TECHNICAL MANUAL

TRANSPORTABILITY GUIDANCE

ROUGH TERRAIN

CONTAINER CRANE (RTCC)

(NSN 3810-01-205-2716)

HEADQUARTERS, DEPARTMENT OF THE ARMY
30 September 1991

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CHAPTER 1

INTRODUCTION

1-1. Purpose and Scope

a. This manual provides transportability guidance for logistical handling and movement of the Rough Terrain Container Crane (RTCC). It also has guidance for safe transport of the crane. It includes significant technical and physical characteristics, as well as safety precautions required for worldwide movement by various modes of transportation.

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

c. Where appropriate, metric equivalents appear in parentheses following dimensions or other measurements.

1-2. Safety

Chapter 3 has appropriate precautionary measures required during RTCC movement.

1-3. Definitions of Warnings, Cautions, and Notes

Throughout this manual, warnings, cautions, and notes emphasize important or critical guidance. They apply to the following conditions:

a. Warning. Instructions that, if not correctly followed, could result in injury to, or death of, personnel.

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

c. Note. An operating procedure or condition that requires emphasis.

1-4. Reporting Recommendations and Comments

The Army requires users of this manual to submit comments and to recommend changes for its improvement. Users should prepare their comments and recommendations on DA Form 2028 (Recommended Changes to DA Publications and Blank Forms) and forward to Commander, Military Traffic Management Command Transportation Engineering Agency, ATTN: MTTE-TRA, P. O. Box 6276, Newport News, VA 23606-0276. Users should address electrically transmitted messages to CDR MTMCTEA FT EUSTIS VA//MTTE-TRA//. This command will furnish a reply.

CHAPTER 2

TRANSPORTABILITY DATA

Section I. GENERAL

2-1. Scope

This chapter gives a general description and drawings of the RTCC, as well as transportability data necessary for transporting the RTCC.

2-2. Description

The RTCC is a commercial mobile hydraulic crane modified for military applications. Personnel will use this crane for handling materiel and both 20-and 40-foot ISO containers. The RTCC has a diesel engine, pneumatic tires for operating over rough terrain, and a hydraulically operated, full revolving, telescoping boom. Also, the RTCC is capable of sectionalization into two major components (superstructure and chassis). Personnel must disassemble the RTCC to remove the superstructure from the chassis (see app A).

Section II. CHARACTERISTICS AND RELATED DATA

2-3. General

The following characteristics and data apply to the model number or national stock number (NSN) shown. Changes in model number or NSN may affect the loadability of the item as related to the guidance in this manual. Dimensions and weights represent the operational configuration and the two major sections when the RTCC is sectionalized for transport.

Line item number	C39398
National Stock Number	3810-01-205-2716

Dimensional and Shipping Data

a. Operational Configuration	
Length	555.4 in. (14.11 m)
Width	144.0 in. (3.66 m)
Height	156.8 in.(3.98 m)
Weight	94,500 lb (42,865 kg)
Axle Loads:	
Front axle	36,516 lb (16,564 kg)
Rear Axle	57,984 lb (26,301 kg)
Shipping cube	7,278 cu ft (206.11 cu m)
Ground clearances	16 in. (0.41 m)
Tires:	
Size	29.5 x 25
Inflation	7 5 psi
Footprint: Front wheels each	290 sq in.
Rear wheels each	410 sq in.
Ground pressure: Front wheels each	62.96 psi
Rear wheels each	70.71 psi
Crane Capacity	80,000 lb (36,288 kg)
Wheelbase	170 in. (4.32 m)
Turning radius	0 ft 3 in. (15.32 m)
Speed	18 mph (28.96 km/hr)
b. Sectionalized Configurations	

Carrier Section	*Superstructure Section*
Length 360.5 in. (9.16 m)	544.9 in. (13.84 m)
Width 144.0 in. (3.66 m)	136.0 in. (3.45 m)
Height 106 in. (2.69 m)	113.3 in. (2.88 m)
Weight 49,370 lb (22,394 kg)	44,191 lb (20,045 kg)

NOTE

Hook and ball boxed separately Weight 939 lb (426 kg)

2-4. Transportability Drawings

Figures 2-1 and 2-2 are detailed side- and end-elevation transportability drawings of the RTCC. These drawings show dimensions, and lifting and tiedown provision locations with load rating capabilities.

2-5. Unusual Characteristics

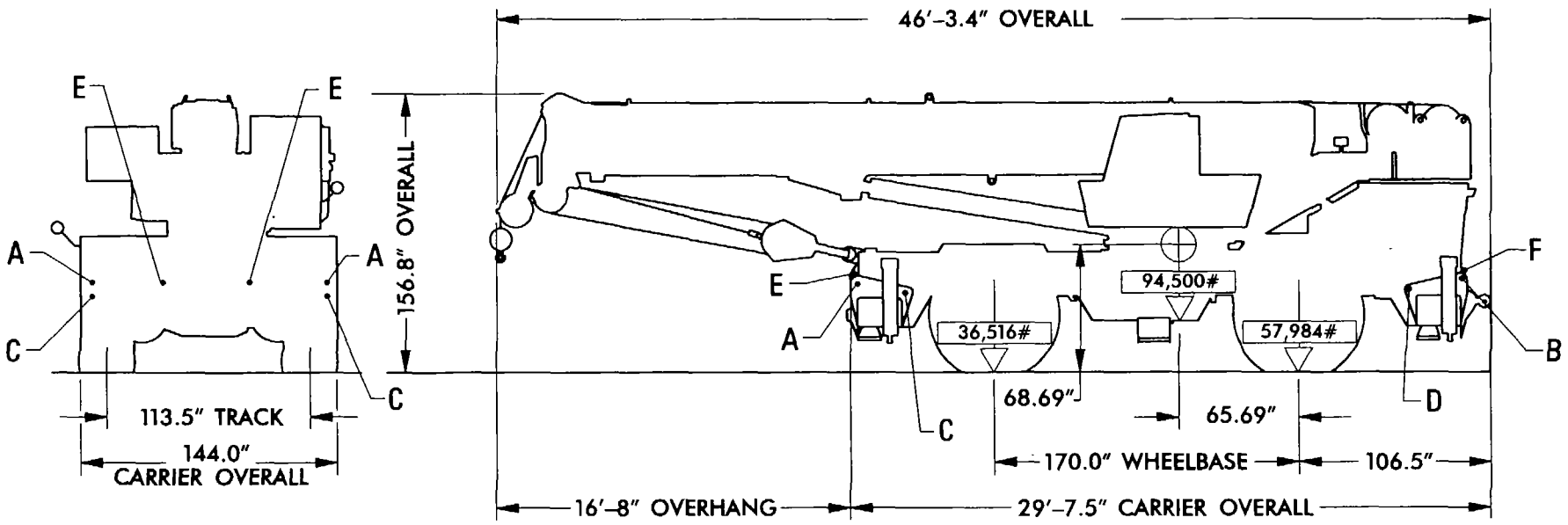
The RTCC has no unusual characteristics that require special attention to temperatures, atmospheric pressure, or humidity variations during exposure to the normal transportation environment.

2-6. Hazardous and Dangerous Characteristics

Unless transport personnel ship the cranes with ammunition, they will not present any special hazardous or dangerous characteristics during their exposure to the normal transportation environment.

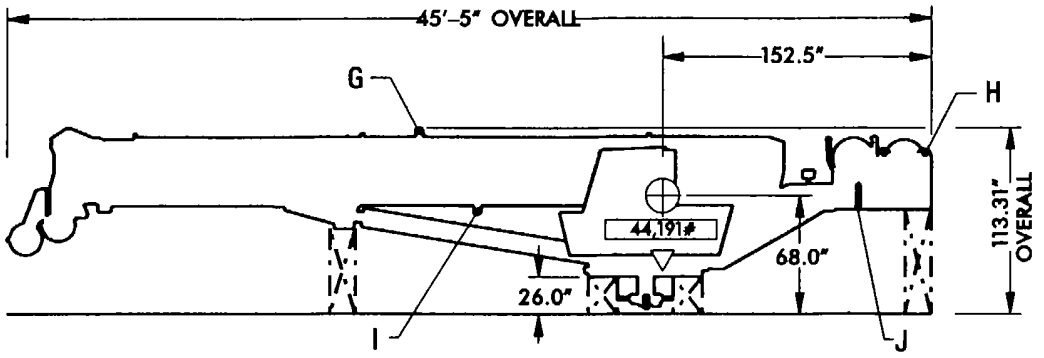
NOTE

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

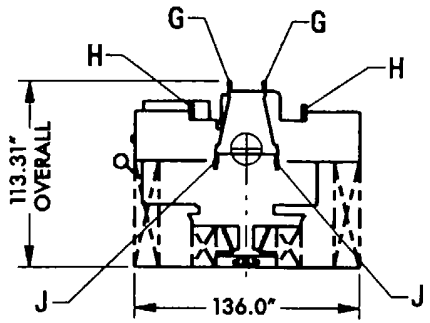


Note: See sheet 2 of figure 2–2 for strength of tiedown and lifting provisions A through J.

Figure 2-1. Assembled RT875CC ready for transport.

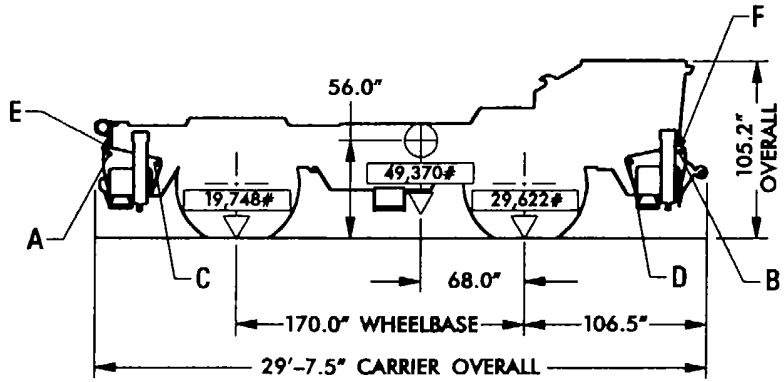


SIDE VIEW



REAR VIEW

CRANE SUPERSTRUCTURE ONLY



Note: See sheet 2 for strength of tiedown and lifting provisions A through J.

SIDE VIEW

CRANE CARRIER ONLY

Figure 2-2. Carrier with superstructure demounted ready for transport (sheet 1 of 2).

FITTING	NO./ UNIT	TOTAL CRANE			CARRIER			SUPER-STRUCT.		FITTING CAPACITY PER LUG (TONS)				
		LIFT	TOW	TIEDOWN	LIFT	TOW	TIEDOWN	LIFT	TIEDOWN	LIFT	TOW	TIEDOWN		
												FORE & AFT	SIDE	DOWN
A	2	X		X	X		X			104.0		68.0	48.0	48.0
B	2	X		X	X		X			104.0		68.0	48.0	48.0
C	2			X			X					68.0	48.0	96.0
D	2			X			X					68.0	48.0	96.0
E	2		X			X	X				35.0			48.0
F	2		X			X	X				35.0			48.0
G	2							X		36.1				
H	2							X	X	21.8		37.1	14.0	41.9
I	2								X			30.4	25.1	50.5
J	2								X				20.3	20.3

Figure 2-2. Continued (sheet 2 of 2).

CHAPTER 3
SAFETY

3-1. General

General safety considerations and precautions for handling and transporting the RTCC are as follows:

a. Do not leave the RTCC unattended while the engine is running.

b. Stay clear and ensure that all personnel and no obstacles are in the RTCC path when it is in reverse.

c. Do not stand or walk under the RTCC when it is being lifted.

d. Check each RTCC to ensure that all loose items are secured.

e. For safe driving the assembled crane long distances or for transport by railcar or semitrailer, remove the hook block, overhaul ball, and the two block weights and chains. Rewind the wire rope on main and auxiliary hoists. If desired, the auxiliary boom nose and counterweight may be removed.

WARNING

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

WARNING

Loading crews must provide proper ventilation during loading and unloading operations, if the RTCC engine is in use. Prolonged inhalation of carbon monoxide fumes could be fatal.

3-2. Specific Safety Requirements

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

CHAPTER 4

AIR TRANSPORTABILITY GUIDANCE

Section I. GENERAL

4-1. Scope
This chapter has air transportability guidance for movement of the RTCC. It also gives tiedown data for loading this equipment into C-5 Air Force aircraft.

4-2. Maximum Utilization of Aircraft
The loads described in this section are not maximum loads. TM 38-236/AFR 71-8 has general guidance on total cargo loads and operating ranges. These documents describe additional cargo and/or personnel, within allowable load limits and restrictions, that C-5 aircraft can accommodate.

4-3. Applicability
The RTCC is transportable in C-5 aircraft. Procedures in this manual and those prescribed in TO IC-5A-9 apply.

4-4. Safety
Besides the safety precautions in chapter 3, the following procedures apply:

a. The activity offering the RTCC for air transport must notify the aircraft commander, or his/her representative, when hazardous materiel is part of the shipment. The offering activity must also state that they have complied with TM 38-250/AFR 71-4 when preparing this materiel for shipment.

b. According to TM 38-250/AFR 71-4, the fuel level may be no more than three-quarters full for air transport.

c. Tie down the vehicles or RTCC chassis according to procedures in TO IC-5A-9.

d. Check each RTCC carefully to ensure that loading personnel have properly stowed and secured all loose items.

WARNING

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

WARNING

Personnel must provide proper ventilation when loading or unloading equipment. Prolonged inhalation of carbon monoxide fumes may be fatal.

CAUTION

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

4-5. Responsibility
The loadmaster will ensure that loading crews have secured equipment according to restraint criteria outlined in TO IC-5A-9.

Section II. TRANSPORT BY US AIR FORCE AIRCRAFT

4-6. Transportability
The RTCC is transportable only in C-5 aircraft. Specific guidance is as follows:

a. Personnel must separate the crane carrier from the superstructure (see app A) and mount the superstructure on the M747 semitrailer. See figure 5-1 in chapter 5 for blocking and tiedown of the RTCC superstructure on the M747 semitrailer.

b. The combined height of the superstructure and the M747 semitrailer shall not exceed 156inches.

c. The maximum weight of the M747 semi-trailer, superstructure, and the M911 tractor shall not exceed 125,000 pounds.

d. The weight of the crane carrier shall not exceed 64,000 pounds.

NOTE

Loading crews must arrange the C-5 aircraft for forward loading with Minuteman loading ramps installed. Personnel must use these ramps any time the M747 and superstructure are air transported. Failure to use the Minuteman ramps, or special loading ramp that provides an approach angle of not more than 4.5°, could result in overloading the M747 axles and exceeding aircraft floor limits.

e. Crews loads the M911/M747 by driving into the aircraft so they can position the front axle of the M911 at fuselage station 1950 for flight. Then they load the crane carrier front end (low end) first and position the aft axle of fuselage station 724. It may be necessary to nest the carrier up under the superstructure boom to achieve the axle location. The transportation unit or activity must supply a minimum of 12- by 18-inch sleeper shoring for the crane carrier. Loading crews will stack the shoring between the frame of the carrier next to each wheel (four places) and the aircraft floor.

4-7. Tiedown Data

The following tiedown data (tables 4-1 and 4-2) provides a guide for securing the RTCC aboard C-5 aircraft. The Air Force loadmaster, as his/her discretion, may alter tiedown procedures. The tables give the capacity of tiedown devices, location points on the RTCC, and aircraft attachment fittings.

Table 4-1. Tiedown Data for the RTCC Superstructure on the C-HET System in C-5 Aircraft

Designation	Attach to item
F24	Left front tiedown provision
B24	Right front tiedown provision
E22	Axle No. 1 left end
C22	Axle No. 1 right end
E21	Right front tiedown provision
C21	Left front tiedown provision
E19	Axle No. 1 left end
C19	Axle No. 1 right end
F13	Left front trailer-lifting provision
B13	Right front trailer-lifting provision
F12	Left rear lifting provision
B12	Right rear lifting provision
E12	Towing pintle
C12	Towing pintle
G12	Tiedown shackle left side
A12	Tiedown shackle right side
G11	Tiedown shackle left side
A11	Tiedown shackle right side
G10	Tiedown shackle left side
A10	Tiedown shackle right side
G9	Tiedown shackle left side
A9	Tiedown shackle right side
G8	Tiedown shackle left side
A8	Tiedown shackle right side
G5	Tiedown shackle left side
A5	Tiedown shackle right side
E2	Left rear tiedown provision
C2	Right rear tiedown provision

Notes:
1. Tiedown devices on C-5 aircraft are type MB-2.
2. All tiedown fittings and devices are rated at 25,000 pounds.

Table 4-2. Tiedown Data for the RTCC Carrier in C-5 Aircraft

Designation	Attach to item
G21	Front left hand sling and tiedown eye
A21	Front right hand sling and tiedown eye
E21	Front left hand tow and tiedown lug
C21	Front right hand tow and tiedown lug
G18	Front left hand tiedown eye
G19	Front left hand tiedown eye
A18	Front right hand tiedown eye
A19	Front right hand tiedown eye
G9	Rear left hand sling and tiedown eye
A9	Rear right hand sling and tiedown eye
E9	Rear left hand tow and tiedown lug
C9	Rear right hand tow and tiedown lug
G11	Rear left hand tiedown eye
G12	Rear left hand tiedown eye
A11	Rear right hand tiedown eye
A12	Rear right hand tiedown eye

CHAPTER 5

HIGHWAY TRANSPORTABILITY GUIDANCE

Section I. GENERAL

5-1. Scope
This chapter has highway transportability guidance for movement of the RTCC on semitrailers. It also prescribes the materiels and guidance required to prepare, load, and restrain the RTCC during transport.

5-2. Safety
Besides the safety precautions in chapter 3, movement of the RTCC within CONUS is subject to all safety laws, rules, and regulations applicable to commercial carriers. Overseas movements are governed by theater and local regulations.

5-3. Transport by Semitrailers
Personnel can convey the RTCC by military or commercial lowbed semitrailers of adequate capacity. The M911 tractor combined with the M747 semitrailer is the only military transporter large enough for RTCC transport. The operational configuration of the RTCC loaded on the M747 semitrailer exceeds highway restrictions worldwide. To reduce these restrictions, personnel must disassemble the RTCC into two sections (carrier and superstructure) for loading onto two M747 semitrailers. As an option, shippers may use a commercial semitrailer to carry the nonsectionalized RTCC.

NOTE

Dimension and weight limits for highway transport throughout the United States are published by the American Trucking Association (ATA), Alexandria, Virginia. Legal limitations for foreign areas are identified in *Limits of Motor Vehicle Sizes and Weights, International Road Federation*, 1023 Washington Building, Washington, DC 20005.

Section II. PREPARATION, LOADING, UNLOADING, AND MATERIALS FOR TRANSPORT ON A SEMITRAILER

5-4. Preparation
When required, personnel will remove the RTCC superstructure from the carrier according to appendix A before loading on the M747 semitrailer.

5-5. Loading, Unloading, and Materials
a. Loading the RTCC Superstructure onto a Semitrailer

(1) Crews can place the superstructure in the tiedown position on the semitrailer with a crane of adequate capacity.

(2) Figure 5-1 shows how to adequately restrain the load against forces met at normal speeds and operating conditions. Table 5-1 gives the bill of materials for securing the RTCC superstructure.

b. Loading the RTCC Carrier onto a Semitrailer

(1) Crews can place the carrier in the tiedown position on the semitrailer with a crane of adequate capacity.

(2) Figure 5-2 shows how to adequately restrain the load against forces met at normal speeds and operating conditions. Table 5-2 gives the bill of material for securing the RTCC carrier.

NOTE

Loading crews must cushion and secure floodlights, wipers, mirrors, and fans with tape.

Table 5-1. Bill of Materials for Blocking and Tiedown of the RTCC Superstructure on an M747 Semitrailer (fig 5-1)

Item	Description	Approximate Quantity
Lumber	Douglas Fir, or comparable; straight-grain, free from material defects; Fed Spec MM-L-751:	
	2- x 6-inch	82 linear feet
	2- x 8-inch	200 linear feet
	2- x 10-inch	19 linear feet
	4- x 6-inch	77 linear feet
	4- x 8-inch	73 linear feet
	6- x 8-inch	132 linear feet
Nails	Common, steel; flathead; bright or cement-coated; table X1-b; Fed Spec FF-N-105:	
	20d	372
	30d	100
Cushioning material	Waterproof paper, or suitable material	as required
Thimbles	Standard open type: 5/8-inch	6
Clamps	Wire rope, U-bolt clamps, saddled single grip, forged steel, Crosby heavy duty, or equal; Fed Spec FF-C-450: 5/8-inch	132
Wire rope	6 x 19, IWRC; improved plow steel; preformed, regular lay; table XI; Fed Spec RR-2-410:	
	5/8-inch diameter	377 feet
Bolts	3/4-inch diameter x 3-1/2-inch long	24
Rod	3/4-inch threaded rod x 14-inches long	16
Nuts	3/4-inch standard steel, hex head	56
Washers	3/4-inch flat, standard steel	80

Table 5-2. Bill of Materials for Blocking and Tiedown of the RTCC Carrier on an M747 Semitrailer (fig 5-2)

Item	Description	Approximate Quantity
Lumber	Douglas Fir, or comparable, straight-grain, free of material defects; Fed Spec MM-L-751:	
	2- x 4-inch 11 linear feet	
	2- x 6-inch 43 linear feet	
	2- x 8-inch 80 linear feet	
	4- x 4-inch 19 linear feet	
	4- x 6-inch 9 linear feet	
	4- x 8-inch 38 linear feet	
	6- x 8-inch 62 linear feet	
	8- x 8-inch 9 linear feet	
Nails	Common, steel; flathead; bright or cement-coated; table X1-b; Fed Spec FF-N-105:	
	20d	111
	30d	100
Cushioning material	Waterproof paper, or suitable material	as required
Shackles	Anchor shackles, screw pin, type IV, class 1; Fed Spec RR-C-271: 7/8-inch (1-inch diameter pin); NSN 4030-00-162-9668	2
Thimbles	Standard open type: 5/8-inch	18
Clamps	Wire rope, U-bolt clamps, saddled single grip, forged steel, Crosby heavy duty, or equal; Fed Spec FF-C-450: 5/8-inch	108
Wire rope	6 x 19, IWRC; improved plow steel; preformed, regular lay; table XI, Fed Spec RR-W-410:	
	5/8-inch diameter	264 feet
Bolts	3/4-inch hex head x 3-1/2 inches long	32
Rods	3/4-inch .h steel rod x 17-11/16 inches	16
Nuts	3/4-inch standard steel, hex head	64
Washers	3/4-inch flat, standard steel	96

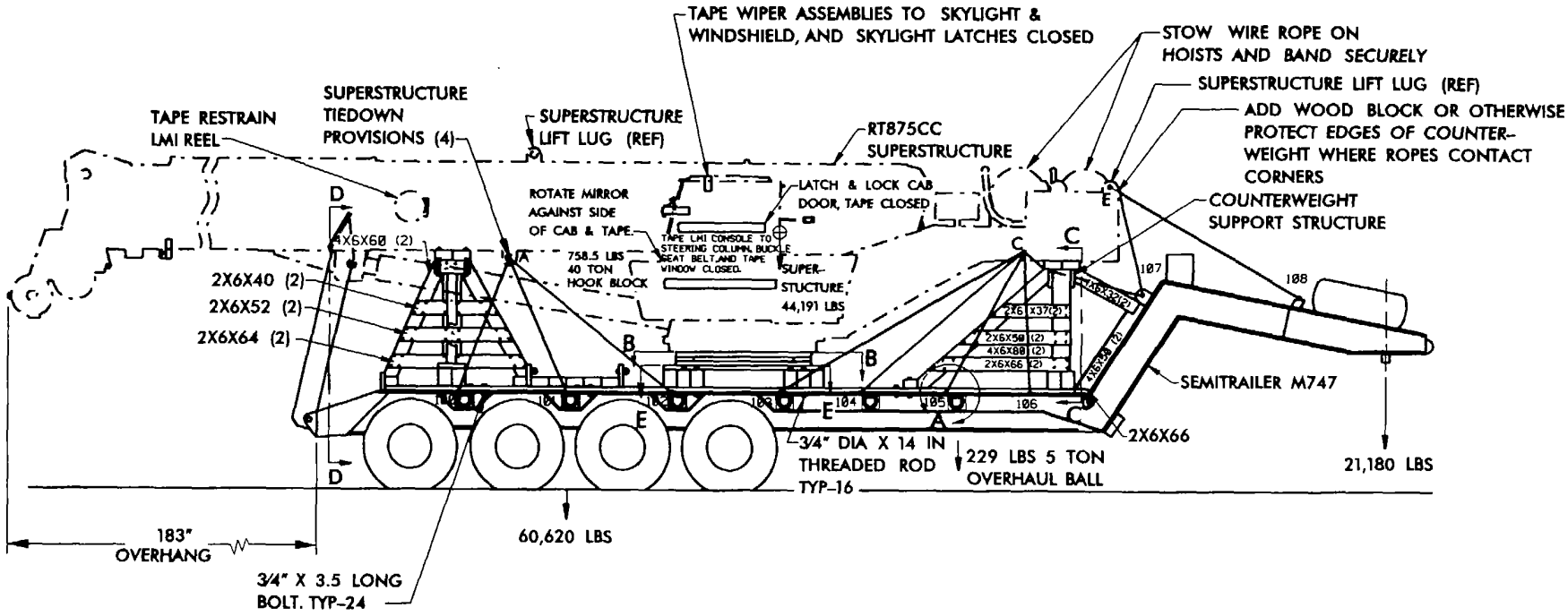


Figure 5-1. Blocking and tiedown of the RTCC superstructure on the M747 semitrailer (sheet 1 of 7).

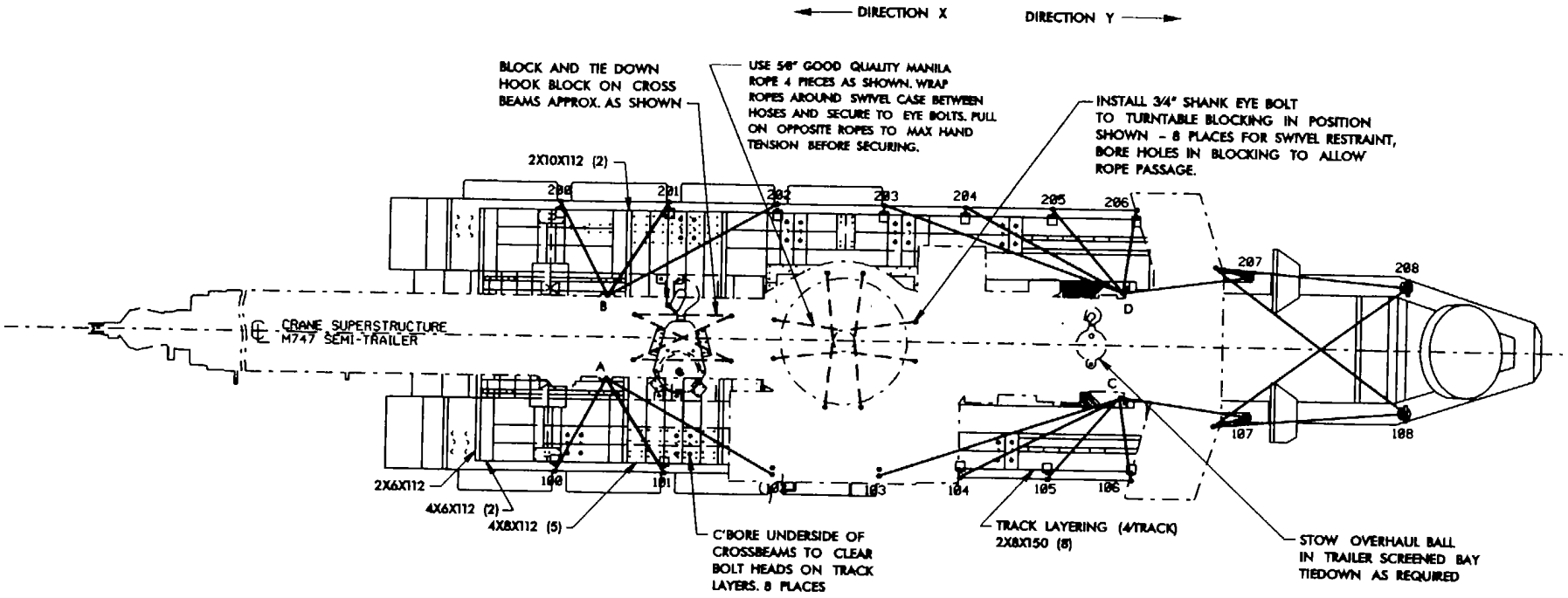


Figure 5-1. Continued (sheet 2 of 7).

FUNCTION	ROUTING
BOOM HOLD DOWN	100 TO A
BOOM HOLD DOWN	200 TO B
BOOM HOLD DOWN	101 TO A
BOOM HOLD DOWN	201 TO B
RESTRAINT, DIR X	102 TO A
RESTRAINT, DIR X	202 TO B
RESTRAINT, DIR Y	103 TO C
RESTRAINT, DIR Y	203 TO D
RESTRAINT, DIR Y	104 TO C
RESTRAINT, DIR Y	204 TO D
CWT HOLD DOWN	105 TO C
CWT HOLD DOWN	205 TO D
CWT HOLD DOWN	106 TO C
CWT HOLD DOWN	206 TO D
CWT HOLD DOWN	107 TO E
CWT HOLD DOWN	207 TO F
RESTRAINT, DIR X	108 TO E
RESTRAINT, DIR X	208 TO F
ANTI-ROTATION	108 TO F
ANTI-ROTATION	208 TO E
RESTRAINT, DIR X	107 TO C
RESTRAINT, DIR X	207 TO D

Figure 5-1. Continued (sheet 3 of 7).

NOTES: (continued)

1. Loading sequence: Install the track layering and crossbeams where indicated. Crossbeams are bolted through layering and metal tracks. Spike unbolted crossbeams to the track layering (see note 7 below). Spike the slide plates to the turntable crossbeams (see view E-E, sheet 7) as shown. Build and bolt the laminated block assembly to the bottom surface of the turntable bearing. Locate the holes in the laminated block by means of a cardboard template made from the hole spacing in the bearing. Bolts, nuts, and washers that were removed during the demount of the superstructure may be used for bolting the superstructure to the laminated block assembly. Lower the superstructure onto the semitrailer so that the laminated blocking contacts the slide plates. Position the load longitudinally as shown, and center it laterally. Support the boom so that the top surface of the boos is level with the trailer. Build and install the counterweight and boom support structures as shown to fit the leveled load. Install the tiedowns as shown (see note 6 below).

2. RT875CC superstructure load consists of components shown, including superstructure, 44,191 pounds; main hook block, 758.5 pounds: and overhaul ball, 229 pounds. This equals 45,178.5 pounds plus blocking and tiedowns.

3. Suspension and fifth wheel loads shown are from actual weighing of loaded RTCC superstructure on MS52162 semitrailer. Weights may vary slightly because of variations in blocking materials and components.

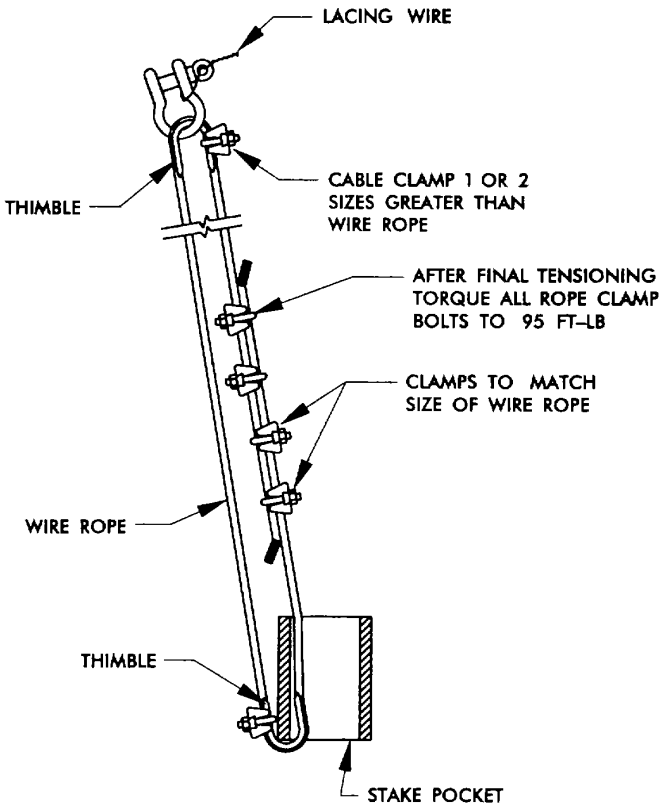
4. Cushion and secure floodlights, wipers, mirrors, and fans with tape.

5. See superstructure demount procedure in appendix A for disassembly.

6. Each tiedown shown is a single length of .62-inch diameter wire rope looped through a trailer pocket or ring and crane lug. Ends are joined as shown in detail A. Tension all ropes to 3,000 pounds and torque rope clamp nuts to 95-foot-pounds.

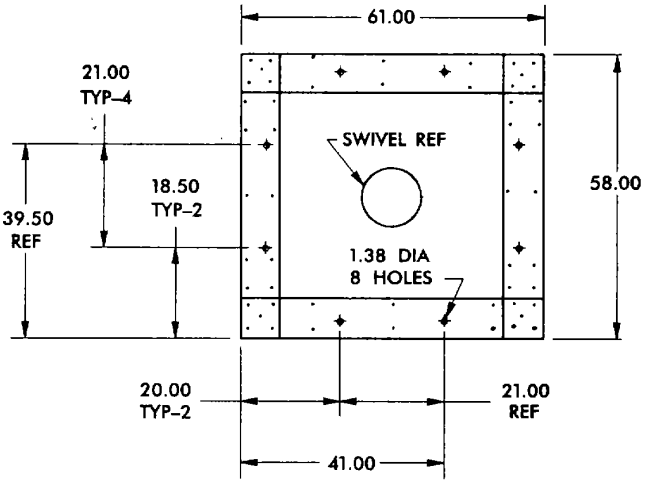
7. Wood joints in structures, planking, beams, and supports, where bolting is not specified, shall be assembled using nails as follows: Nail through turntable block laminations using sixteen 20d nails. Nail slide plate members through into crossbeams using 20d nails. Where toenailing is required to assemble 4 by 4, 4 by 6, 4 by 8, and 6 by 8 beams, stakes, blocks, or to join beams or blocks or stakes to planking or crossbeams, use 30d nails and predrill top member of joint to .156-inch diameter.

Figure 5-1. Continued (sheet 4 of 7).



DETAIL A

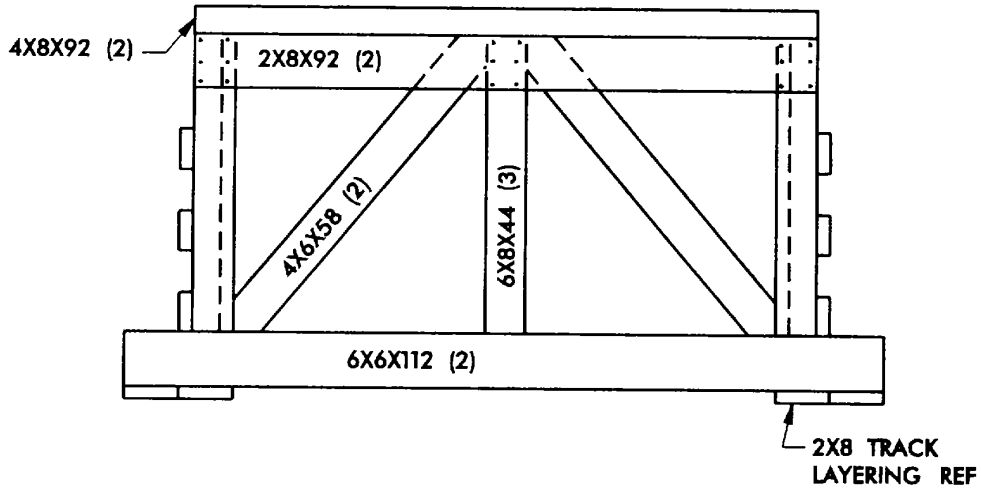
TYPICAL SECTION THRU TRACK EDGE & STAKE POCKET



VIEW B-B

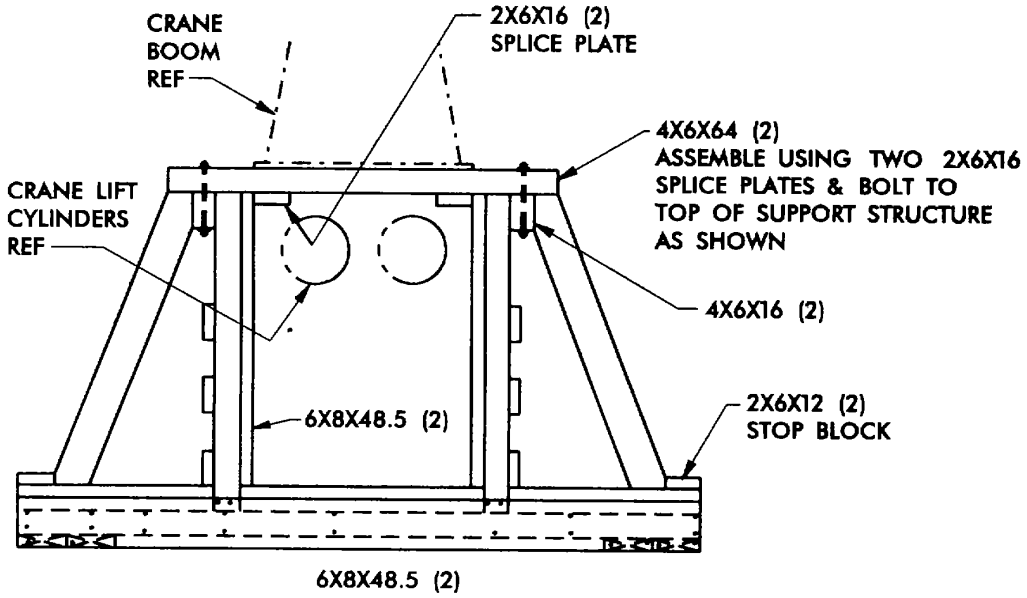
TURNTABLE MOUNTING BLOCK CONSTRUCTION THREE LAYERS THICK. SEE DETAIL OF LAMINATED TURNTABLE BLOCKING FOR ASSEMBLY

Figure 5-1. Continued (sheet 5 of 7).



VIEW C–C

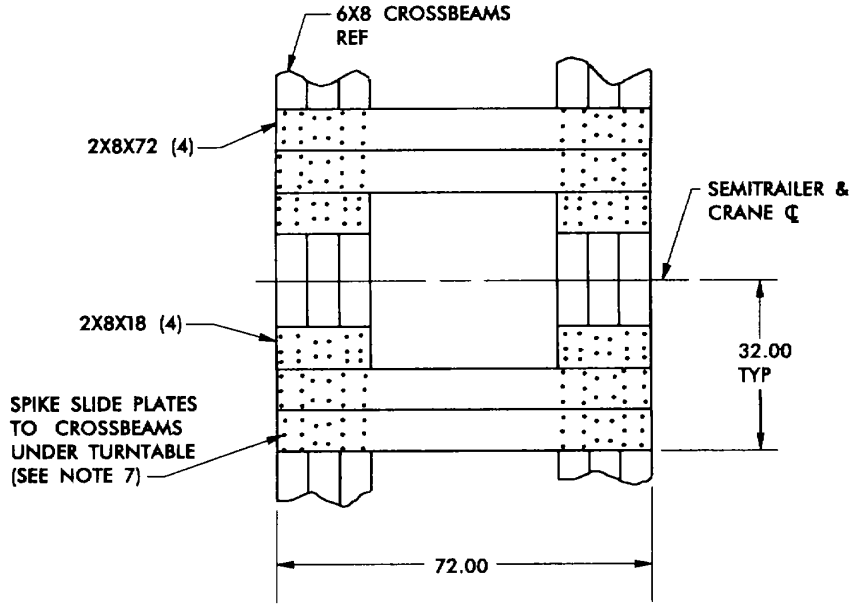
COUNTERWEIGHT SUPPORT
STRUCTURE DETAIL



VIEW D–D

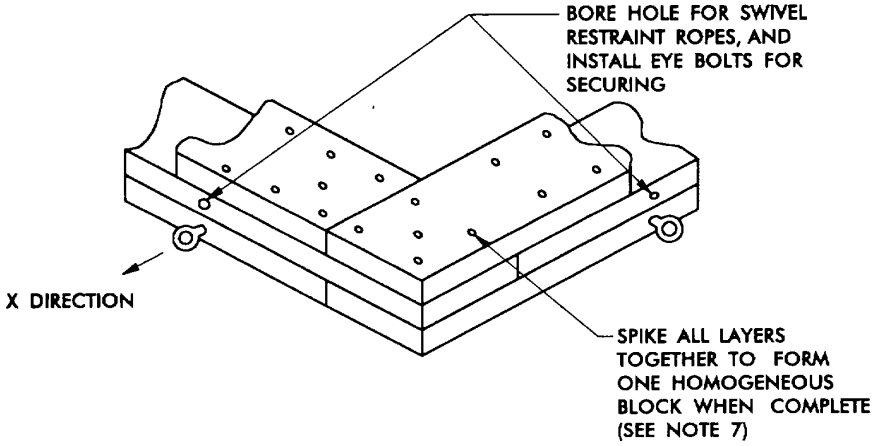
BOOM SUPPORT STRUCTURE
DETAIL

Figure 5-1. Continued (sheet 6 of 7).



VIEW E–E

SLIDE PLATE DETAIL



DETAIL OF LAMINATED TURNTABLE BLOCKING SHOWING BLOCK BUILD UP. SEE SIDE & PLAN VIEWS, AND SECTION B–B

REQUIRED LUMBER

2X8X61 – 4	2X8X45 – 2
2X8X58 – 2	2X8X42 – 2

Figure 5-1. Continued (sheet 7 of 7).

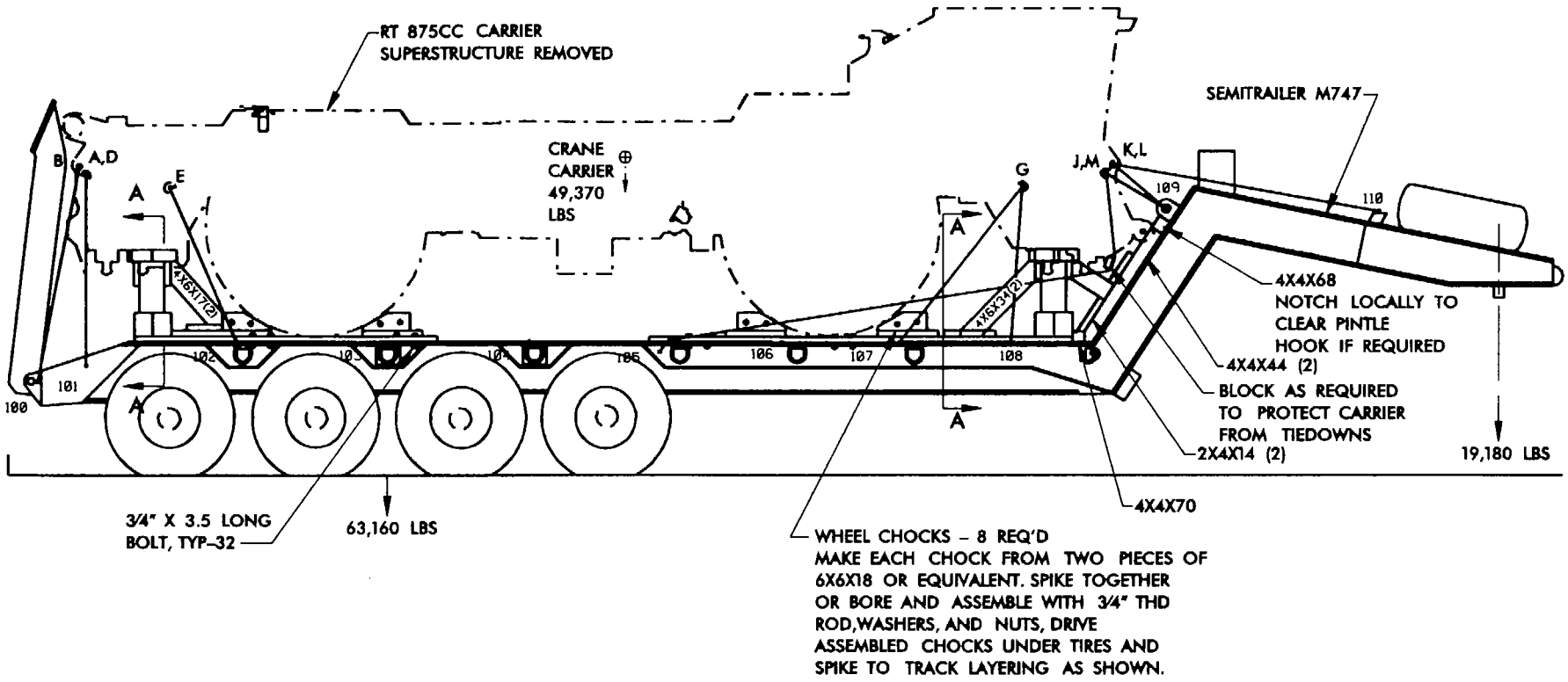


Figure 5-2. Blocking and tiedown of the RTCC carrier on the M747 semitrailer (sheet 1 of 5).

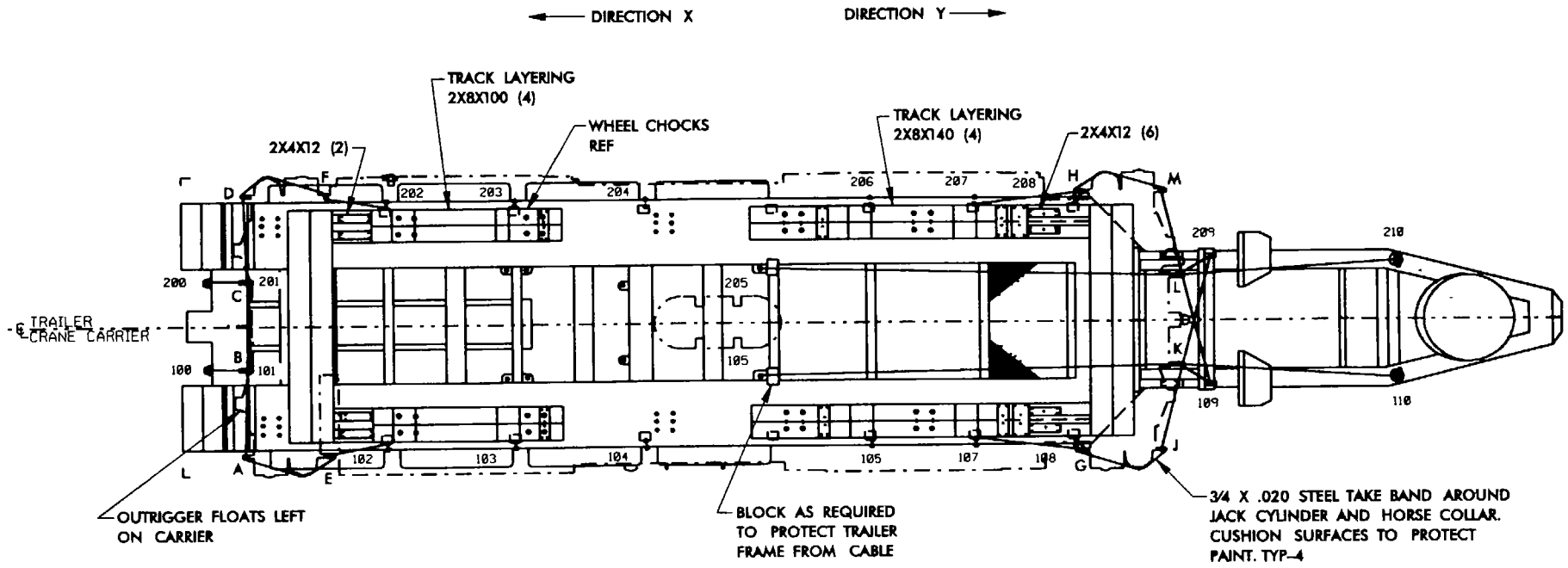


Figure 5-2. Continued (sheet 2 of 5).

FUNCTION	ROUTING
SIDE RESTRAINT	201 TO A
HOLD DOWN	100 TO B
HOLD DOWN	200 TO C
SIDE RESTRAINT	101 TO D
RESTRAINT, DIR X	102 TO E
RESTRAINT, DIR X	202 TO F
RESTRAINT, DIR Y	105 TO K
RESTRAINT, DIR Y	205 TO L
RESTRAINT, DIR Y	107 TO G
RESTRAINT, DIR Y	207 TO H
HOLD DOWN	108 TO G
HOLD DOWN	208 TO H
SIDE RESTRAINT	209 TO J
SIDE RESTRAINT	109 TO M
RESTRAINT, DIR X	109 TO K
RESTRAINT, DIR X	209 TO L
RESTRAINT, DIR X	110 TO K
RESTRAINT, DIR X	210 TO L

Figure 5-2. Continued (sheet 3 of 5).

NOTES:

1. Loading sequence: Install the track layering, crossbeams, and frame supports. Lower the crane carrier to contact with the frame supports. Center the load laterally and position longitudinally as shown. The wheels of the carrier should just touch the track layering. If not, nail shims to the top of the frame supports at either end as required. First apply tiedowns 2, 3, 5, 6, 11, 12, 15, and 16 to seat the carrier against the O/R box supports, then apply other restraints and chocks.

2. RTS75CC carrier load consisting of components below the turntable bearing equals 49,370 pounds, plus blocking and tiedowns .

3. Suspension and fifth wheel loads are from actual weighing of loaded RTCC carrier on MS52162 semitrailer. Weights may vary slightly because of variations in blocking materials and components.

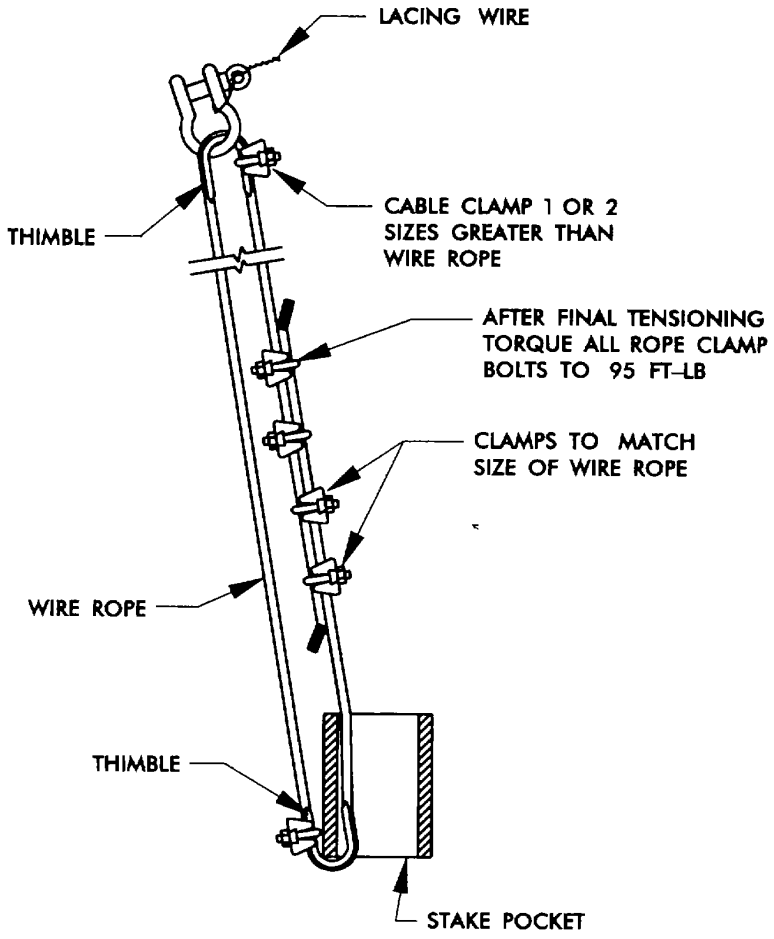
4. Each tiedown shown is a single length of .62-inch diameter wire rope looped through a semitrailer stake pocket or ring and carrier attachment point and are joined as shown in detail A. Tension all ropes to 3,000 pounds and torque rope clamp nuts to 95-foot-pounds.

5. Latch and tape closed all hinged openings, engine access doors, tool compartment, and battery box. Cushion mirrors and tape against frame.

6. Set parking brake.

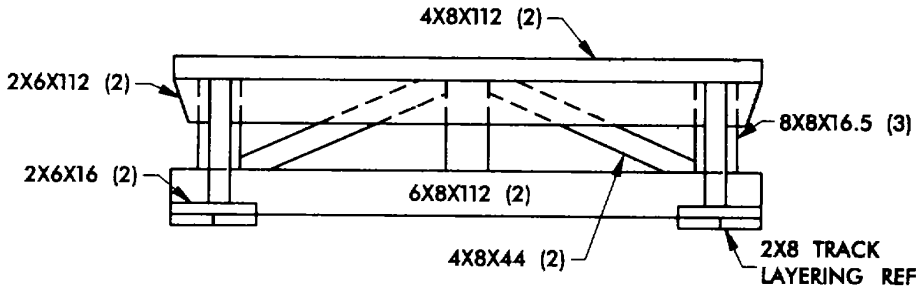
7. Wood joints in structures, planking, beams, and supports, where bolting is not specified, shall be assembled using nails as follows: Nail through wheel chock bottom plates into track layering using sixteen 20d nails. Nail 2-inch-thick blocking and bracing with 20d nails. Where toenailing is required to assemble 4 by 4, 4 by 6, 4 by 8, and 6 by 8 beans, blocks or to join beams, to join beams or blocks to planking, bracing, or track layering, use 30d nails and predrill top member of joint to .156-inch diameter.

Figure 5-2. Continued (sheet 4 of 5).



DETAIL A

TYPICAL SECTION THRU TRACK
EDGE & STAKE POCKET



VIEW A-A

FRAME SUPPORT STRUCTURE
TYPICAL 2 PLACES

Figure 5-2. Continued (sheet 5 of 5).

CHAPTER 6

MARINE AND TERMINAL TRANSPORTABILITY GUIDANCE

Section I. GENERAL

6-1. Scope
This chapter gives the guidance for transporting the RTCC by the marine mode. It also prescribes the materials required to prepare, load, tiedown, and restrain the crane during transport.

6-2. Safety
Besides the safety precautions in chapter 3, personnel should take the following precautions:

a. Inspect all vessel equipment and gear prior to use.

b. Inspect all slings and other items used in loading and offloading operations for safety and adequate capacity.

c. Inspect lifting rings and shackles on each piece of equipment to ensure that they are complete and not damaged.

d. Ensure that all lifts have at least two tag lines attached to control the swing of each item while suspended.

NOTE

When vehicles are loaded onto vessels that are adequately ventilated by power blowers, such as roll-on/roll-off (RORO) vessels, the vehicle fuel tank does not have to be drained.

NOTE

The methods described in this chapter for lifting and securing items of equipment are suggested procedures. Other methods of handling and stowing may be used provided they ensure safe delivery.

Section II. LOADING AND SECURING

6-3. Transportability
Personnel can transport the operational configuration of the RTCC on the LARC LX and larger vessels.

6-4. General Rules for Stowage
Whenever possible, the vehicles should receive the protection of below-deck storage on cargo ships and RORO vessels. Good stowage is accomplished by placing vehicles fore and aft as close together as practical, with 4- to 6-inch spacing between outer vehicles and sweatboards. If not shipped on the vehicle, breakable parts, spare parts, and on equipment materiel (OEM) should be protected and properly identified as to location or disposition during shipment. Vehicles in the ship's hold should have wheels blocked in front, rear, and on both sides so that vehicles cannot move in any direction. Individual wheel blocks should be braced to bulkheads, stanchions, and other wheel blocks. All vehicles should be lashed with wire ropes or chains to nearby bulkheads, stanchions, or pad eyes.

a. Lifting. The RTCC operational configuration has four lifting provisions: two front and two rear on the carrier frame. Figure 6-1 shows the procedure for lifting the RTCC operational configuration.

b. Loading. Crews can load the RTCC operational configuration on most RORO ships, selected breakbulk vessels, and LARC LX and larger vessels of the US Army LOTS lighterage fleet. The RTCC 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 to load the RTCC. The RTCC can load under its own power onto RORO vessels.

NOTE

It is recommended that the ship's loading characteristics pamphlet (SLCP) be consulted for actual clearances and allowable deck loading, as values may vary between decks making some areas unsuitable for carriage.

(1) *Cargo Vessels*. Typical tiedown and blocking details for securing the RTCC is shown in figure 6-2. Materials and their applications are shown in tables 6-1 and 6-2.

(2) *Special Design Vessels*. All RORO vessels, landing ships, and cargo vessels are equipped with patented lashing gear and pre-positioned fittings in the deck. With proper use of patented lashing gear, blocking and bracing are not required.

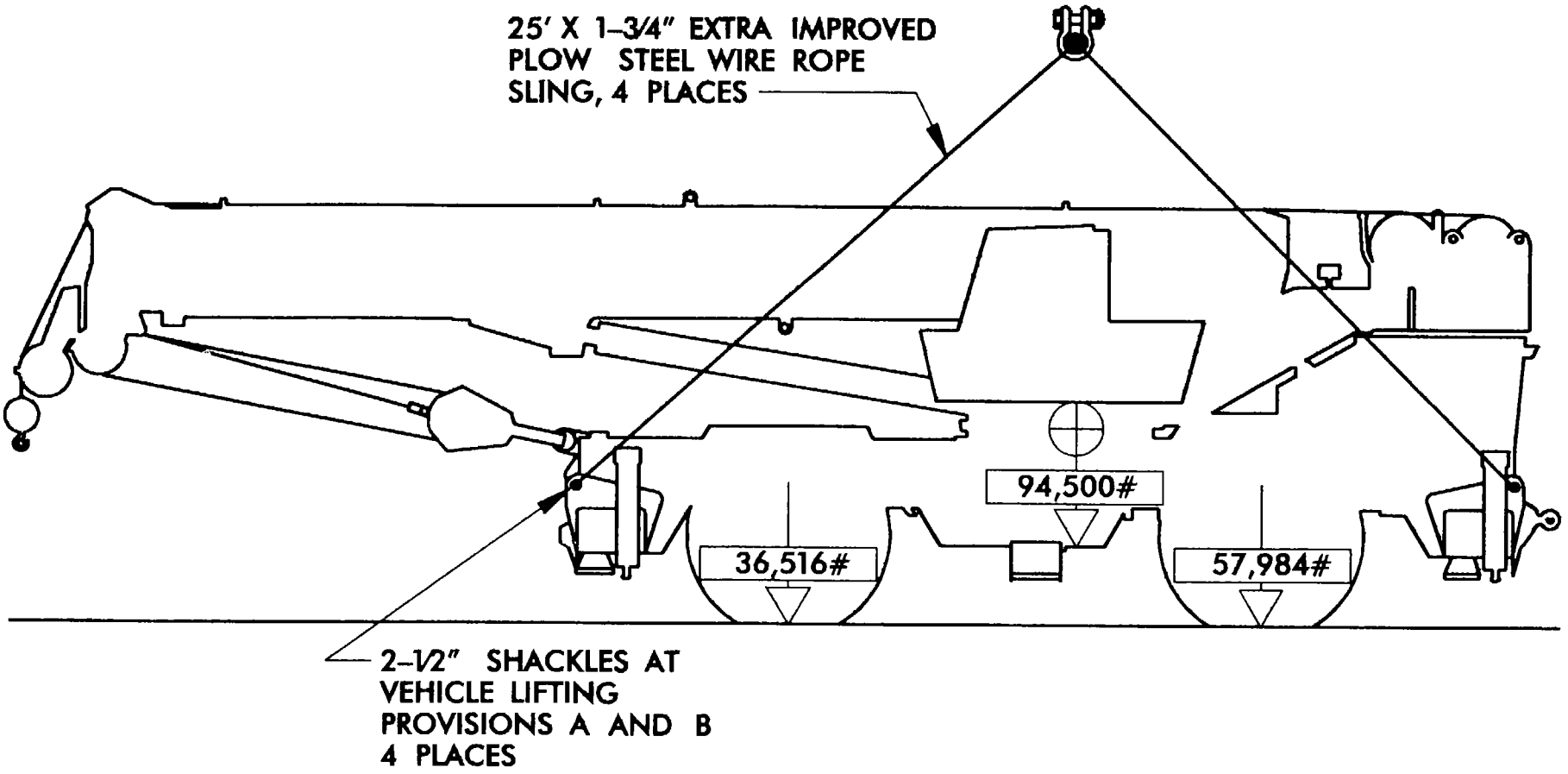
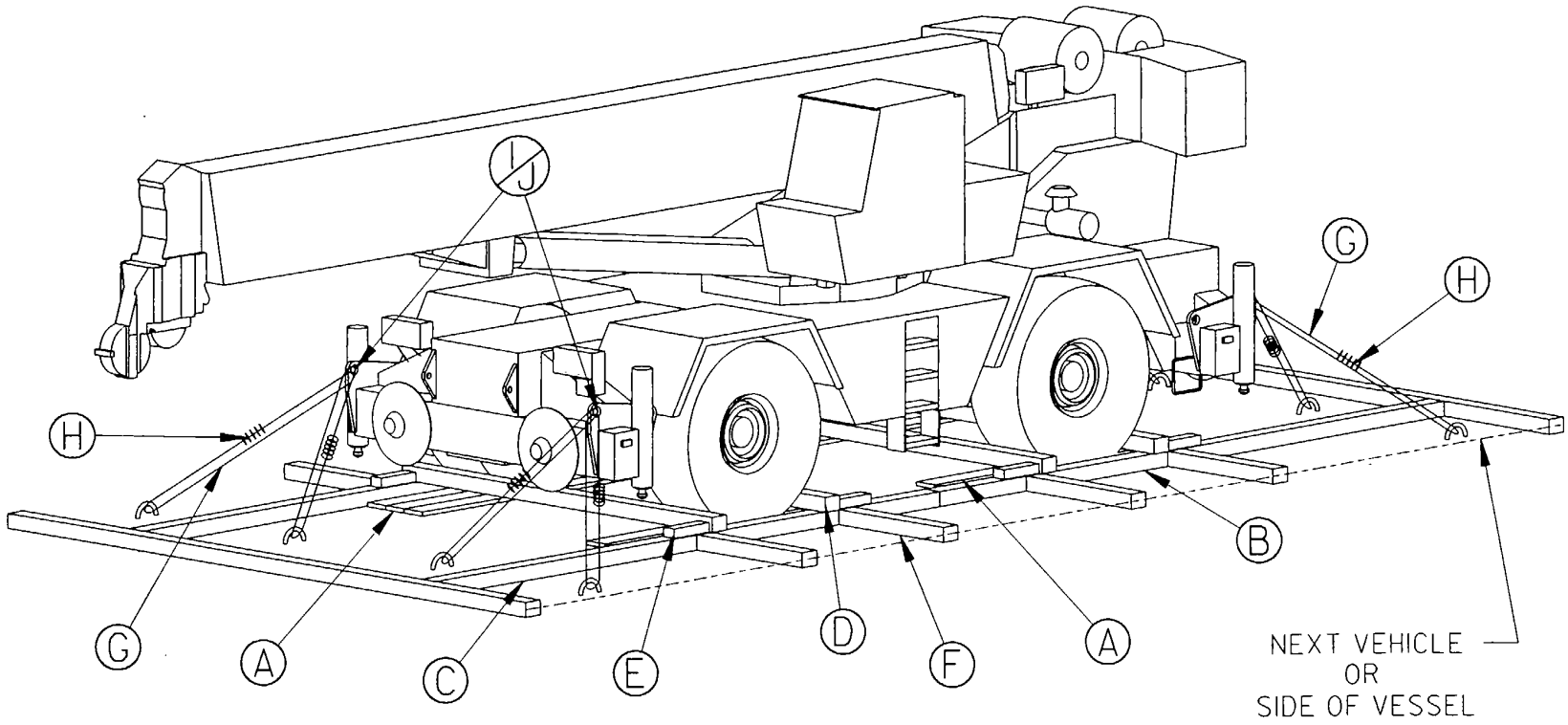


Figure 6-1. Lifting diagram for the RTCC operational configuration.



NOTE: Blocking and bracing, A - F, is not required when the ship is equipped with adequate deck tiedown fittings.

Figure 6-2. Typical tiedown and blocking details of the RTCC in hold of general-cargo vessel.

(3) *Loading Ships, Landing Craft, and Amphibious Vehicles*. When the RTCC is to be moved long distances or through rough waters, tiedowns must be used. Most vessels are equipped with turnbuckles with a sheep's foot on one end that fits into a deck cloverleaf. A suitable substitute may be used where turnbuckles are not provided.

(4) *SEABEE Barges*. Requirements for securing the RTCC aboard general-cargo and barge-type vessels are essentially the same. Barge stability is noticeably affected by loading heavy items. The RTCC should be loaded symmetrically near the center line of the barge in a manner to counterbalance variations in centers of gravity. The RTCC may be placed alternately head to tail in any direction to achieve proper balance.

Table 6-1. Bill of Materials for Blocking and Tiedown of the RTCC Operational Configuration in General Cargo Vessels (fig 6-2)

Item	Description	Approximate Quantity
Lumber	Douglas Fir, or comparable; straight-grain, free from material defects; Fed Spec MM-L-751:	
	2- x 10-inch	120 linear feet
	4- x 6-inch	12 linear feet
	6- x 8-inch	140 linear feet
Nails	Common, steel; flathead; bright or cement coated, table X1-b, Fed Spec FF-N-105:	
	40d	80
Wire rope	6 by 19, IWRC; improved plow steel; preformed, regular lay; table XI, Fed Spec RR-W-410:	
	5/8-inch	220 feet
Clamps	Wire rope, U-bolt clamps, saddled single grip, forged steel, Crosby heavy duty, or equal; Fed Spec FF-C-450:	
	5/8-inch	32
	3/4-inch	8
Thimbles	Standard, open type: 5/8-inch	8
Shackle	Anchor shackle, screw pin, type IV, class 1; Fed Spec RR-C-271: 1-1/8-inch (1-1/4-inch diameter pin); NSN 4030-00-185-0487	1

Table 6-2. Application of Materials for Blocking and Tiedown of the RTCC Operational Configuration in General Cargo Vessels (fig 6-2)

Item	No. Required	Application
A	12	Lumber, 2- x 10- x 120-inch. Pre-position on vessel hold deck so that three pieces will be under each wheel.
B	2	Side blocking for rear wheels, 6- x 8-inch x 260-inch lumber. Place at sides of rear wheels.
C	2	Side blocking for front wheels, 6- x 8- x 260-inch lumber. Place at sides of front wheels.
D	4	End blocking 6- x 8- x 160-inch lumber. Locate on top of items B and C. Place one in front and rear of front set of wheels and in front and rear of rear set of wheels. Toenail each end to B and C with four 40d nails.
E	8	Backup cleats. Each consists of 4- x 6- x 18-inch lumber. Place on top of side blocking (items B and C) against item D. Nail to side blocking with four 40d nails.
F	as required	Bracing. Each consists of 6- x 8- x length-cut-to-suit lumber. Brace as required against adjacent vehicle, cargo, or side of vessel bulkhead, as appropriate. Secure end of each piece to adjacent blocking by toenailing with four 40d nails. (Lumber and nails for this requirement are not included in table 6-1)
G	8	Wire rope, 5/8-inch. Form two loops from each vehicle tiedown provision to appropriate deck pad eye.

Table 6-2. Continued

Item	No. Required	Application
H	32	Clamps, 5/8-inch. Secure the ends of each wire rope at the overlapped area with four clamps, spacing the clamps 3-1/2 inches apart, with a minimum of 6 inches from the ends of the rope.
I	8	Thimbles, 5/8-inch. Place one at each vehicle tiedown provision where the wire rope passes through.
J	8	Clamps, 3/4-inch. Use to secure thimble to wire rope.

CHAPTER 7

RAIL TRANSPORTABILITY GUIDANCE

Section I. GENERAL

7-1. Scope
This chapter provides rail transportability guidance for movement of the RTCC. It covers significant technical and physical characteristics and safety precautions. It also prescribes the materials and guidance to prepare, load, tie down, and unload the RTCC.

7-2. Maximum Utilization of Railcars
Additional cargo, as approved by the activity offering the equipment for transport, may be transported with the system.

Section II. TRANSPORT ON CONUS RAILROADS

7-3. General
The RTCC, whether operational or disassembled, is rail transportable with major restrictions. Disassembling the superstructure from the carrier does not allow unrestricted rail transport, but does minimize restrictions. When loaded on a standard 50-inch-high flatcar, the RTCC exceeds both the Association of American Railroads (AAR) and Gabarit International de Chargement (GIC) rail transport envelopes for CONUS and OCONUS, respectively.

7-4. Preparation
When required, personnel will remove the RTCC superstructure from the carrier according to the appendix A before loading on the railcar.

7-5. Loading, Unloading, and Materials
a. Loading the RTCC Superstructure on Wood-Deck Flatcars

(1) Transporters may place the superstructure in the tiedown position on the railcar with a crane of adequate capacity.

(2) Figure 7-1 shows blocking and tiedown details. Table 7-1 gives the bill of materials for securing the RTCC superstructure.

b. Loading the RTCC Carrier on Wood-Deck Flatcars

(1) Transporters may place the RTCC carrier in the tiedown position on the railcar with a crane of adequate capacity.

(2) Figure 7-2 shows blocking and tiedown details. Table 7-2 gives the bill of materials for the RTCC carrier.

CAUTION Do not allow the crane or carrier to exceed 3 miles per hour (walking speed) during loading or unloading operations.

c. Loading the RTCC Operational Configuration on Wood-Deck Flatcars

(1) Transporters may drive the RTCC operational configuration onto the railcar, if a suitable ramp is available. They may also place the operational configuration in the tiedown position on the railcar with a crane of adequate capacity.

(2) Figure 7-3 shows blocking and tiedown details. Table 7-3 gives the bill of materials for securing the RTCC operational configuration. Figure 7-1 (sheet 5, detail A) shows rope anchor through stake pocket.

NOTE

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

CAUTION

Do not allow the crane or carrier to exceed 3 miles per hour (walking speed) during loading or unloading operations.

CAUTION

When loading the RTCC operational configuration, crews must ensure that the boom is horizontal, fully retracted, and the swing lock engaged. They must also ensure that the outriggers are fully retracted into housings and secured in place with steel tape.

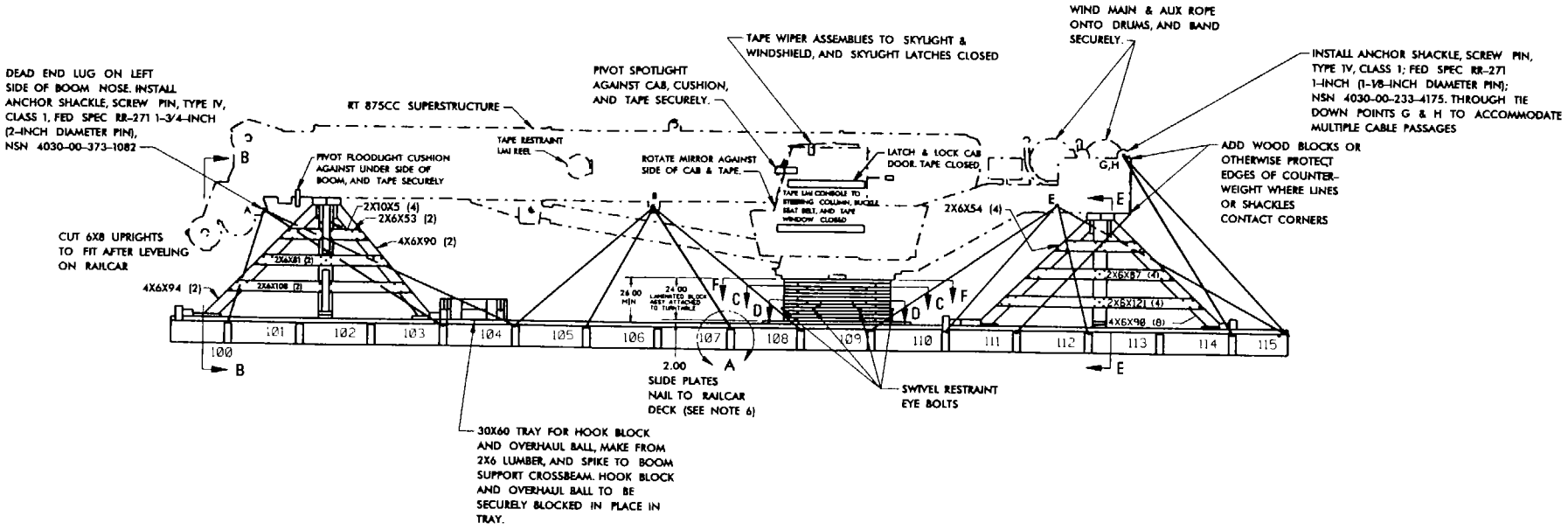


Figure 7-1. Blocking and tiedown of the RTCC superstructure on a wood-deck flatcar (sheet 1 of 8).

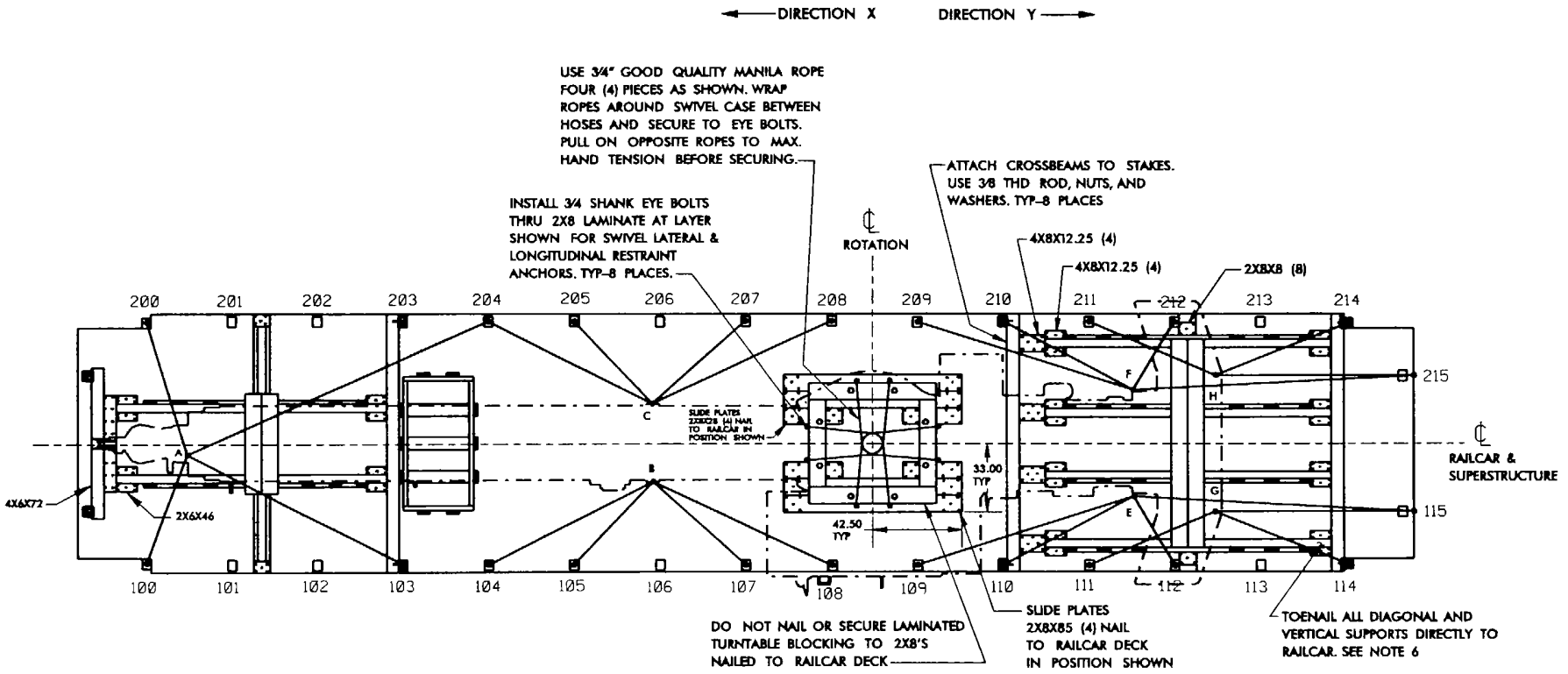


Figure 7-1. Continued (sheet 2 of 8).

FUNCTIQN	ROUTING
BOOM HOLD DOWN	100 TO A
BOOM HOLD DOWN	200 TO A
RESTRAINT. DIR. X	103 TO A
RESTRAINT, DIR. X	204 TO A
RESTRAINT, DIR. Y	104 TO B
RESTRAINT, DIR. Y	204 TO C
BOOM HOLD DOWN	105 TO B
BOOM HOLD DOWN	205 TO C
BOOM HOLD DOWN	107 TO B
BOOM HOLD DOWN	207 TO C
RESTRAINT, DIR. X	108 TO B
RESTRAINT, DIR. X	208 TO C
RESTRAINT, DIR. Y	109 TO E
RESTRAINT, DIR. Y	209 TO F
RESTRAINT, DIR. Y.	110 TO E
RESTRAINT, DIR. Y	210 TO F
CAT HOLD DOWN	112 TO E
CAT HOLD DOWN	212 TO F
RESTRAINT, DIR. Y	111 TO G.
RESTRAINT, DIR. Y	211 TO H
RESTRAINT, DIR. X	115 TO E
RESTRAINT, DIR. X	215 TO F
RESTRAINT, DIR. X	114 TO G
RESTRAINT, DIR. X	214 TO H
RESTRAINT, DIR. X	115 TO G
RESTRAINT, DIR. X	215 TO H
RESTRAINT, DIR. X	115 TO E
RESTRAINT, DIR. X	215 TO F
ANTI-ROTATION	114 TO H
ANTI-ROTATION	214 TO G

Figure 7-1. Continued (sheet 3 of 8).

NOTES:

1. Build and bolt the laminated block assembly to the bottom surface of the turntable bearing. Locate the holes in the laminated block by means of a cardboard template of the hole spacing in the bearing. Bolts, nuts and washers removed during demount of the superstructure may be used for bolting the superstructure to the laminated block assembly. Install the stakes, crossbeams, and slide plates to the railcar deck. Lower the superstructure onto the railcar so that the laminated blocking contacts the slide plates. Position the load longitudinally as shown, and center it laterally. Support the boom so that the top surface of the boom is level with the railcar deck. Build and install the counterweight and boom support structures as shown to fit the leveled load. Install the tiedowns as shown (see note 5 below).

2. Engage positive swing lock.

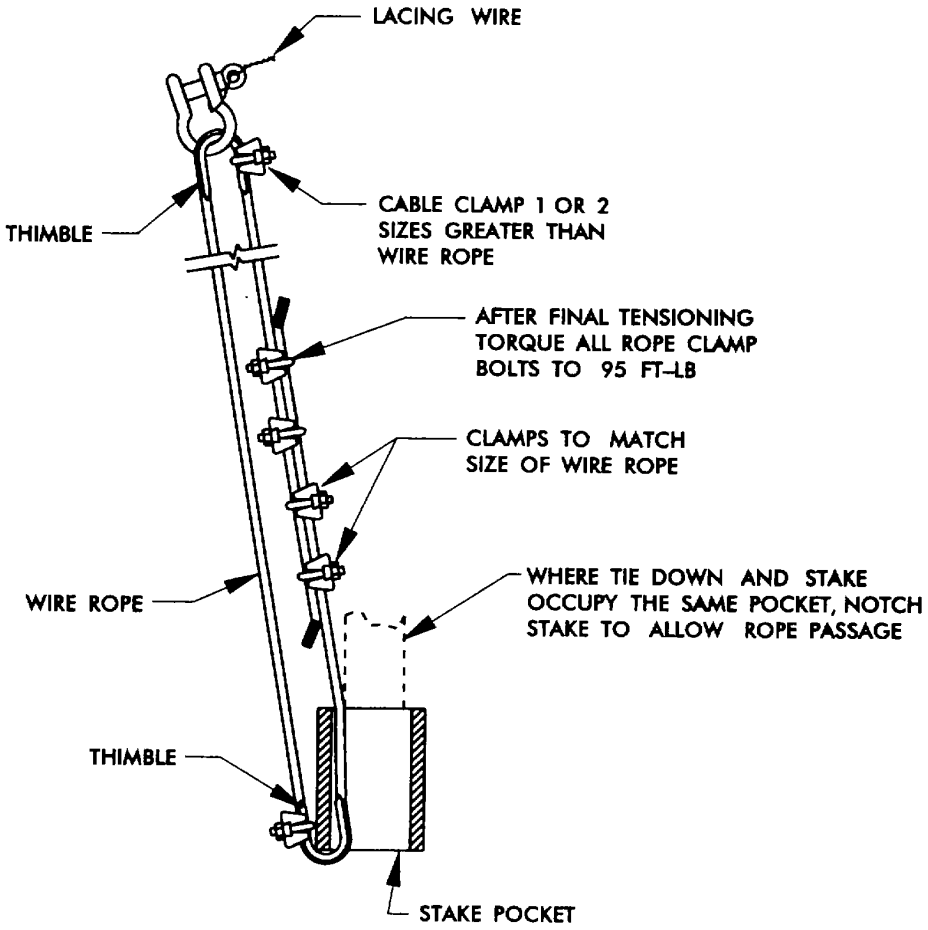
3. Latch and tape closed all hinged and sliding openings: cab door, skylight, cab sliding glass, and valve compartment lid.

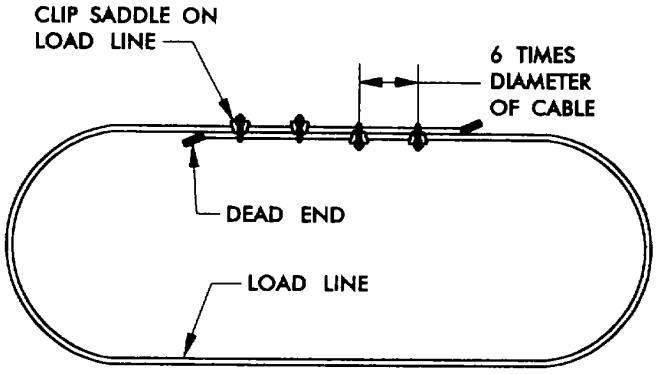
4. Shallow notches are permitted in braces to allow passage of tiedown cables.

5. Each tiedown shown is a single length of .62-inchdiameter wire rope looped through a railcar stake pocket and crane lug. Ends are joined as shown in detail A. Tension all ropes to 3,000 pounds and torque rope clamp nuts to 95-Eoot-pounds.

6. Wood joints in structures, planking, beams and supports, shall be assembled using nails as follows: Nail through turntable block laminations using sixteen 20d nails. Nail slide plate members through into railcar deck using 20d nails. Where toenailing is required to assemble 4 by 4, 4 by 6, 4 by 8, and 6 by 8 beams, stakes, blocks, or to join beams or blocks or stakes to planking, bracing, railcar deck, and so forth, use 30d nails and pre-drill top members of joint to .156-inch diameter.

Figure 7-1. Continued (sheet 4 of 8).



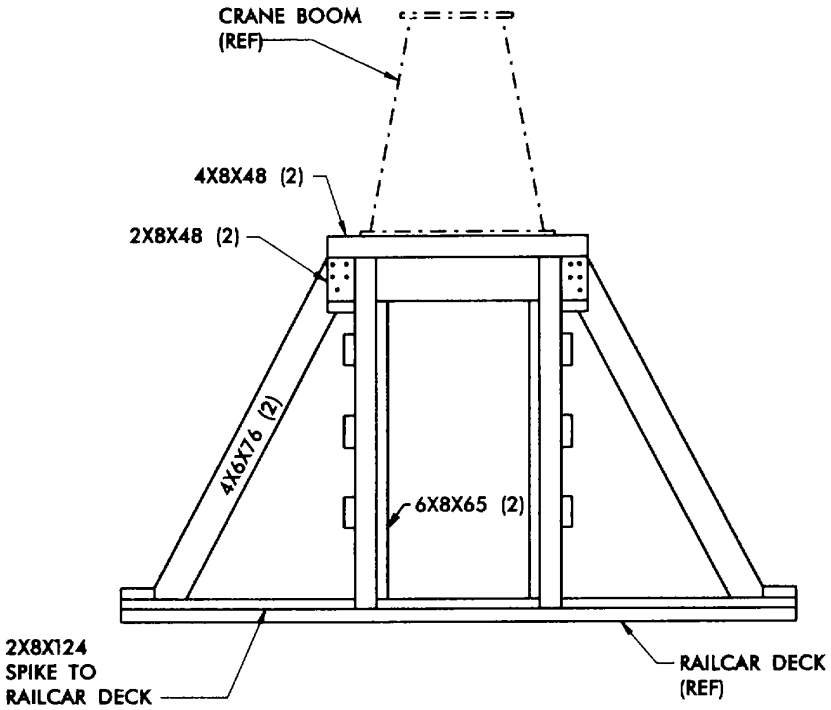


COMPLETE LOOP

DETAIL A

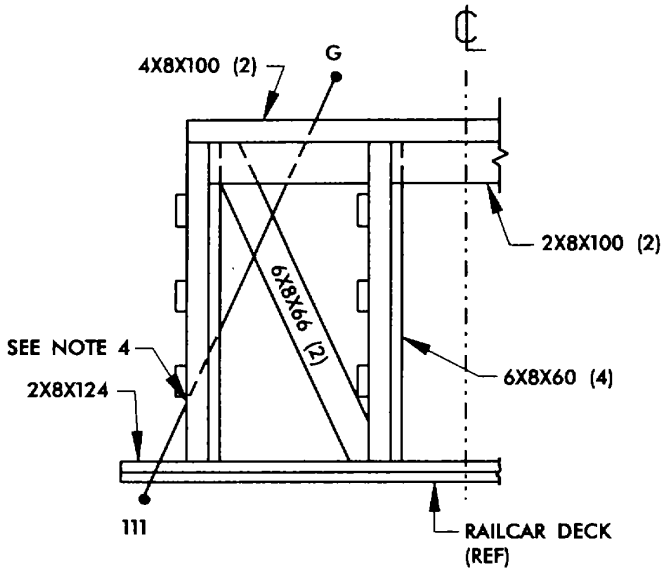
SHOWING ROPE ANCHOR THRU STAKE POCKET

Figure 7-1. Continued (sheet 5 of 8).



VIEW B–B

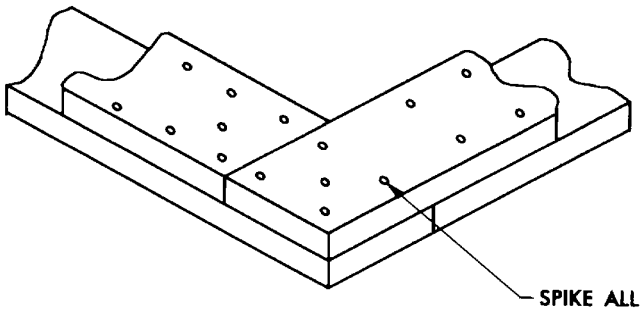
BOOM SUPPORT CONSTRUCTION
AND NOSE TIE DOWN



VIEW E–E

VIEW SYMMETRICAL ABOUT ℄

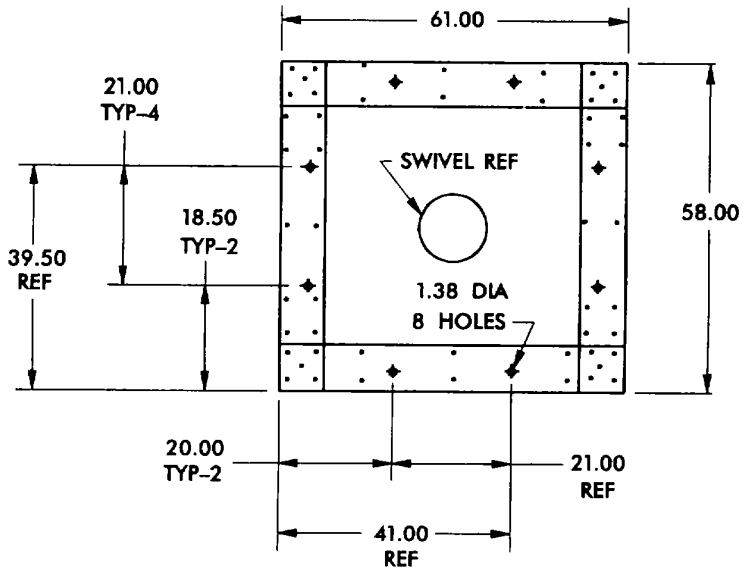
Figure 7-1. Continued (sheet 6 of 8).



DETAIL OF LAMINATED TURNTABLE BLOCKING
SHOWING BLOCK BUILD UP. SEE SIDE & PLAN
VIEWS, SECTIONS C–C & D–D, AND VIEW F–F
FOR DETAILS OF BLOCK CONSTRUCTION

REQUIRED LUMBER

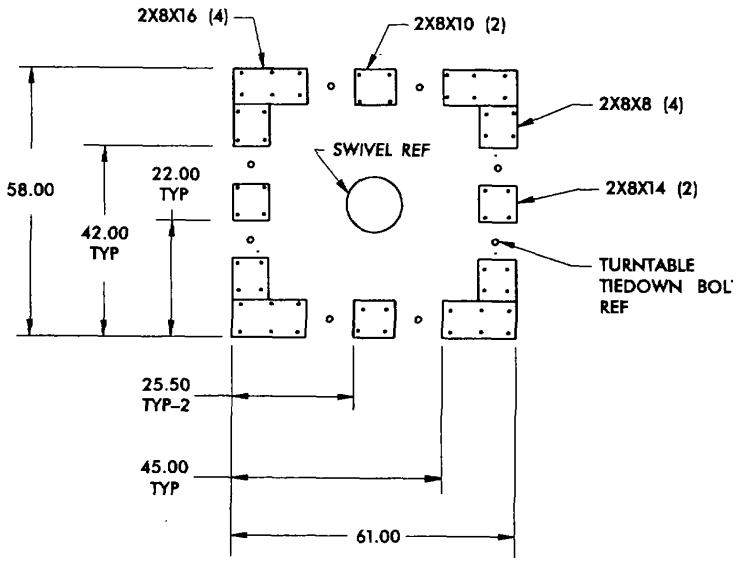
2X8X61 – 20	2X8X45 – 22
2X8X58 – 22	2X8X42 – 20



VIEW F–F

TURNTABLE MOUNTING PLATE CONSTRUCTION
TYPICAL TOP TWO (2) LAYERS

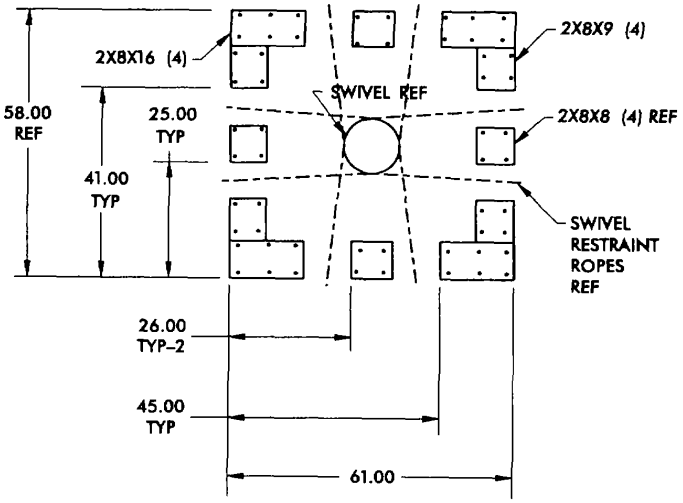
Figure 7-1. Continued (sheet 7 of 8)



VIEW C–C

SPACER BLOCK CONSTRUCTION
FOR TURNTABLE BOLT INSTL.

LAMINATES BELOW THIS SECTION NOT
SHOWN FOR CLARITY



VIEW D–D

SPACER BLOCK CONSTRUCTION
FOR SWIVEL RESTRAINT PASSAGE

LAMINATES BELOW THIS SECTION NOT
SHOWN FOR CLARITY

Figure 7-1. Continued (sheet 8 of 8).

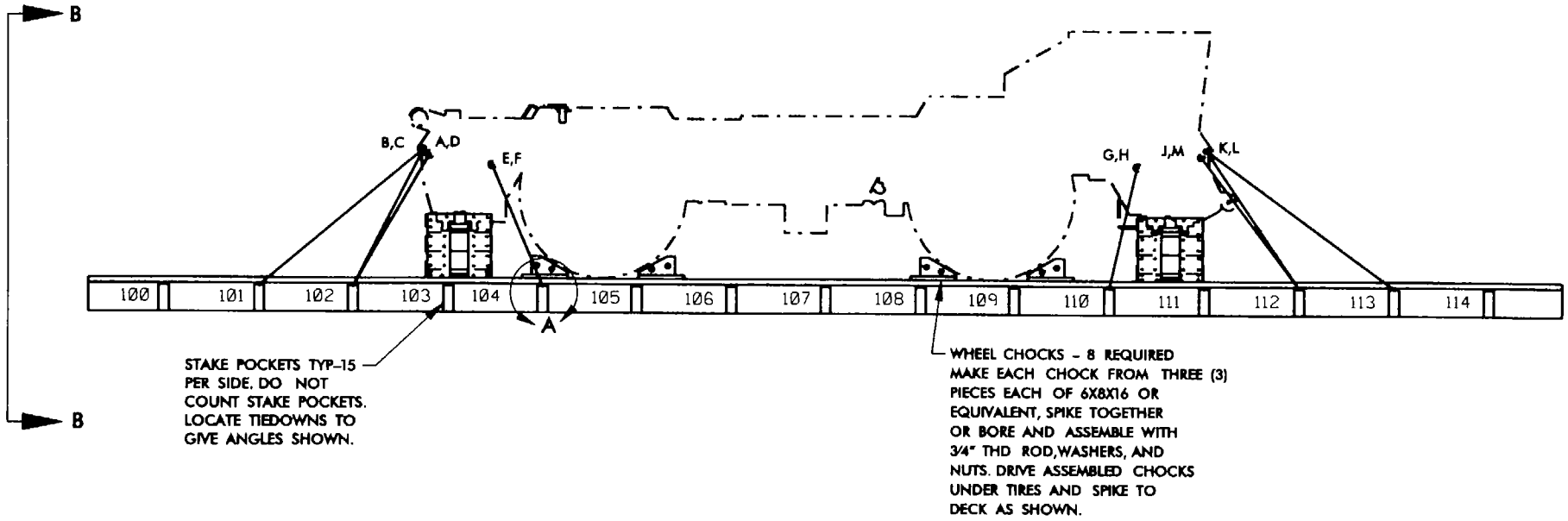


Figure 7-2. Blocking and tiedown of the RTCC carrier on a wood-deck flatcar (sheet 1 of 6).

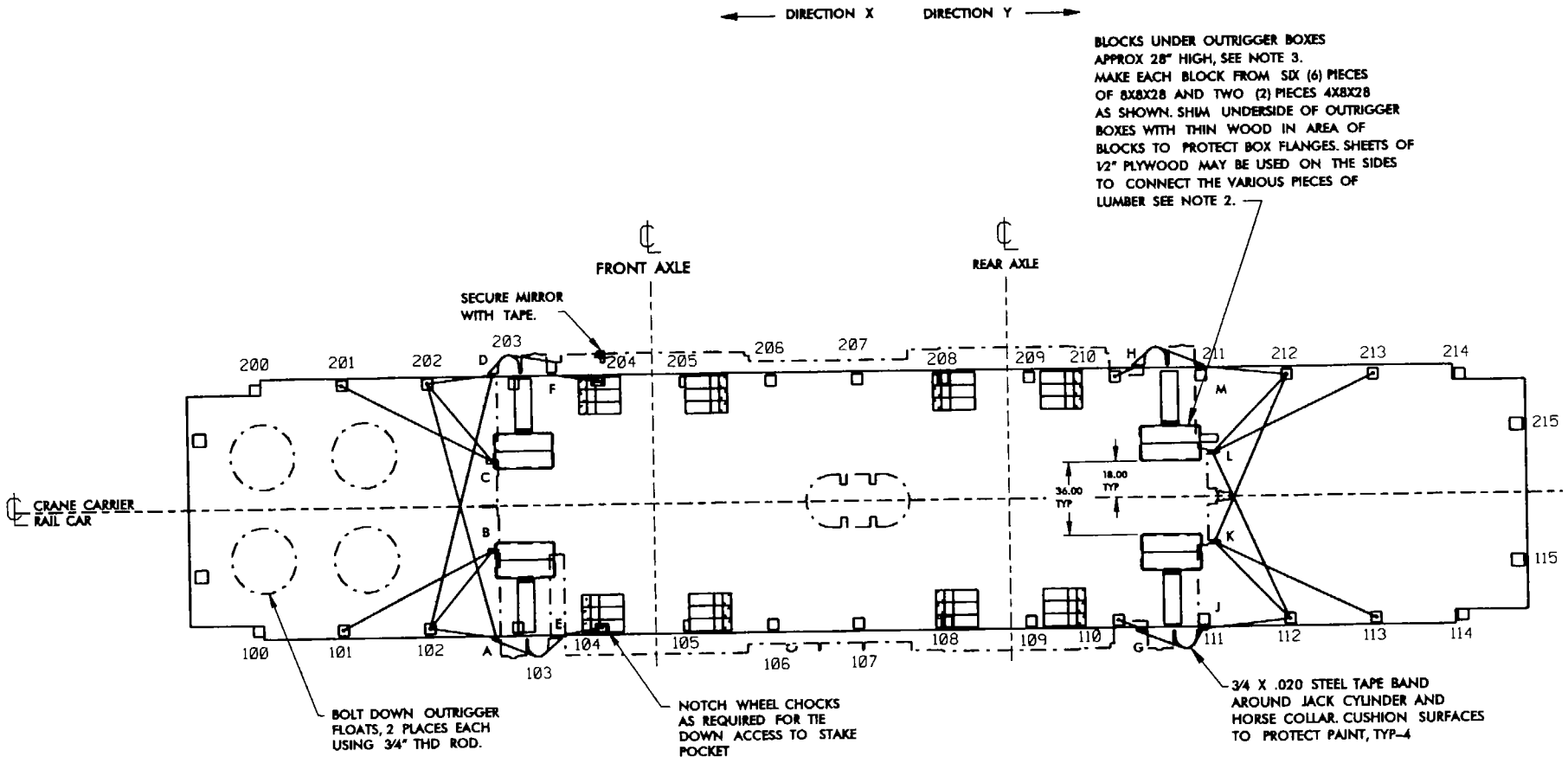


Figure 7-2. Continued (sheet 2 of 6).

FUNCTION	ROUTING
RESTRAINT, DIR Y	B TO 101
RESTRAINT, DIR Y	C 10 201
SIDE RESTRAINT	D TO 102
SIDE RESTRAINT	A TO 202
RESTRAINT, DIR Y	B TO 102
RESTRAINT, DIR Y	C TO 202
RESTRAINT, DIR-Y	A TO 102
RESTRAINT, DIR Y	D TO 202
HOLD DOWN	E TO 104
HOLD DOWN	F TO 204
HOLD DOWN	G TO 110
HOLD DOWN	H TO 210
RESTRAINT, DIR X	J TO 112
RESTRAINT, DIR X	M TO 212
RESTRAINT, DIR X	K TO 112
RESTRAINT, DIR X	L TO 212
SIDE RESTRAINT	L TO 112
SIDE RESTRAINT	K TO 212
RESTRAINT, DIR X	K TO 113
RESTRAINT, DIR X	L TO 213

Figure 7-2. Continued (sheet 3 of 6).

NOTES:

1. Latch and tape closed all hinged openings: engine access doors, tool compartment, and battery box. Cushion mirrors and tape against frame.

2. Assemble wood joints in structures, planking, beans, and supports, where bolting is not specified, using nails as follows: Nail plywood sheathing to O/R blocks and braces to blocks using sixteen 20d nails. Nail wheel chocks, bottom plates, and O/R box block braces through into railcar deck using 20d nails. Where toenailing is required to assemble 4 by 4, 4 by 6, 4 by 8, or 6 by 8 blocks or to nail blocks to railcar deck, use 30d nails and predrill top members to .156-inch diameter.

3. Loading sequence: Lift the crane carrier onto the flatcar. Center the load laterally and position longitudinally. The blocking under the outrigger boxes must support the weight of the load. Tires should be just touching the railcar deck. First tension tiedowns 7, 8, 9, 10, 11, 12, 13, and 14 to seat the carrier against the O/R box blocks. Then apply the other restraints and chocks (see note 4 below).

4. Each tiedown shown is a single length of .62-inch-die. wire rope looped through a railcar stake pocket and crane carrier lug. Ends are joined as shown in detail A. Tension all ropes to 3000 pounds and torque rope clamps to 95-foot-pounds.

Figure 7-2. Continued (sheet 4 of 6).

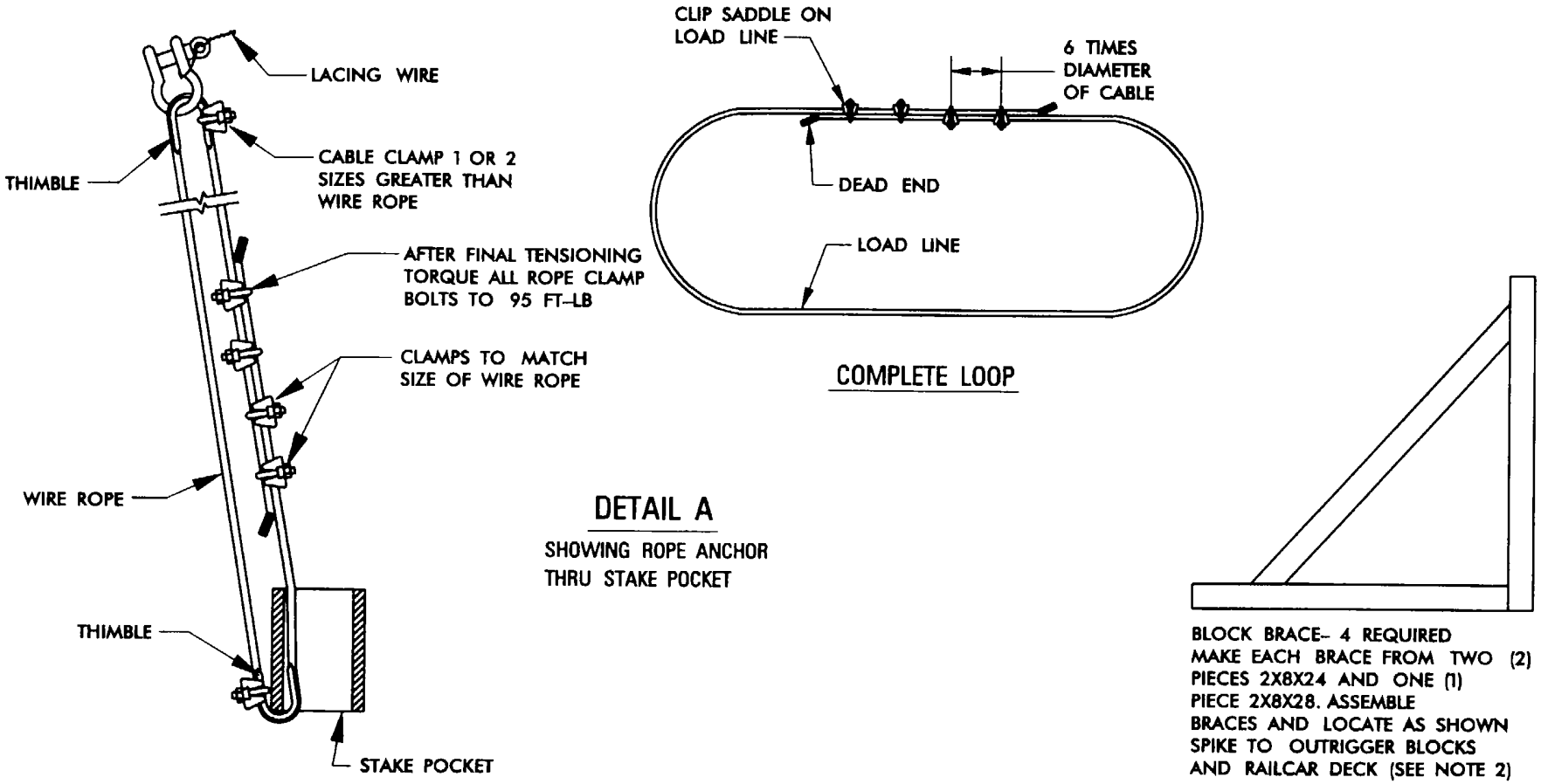
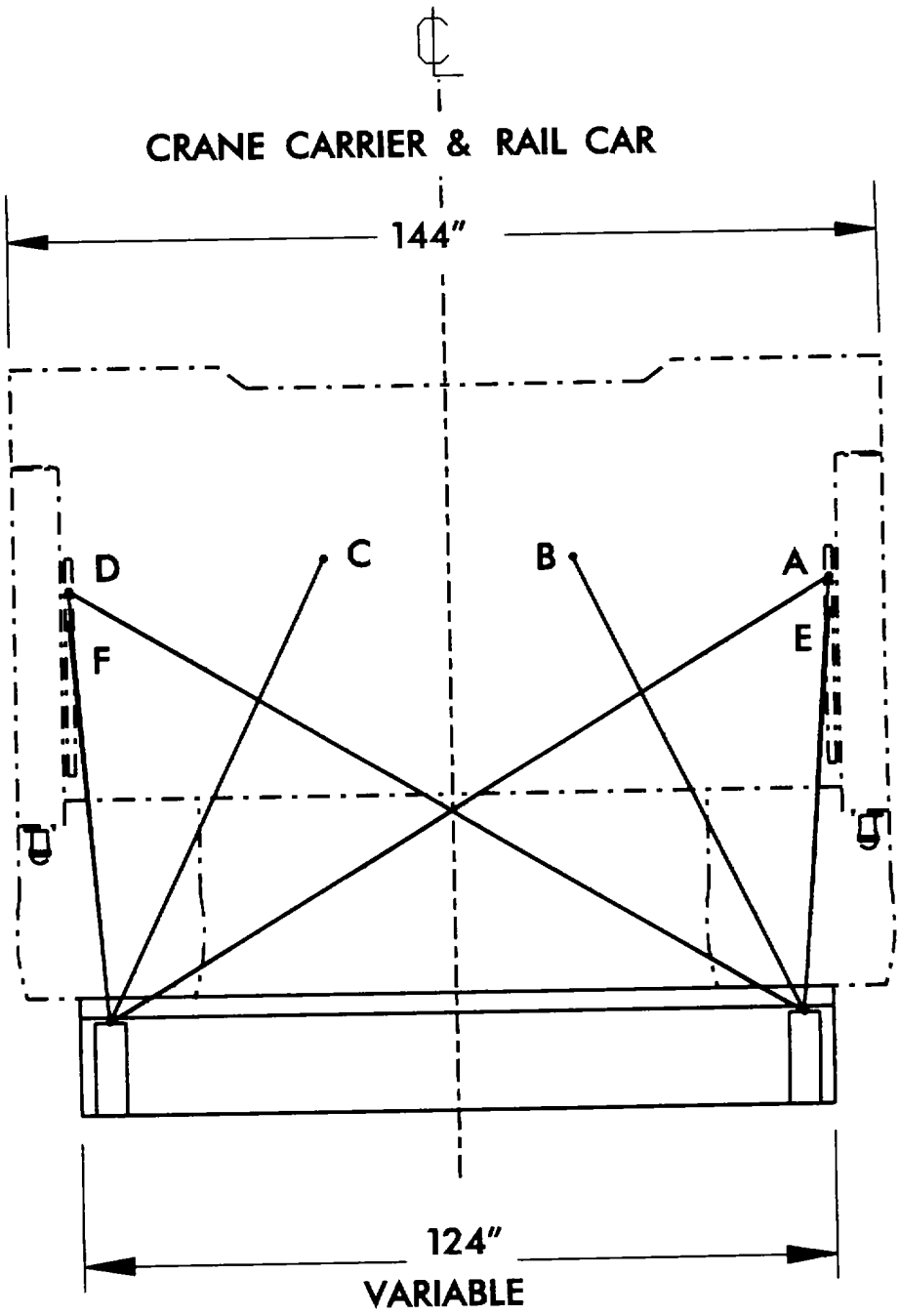


Figure 7-2. Continued (sheet 5 of 6).



VIEW B–B

Figure 7-2. Continued (sheet 6 of 6).

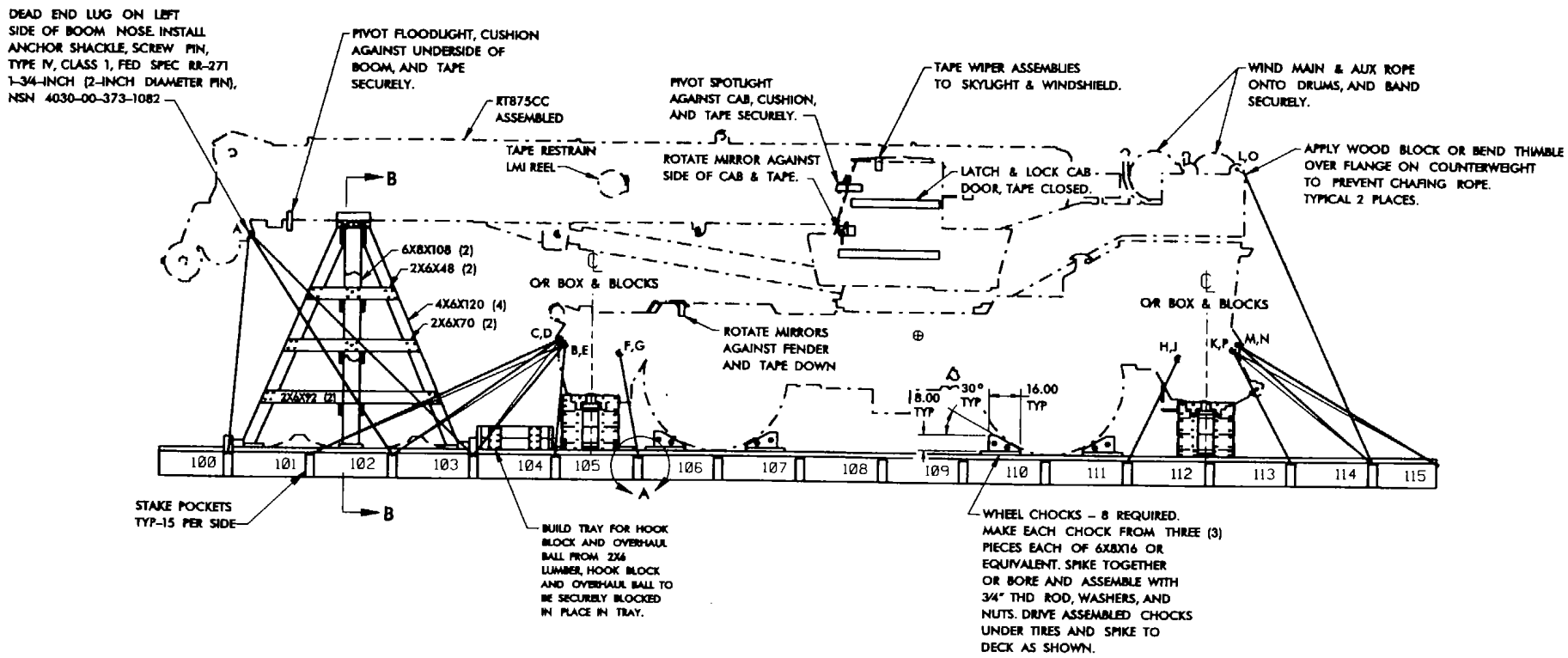


Figure 7-3. Blocking and tiedown of the RTCC operational configuration on a wood-deck flatcar (sheet I of 5).

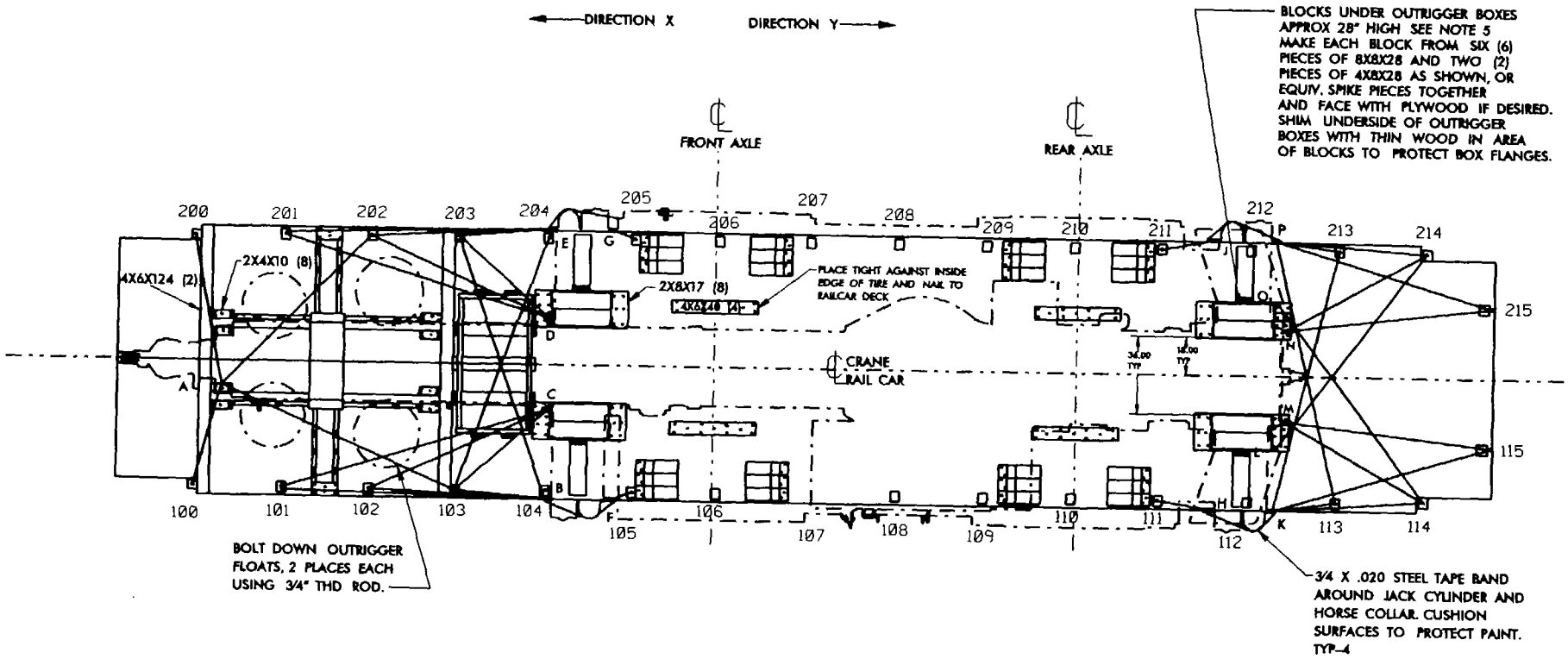


Figure 7-3. Continued (sheet 2 of 5).

FUNCTION	ROUTING
BOOM HOLD: DOWN	100 TO A
BOOM HOLD DOWN	200 70 A
BOOM HOLD DOWN	103 TO A
BOOM HOLD DOWN	202 TO A
RESTRAINT IN DIR Y	101 TO B
RESTRAINT IN DIR:Y-	201 TO E
RESTRAINT IN DIR Y	101 l0 C
RESTRAINT IN DIR Y	201 TO D
RESTRAINT IN DIR Y	102 TO B
RESTRAINT IN DIR Y	202 TO E
RESTRAINT IN DIR Y	102 TO C
RESTRAINT IN DIR Y	202 TO D
RESTRAINT IN GIR:Y	103 TO B
RESTRAINT IN DIR Y	203 TO E
RESTRAINT IN DIR Y	103 TO C
RESTRAINT IN D'R Y	203 TO D
SIDE RESTRAINT	103 TO E
SIDE RESTRAINT	203 TO B
CRANE HOLD DOWN	104 TO B
CRANE HOLD DOWN	204 TO E
CRANE HOLD DOWN	105 TO F
CRANE HOLD DOWN	205 TO G
CRANE HOLD DOWN	111 TO H
CRANE HOLD DOWN	211 TO J
CRANE MOLD: DOWN	113 70 K
CRANE HOLD DOWN	213 TO P
RESTRAINT IN DIR X	114 TO K
RESTRAINT IN DIR X	214 TO P
RESTRAINT IN DIR X	115 TON
RESTRAINT IN DIR X	215 TO p
RESTRAINT IN DIR X	115 TO M
RESTRAINT IN CIR X	115 TO M
RESTRAINT IN DIR X	215 TO N
RESTRAINT IN D`R X	215 10 N
SIDE RESTRAINT	213 TO K
SIDE RESTRAINT	113 TO P
RESTRAINT IN DIR X	214 TO N
RESTRAINT IN DIR X	114 TO M
SIDE RESTRAINT	214 TO L
SIDE RESTRAINT	114 TO O

NOTE: TWO TIE DOWNS ARE INSTALLED: BETWEEN 115 AND M (LINES 31&32) AND BETWEEN 215 AND N (LINES 33&34). LOOP LINES OVER THE END OF THE RAILCAR AROUND AND UP THROUGH THE STAKE POCKET.

Figure 7-3. Continued (sheet 3 of 5).

NOTES:

1. Latch and tape closed all hinged openings: engine access doors, tool compartment, battery box doors, cab door, skylight and right side sliding glass, and valve compartment lid.

2. Set parking brake and engage swing lock.

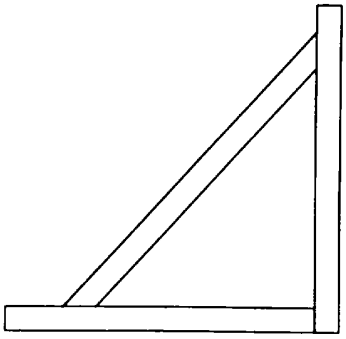
3. Each tiedown shown is a single length of .62-inch-diameter wire rope looped through a railcar stake pocket and crane lug. Ends are joined as shown in detail A. Tension all ropes to 3000 pounds and torque rope clamp nuts to 95-foot-pounds.

4. Loading sequence: Lift the crane onto the flatcar. Center the load laterally and position longitudinally. The blocking under the outrigger boxes must support the gross vehicle weight. Tires should just touch the railcar deck. Level the boom and build the boom support structure to suit. Tension lines 19, 20, 21, 22, 23, 24, 25, and 26 first to seat the carrier against the O/R box blocks. Then apply other restraints and chocks.

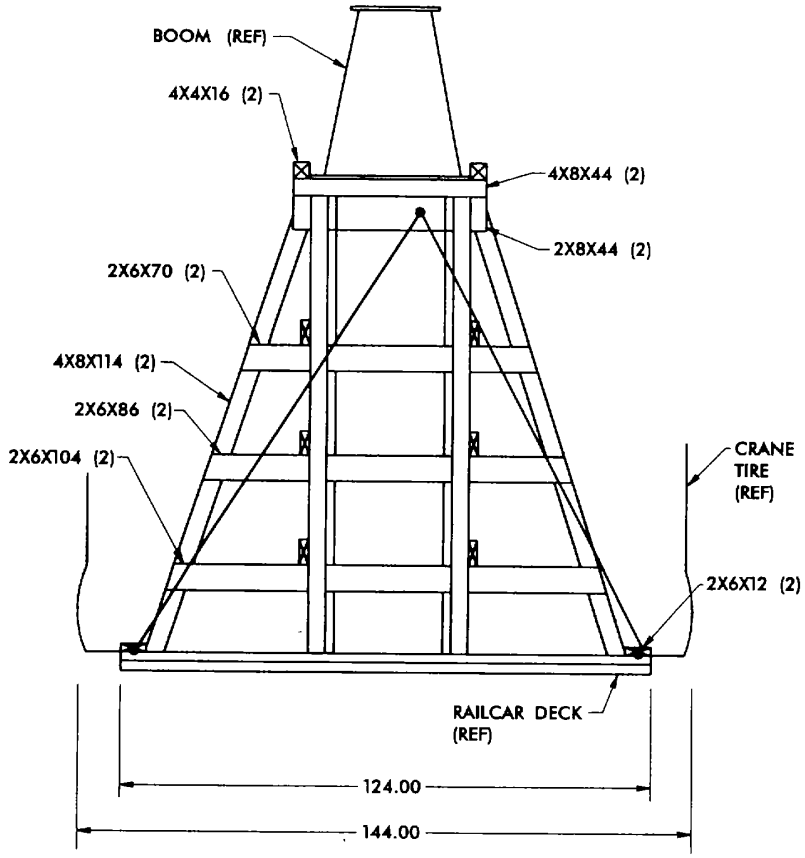
5. Assemble wood joints in structures, planking, beams, and supports, where bolting is not specified, using nails as follows: Nail through plywood sheathing to O/R box blocks and braces to blocks using sixteen 20d nails. Nail wheel chocks, bottom plates, and O/R box block braces through into railcar deck using 20d nails.

   Where toenailing is required to assemble 4 by 4, 4 by 6, 4 by 8, or 6 by 8 blocks or to nail beams or blocks or stakes to planking, bracing, railcar deck, and so forth, use 30d nails and pre-drill to .156-inch diameter.

Figure 7-3. Continued (sheet 4 of 5).



BLOCK BRACE –4 REQUIRED
MAKE EACH BRACE FROM TWO (2)
PIECES 2X8X24 AND ONE (1)
PIECE 2X8X28. ASSEMBLE
BRACES AND LOCATE AS SHOWN
SPIKE TO OUTRIGGER BLOCKS
AND RAILCAR DECK (SEE NOTE 5).



VIEW B–B

BOOM SUPPORT CONSTRUCTION

Figure 7-3. Continued (sheet 5 of 5).

7-6. Loading on Special-Purpose Flatcars

Crews can load the RTCC on special-purpose HTTX flatcars or similar cars that have proof tested 27,500-pound-chain tiedown restraints. The HTTX flatcars are equipped with special heavy-duty tiedown anchors and chain assemblies contained on each side of the center sill. Contact transportation officer for detailed information.

Section III. TRANSPORT ON FOREIGN RAILWAYS

7-7. General

The transportability guidance in this section is applicable when the cranes are transported on foreign railroads. Consideration is given to single and multiple vehicle movements for the types of railcars normally used in the movement of this type of equipment. Because of the height of assembled or disassembled cranes, special clearance is required for movement on foreign railroads. Clearances vary from one country to the next and within a country; so evaluation of rail transport capability must be made on each shipment.

7-8. Transport on Foreign-Service Flatcars

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

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

Table 7-1. Bill of Materials for Blocking and Tiedown of the RTCC Superstructure on Wood-Deck Flatcar (fig 7-1)

Item	Description	Approximate Quantity
Lumber	Douglas-fir, or comparable: straight grain, free from material defects; Fed Spec MM-L-751:	
	2- x 4-inch	21 linear feet
	2- x 6-inch	132 linear feet
	2- x 8-inch	472 linear feet
	2- x 10-inch	2 linear feet
	4- x 6-inch	110 linear feet
	4- x 8-inch	29 linear feet
	6- x 8-inch	11 linear feet
Nails	Common, steel; flathead; bright or cement-coated: table X1-b, Fed Spec FF-N-105:	
	16d	168
	20d	508
	30d	88
Thimbles	Standard, open type: 5/8-inch	58
Clamps	Wire rope, U-bolt clamps, saddled single grip, forged steel, Crosby heavy duty, or equal; Fed Spec FF-C-450: 5/8-inch	150
Shackles	Anchor shackles, screw pin, type IV, class 1; Fed Spec RR-C-271; 7/8-inch (1-inch diameter pin); NSN 4030-00-162-9668	2
Wire rope	6 by 19, IWRC; improved plow steel; preformed, regular lay; table XI, Fed Spec RR-W-410: 5/8-inch	723 feet
Rods	3/4-inch threaded steel rod x 13-3/4 inches	8
Rods	3/4-inch threaded steel rod x 9-3/4 inches	16
Nuts	3/4-inch standard steel, hex head	56
Washers	3/4-inch flat, standard steel	64
Rope	3/4-inch manila	as required
Eye bolts	3/4-inch shank	8

Table 7-1. Continued

Item	Description	Approximate Quantity
Shackle	Anchor shackle, screw pin, type IV, class 1; Fed Spec RR-C-271: 1-inch (1-1/8-inch diameter pin); NSN 4030-00-233-4175	1
Shackle	Anchor shackle, screw pin, type IV, class 1; Fed Spec RR-C-271: 1-3/4 inch (2-inch diameter pin); NSN 4030-00-373-1082	2

Table 7-2. Bill of Materials for Blocking and Tiedown of the RTCC Carrier on Wood Deck Flatcar (fig 7-2)

Item	Description	Approximate Quantity
Lumber	Douglas-fir, or comparable; straight grain, free from material defects; Fed Spec MM-L-751:	
	2- x 6-inch	35 linear feet
	2- x 8-inch	26 linear feet
	4- x 8-inch	19 linear feet
	6- x 8-inch	32 linear feet
	8- x 8-inch	56 linear feet
	1/2-inch plywood	3 (4- by 8-foot-sheets)
Nails	Common, steel; flathead; bright or cement-coated; table XI-b, Fed Spec FF-N-105:	
	16d	408
	20d	32
	30d	128
Rods	3/4-inch threaded steel rod x 20-5/16 inch	16
Nuts	3/4-inch, standard steel, hex head	32
Washers	3/4-inch, flat, standard steel	32
Thimbles	Standard, open type: 5/8 inch	40
Clamps	Wire rope, U-bolt clamps, saddled single-grip, forged steel, Crosby heavy duty, or equal; Fed Spec FF-C-450: 5/8-inch	100
Shackles	Anchor shackles, screw pin, type IV, class 1; Fed Spec RR-C-271: 7/8-inch (1-inch diameter pin); NSN 4030-00-162-9668	2
Wire rope	6 by 19, IWRC; improved plow steel; preformed, regular lay; table XI; Fed Spec RR-W-410: 5/8-inch	371 feet
Cushioning material	Waterproof paper, or suitable material	as required
Steel tape		as required

Table 7-3. Bill of Materials for Blocking and Tiedown of the RTCC Operational Configuration on Wood-Deck Flatcar (fig 7-3)

Item	Description	Approximate Quantity
Lumber	Douglas-fir, or comparable; straight grain, free from material defects; Fed Spec MM-L-751:	
	2- x 4-inch	7 linear feet
	2- x 6-inch	116 linear feet
	2- x 8-inch	45 linear feet
	4- x 4-inch	3 linear feet
	4- x 6-inch	75 linear feet
	4- x 8-inch	46 linear feet

Table 7-3. Continued

Item	Description	Approximate Quantity
	6- x 8-inch	51 linear feet
	8- x 8-inch	57 linear feet
	1/2-inch plywood	3 (4- by 8-sheets)
Nails	Common, steel; flathead; bright or cement-coated: table X1-b; Fed Spec FF-N-105:	
	16d	408
	20d	32
	30d	128
Thimbles	Standard, open type: 5/8-inch	78
Clamps	Wire rope, U-bolt clamps, saddled single-grip, forged steel, Crosby heavy duty, or equal; Fed Spec FF-C-450: 5/8-inch	200
Shackles	Anchor shackles, screw pin, type IV, class 1; Fed Spec RR-C-271: 7/8-inch (1-inch diameter pin); NSN 4030-00-162-9668	2
Rods	3/4-inch threaded steel rod x 13-3/4 inches	4
	3/4-inch threaded steel rod x 9-3/4 inches	8
Nuts	3/4-inch, standard steel, hex head	24
Washers	3/4-inch, flat, standard steel	24
Wire rope	6 by 19, IWRC; improved plow steel; preformed, regular lay; table XI; Fed Spec RR-W-410: 5/8-inch	907 feet
Shackle	Anchor Shackle, screw pin, type IV, class 1; Fed Spec RR-C-271; 1-inch (1-1/8 inch diameter pin); NSN 4030-00-233-4175	1

General Instructions

1. Tension wire rope with an appropriate-size come-along mechanical hoist or equal tensioning device.
2. For further details, see General Rules 1, 2, 3, 4, 5, 9, 14, 15, 19A and 19B in Section I of the *Rules Governing the Loading of Commodities on Open-Top Cars and Trailers*, published by the Association of American Railroads.

APPENDIX A

DEMOUNTING AND REMOUNTING THE RT875CC SUPERSTRUCTURE

A-1. Demounting the RT875CC superstructure includes removing forty 1-1/4-inch bolts, nuts and washers that secure the superstructure turntable swing bearing and ring gear to the crane carrier deck plate. The crane swivel assembly must also be unbolted from the carrier and suspended from and lifted off with the superstructure. Disconnects for all fluid, air, and electric supply to the superstructure are located at the lower end of the swivel assembly, under the crane.

CAUTION

Failure to demount the RT875CC superstructure in the following step by step procedure could result in serious injury to personnel and/or damage to the crane.

A-2. Tools needed to demount the superstructure are included in the standard variety, normally available in heavy-equipment maintenance facilities. Breaking the 1,965-foot-pound torque of the inner ring bearing bolts may be accomplished with several different combinations of tools, depending on availability:

1. A 28 to 1 multiplier plus a 30to 250-pound torque wrench, and 3/4-inch male to 1/2-inch female adapter.

2. A 2,000-foot-pound torque wrench with handle extensions as required.

3. A 2,000-foot-pound-capacity impact wrench, if shop air pressure is available.

4. A 2,000-foot-pound hydraulic wrench, if auxiliary hydraulic pressure is available. All of the above require a 1-7/8-inch socket with a compatible drive for the tool selected. Also, a second 1-7/8-inch socket and handle, open or box end wrench, is needed to hold the nut while untorquing. Also, a socket set, up to 1-1/8-inch, is needed and material handling equipment and slings of at least 53,000-pound-capacity to demount the superstructure and move the carrier. If the crane is to be transported, semitrailers or railroad flatcars of this capacity must also be supplied. Cribbing, planking, blocks, tiedown-chain cables, straps, and so forth, must be onhand to stabilize the removed superstructure on its transport vehicle or in its stowed location.

Demount Procedure:

1. Position the crane on a flat, level surface, outriggers retracted, boom over front, retracted and horizontal. Remove the hook block and overhaul ball and rewind all rope on the hoist drums and stow the outrigger pads.

2. With the superstructure rotated 4-1/2° to the right, from straight over front, four inner ring bearing bolts 1, 2, 6, and 7 (figs 1 and 2) are visible through the elongated holes on each side of the turntable base plate. Mark these four bolts and do not remove them until all of the following steps are completed.

3. Using crane power, the superstructure may now be swung 18° to the right or left of the initial position in step 2 above, exposing pairs of unmarked bearing bolts in the elongated holes on each side of the turntable base plate. If the bolts on the left side, under the cab, can be reached with the available tool combination, begin by removing four bolts-3, 4, 8, and 9 or 34, 35, 39, and 40. Continue incremental swings of 18° in the same direction and remove all bolts, except 1, 2, 6, and 7, previously marked. If bolts are tight in holes after nut removal, tap out using a hammer.

4. Alternately, if a multiplier-torque wrench combination, air impact, or hydraulic wrench is to be used, and lacks vertical space on the left side under the cab, all bolts may be removed through the elongated holes on the right side of the turntable. Remove all bolts, except 1, 2, 6, and 7, in any sequence.

CAUTION

When swinging boom over rear, during bearing bolt removal, raise the boom enough to clear carrier structure so the operator can see to the right side of the turntable.

5. After all bolts except 1, 2, 6, and 7 are removed, swing the boom back to the initial, 4-1/2° to the right of boom, straight over front position. (Bolts 1, 2, 6, and 7 are again exposed through the elongated holes in the turntable base plate.) If the vertical height of the tool combination prohibits removing bolts 6 and 7 from under the cab on the left side of the turntable, break the torque of these two bolts when the boom is to the right, straight over rear position. Leave 6 and 7 snug until final removal as stated in the steps below.

6. Suitable material handling equipment as noted above must be used to demount the superstructure. Using a four-fall sling with single apex positioned above the superstructure longitudinal

center of gravity (c.g.), about 28 inches to the rear of the center of rotation, connect each fall to a superstructure sling eye. (For superstructure sling eye locations, refer to the Shipping Data Plate or Transportability Data drawing (E6-829-008730). Hoist up to remove slack from the sling falls.) Remove bolts 7 and 2 (see figs 1 and 2), center the boom over front, engage the swing lock, lower the boom to the horizontal position and turn off the engine.

7. Disconnect the quick coupler provided in the lift-retract circuit, located between the turntable side plates at the base end of the lift cylinders. Breaking this line effectively blocks any possible leakage past the lift control valve spool, which would allow the boom to raise during superstructure demount. Install dust caps or otherwise cover quick coupler ends to avoid dirt entering. Tie up the loose hose assembly to prevent damage to the PAT electrical writing.

NOTE

Failure to break this line at the disconnect may result in the boom raising when the superstructure is lifted.

8. Purge the air tanks. Uncouple 5 air and 19 hydraulic quick disconnect fittings and 3 electrical conduit plugs on the underside of the swivel. Also, remove the four 3/4-inch bolts, nuts and washers attaching the swivel mounting channel to the crane carrier frame (see fig 1, detail A). Save the bolts, nuts and washers for use in remounting the superstructure. Install dust covers on all quick disconnects.

9. From underneath the crane, center line of rotation, find the four swivel assembly suspension chains in their stowed positions snapped together around the swivel barrel (see fig 1). Detach the chains from their stowed positions. The upper ends of these chains are secured to the underside of the superstructure turntable base plate. Engage the hooks on the lower ends of the chains in the four eyes provided on the corners of the carrier swivel support channel.

10. Unpin and remove the two rotation links between the turntable base plate and swivel barrel (see fig 1, detail A).

NOTE

Code mark these links so that they can be replaced in the same location at remount of the superstructure. Failure to do so will result in rotary misalignment of the swivel assembly. These links rotate the swivel barrel with the turntable and are not designed to accept the weight of the suspended swivel assembly. Stow the links and attach hardware in the tool box for use in remounting the superstructure.

11. Paint indelible match marks on the outside of the turntable ring gear and carrier base plate. These match marks will aid in remating the swivel assembly support channel with the support lugs in the carrier frame. Place the swing lock in relation to the boom straight over front position.

12. Verify that slack is removed from the sling falls and that the apex is over the load c.g. (see 6 above). Remove the final two bolts, 1 and 6 securing the swing bearing and ring gear to the carrier deck plate. Discard all forty of the swing bearing tie-down bolts and nuts. (Remounting the superstructure will require all new 1-1/4-inch-7 N.C. x 8-inch, GRD 8, bolts and nuts.) Retain the washers, if not damaged or deformed, for future use when remounting the superstructure.

13. Demount the superstructure, hoisting carefully to avoid damage to the swivel assembly and surrounding hoses.

NOTE

Protect the turntable bearing ring and carrier deck plate machined surfaces against damage and rust during separation.

CAUTION

The crane superstructure, when lowered to a flat supporting surface, must be blocked about 26 inches under the turntable bearing ring to protect the suspended swivel. The load is unstable resting on the bearing ring without additional supports and tiedowns. See figures 2-1 and 2-2 for locations of tiedowns and supports.

For semitrailer or rail transport of the crane superstructure and carrier, see the Shipping Data Plate, and figures 5-1, 5-2, 7-1, 7-2, and 7-3 for details.

Remount Procedure:

1. To unload the crane carrier and superstructure from transport vehicle, top lift material handling equipment of at least 53,000-pound-capacity (26.5 tons) is required. Forty, new 1-1/4-inch x 8-inch long, grade 8, bolts and nuts are required for remounting the superstructure. Use the eighty bearing bolt washers saved at demount, step 12 above, unless damaged or deformed. Tool selection options from items 1 through 4, above, for demount are required for the remount procedure.

CAUTION

When reassembling the crane superstructure and carrier, do not mix serial num-

bered components. The crane superstructure should be replaced on the carrier from which it was removed. (See fig 1 for serial number locations.)

2. Place the crane carrier on a flat level surface.

3. Position the material handling boom head with suspended sling over the superstructure c.g. (see step 6 in the demount procedure) and connect the four falls of the sling to the sling eyes located on the boom base section and counterweight. (See the Shipping Data Plate (E7-376-002128) and/or fig 2-2 for details on superstructure slinging.) 4. Take up slack in the sling falls and remove cribbing, planking, supports, and superstructure tiedowns. Attach guide ropes at the boom nose and/or the counterweight (use for rotationally aligning the superstructure with the carrier during remount). Inspect the bearing and carrier deck plate mating surfaces. Mating surfaces should be clean and dry for remounting.

5. Insert three new bearing bolts with washers under heads through the exposed holes in the turntable bearing ring at 1, 6, and 16, figures 1 and 2. These bolts will serve to align the entire superstructure bearing hole pattern with the matching holes in the carrier deck plate. (If the crane is being reassembled after shipment by flatbed railcar or military semitrailer, the eight 9-1/2-inch long holddown bolts, used for shipment, may also be left in place to align the bearing and carrier deck hole patterns.) 6. Lift and swing the suspended superstructure over the crane carrier. Center the boom over the front and try to align the superstructure turntable bearing ring with the bearing hole pattern in the carrier deck plate. Use caution to avoid damaging the swivel assembly, which is suspended from the superstructure turntable base plate.

7. Station a rigger on the carrier in view of the match marks on the front of the superstructure bearing ring and carrier deck plate. Also, place a rigger under the carrier to center the swivel assembly support channel onto its supporting lugs in the carrier frame, as it is lowered into place.

8. Lower the superstructure into close contact with the carrier deck plate. The swivel support channel will contact its supporting lugs before the turntable bearing contacts the carrier deck plate. Center the channel on the lugs and install the four 3/4-inch bolts through the channel and lugs. Install the washers and nuts on the. ends of the bolts. Do not tighten. Unhook the swivel assembly suspension chains and snap together around the swivel barrel (see fig 1, detail A).

9. The remaining procedure to bring the turntable ring gear into final contact with the crane carrier deck plate involves minute movements of the suspended superstructure. Rotate the load and use the guide lines to slowly move the swing, lift, and hoist functions of the supporting equipment. The aim is to align the match marks on the swing bearing and carrier deck plate, and finally the hole patterns in the two units. Pay close attention to the proximity of the counterweight to the top of the engine hood. Only 3 inches of space exists here, after installation, and minor rocking of the superstructure during remounting could damage the hood. Accurate final matching of the bearing hole patterns is evidenced by the three bolts installed in 4 above (and the eight shipping holddown bolts if left in place) dropping through the carrier deck plate. Allow the superstructure to settle onto the crane carrier, but keep the sling falls taut. Install washers and nuts on the three new bearing bolts now in place and tighten snugly, but do not torque.

10. Tighten the bolts to secure the swivel assembly base channel to the supporting lugs in the carrier frame. Tighten the bolts one-half turn past snug-tight. Reinstall the drag links according to their coded locations, between the turntable base plate and upper end of the swivel.

11. Reconnect all air and hydraulic quick couplers at the base of the swivel, being careful to mate coded tie strap ends. Uncoded ends and electrical plugs are unmarked and cannot be installed incorrectly. Air and transmission lines have color-coded tie straps and number-stamped identification.

12. Recouple the quick disconnect in the lift retract circuit.

13. Start the engine and swing the superstructure (with sling falls still attached) 9° to the right. Install three more bearing bolts-2, 7, and 17, with washers under heads, figures 1 and 2. Install washers and nuts and tighten snugly, but do not torque. If eight shipping bolts have been left in step 9 above, replace these as they appear in this step and step 14. Disconnect the material handling sling falls and remove.

14. Alternatively swing left and right and install all remaining bearing bolts, washers and nuts.

NOTE

Each installed bearing bolt includes washers under head and nut. After initial tightening, torque all bearing bolts per attaching procedure (fig 2) using available torque wrench.

15. Function check the crane.

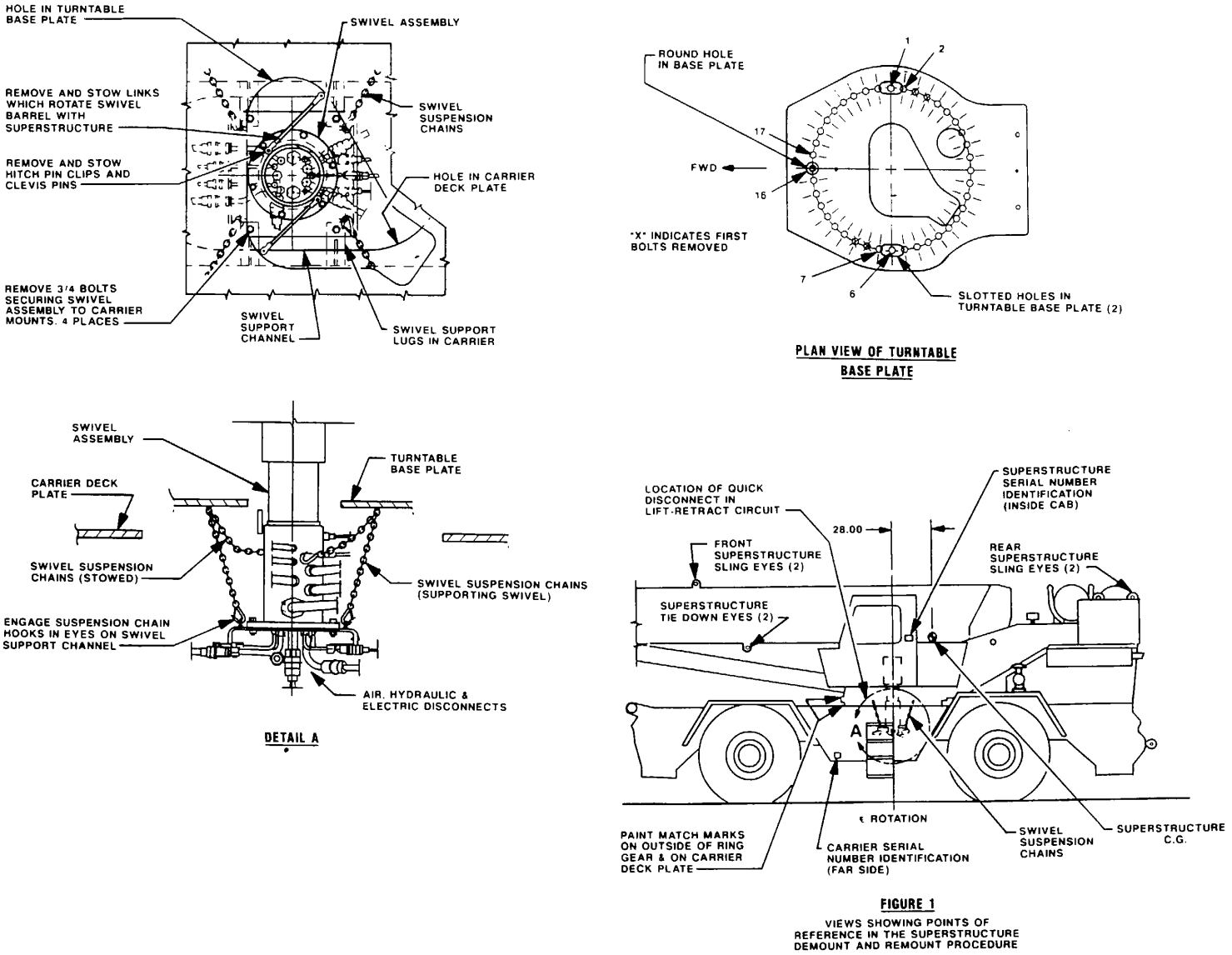
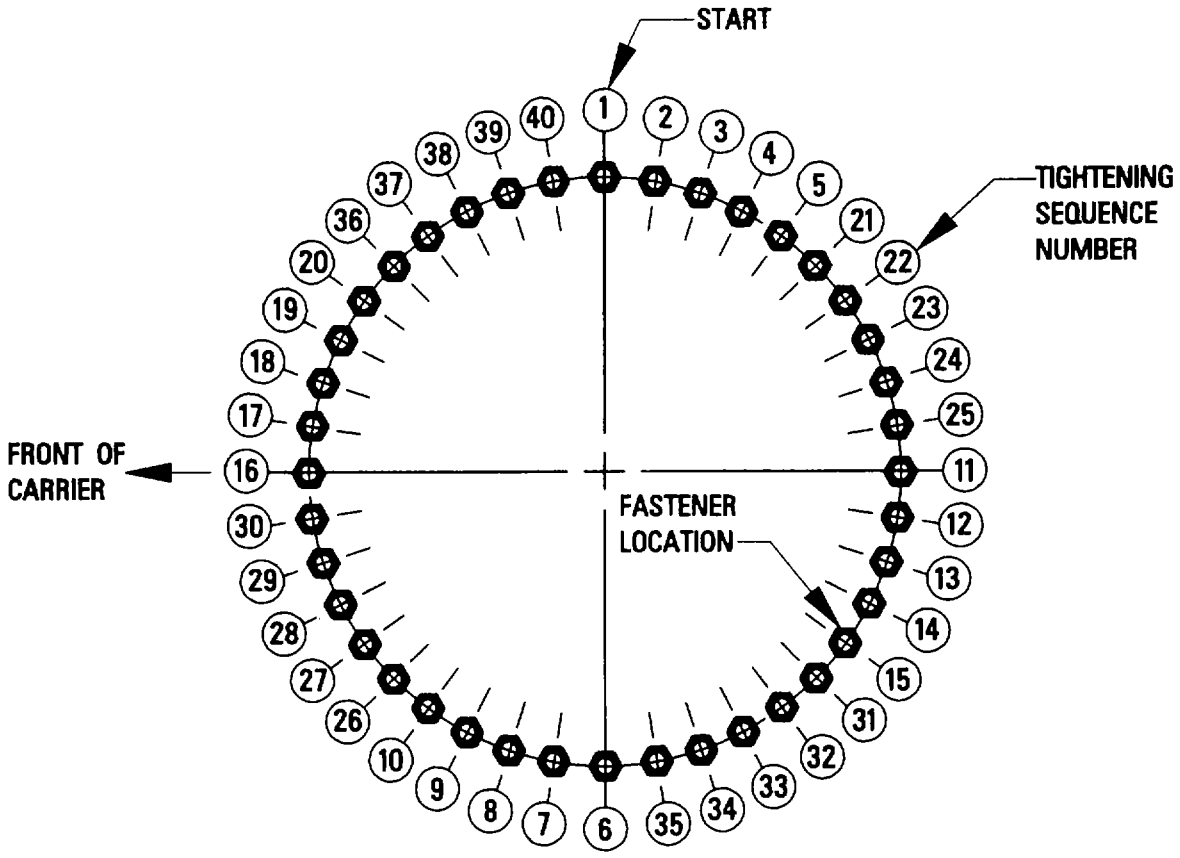


Figure 1. Views showing points of reference in the superstructure demount and remount procedure

TIGHTEN THE HEAD OF EACH FASTENER IN SEQUENCE SHOWN STARTING WITH FASTENER LABELED NO. 1 – TO FINAL TORQUE VALUE (1964 FT – LB DRY)



TIGHTENING SEQUENCE DIAGRAM

FINAL ASSEMBLY TORQUE VALUES
A. TORQUING, DRY THREADS, 1964 FT – LB
B. TORQUING CLEAN, LIGHTLY LUBRICATED THREADS, 1768 FT – LB

Figure 2. RT875CC T/T bearing torque sequence

APPENDIX B

REFERENCES

1. Technical Manuals (TM)

55-2320-258-14 Transportability Guidance Heavy-Equipment Transporter (HET) System, Truck-Tractor, 22-1/2 Ton, 8 x 8, M-746
Heavy-Equipment Transporter (C-HET) System, Truck-Tractor, Commercial 85,000 GVWR, 8 x 6, M911

2. Technical Orders (TO)(Air Force)

IC-5A-9 Loading Instructions USAF Series C-5 Aircraft

3. Field Manuals (FM)

55-9 Unit Air Movement Plan
55-15 Transportation Reference Data
55-17 Terminal Operations Coordinator's Handbook.

4. Other Publications and Sources of Procurement

Association of American Railroads, Section No. 1, General Rules Governing the Loading of Commodities On Open Top Cars

Available From: Association of American Railroads
American Railroads Building
50 F Street, NW
Washington, DC 20001

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1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

'VEIGHTS

Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

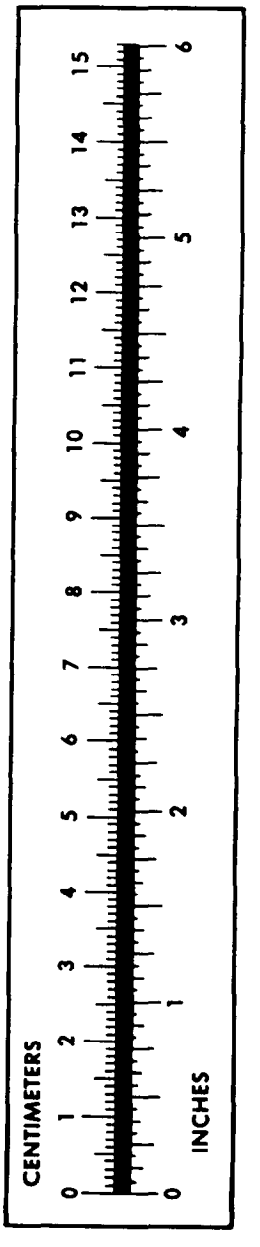
TEMPERATURE

5/9(°F - 32) = °C
212° Fahrenheit is evuivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 =°F

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
ıts	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
ers	Gallons	0.264
ms	Ounces	0.035
ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
lometers per Liter	Miles per Gallon	2.354
meters per Hour	Miles per Hour	0.621



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