DEPARTMENT OF THE ARMY TECHNICAL MANUAL

TRANSPORTABILITY GUIDANCE

RECOVERY VEHICLE, FULL-TRACKED, MEDIUM, M88

Headquarters, Department of the Army, Washington, D. C.
26 September 1968

1. Purpose and Scope

a. This manual provides transportability guidance for movement of the recovery vehicle, fulltracked, medium, M88 (fig. 1), also referred to as "item". This manual covers significant transportability and safety considerations in the movement of the item by the various modes of transport. Included are side- and end-elevation drawings (figs. 2 and 3) and characteristics of the item.

***This manual supersedes TM 55-2320-222-10-1, 8 July 1964.**

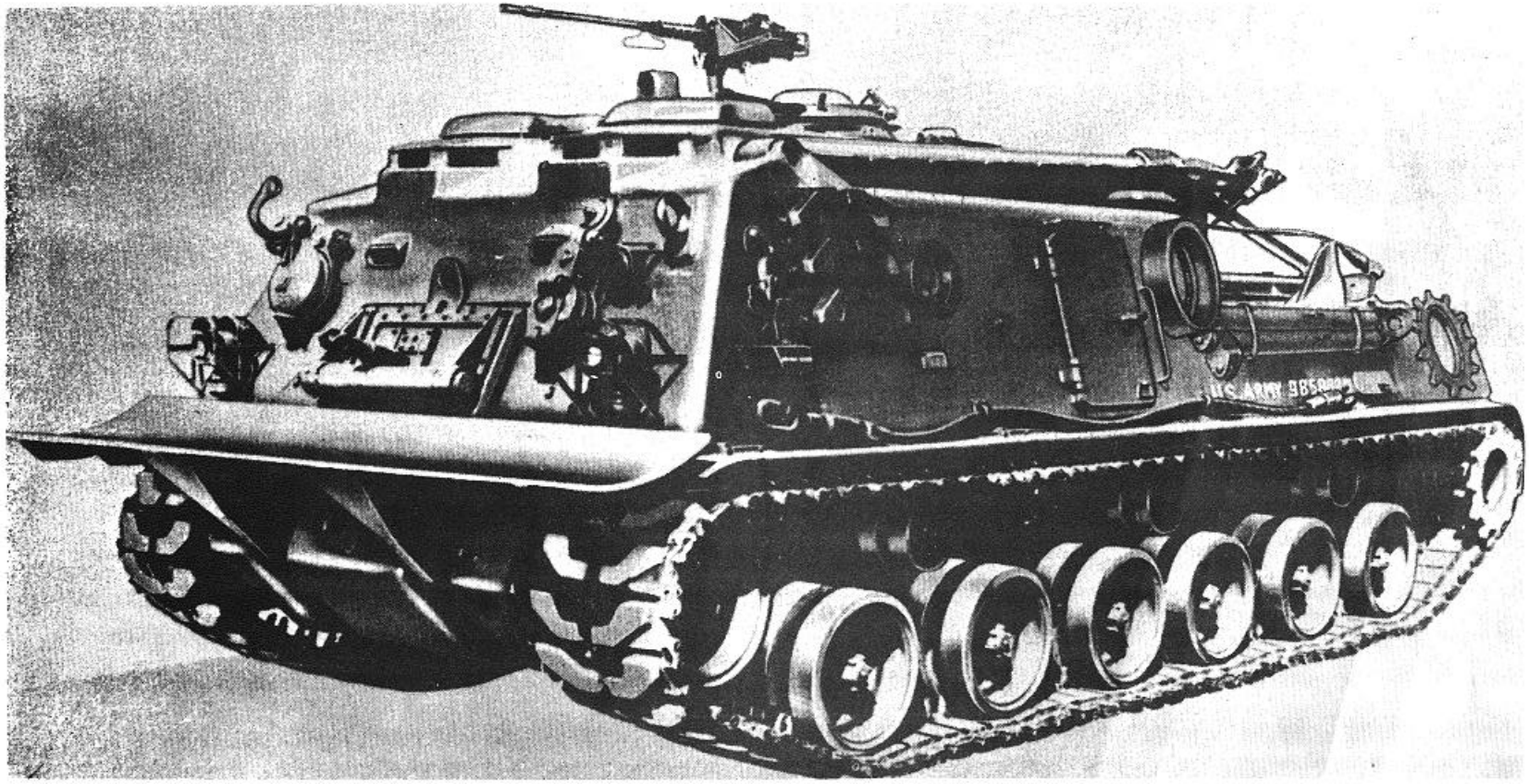

Figure 1. Recovery vehicle, full-tracked, medium, M88.

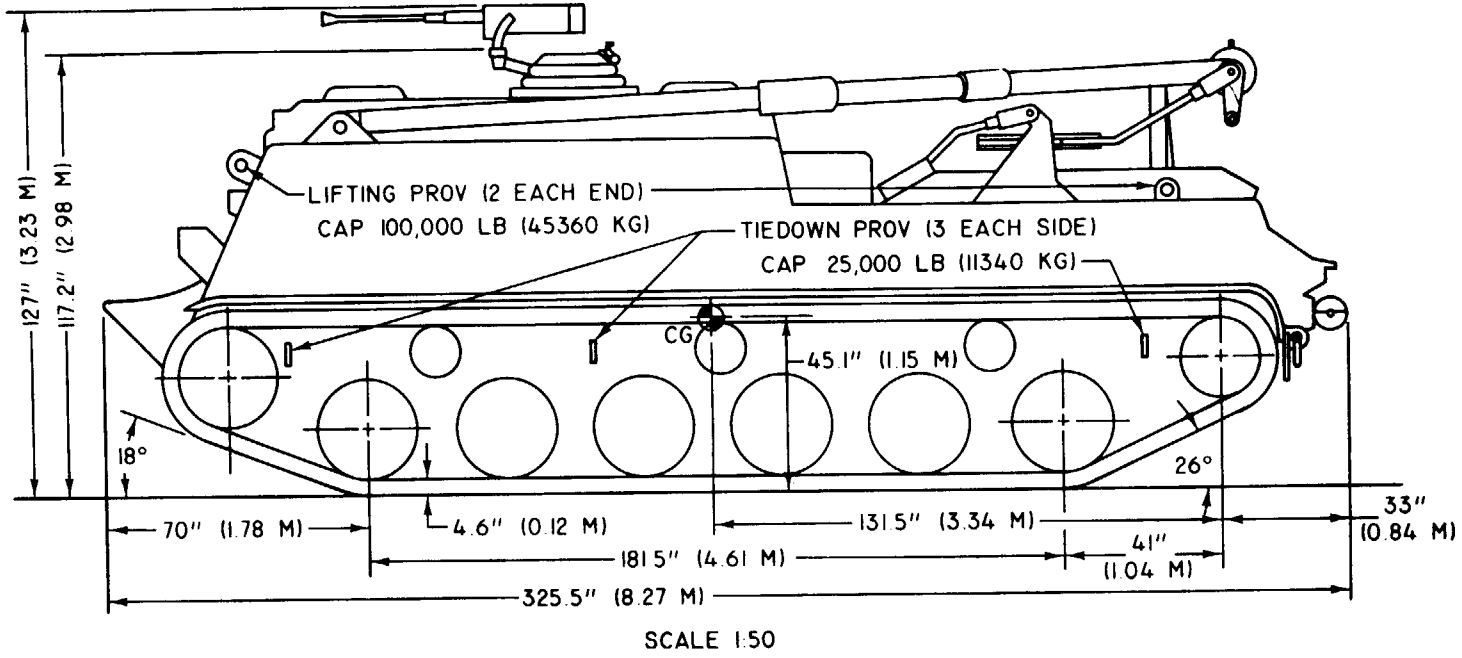

Figure 2. Side elevation.

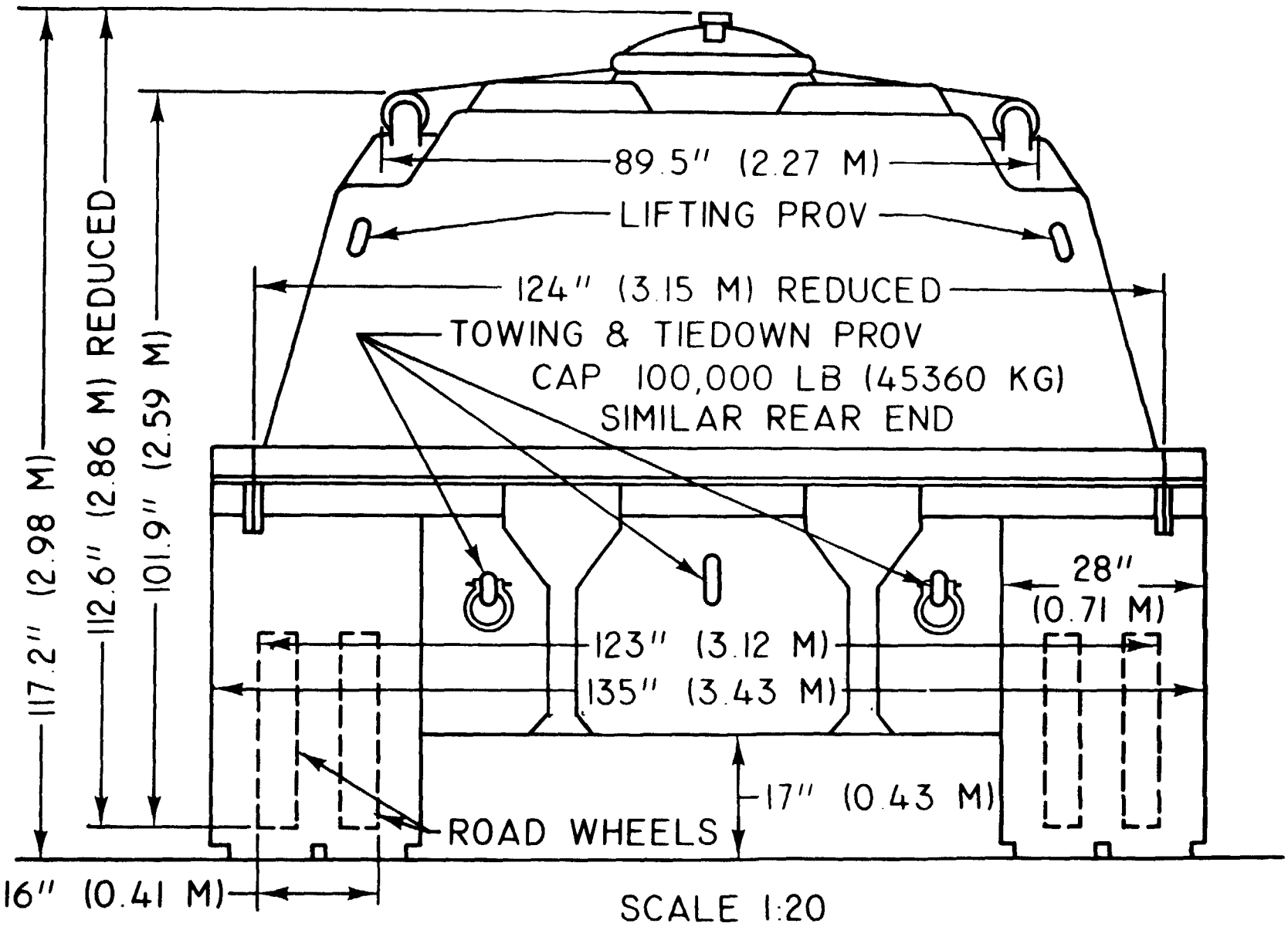

Figure 3. End elevation

b. Report of errors, omissions, and recommendations for improving this manual by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded to Director, U.S. Army Transportation Engineering Agency, Military Traffic Management and Terminal Service, ATTN: MTT-GD, Fort Eustis, Va. 23604.

2. Description

The M88 recovery vehicle is a heavily armored, full track-laying, low-silhouette vehicle that performs hoisting, winching, and towing operations in the rescue and recovery of light and medium tanks, self-propelled equipment, and other vehicles. It also supports medium and light tank units to effect battle field recovery, and is equipped to assist in repairs of supported vehicles under typical field conditions. The vehicle carries a crew of four: commander, driver, mechanic, and rigger.

3. Modes of Transport

a. Shipment by Air.

(1) The item cannot be transported by U.S. Army aircraft.

(2) Based on a typical mission of 5,500 nautical miles (10186 km), one way, the item can be transported without sectionalization by the C-5A U.S. Air Force aircraft.

Note.

The maximum U.S. Air Force aircraft cargo weight and range capabilities are based on the following conditions:

Standard day conditions
Sea Level operating conditions
Hard-surfaced runways
No weather alternate required
No wind conditions
Fuel reserve
Constant cruising altitude

In the event one or more of these operating conditions are changed, the maximum cargo load and/or range may be affected.

b. Shipment by Highway.

(1) *On road*. The item can be transported on highway by its own power or when loaded on a semitrailer of adequate capacity; however, movement over public highways in CONUS and oversea areas should be made only when other modes of transport cannot be used. Weight and width of the item exceed the legal highway limitations in CONUS and the recommended highway limitations in oversea areas. When the item is loaded on a semitrailer, the height may exceed the legal highway limitations in CONUS and will exceed the recommended limitations in oversea areas. Special permits will be required in CONUS, and special routing may be required overseas. Tuning characteristics of the item loaded on an M15A2 semitrailer towed by the M123 truck tractor are shown in figure 4.

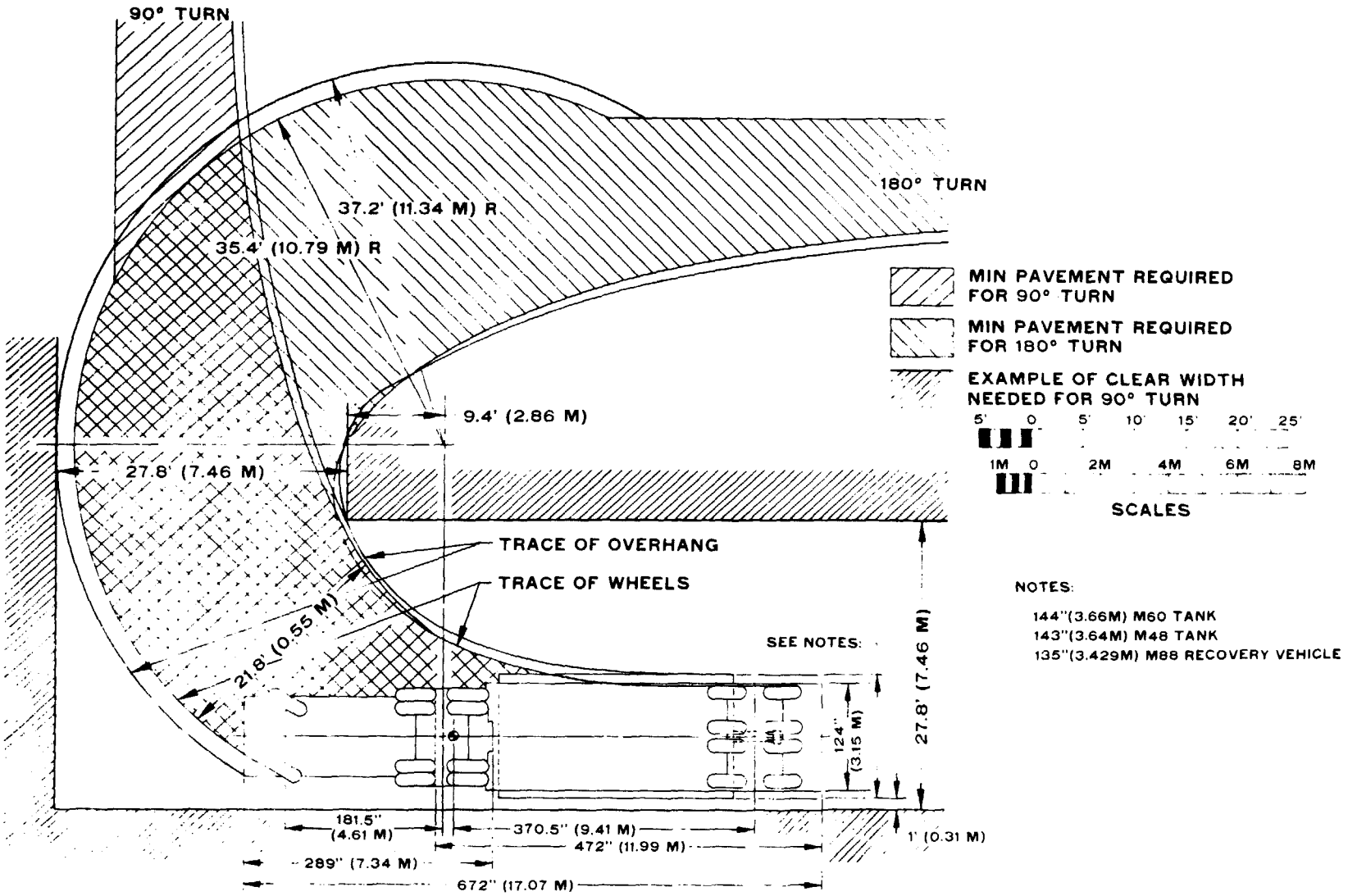

Figure 4. Turning characteristics diagram for the semitrailer, tank transporter, M15A2, and truck, tractor, M123, with the recovery vehicle, full-tracked, medium M88, loaded on the M15A2.

(2) *Off road: soils trafficability data.*

A vehicle cone index (VCI) is a number which tests have proven can be related to the characteristics of a particular vehicle (see para 5). This number, when used in connection with the rating cone index (of the soil), can forecast the ability of that vehicle to repeatedly cross fine-grained soil, and sands with fines, poorly drained. The rating cone index is obtained by use of the cone penetrometer and its associated equipment. See TB ENG 37 for use of the equipment in the field and for interpretation of index numbers.

c. Shipment by Rail.

(1) Within CONUS, the item loaded on a railroad flatcar can be transported without sectionalization but it exceeds the width limitations of the "Outline Diagram for Single Loads, Without End Overhang, on Open Top Cars,"* and verification of line clearances will be required.

After sectionalization as outlined in para 4, the item can be transported on a railroad flatcar without limitations.

(2) In countries complying with the Berne International Rail Interchange Agreement, the item loaded on a railroad flatcar can be transported without sectionalization but it exceeds the width and height limitations of the Berne Clearance Diagram, and verification of line clearances will be required. After sectionalization as outlined in para 4, the item can be transported on a railroad flatcar without limitations.

(3) See appendix for information regarding blocking and restraining the item on railroad flatcars.

d. Shipment by Water. The item can be transported by inland waterway cargo carriers and lighters of adequate capacity. It can also be shipped by Mariner-, Victory-, and Liberty-class seagoing vessels, subject to the following limitations:

Class	*Hatch size adequate*	*Hatch boom adequate*	*Hatches requiring terminal crane*
Mariner	No.2,3,4,5 6, 7	No.4,6	No. 2, 3, 5, 7
Victory	No. 3, 4	No. 3	No. 4
Liberty	No. 1, 2, 4, 5	No. 2*	No. 1, 4. 5

*When equipped with 50 ton (long ton) cargo boom.

4. Sectionalization

The overall height of 127 inches (3.23 m) can be reduced to 112.6 inches (2.86 m) and the overall width of 135 inches (3.43 m) can be reduced to 124 inches (3.15 m) by removing the machine gun, fenders, spade extensions, tracks, track-drive hubs, and sprockets.

*Detailed information available in Railway Line Clearances publication.

5. Item Characteristics and Related Data

(Data based on item in unloaded condition unless otherwise indicated.)

Nomenclature- Recovery Vehicle, Full-Tracked, Medium M88.

FSN	2320-678-5772
LIN	R50680
Type Classification	Standard A
Item Weight	
Unloaded	108,000 lb (48990 kg)
With Combat Load	112,000 lb (50800 kg.)
Ground Pressure:	
Unloaded	11.0 psi (0.75 kg/sq cm)
With Combat Load	10.6 psi (0.77 kg/sq cm)
Center of Gravity:	
Above Ground	45.1 in. (1.15 m)
From CL, Drive Sprocket	131.5 in. (3.34 m.)
Dimensions and Shipping Data	
Length	325.5 in. (8.27 m)
Width, Operational	.135 in. (3.43 m)
Width, Reduced	124 in. (3.15 m)
Height, Operational	127 in. (3.25) m
Height, w/o Machine Gun	117.2 in. (2.98 m)
Height, Reduced	112.6 in. (2.86 m)
Area, Operational	305.1 sq ft (28.37 sq) m
Area, Reduced	280.3 sq ft (26.07 sq m)
Volume, Operational	3.229.6 cu ft (91.41 cu m)
Volume, w/o Machine Gun	2,980.3 cu ft (84.33 cu m)
Volume, Reduced	2,630.0 cu ft (74.43 cu m)
Angle of Approach	18
Angle of Departure	26°
Soils Trafficability Data (para 3b(2)):	
1. Item at Unloaded Weight plus Crew of Four	VCI 60
2. Item at Combat Weight	VCI 61
Vehicle Classification:	
1. Item at Unloaded Weight Plus Crew of Four	53
2. Item at Combat Weight	55
CONUS Freight, Classification	Army Tractor Tanks without guns, with necessary equipment properly secured inside tanks, or boxed and shipped with tanks.
Uniform Freight Classification (UFC)	U72770
National Motor Freight Classification (NMFC)	145720
Publications	TM 9-2320-222-10 TM 9-2320-222-20 TB ENG 37

Blocking and Restraining Item on Railroad Flatcars With Wooden Floors

1. Bill of Material

	Type of material	Approximate quantity
a.	*Lumber*. Douglas-fir, or comparable lumber, straight-grain, free from material defects, fed spec MM-L 751c	
	2- x 4-in.	135 linear ft
	2- x 12-in.	60 linear ft
	6- x 6-in.	60 linear ft
b.	*Nails*. Common, or cement-coated, fed spec FF-N-105a	
	20d	160
	30d	175
c.	*Wire Rope and Strand*. 5/8-in., 6x19, IWRC, improved plow steel, performed, regular-lay, fed spec RR-W-410a	140 ft
d.	*Clamps*. Wire-rope, %-in.	48
e.	*Thimbles*. %-in., std, open-type	16
f.	*Clevis Assembly Suspension* (*Shackles*). Bolt and nut type, large, FSN-1670-090-5354, or equal (for front and rear towing and tiedown provisions).	4

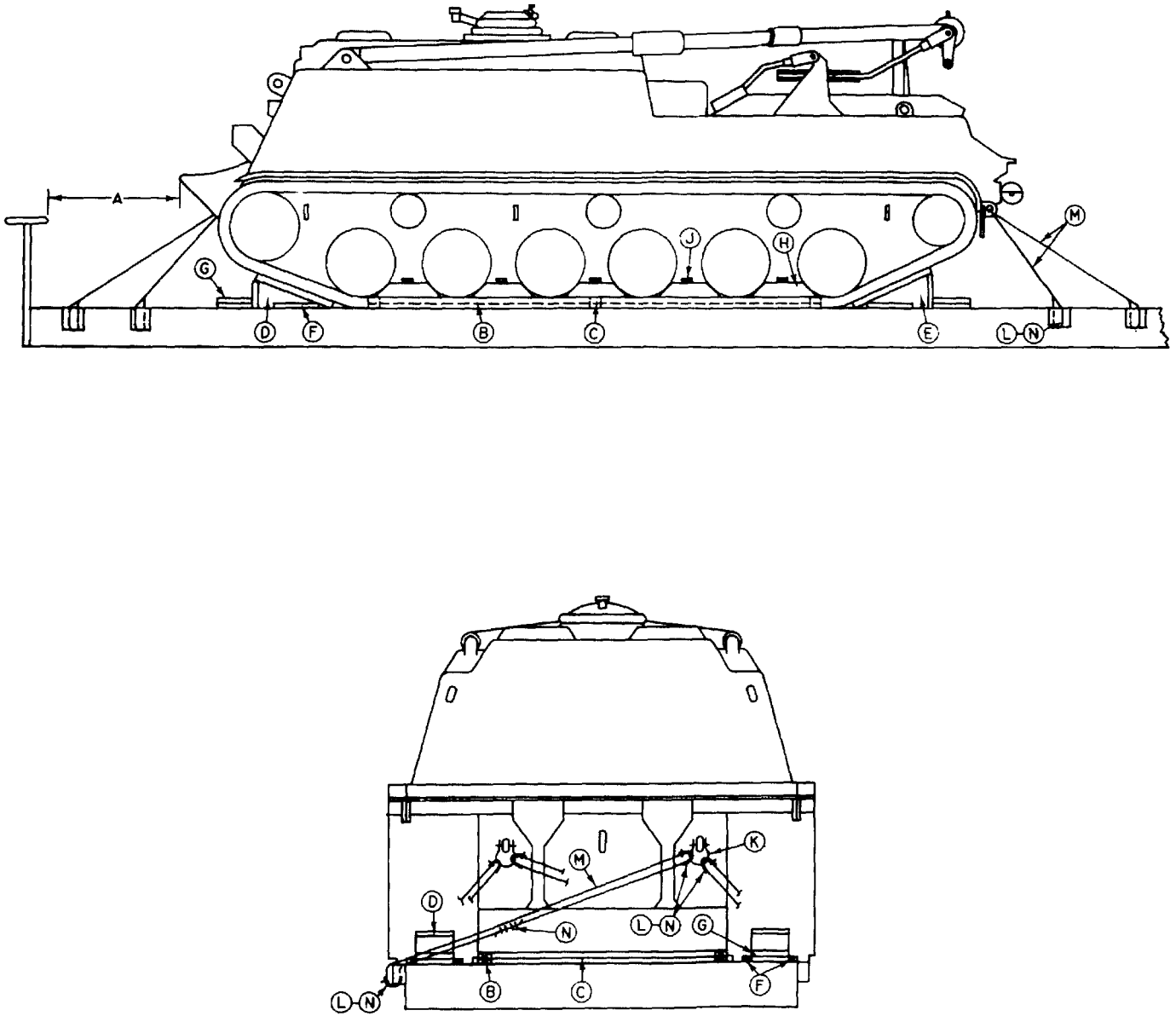

Figure 5. Blocking and restraining diagram.

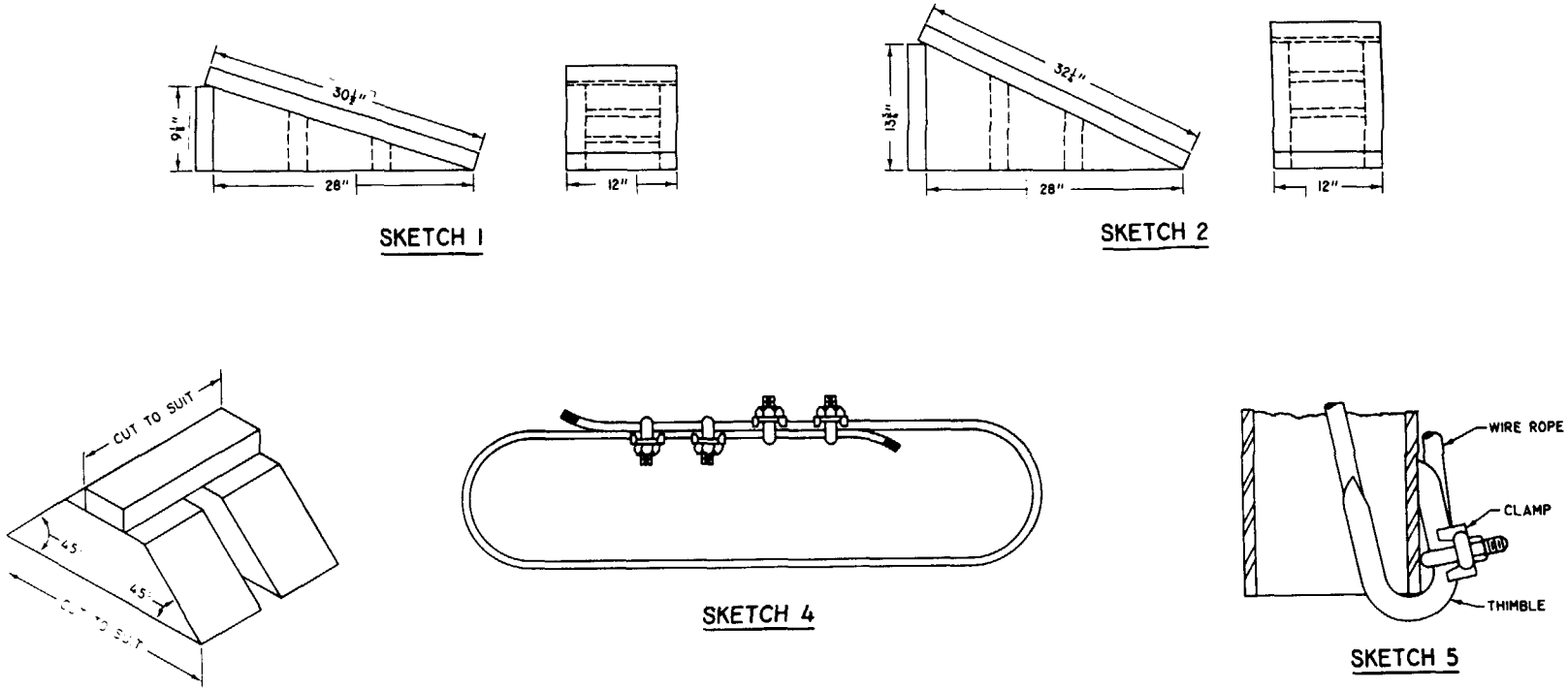

Figure 6. Blocking detail diagram.

Item	*No. required*	*Application*
A		Brake wheel clearance. Minimum in back of, and on both sides of clearance required is 6 in. above, and 4 in underneath wheel.
B	2	Track, side cleats, each to consist of two pieces of 2-in. x 4-in. x 180-in. lumber. Locate along the inside of each track. and nail the lower piece to the car floor with sixteen 30d nails. Nail the top piece to the one below with sixteen 30d nails.
C	3	Track, side cleat spreaders, each to consist of two pieces of 2-in. x 4-in. x length-to-suit lumber. Locate at each end and in center between Items B. Nail the lower piece to the car floor with six 30d nails. Nail the top piece to the one below with six 30d nails.
D	2	Block, track, front, right and left sides. Construct with 2-in. x 12-in. lumber and 20d nails. See sketch 1, figure 6. Locate the blocks against the tracks as shown in figure 5.
E	2	Bloc(k. track. rear, right and left sides. Construct with 2-in. x 12-in. lumber and 20d nails. See sketch 2, figure 6. Locate the blocks against the tracks as shown in figure 5.
F	8	Cleats, track, block sides, 2-in. x 4-in. x 24-in. lumber. Locate one piece on the inside and one piece on the outside of each item D and E. Nail each piece to the car floor with four 30d nails.
G	4	Cleats, track block ends, each to consist of two pieces of 2-in. x 12-in. x 18-in. lumber. Locate one piece against ends of each item D and E. Nail the lower piece to the car floor with five 30d nails and the top piece to the one below in a like manner.
H	10	Block. bogie wheel, each to consist of two pieces of 6-in. x 6-in x length-to-suit lumber (cut to fit snugly between bogie wheel assemblies as shown in fig. 5). See sketch 3, figure 6.
J	10	Cross brace, bogie wheel block, 2-in. x 4-in. x length-to-suit lumber, as shown in figure 5 and sketch 3, figure 6. Nail one piece to each block (Item H) with two 20d nails.
K	4	Shackles. Secure one shackle at each towing lug (two at front end of vehicle and two at rear end).
L	16	Thimbles, %-in. Locate two thimbles at each item K and one thimble at each stake pocket under each item M. See figure 5 and sketch 5, figure 6.
M	8	Wire Rope, %-in., doubled. Attach to towing connections and stake pockets. See figure 5 and sketch 5, figure 6.
N	48	Clamps, %-in. Secure the ends of item M wire rope with four clamps each. Secure the thimbles to item M with one clamp each. See figure 5 and sketches 4 and 5, figure 6.

3. General Notes

a. Load as shown is based on a flatcar 10 feet 6 inches wide (platform). Cars with wider platforms may also be used.

b. All handbrakes will be applied with the hand levers wired or blocked. Gearshift levers for transmissions must be placed and wire-tied in neutral position. Hoisting boom must be locked in travel position with the hoist hook engaged in the center towing eye and the hoist cable taut.

c. For further details, refer to Association of American Railroads (AAR) "Rules Governing the Loading of Commodities on Open Top Cars" and General Rules 2, 3, 4, 5, 7, 9, 14, 15, and 19A therein.

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 decagram = 10 grams = .35 ounce
1 hectogram = 10 decagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	Newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	Newton-meters	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

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