of MO60-Series Tanks on M747 Semitrailer (Fig. 5-1)

Item	No. Required	Application
A*	4	Wire rope, 5/8-in. Attach to vehicle tiedown ring and trailer tiedown ring in complete loop; not required if items F and G are used.
B*	16	Clamp, 5/8-in. Secure the ends of the wire rope with four clamps each. Secure the thimbles with one clamp each (sketches 1 and 2, fig 7-3); not required if items F and G are used.
C	24	Road wheel chocking. Cut each to consist of two pieces of 6- x 6-in. lumber x length-to-suit to fit contour of road wheels. Locate one piece between inside and outside a wheels of each road arm assembly.
D	12	Tie cleat, 2- x 4-in. lumber x length-to-suit. Locate on top of item C (inside and outside), and secure with four 20d nails.
E	4	Shackles. Secure one shackle to each towing lug (two at front of vehicle and two at rear end).
F*	8	Chain, load-lashing, passed through vehicle tiedowns and semitrailer lashing rings. Excess chain must be safely stowed; not required if items A and B are used.
G*	8	Loadbinder. Grabhooks secured to chain, and slack taken up with eccentric takeup; not required if items A and B are used.

*Items F and G may be substituted for A and B.

CHAPTER 6 MARINE AND TERMINAL TRANSPORTABILITY GUIDANCE

Section I. GENERAL

6-1. Scope

This chapter provides marine and terminal transportability guidance for movement of the M60-series tanks. It includes significant technical and physical characteristics and safety considerations and prescribes the materials and guidance required to prepare, load, tie down, and unload the vehicles.

6-2. Safety

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

a. The activity offering the vehicle for transport will notify the carrier in the event that ammunition or explosives are to be transported with the vehicle. Compliance with paragraph 2-7, AR 55-228, is mandatory.

b. Ammunition and vehicles will be handled and stowed in accordance with provisions contained in Code of Federal Regulations (CFR) 49 or reissues thereof.

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

d. Fuel tanks of vehicles must not be more than one-fourth full.

6-3. Water Shipment

The vehicles can be transported by a great variety of inland-waterway cargo carriers and lighters and by all seagoing cargo vessels.

NOTE

The methods described in this chapter for lifting and securing vehicles are suggested procedures. Other methods of handling and stowage may be used, provided that safe delivery is insured.

Section II. LOADING AND SECURING

6-4. General Rules for Stowing Tracked Vehicles

a. General. Whenever possible, vehicles should receive the protection of below-deck stowage. In most cases, good stowage of vehicles means vehicles are placed fore and aft as close together as practicable, with minimum spacing between outer vehicles and the sweatboards; breakable parts are protected and the disposition of spare parts is noted, usually within or near the vehicles; vehicles are stowed in neutral with brakes set; battery terminals are disconnected; fuel is drained; and vehicles are secured by adequate blocking and lashing. Securing includes blocking of tracks on all four sides so that the vehicles cannot move in any direction; individual vehicle blocks are braced to bulkheads, stanchions, and other vehicle blocks; and vehicle is lashed with wire rope or chain.

NOTE

DOT exemption (DOT-E-7280) authorizes DOD to ship vehicles involved in readiness exercises with fuel tanks three-quarters full when vehicles are loaded on vessels that

are adequately ventilated by power blowers, such as the roll-on/roll-off vessels.

b. Loading. Vehicles are always loaded on vessels in their minimum configuration; that is, reduced height, with or without cargo. The vehicles can be loaded onto landing craft, beach discharge and amphibious lighters, and landing ship tanks under their own power or by crane of adequate capacity. The vehicles can also be loaded under their own power onto the decks of barges from a pier when tidal conditions are suitable and ramps are available. The vehicles can be loaded onto seagoing vessels by shoreside or floating cranes of adequate capacity. Jumbo booms and heavy-lift ship's gear may be used in loading vehicles on vessels. The vehicles can be loaded on roll-on/roll-off vessels under their own power or by towing. A diagram for typical M60A2 lifting is figure 6-1; typical blocking and tiedown details are shown as figure 6-2; and a bill of materials and application of materials, as tables 6-1 and 6-2.

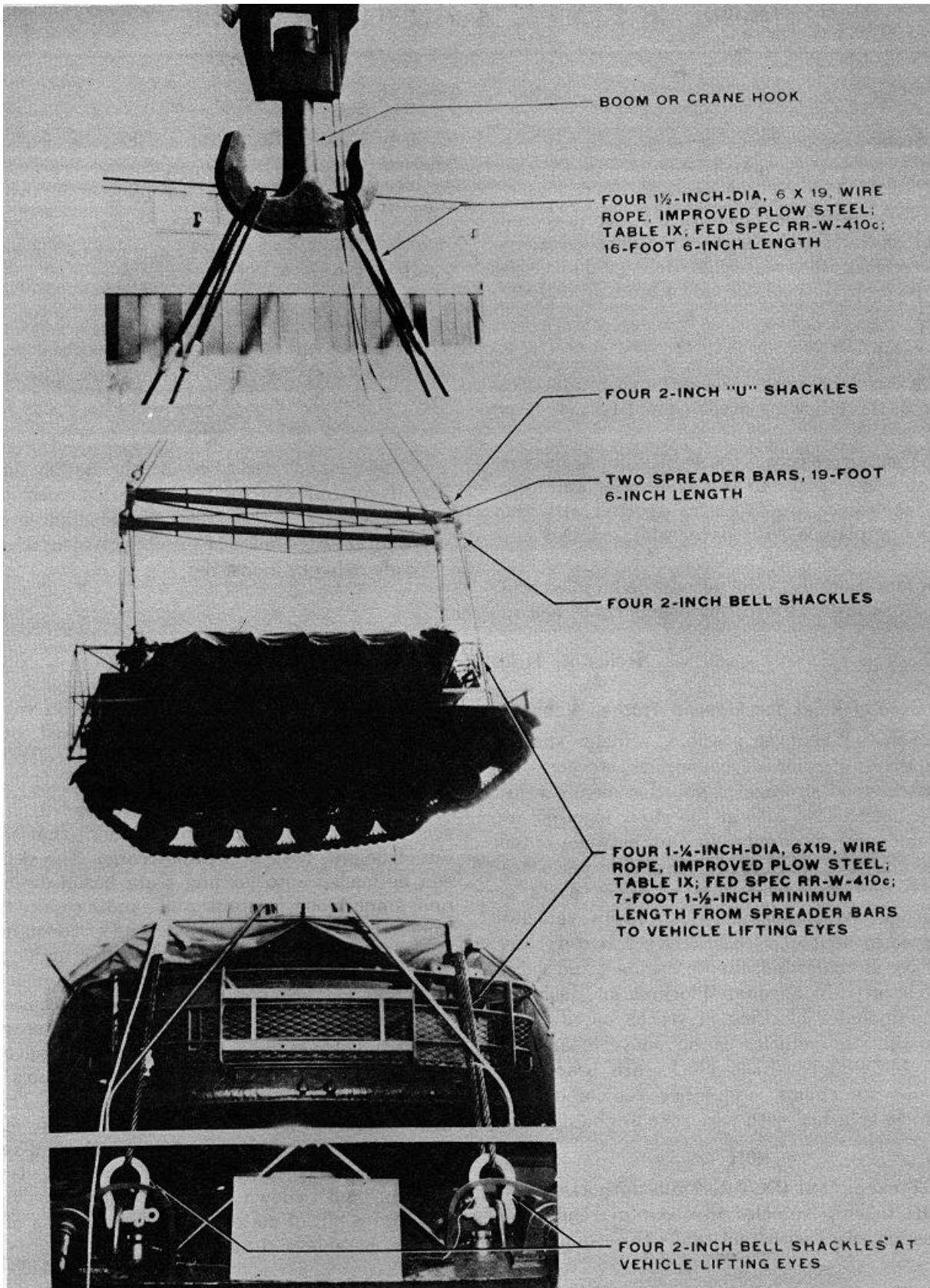


Figure 6-1. Lifting diagram for M60, with wire-rope and spreader-bar sling.

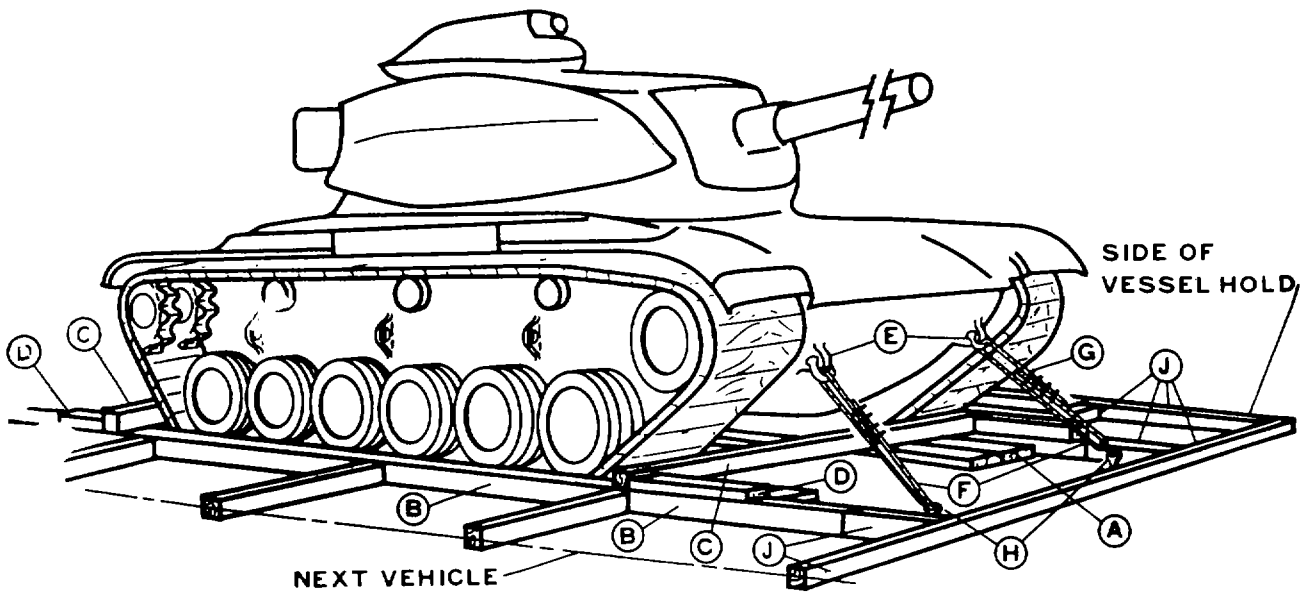


Figure 6-2. Typical blocking and tiedown for M60 in hold of general cargo vessel.

Table 6-1. Bill of Materials for Blocking and Tiedown of M60 in Hold of 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-751c:	
	4- x 6 in.....	4 linear ft
	2- x 12-in	80 linear ft
	6- x 8-in	154 linear ft
Nails	Common, steel; flathead; bright or cement-coated; table XI-b, Fed Spec FF-N-105a:	
	20d	20
	40d	116
Wire rope.....	6 x 19, IWRC; improved plow steel; preformed, regular-lay; table X, Fed Spec RR-W-410a:	60 ft
	5/8-in	
Clamps.....	Wire-rope, "U"-bolt clips, single-grip, steel, Crosby heavy-duty, or equal; MIL-STD 16842:	16
	5/8-in.	
Shackles.....	Clevis assembly suspension, bolt and nut type, large, FSN 1670-090-5354, or equal (for front and rear towing and tiedown provisions).	4

Table 6-2. Application of Materials for Blocking and Tiedown of M60 in Hold of General Cargo Vessel (Fig. 6-2)

Item	No. Required	Application
A	4	Lumber, 2- x 12- x 240-inch. Pre-position on vessel hold floor under vehicle treads; two pieces required under each tread.
B	2	Side blocking. Each consists of one piece of 6- x 8- x 240-inch lumber. Locate against vehicle treads; one piece on each side of vehicle.
C	2	End blocking. Each consists of one piece of 6- x 8-in. x length-to-suit. Locate on top of item B against vehicle treads. Toenail to item B with four 40d nails at each end.
D	4	Backup cleats, 4- x 6- x 12-inch lumber. Locate on top of item B against item C. Toenail to item B with four 40d nails.
E	4	Shackles. Secure one shackle to each towing lug (two at front and two at rear end of vehicle).
F	4	Wire rope, 5/8-in., in a complete loop. Secure with clamps (item G). Attach to front and rear shackles and padeyes.
G	16	Clamps, 5/8-in. Secure to item E in complete loop.
H	4	Padeye. Four required on floor of vessel.
J	as required	Bracing, 6- x 8in. x length-to-suit. Brace as required against vehicle blocking, side of vessel, or adjacent cargo blocking to immobilize vehicle and blocking. Secure each end to adjacent bracing or blocking detail by toenailing with four 40d nails.

c. *Special Design.* Seatrain trailer vessels, roll-on/roll-off vessels, landing ships, and attack-cargo vessels are all equipped with patented lashing gear and pre-positioned fittings in the deck. By proper application of four 70,000-lb (31 752 kg) or eight 35,000-lb (15 876 kg) lashing gear to each end, the M60 will not require blocking and bracing. Typical application of patented lashing gear securing M60-series tanks is shown in figure 6-3.

6-5. Barges and Lighters

When the vehicle is moved by barge or similar lighterage to or from vessels secured to piers or at a sheltered anchorage, blocking and bracing materials will be required. When the vehicle is moved for extended distances or through rough waters, tiedowns must also be used.

6-6. Landing Ships, Landing Craft, and Amphibious Vehicles

When the vehicle is moved for extended distances or through rough waters, blocking and tiedowns must be used. In most cases, the vessels are equipped with turnbuckles with a sheep's foot on one end that fits into a deck cloverleaf; where turnbuckles are not provided, a suitable substitute may be used.

6-7. Lighter Aboard Ship (LASH)

a. *General.* To transport the vehicle by LASH-type ships, securement by blocking and tiedown requirements is essential, as illustrated in figure 6-4.

(1) Armored tracked vehicles may arrive at the processing area with access hatches or tank turrets welded shut to prevent pilferage. Since these vehicles are not maneuverable under their

own power, tracks are not braked and transmissions are set in the neutral position to permit towing in the loading area. Contrary to normal stowage of tanks on a conventional vessel, the idler wheel chocks (items F and G, fig 7-5) should be in place, and the tanks may be positioned by crane in their final stow location.

(2) Barge stability is noticeably affected by the placement of heavy-lift items, and tracked vehicles should be loaded symmetrically in sequence about the centerline of the barge or lighter. The M60-series tanks should be loaded in a manner to counterbalance variations in the locations of centers of gravity from true center; that is, the M60-series tanks should be alternated head to tail.



Figure 6-3. M60-series tanks secured with patented lashing onboard a RORO vessel

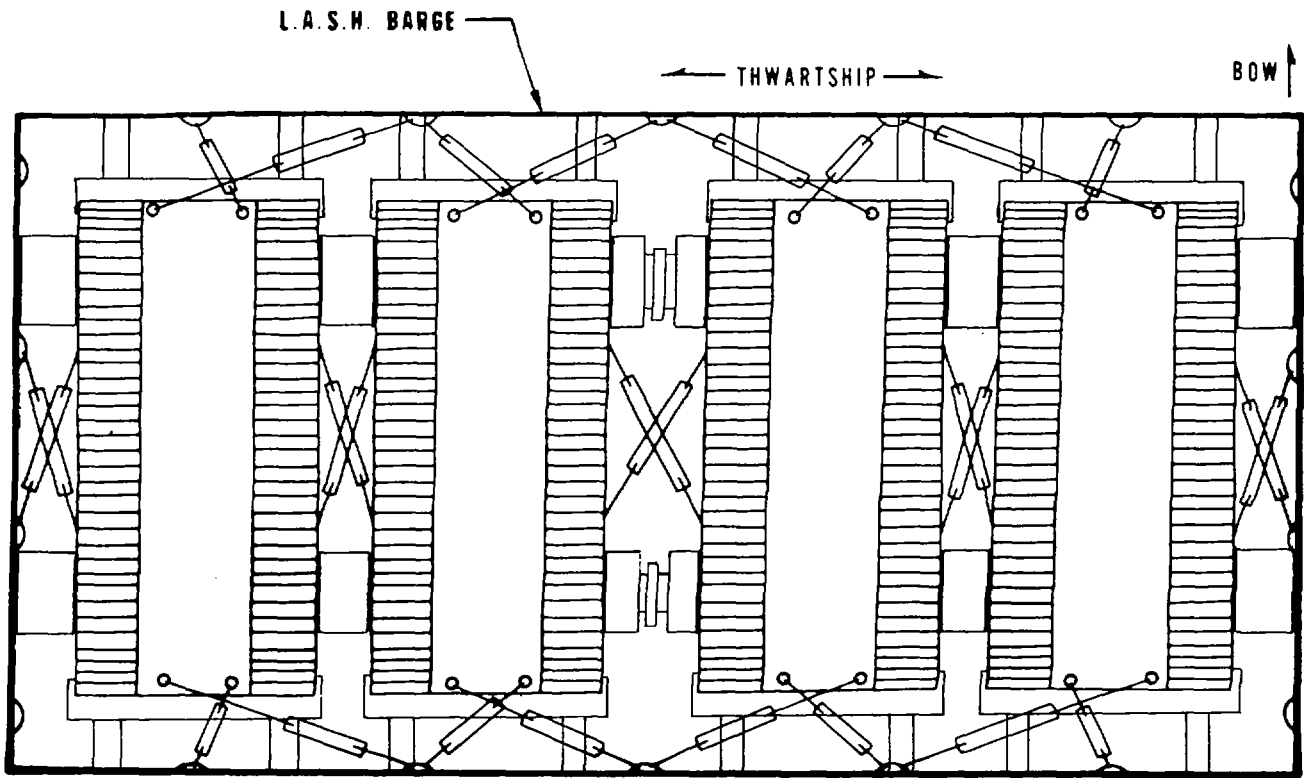


Figure 6-4. Typical loading of four tanks on a LASH (59.9-foot by 29.5-foot) barge, with wire rope, cable clips, and turnbuckles, and blocking between tanks and tanks to hull.

b. *Shoring.* Shoring is not generally used beneath the treads of most tracked vehicles equipped with rubber tread pads; frictional forces between the tread pads and the deck are sufficient to make it unnecessary. However, deck surfaces should be dry and free grease or debris.

c. *Blocking.* M60-series tanks may be adequately blocked and braced by 6- by 8-inch timbers. If the load orientation permits, blocking may be installed as a separator between the vehicle track and the barge bulkhead. Blocking is usually installed in front of and in

rear of the tracks and the bracing part force-fitted to the bulkhead. Loading, blocking, and bracing proceed from the outer areas of the barge toward the center, which is loaded last. A single separator timber is installed against the tracks of the loaded vehicle, and the next vehicle to be loaded is placed firmly against the timber. The void area, which remains in the center of the barge after the final vehicle has been loaded, is filled (figs 6-4 and 6-5) by cut and force-fitted blocking.

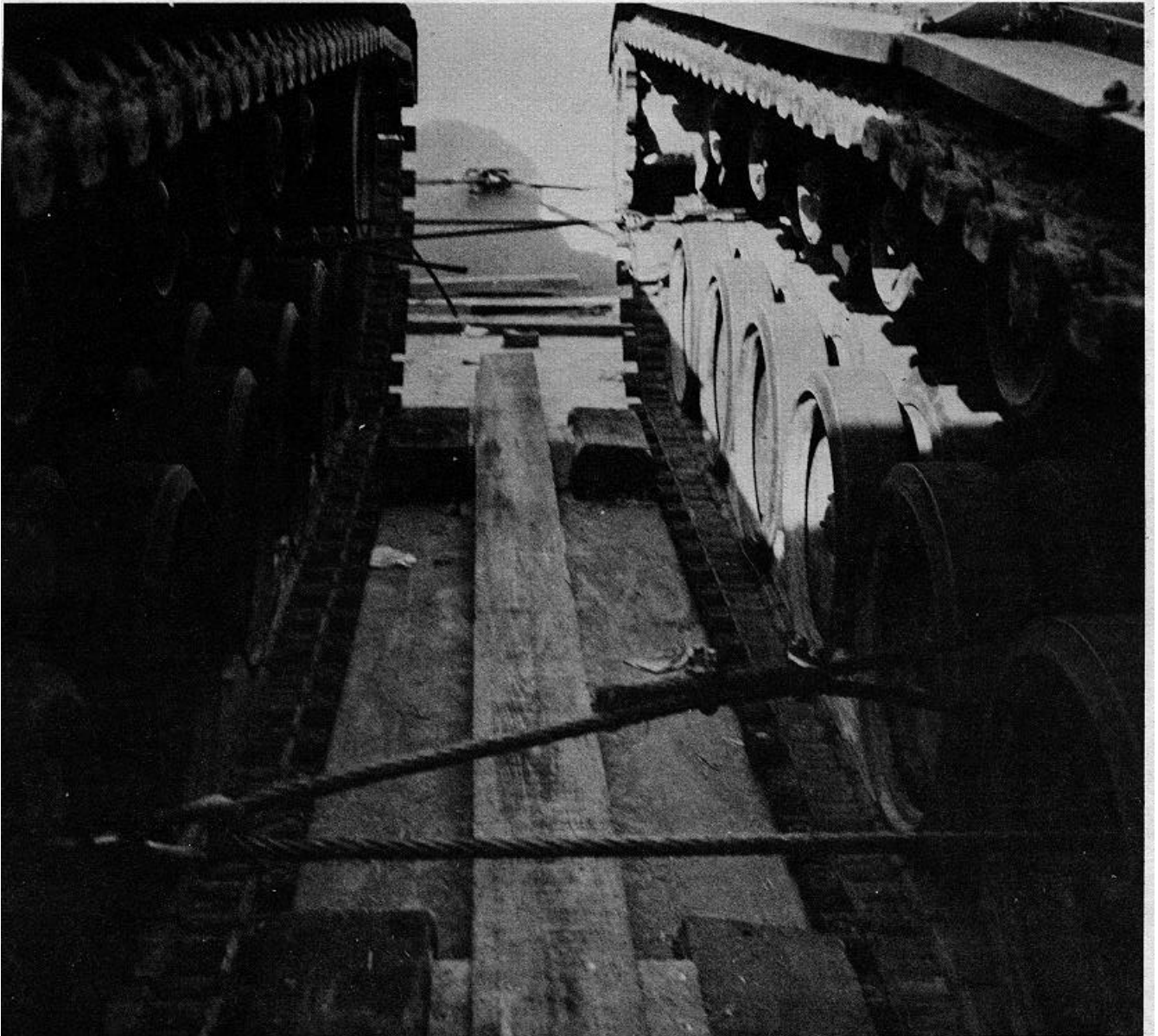


Figure 6-5. Filling center void area.

CHAPTER 7 RAIL TRANSPORTABILITY GUIDANCE

Section I. GENERAL

7-1. Scope

This chapter provides rail transportability guidance for movement of the M60-series tank. It includes technical and physical characteristics and safety considerations and prescribes the materials and guidance required to prepare, load, tie down, and unload the vehicle.

7-2. Maximum Utilization of Railcars

Additional cargo, as approved by the activity offering the items for transport, may be transported on the same railcar with the tank.

Section II. TRANSPORT ON CONUS RAILWAYS

7-3. General.

The transportability guidance contained in this section is applicable when the vehicle is transported on CONUS railways. Consideration is given to single and multiple movements for the types of flatcars normally used in the movement of this vehicle. The vehicle, when loaded on a suitable flatcar, can be transported without sectionalization or major disassembly. The M60-series tank exceeds width limits for unrestricted movement and will require special routing as determined by officials of the railroad accepting the load.

7-4. Preparation for loading.

a. M60-Series Tank. Preparation of the M60-series tank will vary among loads to be transported over various routes on different rail equipment and with different restraint procedures. When tanks are moved short distances over a single railroad line, preparation is minimal. When tanks are moved long distances through interchange points of several railroad lines, preparation must be adequate to assure safe and economic delivery at their destination. Loading procedures are described in paragraphs 7-5 through 7-9.

b. Sixty-Eight Foot, 140-Ton, Chain-Tiedown DODX Flatcar.

(1) The 140-ton flatcar is a heavy-duty, six-axle flatcar with a loading deck 816 inches (20.73 m) long and 123 inches (3.12 m) wide except for the ends, which are tapered to 117 inches (2.97 m). Its metal deck has four lengthwise channels holding 48 chain tiedown assemblies. The two outboard channels marked A and D are 34 inches (.86 m) from the centerline of the flatcar. The two inboard channels marked B and C are 239/16 inches (.60 m) from the centerline of the flatcar. Each channel has 44 primary tiedown positions marked on the deck of the flatcar.

Between each marked position are four more positions; each is 3 inches (.08 m) apart.

(2) Each chain tiedown assembly is made up of an anchor, which is movable in the channels; a turnbuckle; a compression unit, and a 1/2-inch alloy-steel chain, 8 feet (2.44 m) long, with an open hook on the load attachment end and a grabhook on the turnbuckle end.

(3) Before loading, the chain anchors must be locked at proper locations. With the use of the turnbuckle as a handle, the chain anchor must be slid along the bottom of the channel and lifted to the required locking location in the channel. For the anchor to be locked in position, the tabs at each end of the anchor must be rotated up and moved sideways to retract the movable pins in the anchor, and the anchor must be lifted to completely seat in the channel notches. This position must be held while the tabs at each end of the chain anchor are moved sideways, to extend the movable pins so they rest on top of the channel. The tabs must be rotated down and into the recess keeper. Each turnbuckle must be extended to its mechanical stop.

(4) Each tiedown chain (and its fittings) to be used be inspected for visible breaks, cracks, gouges, open welds, or deformed components. Special attention must be given to the connector link that attaches the chain to the anchor fitting. If defects are found, the chain or fitting must be replaced.

(a) Flatcars manufactured by Fruit Growers Express Company are equipped with chains that have a sliding hook at the free end of the chain. If all components are free of visible damage, the eight-link segment next to the free end of the chain must be compared with the eight-link segment

next to the anchor fitting. If the eight-link segment near the anchor fitting is 1/2 inch or more longer than the eight-link segment near the free end, the chain has stretched beyond normal limits and should be replaced.

(b) Flatcars manufactured by Thrall Car Manufacturing Company are equipped with chains that have an open hook attached to the free end of the chain. If all components are free of visible damage, the eight-link segment next to the turnbuckle end of the chain must be compared with the eight-link segment next to the hook fitting at the free end. If the eight-link segment near the hook fitting at the free end is 1/2 inch or more longer than the eight-link segment near the turnbuckle end, the chain has stretched beyond normal limits and should be replaced.

(5) Each turnbuckle in the chain tiedown assemblies must have adequate lubrication (grease, MIL-G-10924, or equivalent) to assure smooth operation during tensioning. After tensioning is completed, 15 to 25 foot-pounds of torque must be applied to the jamnut, and the bare threaded areas of the turnbuckle must be lubricated to prevent rusting during transit.

(6) The shackles and links for attaching the chains to the M60-series tanks are furnished with the 140-ton flatcar.

(7) The ratchet-type handbrake lever is located on the side of the car, below the level of the deck. In this position, the brake lever is operated from the ground and does not interfere with loading or unloading.

c. *General-Purpose Flatcar.* The wood-decked flatcar should be clear of used tiedown and blocking materials, and the flatcar decking should be in sound condition. Loads discussed in this manual are based on a flatcar that is 10 feet 4 inches wide, minimum.

7-5. Loading M60-Series Tank on 68-Foot, 140-Ton, Chain-Tiedown DODX Flatcar

a. The M60-series tank may be placed in the tiedown position on the flatcar by a crane; or it may be driven or towed, provided that a suitable ramp or bridge

is available. Tanks are generally loaded facing forward, in the same direction of intended transport.

b. Before the M60-series tank is loaded, the chain anchors must be placed in the proper position as shown in figures 7-1, 7-2, or 7-3. Color coded positions are provided on the flatcar for placement of tiedown anchors for tanks. White is M1 tanks; yellow is for M60-series tanks. Stenciled on these painted positions are the tiedown attachment points on the applicable tank, except for tanks that have the M9 bulldozer installed. Stenciled attachment positions are illustrated in figures 7-1, 7-2, and 7-3, and described in tables 7-2, 7-3, 7-4, and 7-5. Chains attached to the anchors must be placed in piles, in the center of the flatcar.

CAUTION

Do not place the tanks on, or drive the tank over, the chains, turn buckles, or chain anchors (damage could result).

c. When two M60-series tanks are loaded (fig. 7-1), the forward left-hand road wheel of tank No. 1 should be centered over the yellow mark on the left-hand side, 154 inches (3.91 m) from the forward end of the flatcar. The last left-hand road wheel of tank No. 2 should be centered over the yellow mark on the left-hand side, 154 inches (3.91m) from the aft end of the flatcar. Should the 140-ton flatcar arrive in the reverse direction at the loading ramp, the tank will be loaded in reverse and tied down as described in table 7-2. When one M60-series tank is loaded, the space between the third and fourth left-hand road wheels should be equally located over the center mark of the flatcar, 408 inches (10.37 m) from either end (fig. 7-3).

d. After the M60 tank is loaded and placed in the tiedown position, handbrakes should be set. Lever for transmission must be placed in neutral position.

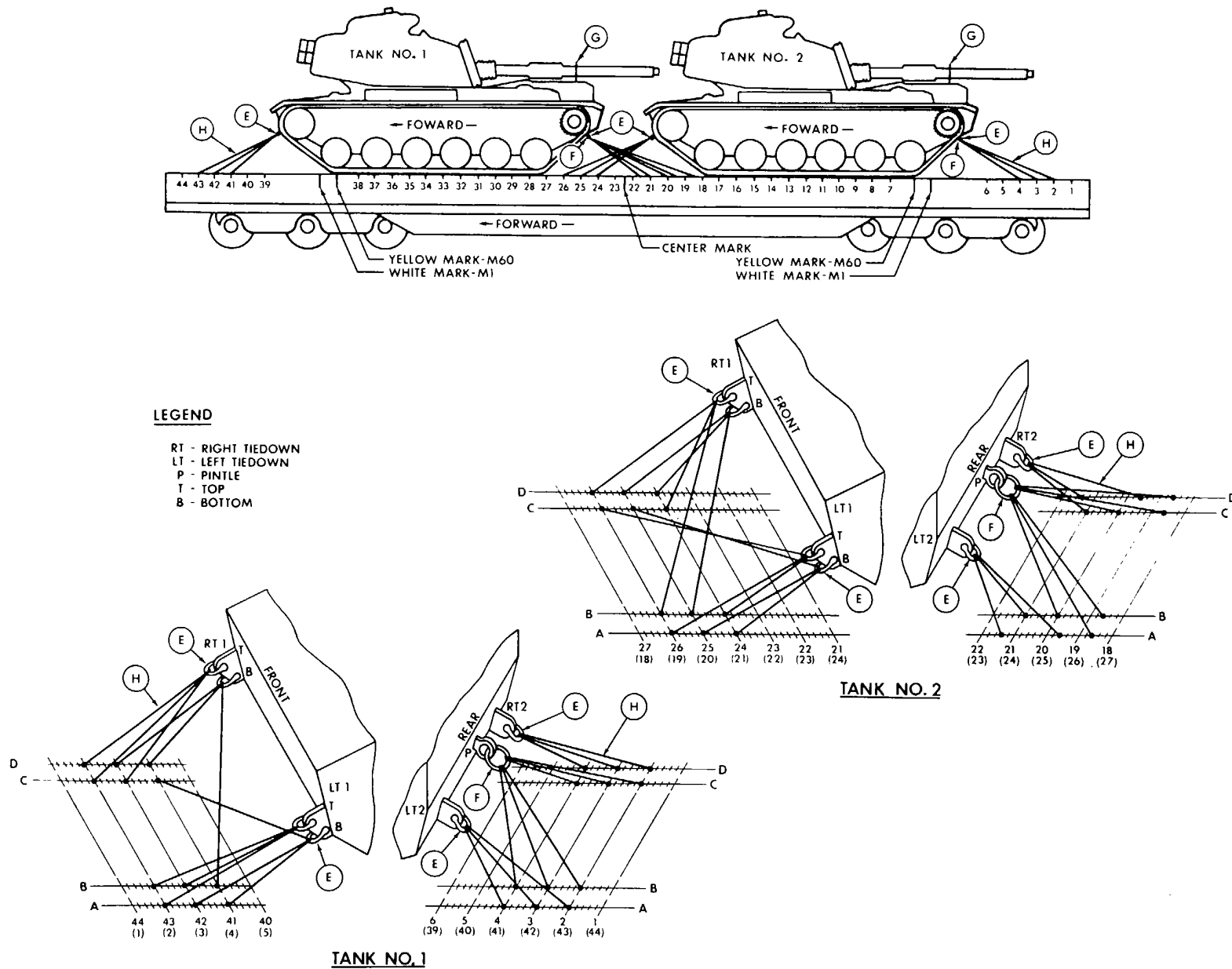
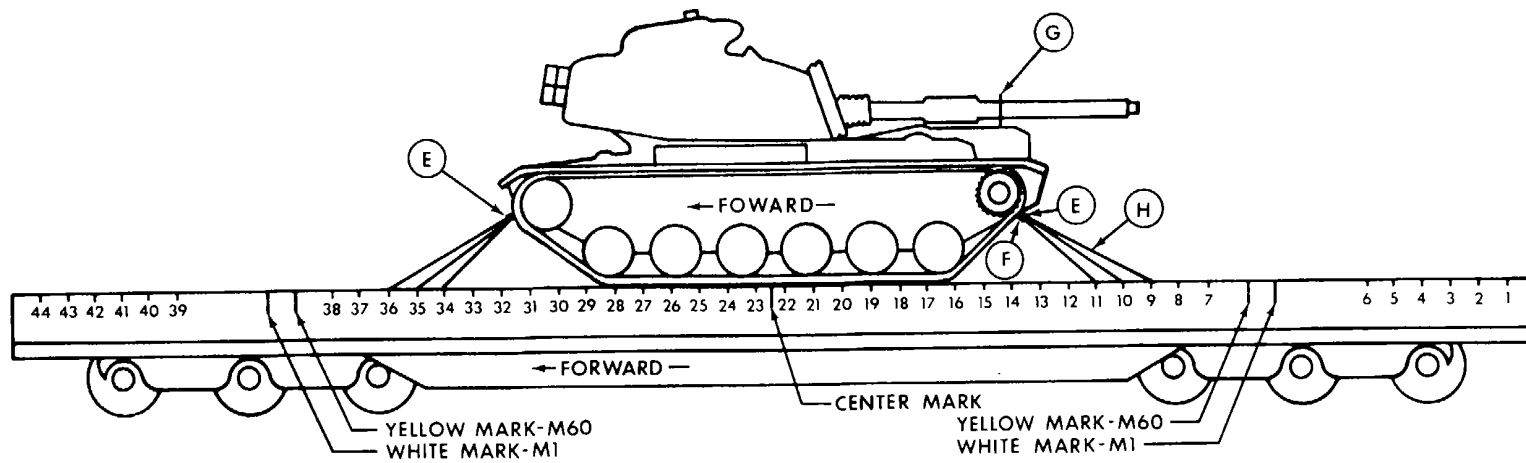
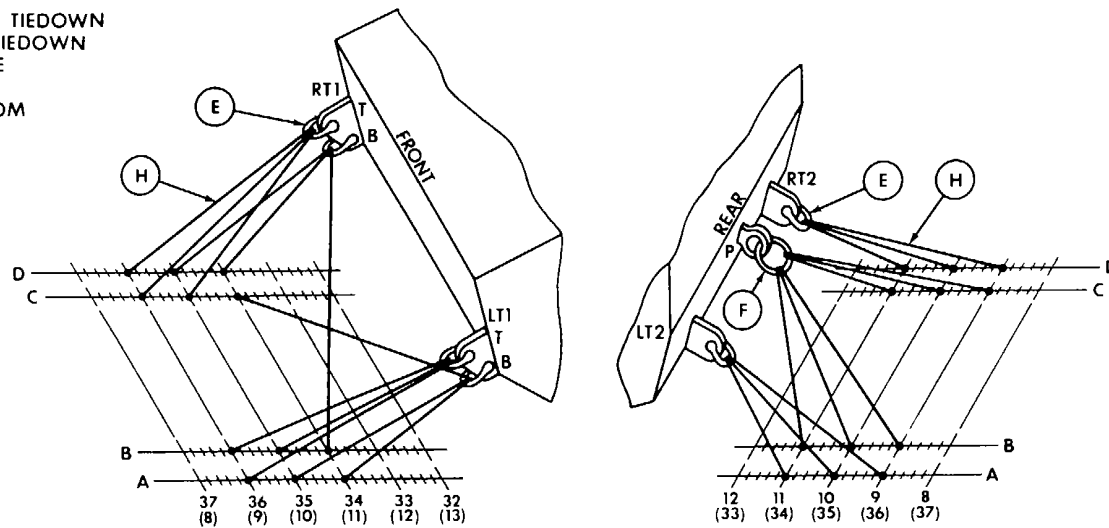


Figure 7-1. Tiedown diagram for two M60-series tanks facing one direction on DODX 140-ton flatcar.



LEGEND

- RT - RIGHT TIEDOWN
- LT - LEFT TIEDOWN
- P - PINTLE
- T - TOP
- B - BOTTOM



TANK

Figure 7-2. Tiedown diagram for one M60-series tank on DODX 140-ton flatcar.

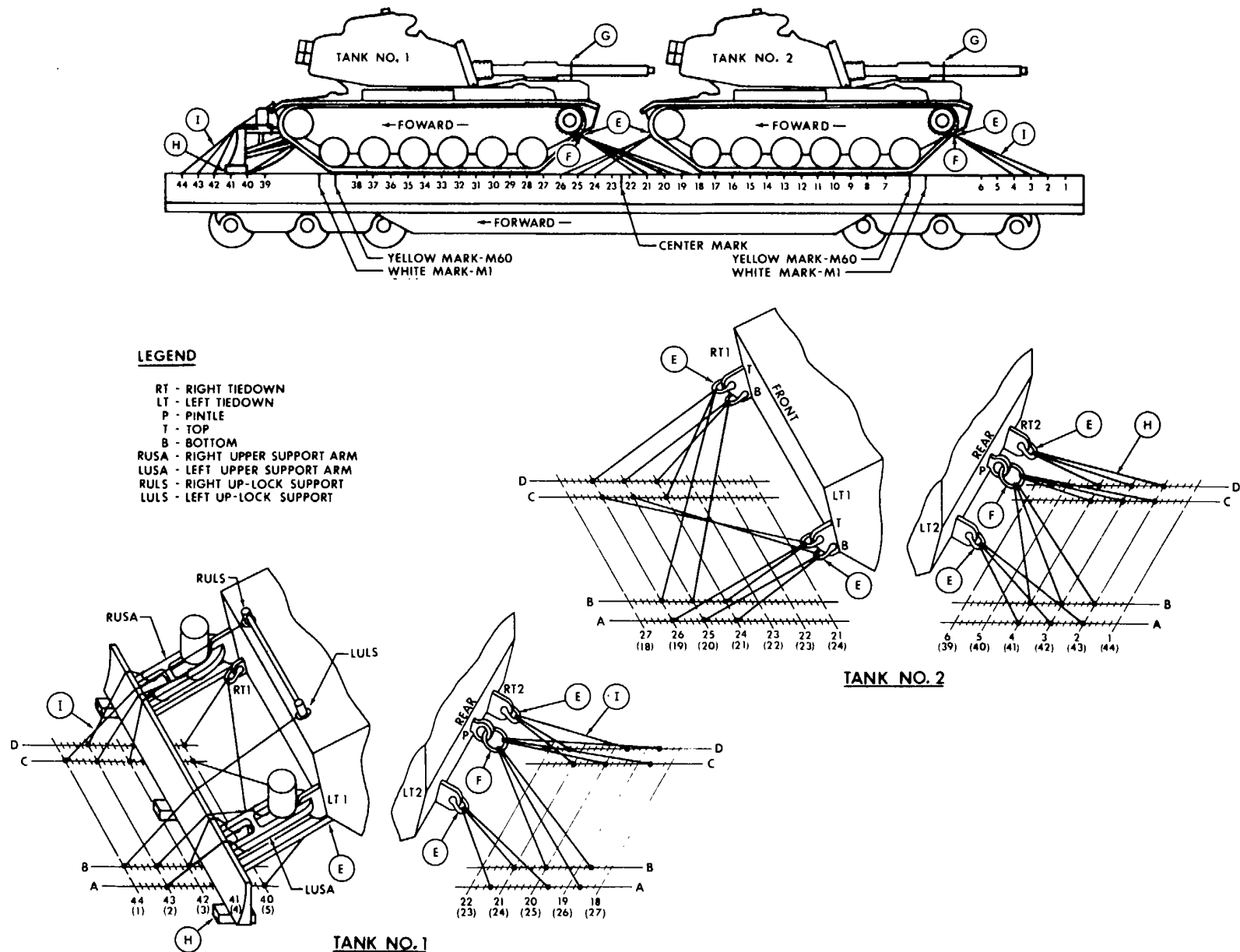


Figure 7-3. Tiedown diagram for two M60-series tanks facing one direction on DODX 140-ton flatcar; tank No. 1 is equipped with M9 bulldozer (fig 7-1 and table 7-5).

Table 7-1. Bill of Materials for Loading and Restraining Two MO60-Series Tanks on 68-Foot, 140-ton, Chain-Tiedown DODX Flatcar

Item	Description	Approximate
Lumber*.....	Douglas-fir, or comparable, straight-grain, free from material defects; Fed Spec MIL-L-751: 4- x 6-in.	4 linear ft
Wire rope.....	6 x.19, IWRC; improved plow steel; preformed, regular-lay; table X, Fed Spec RR-W-410: 3/8-inch.	60 ft
Clamps.....	Wire rope, U-bolt clips, saddled, single-grip, steel, Crosby heavy-duty or equal; MIL-STD-16842: 3/8-inch.	12
Cushioning material	Waterproof paper, or suitable material.....	as required
Thimbles	Standard, open-type: 3/8-in.....	2

*Used only with tanks with bulldozer blade installed.

Table 7-2. Application of Materials for Loading and Securing Two MO60-Series Tanks on 68-Foot, 140-Ton, Chain-Tiedown DODX Flatcar (Fig. 7-1)

Item	No. Required	Application
A through D		Channels. Refer to paragraph 7-4b(1) for description.
E	6 per tank	Shackles. At the front of tank, attach one shackle to the top and bottom of each tiedown fitting. At the rear of tank, attach one shackle to each tiedown fitting.
F	1 per tank	Oblong link. Attach to towing pintle at the rear of tank.
G	2 per tank	Wire rope, 3/8-inch. Wrap gun tube with cushioning material. Apply wire rope in two complete loops, one around gun tube to left-rear lifting eye and the other around gun tube to right-rear lifting eye, and secure ends with three 3/8-inch clips. (Not required if tank has operable external gun-tube brace.)
H	24 per tank	Chains. TANK NO. 1, NEAREST THE NUMBER 44 CHAIN ANCHOR
RT1-B	3	Chains. Attach chains from the lower right-front tiedown shackle to chain anchors in D41, D42, and B41.
RT1-T	3	Chains. Attach chains from the upper right-front tiedown shackle to chain anchors in C42, C43, and D43.
LT1-B	3	Chains. Attach chains from the lower Left-front tiedown shackle to chain anchors in C41, A41, and A42.
LT1-T	3	Chains. Attach chains from the upper left-front tiedown shackle to chain anchors in B42, A43, and B43.
RT2	3	Chains. Attach chains from the right-rear tiedown shackle to chain anchors in D21-2/5, D19-3/5, and C21.
LT2	3	Chains. Attach chains from the left-rear tiedown shackle to chain anchors in A21-2/5, A19-3/5, and B21.
P	6	Chains. Attach chains from oblong link in pintle to chain anchors in B20, C20, A18-3/5, B18-3/5, C18-3/5, and D18-3/5.
		TANK NO. 2, NEAREST THE NUMBER 1 CHAIN ANCHOR
RT1-B	3	Chains. Attach chains from the lower right-front tiedown shackle to chain anchors in D24, D25, and B25.
LT1-B	3	Chains. Attach chains from the lower left-front tiedown shackle to chain anchors in C25, A24, and A25.
RT1-T	3	Chains. Attach chains from the upper right-front tiedown shackle to chain anchors in B26, C24, and D26.
LT1-T	3	Chains. Attach chains from the upper left-front tiedown shackle to chain anchors in C26, B24, and A26.
RT2	3	Chains. Attach chains from the right-rear tiedown shackle to chain anchors in D4, D3, and D2.
LT2	3	Chains. Attach chains from the left-rear tiedown shackle to chain anchors in A4, A3, and A2.
P	6	Chains. Attach chains from oblong link in pintle to chain anchors in C4, C3, C2, B4, B3, and B2.

GENERAL INSTRUCTIONS

1. Tank brakes should be set. Transmission selector must be in neutral.
2. Turret gun must be in the aft travel position and secured, to prevent movement. Turret rotation and gun-elevating controls must be wire-tied, if feasible, to prevent movement of turret and gun.
3. Turnbuckles of front and rear chain tiedowns must be tightened at the same time to prevent uneven tensioning. Each chain must be tightened until the rubber pads of the compression unit are compressed, so that the spacing between the metal rings is about 1/8 inch.
4. General Loading Rules 4, 5, 7, 11, 15(g), 19, 19A, and 19C in section I of the *Rules Governing the Loading of Commodities on Open-Top Cars and Trailers*, published by the Association of American Railroads, provide applicable guidelines and are mandatory in application.

Table 7-3. Application of Materials for Securing Two M60-Series Tanks Facing the Opposite Direction From That Shown in Figure 7-1

Item	No. Required	Application
A through D		Channels. Refer to paragraph 7-4b(1) for description.
E	6 per tank	Shackles. At the front of tank, attach one shackle to the top and bottom of each tiedown fitting. At the rear of tank, attach one shackle to each tiedown fitting.
F	1 per tank	Oblong link. Attach to towing pintle at rear of tank.
G	1 per tank	Wire rope, 3/8-inch. Wrap gun tube with cushioning material. Apply wire rope in two complete loops, one around gun tube to left-rear lifting eye and the other around gun tube to right-rear lifting eye, and secure ends with three 3/8-inch clips. (Not required if tank has operable external gun-tube brace.)
H	24 per tank	Chains. TANK NO. 1, NEAREST THE NUMBER 1 CHAIN ANCHOR
RT1-B	3	Chains. Attach chains from the lower right-front tiedown shackle to chain anchors in A4, A3, and C4.
RT1-T	3	Chains. Attach chains from the upper right-front tiedown shackle to chain anchors in A2, B3, and B2.
LT1-B	3	Chains. Attach chains from the lower left-front tiedown shackle to chain anchors in D4, D3, and B4.
LT1-T	3	Chains. Attach chains from the upper left-front tiedown shackle to chain anchors in D2, C3, and C2.
RT-2	3	Chains. Attach chains from the right-rear tiedown shackle to chain anchors in A23-3/5, B24, and B25-2/5.
LT2	3	Chains. Attach chains from the left-rear tiedown shackle to chain anchors in D23-3/5, C24, and D25-2/5.
P	6	Chains. Attach chains from oblong link in pintle to chain anchors in B25, C25, A26-2/5, B26-2/5, and D26-2/5. TANK NO. 2, NEAREST THE NUMBER 44 CHAIN ANCHOR
RT1-B	3	Chains. Attach chains from the lower right-front tiedown shackle to the chain anchors in A21, A20, and C20.
LT1-B	3	Chains. Attach chains from the lower left-front tiedown shackle to the chain anchors in B20, D21, and D20.
RT1-T	3	Chains. Attach chains from the upper right-front tiedown shackle to the chain anchors in B21, C26, and A26.
LT1-T	3	Chains. Attach chains from the upper left-front tiedown shackle to the chain anchors in B26, C21, and D26.
RT2	3	Chains. Attach chains from the right-rear tiedown shackle to chain anchors in A41, A42, and A43.
LT2	3	Chains. Attach chains from the left-rear tiedown shackle to chain anchors in D41, D42, and D43.
P	6	Chains. Attach chains from oblong link in pintle to chain anchors in B41, B42, B43, C41, C42, and C43.

GENERAL INSTRUCTIONS

1. Tank brakes should be set. Transmission selector must be in neutral.
2. Turret gun must be in the aft travel position and secured, to prevent movement. Turret rotation and gun-elevating controls must be wire-tied, if feasible, to prevent movement of turret and gun.
3. Turnbuckles of front and rear chain tiedowns must be tightened at the same time to prevent uneven tensioning. Each chain must be tightened until the rubber pads of the compression unit are compressed, so that the spacing between the metal rings is about 1/8 inch.
4. General Loading Rules 4, 5, 7, 11, 15(g), 19, 19A, and 19C in section I of the *Rules Governing the Loading of Commodities on Open-Top Cars and Trailers*, published by the Association of American Railroads, provide applicable guidelines and are mandatory in application.

Table 7-4. Application of Materials for Loading and Securing One M60-Series Tank on 68-Foot, 140-Ton, Chain-Tiedown DODX Flatcar (Fig. 7-2)

Item	No. Required	Application
A through D		Channels. Refer to paragraph 7-4b(1) for description.
E	6	Shackles At the rear of the tank, attach one shackle to each tiedown fitting. At the front of the tank, attach one shackle to each bottom and top tiedown fitting.
F	1	Oblong link. Attach to towing pintle at the rear of tank.
G	1	Wire rope, 3/8-inch. Wrap gun tube with cushioning material, Apply wire rope in two complete loops, one around gun tube to left-rear lifting eye and the other around gun tube to right-rear lifting eye, and secure ends with three 3/8-inch clips. (Not required if tank has operable external gun-tube brace.)
H	24	Chains. TANK FACING NUMBER 44 CHAIN ANCHOR
RT1-B	3	Chains. Attach chains from the lower right-front tiedown shackle to chain anchors in B34, D34, and D35.
LT1-B	3	Chains. Attach chains from the lower left-front tiedown shackle to chain anchors in C34, A34, and A35.
RT1-T	3	Chains. Attach chains from the upper right-front tiedown shackle -to chain anchors in D36,C35, and C36.
LT1-T	3	Chains. Attach chains from the upper left-front tiedown shackle to chain anchors in A36, B35, and B36.
RT2	3	Chains. Attach chains from the right-rear tiedown shackle to chain anchors in D11, D10, and D9.
LT2	3	Chains. Attach chains from the left-rear tiedown shackle to chain anchors in A11, A10, and A9.
P	6	Chains. Attach chains from the oblong link in pintle to chain anchors in C11, C10, C9, B11, B10, and B9.

GENERAL INSTRUCTIONS

1. Tank brakes should be set. Transmission selector must be in neutral.
2. Turret gun must be in the aft travel position and secured, to prevent movement. Turret rotation and gun-elevating controls must be wire-tied, if feasible, to prevent movement of turret and gun.
3. Turnbuckles of front and rear chain tiedowns must be tightened at the same time to prevent uneven tensioning. Each chain must be tightened until the rubber pads of the compression unit are compressed, so that the spacing between the metal rings is about 1/8 inch.
4. General Loading Rules 4, 5, 7, 11, 15(g), 19, 19A, and 19C in section I of the *Rules Governing the Loading of Commodities on Open-Top Cars and Trailers*, published by the Association of American Railroads, provide applicable guidelines and are mandatory in application.

Table 7-5. Application of Materials for Loading and Securing Two M60-Series Tanks, One with M9 Bulldozer, on 68-foot, 140-Ton, Chain-Tiedown DODX Flatcar (Fig. 7-3)

Item	No. Required	Application
A through D		Channels. Refer to paragraph 7-4b(1) for description.
E	10	Shackles. At the rear of tank No. 1, attach one shackle to each tiedown fitting. At the front of tank No. 1, attach one shackle to each bottom inside tiedown fitting. At the rear of tank No. 2, attach one shackle to each tiedown fitting. At the front of tank No. 2, attach one shackle to the top and bottom of each tiedown fitting.
F	1 per tank	Oblong link. Attach to towing pintle at rear of tank.
G	1 per tank	Wire rope, 3/8-inch. Wrap gun tube with cushioning material. Apply wire rope in two complete loops, one around gun tube to left-rear lifting eye and the other around gun tube to right-rear lifting eye and secure ends with three 3/8-inch clips. (Not required if tank has operable external gun-tube brace.)
H	3	Lumber, 4- x 6- x 15inch. Place one piece along the centerline of the railcar and one piece 4 inches from each outside edge of the railcar, where the bulldozer blade will rest.
I	23 tank No. 1; 24 tank No. 2	Chains.

Table 7-5. Application of Materials for Loading and Securing Two M60-Series Tanks, One with M9 Bulldozer, on 68-foot, 140-Ton, Chain-Tiedown DODX Flatcar (Fig. 7-3)-Continued

Item	No. Required	Application
TANK NO. 1 WITH M9 BULLDOZER		
		Cushioning material. Place cushioning material between blade and tiedown chain, where they may contact each other.
RT1	2	Chains. Attach chains from tiedown shackle to chain anchors in B40 and D40.
LT1	2	Chains. Attach chains from tiedown shackle to chain anchors in C40 and A40.
RUSA	3	Chains. Attach two chains by looping one chain around each top blade-attachment point of RUSA to chain anchors in C42 and D43. Attach one chain by looping chain around RUSA aft of structural cross member to chain anchor in C43.
RULS	1	Chain. Attach chain by looping chain around RULS to chain anchor in C44.
LUSA	3	Chains. Attach two chains by looping one chain around each top blade-attachment point of LUSA to chain anchors in A43 and B42. Attach one chain by looping chain around LUSA aft of structural cross member to chain anchor in B43.
LULS	1	Chain. Attach chain by looping chain around LULS to chain anchor in B44.
RT2	3	Chains. Attach chains from the right-rear tiedown shackle to chain anchors in D21-2/5, D19-3/5, and C21.
LT2	3	Chains. Attach chains from the left-rear tiedown shackle to chain anchors in A21-2/5, A19-3/5, and B21.
P	6	Chains. Attach chains from the oblong link in the pintle to chain anchors in B20, C20, A18-3.5, B18-3/5, C18-3/5, and D18-3/5.
TANK NO. 2, NEAREST THE NUMBER 1 CHAIN ANCHOR		
RT1-B	3	Chains. Attach chains from the lower right-front tiedown shackle to chain anchors in D24, D25, and B25.
LT1-B	3	Chains. Attach chains from the lower left-front tiedown shackle to chain anchors in C25, A24, and A25.
RT1-T	3	Chains. Attach chains from the upper right-front tiedown shackle to chain anchors in B26, C24, and D26.
LT1-T	3	Chains. Attach chains from the upper left-hand tiedown shackle to chain anchors in C26, B24, and A26.
RT2	3	Chains. Attach chains from the right-rear tiedown shackle to chain anchors in D4, D3, and D2.
LT2	3	Chains. Attach chains from the left-rear tiedown shackle to chain anchors in A4, A3, and A2.
P	6	Chains. Attach chains from the oblong link in pintle to chain anchors in C4, C3, C2, B4, B3, and B2.

GENERAL INSTRUCTIONS

1. Tank brakes should be set. Transmission selector must be in neutral.
2. Turret gun must be in the aft travel position and secured, to prevent movement. Turret rotation and gun-elevating controls must be wire-tied, if feasible, to prevent movement of turret and gun.
3. Turnbuckles of front and rear chain tiedowns must be tightened at the same time to prevent uneven tensioning. Each chain must be tightened until the rubber pads of the compression unit are compressed, so that the spacing between the metal rings is about 1/8 inch.
4. General Loading Rules 4, 5, 7, 11, 15(g), 19, 19A, and 19C in section I of the *Rules Governing the Loading of Commodities on Open-Top Cars and Trailers*, published by the Association of American Railroads, provide applicable guidelines and are mandatory in application.

e. Chains, shackles, and links that are not in use must be secured to the DODX 140-ton flatcar in a way that will prevent them from becoming free, endangering material or persons along the right-of-way of the railroad. As shown in figure 7-4, chain anchors must be moved to A6, A1, A2, B1, B2, B3, C1, C2, C3, D6, D1, and D2. Chains from anchors A6 and D6 must be placed across the flatcar so that one chain passes through the link, attaching the hooks together about 6

inches from the centerline of the flatcar. The necklace chains should be pushed into shackles and shackle pins should be reinstalled. Then the necklace chain should be drawn taut and the chain grabhook B1 should be hooked onto link. This process should be repeated for each chain. Each chain should be snugged by tightening the turnbuckle, to assure that the hook on the free end will not unhook from the shackles or link. This process should be

repeated for chains on the opposite end of the flatcar by using necklace chain anchors in A39 and D39. Chains should be secured in the center section of the flatcar in the same way. As shown in figure 7-4, the chain anchors are in the location required for two tanks, with necklace chain anchors in A31, D31, A14, and D14. (When only one tank is loaded in the center of the

flatcar, necklace chain anchors will be placed in A30, D30, A16, and D16.) Remaining chains in A10, A9, B11, B10, B9, C11, C10, C9, D10, and D9 should be attached to necklace in A16 and D16. Remaining chains in A36, A35, B36, B35, B34, C36, C35, C34, D36, and D35 should be attached to necklace in A30 and D30.

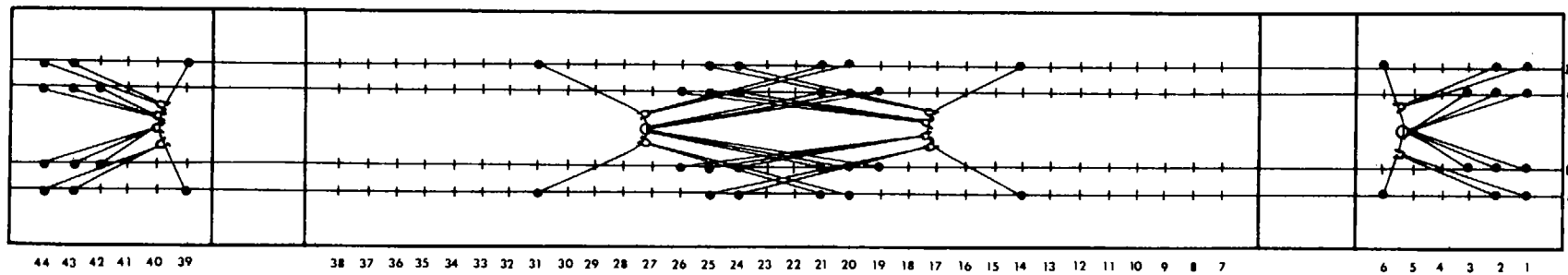


Figure 7-4. Diagram for applying the necklace method to secure tiedown chains and hardware of DODX 140-ton flatcar, without a load.

7-6. Loading M60-Series Tanks on General-Purpose Flatcars

a. The vehicle may be placed in the tiedown position on the flatcar by a crane, or may be driven or towed, provided that a suitable ramp or bridge is available.

b. After the vehicle is loaded and placed in the tiedown position, handbrakes on the vehicle should be set. Gearshift lever for the transmission must be placed in neutral position.

c. Loads shown in figures 7-5 and 7-6 are based on a flatcar that is 10 feet 4 inches wide, minimum.

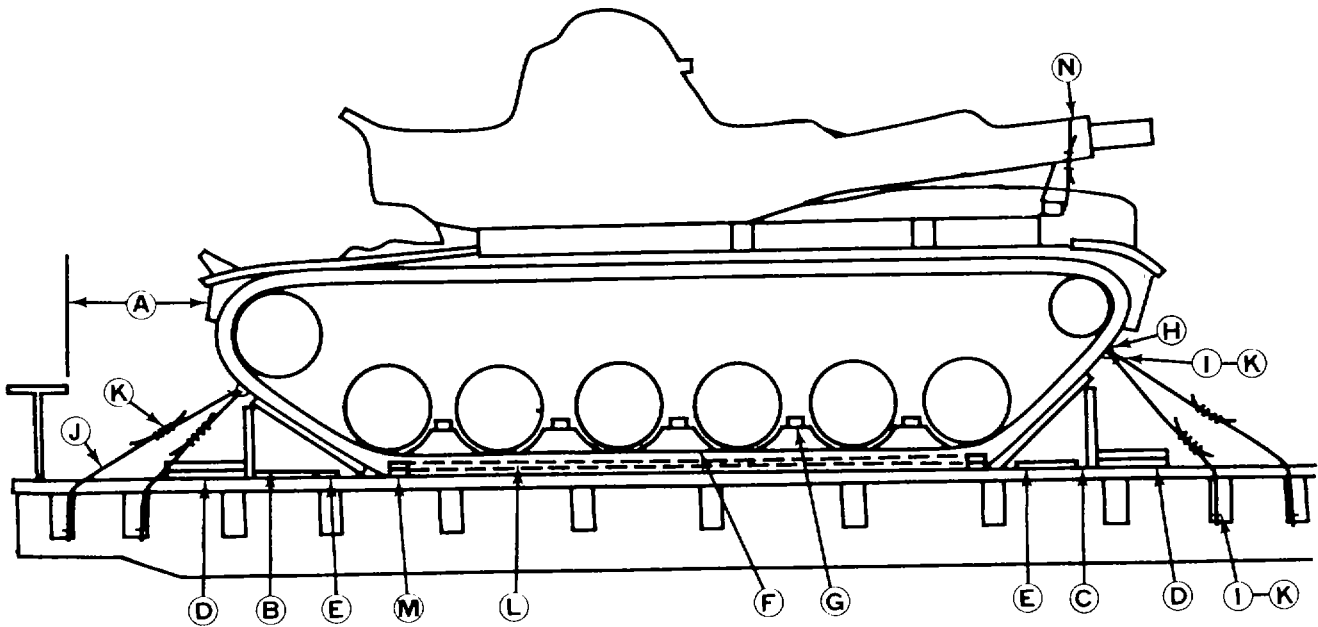


Figure 7-5. Blocking and tiedown for M60-series tank on general-purpose flatcar (side view).

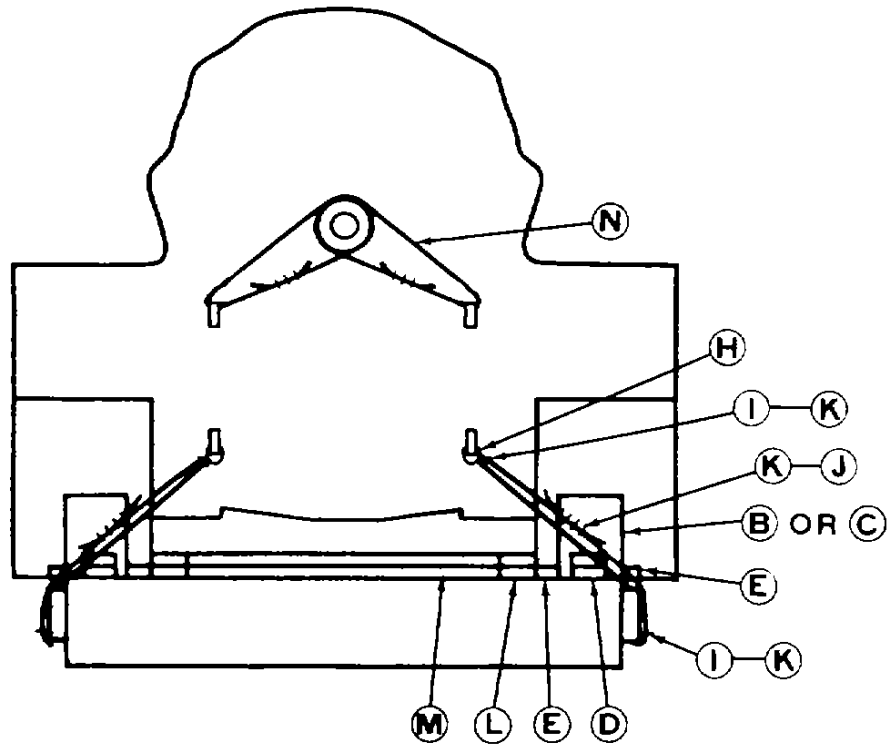


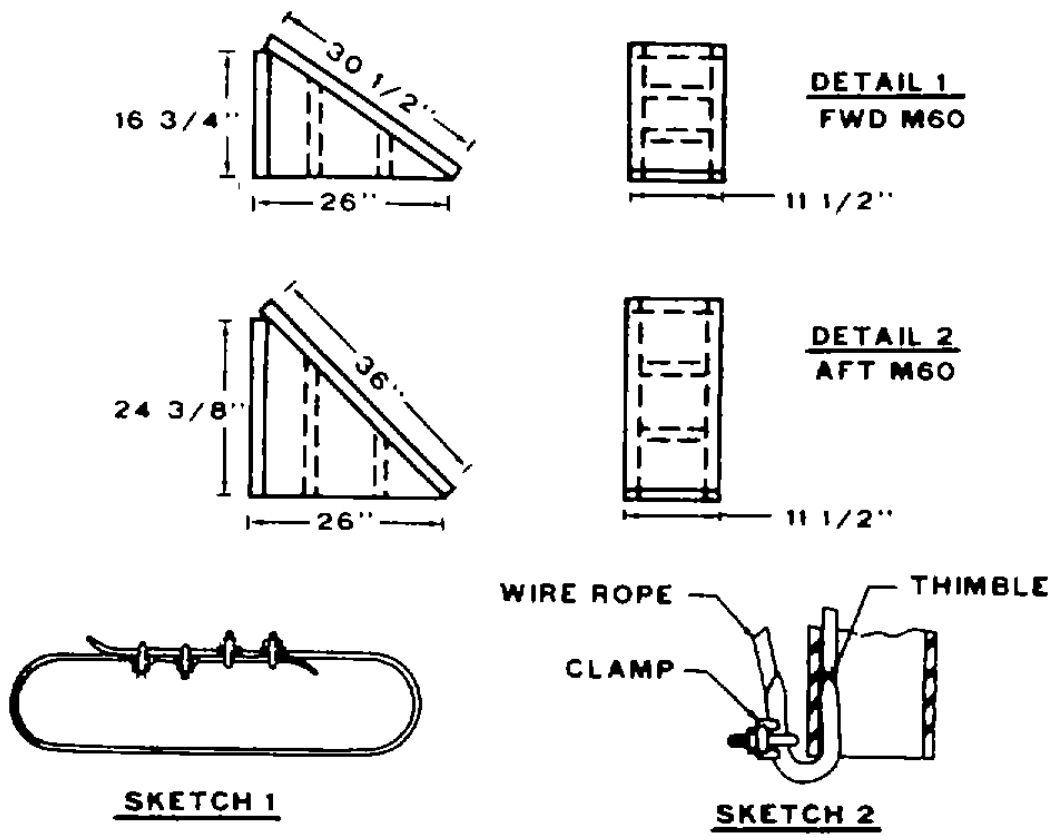
Figure 7-6. Blocking and tiedown for M60-series tank on general-purpose flatcar (end view).

CAUTION

Do not allow vehicle to exceed 3 miles per hour during loading or unloading.

d. Bill of materials for blocking and tiedown of the M60-series tanks on the flatcar is shown in table 7-6.

Blocking and tiedown (figures 7-5 and 7-6), are compatible with standard loading practices, and provide for adequate restraint against the forces encountered during movements at normal speeds. Blocking details are described in figure 7-7. Application of materials for loading and securing the vehicle on the flatcar is shown in table 7-7.



NOTE: DETAILS 1 AND 2 ARE FABRICATED FROM 2- X 12-IN. LUMBER. USE 20d NAILS.

Figure 7-7. Blocking and detail diagram.

Table 7-6. Bill of Materials for Blocking and Tiedown of M60-Series General-Purpose Flatcar (Figs. 7-5 and 7-6)

Item	Description	Approximate Quantity
Lumber.....	Douglas-fir, or comparable, straight-grain, free from material defects; Fed Spec MM-L-751:	2- X 4-in. 148 linear ft 2- X 12-in. 60 linear ft 6- X 6-in. 36 linear ft
Wire rope.....	6 X 19, IWRC; improved plow steel; preformed, regular-lay; table X, Fed Spec RR-W-410:	3/8-in. 30 ft 5/8-in. 168 ft
Clamps.....	Wire rope, U-bolt clips, saddled, single-grip, steel, Crosby heavy-duty or equal; MIL-STD 16842	3/8-in. 6 5/8-in. 48
Thimbles.....	Standard, open-type:	3/8-in. 2 5/8-in. 16
Nails.....	Common, steel; flathead; bright or cement-coated; table XI-b, Fed Spec FF-N-105:	20d 296 30d 160
Cushioning material.....	Waterproof paper, or suitable material	as required
Steel strapping.....	1 1/4 X .035-in. thick	3 linear ft
Shackles.....	Anchor, 1 3/8-in.-diameter pin, 2-in. opening; NSN 4030-00-162-7545 or equal	8

Table 7-7. Application of Materials for Loading and Securing MO60-Series Tanks on General-Purpose Flatcar (Figs. 7-5, 7-6, and 7-7)

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	2	Chock blocks (detail 1, fig 7-7). Place the incline face of the block against the track, even with the inboard edge at the front of vehicle.
C	2	Chock blocks (detail 2, fig 7-7). Place the incline face of the block against the track, even with the inboard edge at the rear of vehicle.
D	4	End cleats. Each consists of two pieces of 2- X 12- X 18-in. lumber. Place one against both items B and C. Secure the lower piece to the floor with four 30d nails and the top piece to the one below, in a like manner, with four 30d nails.
E	8	Side cleats. Each consists of one piece of 2- X 4- x 24-in. lumber. Place one on each side of items B and C. Secure to item B or floor with four 20d nails.
F	24	Idler wheel chocking. Each to consist of two pieces of 6- X 6-in. lumber X length-to-suit, cut to fit contour of idler wheels. Place one piece between inside and outside wheels of each road wheel assembly.
G	12	Tie cleats, 2- X 4-in. lumber X length-to-suit. Place on top of item F (inside and outside) and secure with four 20d nails.
H	4	Shackles. Secure one shackle to each towing lug (two at front end of vehicle and two at rear end).
I	16	Thimbles. Place one thimble at each item H and one thimble under each stake pocket.
J	8	Wire rope, 5/8-in. Attach to each item H and stake pockets (as shown in sketch 2, fig 7-7).
K	48	Clamps, 5/8-in. Secure the ends of each wire rope loop with four clamps. Secure each thimble with one clamp. (See sketches 1 and 2, fig 7-7.)
L	2	Blocking, inside. Each consists of two pieces of 2- X 4- x 180-in. lumber. Place along the inside of each track, and nail the lower piece to car floor with sixteen 30d nails evenly spaced. Nail the top piece to the one below with sixteen 30d nails in like manner.
M	3	Spreaders, inside cleat. Each consists of two pieces of 2- x 4-in. lumber X length-to-suit. Place one between each end and center of item L. Nail lower piece to car floor with six 30d nails and nail the top piece to the one below with six 30d nails in like manner.

Table 7-7. Application of Materials for Loading and Securing M60-Series Tanks on General-Purpose Flatcar (Figs. 7-5, 7-6, and 7-7)-Continued

Item	No.	Application
N	2	Wire rope, 3/8-in. Wrap gun tube with cushioning materials. Apply wire rope in two complete loops, one around gun tube to left rear lifting eye and the other around gun tube to right-rear lifting eye, and secure ends with three 3/8-inch clips. (Not required if tank has operable external gun-tube brace.)

GENERAL INSTRUCTIONS

4. Loading Rules 1A, 3, 4, 5, 7, 9, 14, 15, 19, 19A, and 19C in section I of the *Rules Governing the Loading of Commodities on Open-Top Cars and Trailers*, published by the Association of American Railroads, provide applicable guidelines and are mandatory in application.

7-7. Transport of One or Two M60-Series Tanks on 54-Foot DODX Flatcar

a. Loads described in this paragraph are based on a flatcar that is 10 feet 4 inches wide, minimum.

b. The M60 tank may be placed in the tiedown position on the flatcar by a crane, or may be driven or towed, provided that a suitable ramp or bridge is available.

c. After the vehicle is loaded and placed in the tiedown position, the handbrakes should be set. Gearshift lever for the transmission must be placed in neutral position and wire-tied, if practicable.

d. When one tank is loaded, it should be loaded in the center area of the 54-foot DODX flatcar. When two tanks are loaded, the gun tube of one tank must be placed about 5° to the right or left of the centerline of the

tank. Both tanks must be loaded rear to rear at the center of the flatcar. The tank with the offset gun tube will have the gun tube brace folded down in its normal stow position. The turret rotation lock must be engaged in its position, where the lock teeth match the turret ring gear teeth nearest the 5° position of the gun tube (fig 7-8). The tanks should be placed on the 54-foot flatcar as shown in figure 7-8, with equal spacing (about 30 inches) at each end and between the tank hulls.

e. Bill of materials for blocking and tiedown of two M60-series tanks on a 54-foot DODX flatcar is shown in table 7-6. Blocking and tiedown shown in figures 7-5 and 7-6 are compatible with standard loading practices and provide for adequate restraint against the forces encountered during movements at normal speeds. Blocking details are described in figure 7-7. Application of materials for loading and securing the tanks on the flatcar is shown in table 7-7.

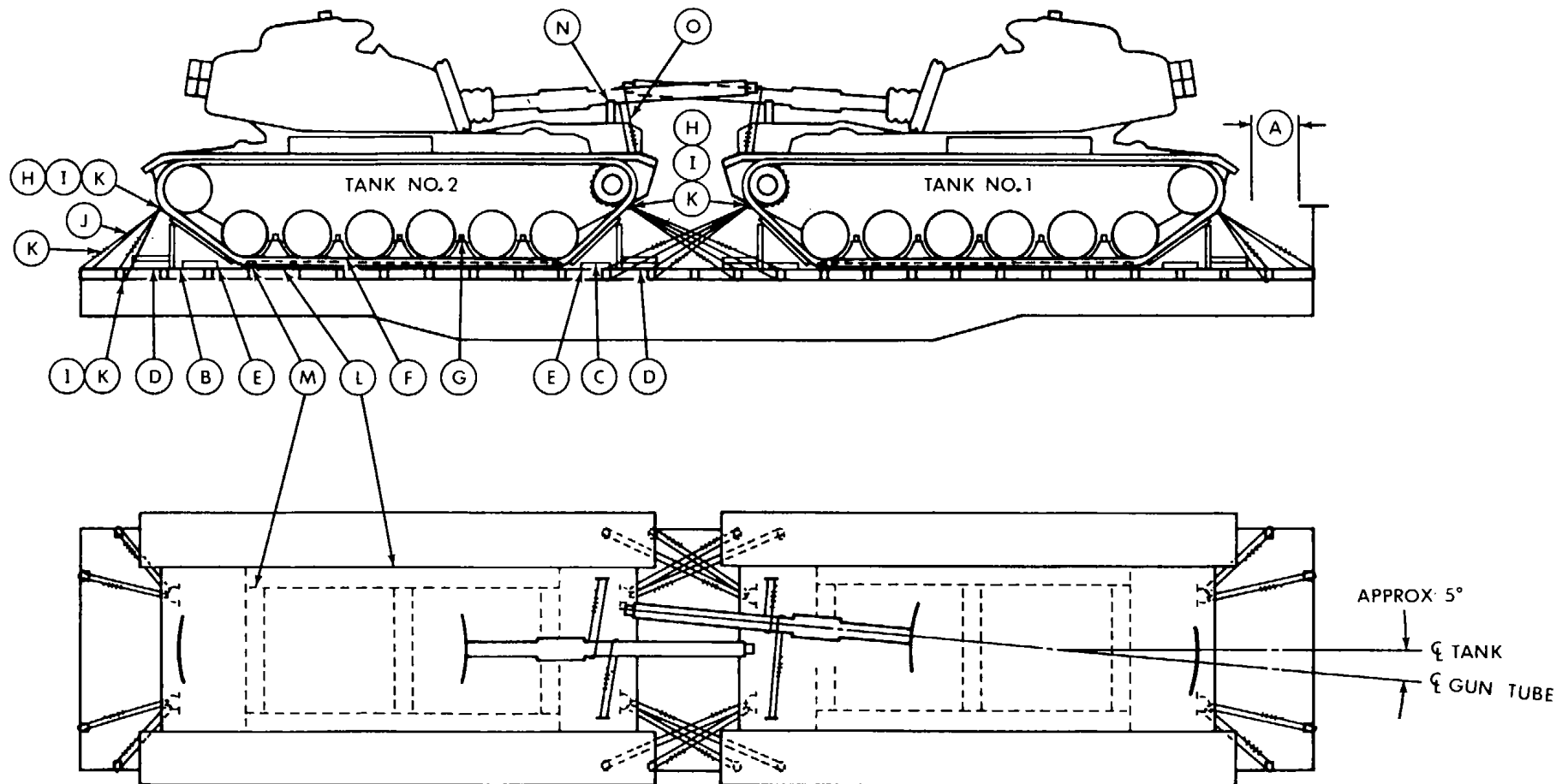


Figure 7-8. Blocking and tiedown for two M60-series tanks on 54-foot DODX flatcar.

7-8. Transport of M60-Series Tanks in Controlled Train Service for Unit Moves

Movement by this method of securement is designed to provide prompt movement over short distances from military installations to portside for shiploading. The M60-series tanks can be loaded on a railcar of adequate weight capacity that is a minimum of 10 feet 4 inches wide. Blocking and tiedown requirements are reduced from those shown in figures 7-5 and 7-6. Only items B, C, J, K, and N of table 7-5 are applied to provide adequate restraint against forces encountered during movements on controlled train service.

7-9. Transport of M60-Series Tank Restrained With Wood Blocking Only

Controlled train service is generally a short distance from an installation to an outport or training area and over rails owned or controlled by a single handling carrier. Under these conditions, the carrier will specify the safe speed a load can move with reduced restraints. The wood blocking method of restraint can be used for movement only when prior coordination and acceptance by the handling carrier railroad have been

accomplished. Loading and placement of the M60-series tank on wood decked flatcar are as shown in figures 7-5 and 7-6. Blocking is applied as shown in A, B, C, D, E, L, and M of table 7-5. No tiedowns or road wheel blocks are applied.

7-10. Transport of M60-Series Tanks on Special-Purpose Flatcars

a. Special-purpose G85 and G89 cushion rub-rail flatcars are not considered appropriate for loading the M60-series tanks, since the individual weight of the vehicles exceeds the load-restraint capability of the tiedown chains working in relation to the action of the cushioned rub-rails.

b. Special-purpose flatcars owned by the Trailer Train Company, with the exception of the HTTX, are not considered appropriate for handling the M60-series tanks because of the obstruction of side guide rails, strength of tiedown chains, and spacing of tiedown devices. The M60-series tanks have not been test-loaded on the HTTX; therefore, procedures have not been included in this publication.

Section III. TRANSPORT ON FOREIGN RAILWAYS

7-11. General

The transportability guidance contained in this section is applicable when the M60-series tank is transported on foreign railways. Consideration is given to single and multiple vehicle movements for the types of flatcars normally used in the movement of this type of vehicle. The vehicle, when loaded on a suitable flatcar, can be transported, with restrictions, within European countries complying with the passe-partout international (PPI) gauge railways; this also applies to the majority of the countries in the Middle East, South America, Australia, India, and Pakistan. In the Middle East and South America, the clearances vary by country, and each country will require a separate check. In Australia, India, and Pakistan, wide- or broad-gauge railways provide greater clearances and less restrictions.

Because of the various designation systems and clearances used by different countries, evaluation of transport capability must be made on an individual basis.

7-12. Transport on Foreign-Service Flatcars

a. *General.* The vehicle can be transported on some foreign-service flatcars. Flatcars representative of those available in Europe that are suitable for transporting the vehicle are described in table 7-6.

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

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

Flatcar Designation	Capacity	Length	Width	Platform Height
RLMMP 700	57.3-ton (52.00 MT)	31-ft 2-in. (9.50 m)	10-ft 4-in. (3.15 m)	4-ft 2 3/4-in. (1.29 m)
SAMS 710	71.63-ton (65.00 MT)	49-ft 3-in. (15.01 m)	10-ft 2-in. (3.10 m)	4-ft 2 3/4-in. (1.29 m)

APPENDIX REFERENCES

A-1. Army Regulations (AR)

- 55-29 Military Convoy Operations in CONUS
- 55-80 Highways for National Defense
- 55-162 Permit for Oversize, Overweight, or Other Special Military Movements on Public Highways in the Contiguous States and the District of Columbia of the United States
- 55-228 Transportation by Water of Explosives and Hazardous Cargo
- 55-355 Military-Traffic Management Regulation
- 70-44 DOD Engineering for Transportability
- 70-47 Engineering for Transportability
- 335-40 Accident Reporting and Records
- 746-1 Color, Marking, and Preparation of Equipment for Shipment

A-2. Army Field Manuals (FM)

- 55-9 Unit Air Movement Planning
- 55-15 Transportation Reference Data
- 55-17 Terminal Operations Specialists Handbook

A-3. Army Supply Bulletins (SB)

- 700-20 Army Adopted Items of Materiel

A-4. Army Technical Bulletins (TB)

- 55-46-1 Standard Characteristics (Dimensions, Weight, and Cube) for Transportability of Military Vehicles and Equipment

A-5. Technical Manuals (TM)

- 9-2350-215-10-1 Operators Manual: Tank, Combat, Full-Tracked: 105 mm Gun, M60A1 (2350-00-756-8497); Tank, Combat, Full-Tracked: 105-mm Gun and M60A1 (AOS) (2350-01-058-9487)
- 9-2350-215-20 Organizational Maintenance Manual: Tank, Combat, Full-Tracked: 105-mm Gun, M60A1 (2350-00-756-8497); Tank, Combat, Full-Tracked: 105-mm Gun, M60 W/E (2350-00-678-5773)
- 9-2350-232-10 Operators Manual for Tank, Combat, Full-Tracked: 152-mm Gun/Launcher M60A2 W/E (2350-00-930-3590)
- 9-2350-253-10 Operators Manual: Tank, Combat, Full-Tracked: 105-mm Gun, M60A3 (2350-00-148-6548) and TTS (Tank, Thermal Sight) (2350-00-061-2306)
- 38-250-(AFR 71-4) Packaging and Handling of Dangerous Materials for Transportation by Military Aircraft
- 55-405-9 Weight and Balance
- 55-500 Marine Equipment Characteristics and Data
- 55-2200-001-12 Transportability Guidance: Application of Blocking, Bracing, and Tiedown Materials for Rail Transportation

A-6. Air Force Manuals

- TO 1-1B-40 Handbook of Weight and Balance Data
- TO 1C-5A-9 Loading Instructions, USAF Series C-5A Airplane

A-7. Other Publications and Source of Procurement

- a. *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 and Trailers*

Section No. 1- General Rules
Section No. 6- Rules Governing the Loading of Department of Defense Materiel on Open-
Top Cars

Available from: Association of American Railroads
59 E. Van Buren Street
Chicago, IL 60605

c. American Association of State Highway and Transportation Officials (AASHTO) *Legal Maximum Di-
mensions and Weights of Motor Vehicles Compared with AASHTO Standards*

Available from: American Association of State Highway and Transportation Officials
341 National Press Building
Washington, DC 20004

A-8. Department of Transportation

Special Permit No. 3498
USCG 108 Rules and Regulations for Military Explosives and Hazardous Munitions

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