

CHAPTER 4

RIGGING DUAL ROW AIRDROP SYSTEM (DRAS) M998 / M1038/ M1097 CARGO/TROOP CARRIER HMMWV

DESCRIPTION OF LOAD

4-1. The HMMWV truck is rigged on a DRAS platform for DRAS airdrop. An accompanying load weighing a minimum of 800 pounds and a maximum of 2,000 pounds must be rigged in the truck. The load is rigged with three G-11D cargo parachutes.

a. The M998 Cargo/Troop Carrier (Figure 4-1). It weighs 5,200 pounds. It is 180 inches long and 85 inches wide. The reduced height of the vehicle is 54 inches.

b. The M998A1 Cargo/Troop Carrier. It weighs 5,380 pounds. It is 180 inches long and 86 inches wide. The reduced height of the vehicle is 56 inches.

c. The M1038 with winch Cargo/ Troop Carrier. It weighs 5,327 pounds. It is 180 inches long and 86 inches wide. The reduced height of the vehicle is 54 inches.

d. The M1038A1 with winch Cargo/Troop Carrier. It weighs 5,507 pounds. It is 186 inches long and 86 inches wide. The reduced height of the vehicle is 56 inches.

e. The M1097 Cargo/Troop Carrier. It weighs 5,600 pounds. It is 180 inches long and 85 inches wide. The reduced height of the vehicle is 54 inches.

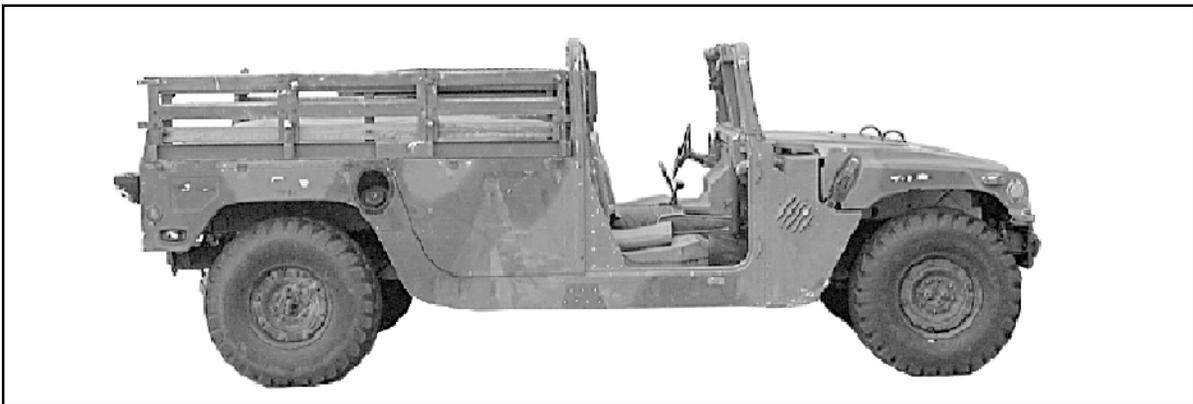
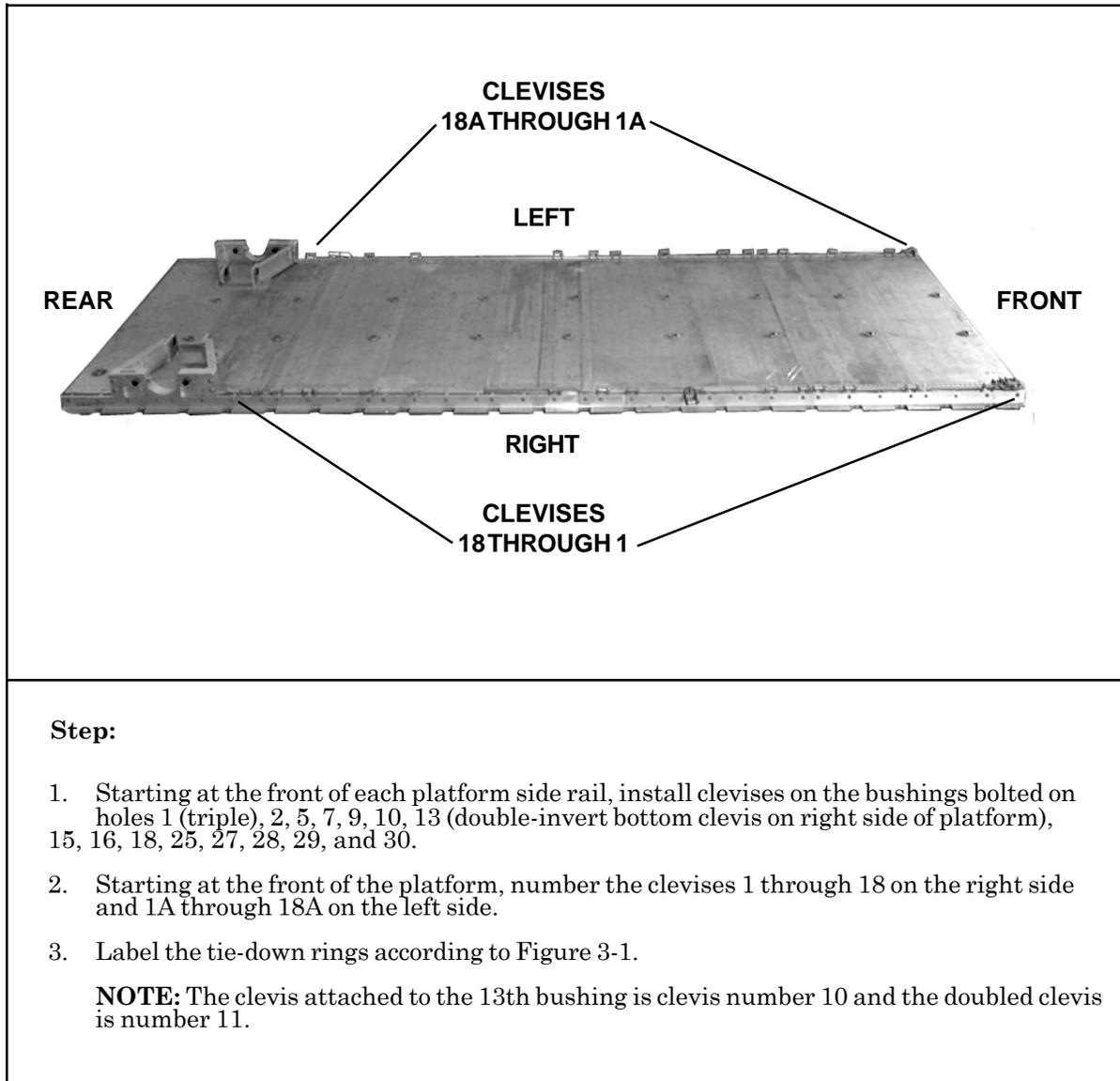


Figure 4-1. M998/ M1038/ M1097 Cargo/Troop Carrier HMMWV

PREPARING PLATFORM

4-2. Inspect, or assemble and inspect, a DRAS platform with outrigger assemblies and outrigger platform support weldments and link assemblies according to TM 10-1670-268-20&P/TO 13C7-52-22 and as shown in Figure 4-2.



Step:

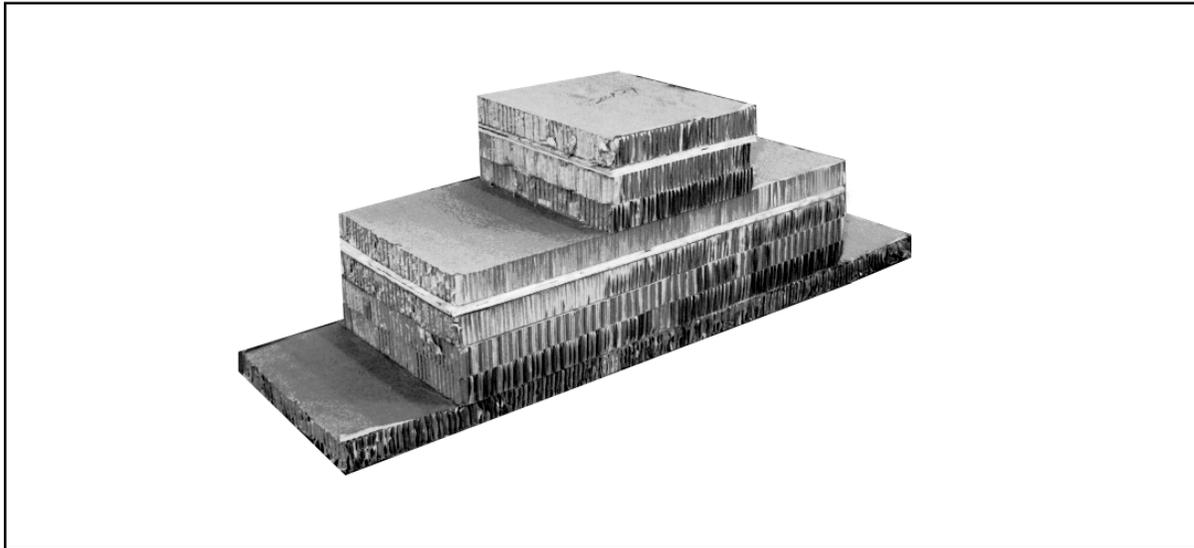
1. Starting at the front of each platform side rail, install clevises on the bushings bolted on holes 1 (triple), 2, 5, 7, 9, 10, 13 (double-invert bottom clevis on right side of platform), 15, 16, 18, 25, 27, 28, 29, and 30.
2. Starting at the front of the platform, number the clevises 1 through 18 on the right side and 1A through 18A on the left side.
3. Label the tie-down rings according to Figure 3-1.

NOTE: The clevis attached to the 13th bushing is clevis number 10 and the doubled clevis is number 11.

Figure 4-2. Platform Prepared

BUILDING AND PLACING HONEYCOMB STACK

4-3. Prepare the honeycomb stacks for the trucks as shown in Figure 4-3.
Position the honeycomb stacks as shown in Figure 4-4.



Stack Number	Pieces	Width (inches)	Length (inches)	Material	Instructions
1 and 3	1	24	80	Honeycomb	This is the base.
	3	24	54	Honeycomb	Center and glue together and glue to base.
	1	24	54	3/4-inch Plywood	Center and glue to top of 24-inch by 54-inch honeycomb.
	1	24	54	Honeycomb	Center and glue to top of 24-inch by 54-inch plywood.
	2	24	20	Honeycomb	Center and glue to top of 24-inch by 54-inch honeycomb.
	1	24	20	3/4-inch Plywood	Center and glue to top of 24-inch by 20-inch honeycomb.
	1	24	20	Honeycomb	Center and glue to top of 24-inch by 20-inch plywood.

Figure 4-3. Honeycomb Stacks Prepared

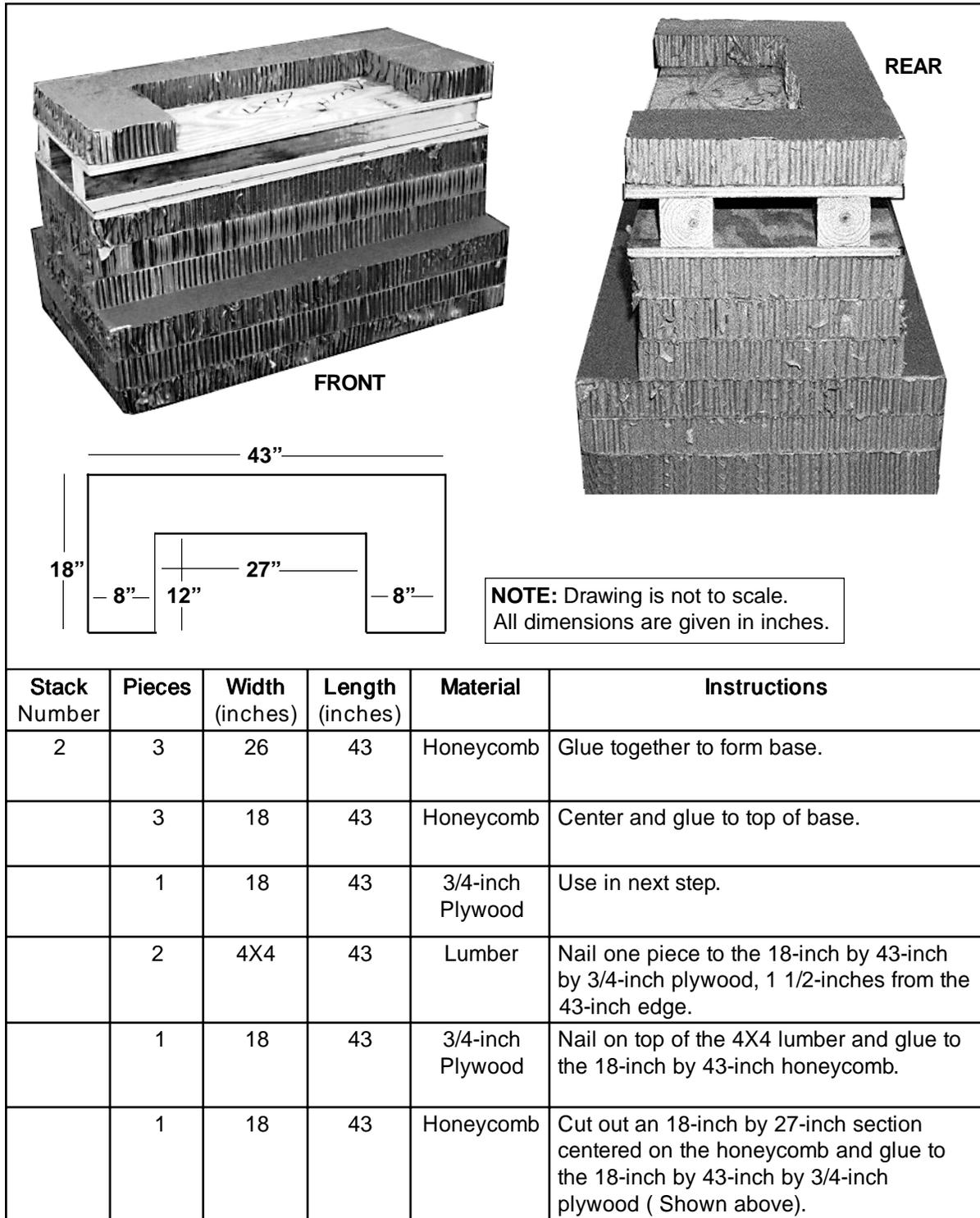


Figure 4-3. Honeycomb Stacks Prepared (Continued)

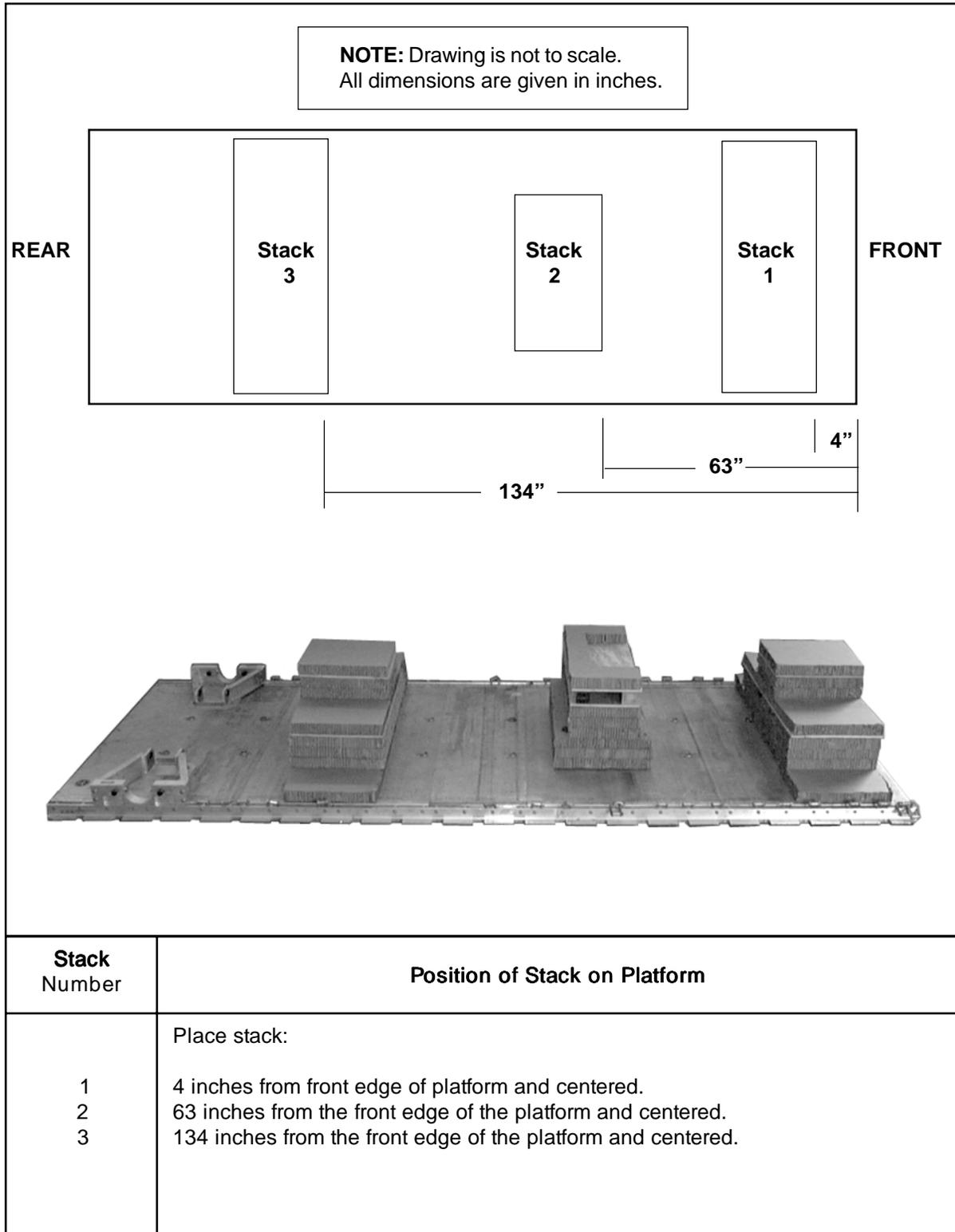


Figure 4-4. Honeycomb Positioned

INSTALLING OPTIONAL DRIVE- OFF AID ON PLATFORM

4-4. Install the drive-off aid as shown in Chapter 3, Figure 3-5.

PREPARING TRUCK

4-5. Prepare the truck as described below.

- a. Make sure the fuel tank is no more than 75% full. Prepare the fuel tank filler cap and fuel filler opening as shown in Figure 4-5. Prepare the fuel tank drain plug as shown in Figure 4-6.

NOTE: Certain units may be authorized a waiver allowing 95% fuel. One way to verify the tank is 95% full is to fill the tank and withdraw 1 1/4 gallons with a hand pump.

CAUTION

A full tank does not allow for expansion, and is a danger to aircraft and air crew.

- b. Make sure the batteries and battery compartment comply with AFJMAN 24-204/TM 38-250.

- c. Prepare the cab of the truck as shown in Figure 4-7.

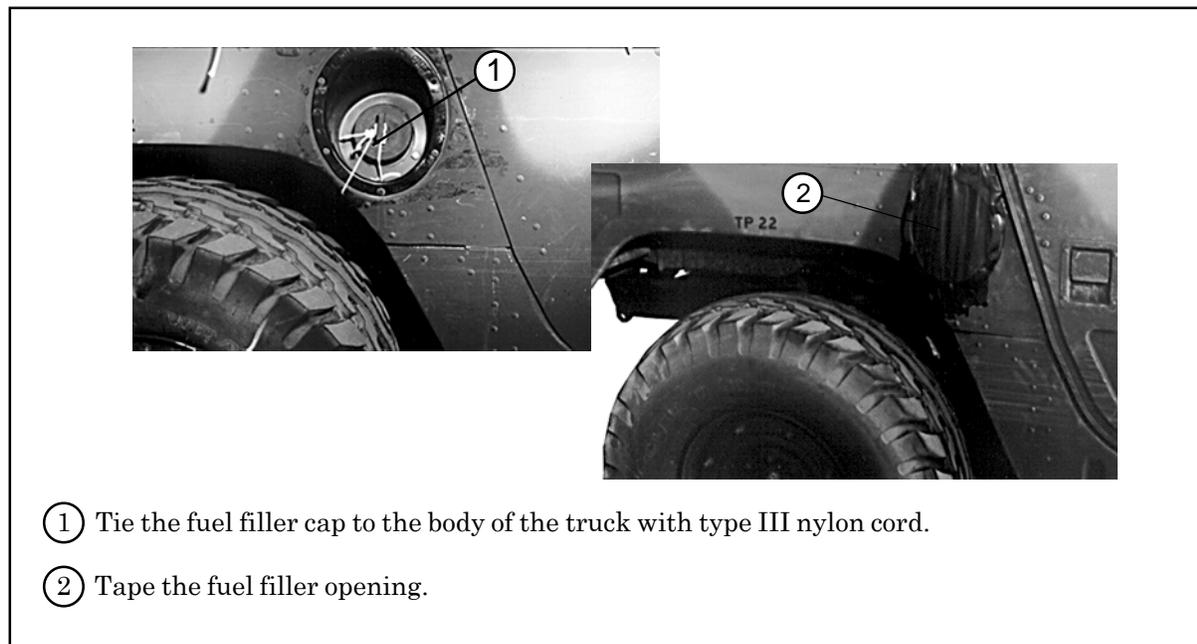
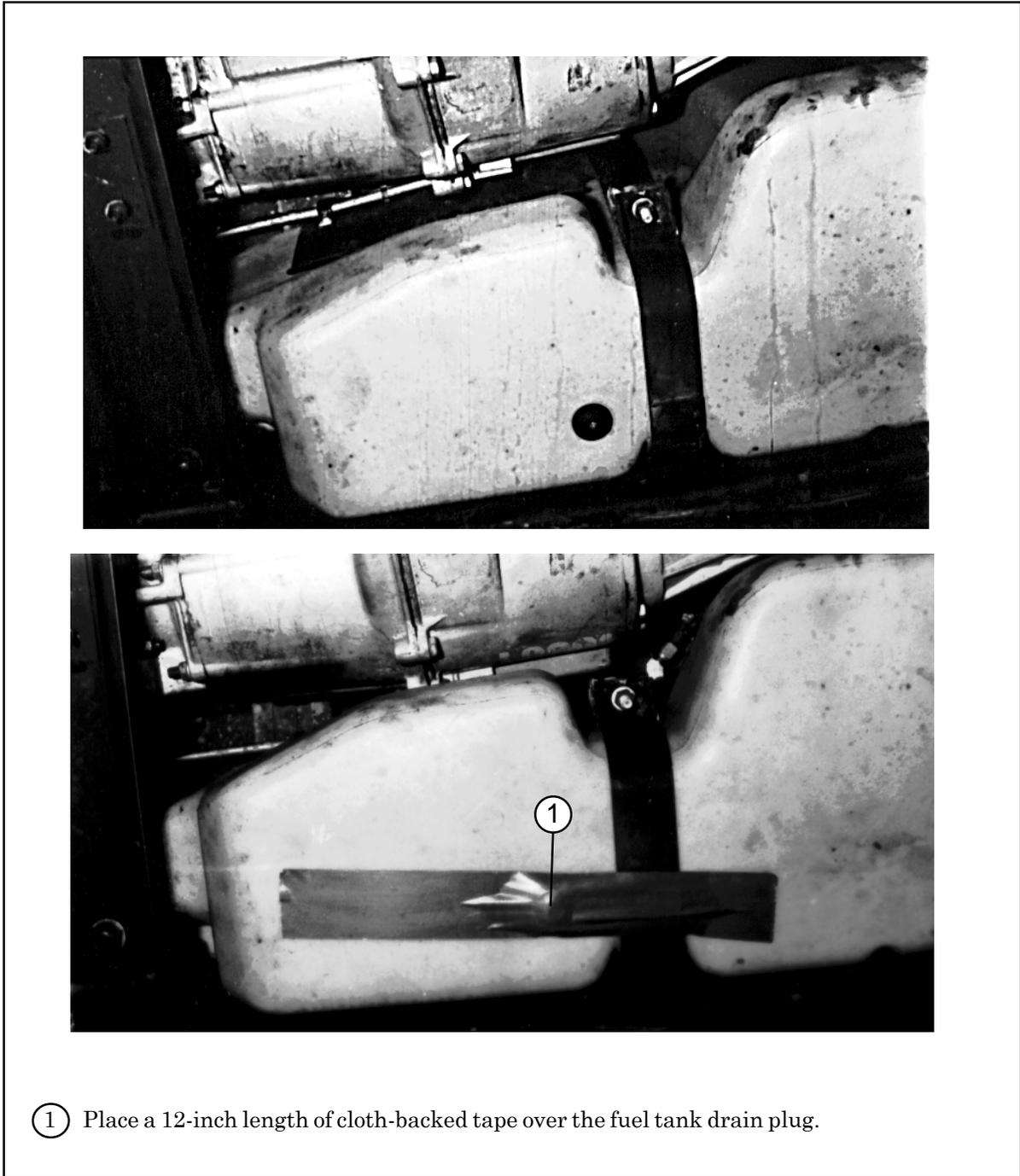
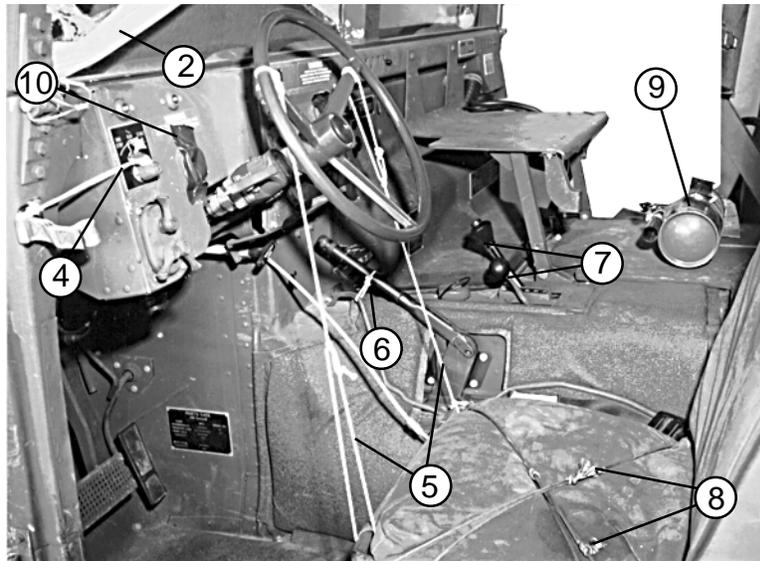


Figure 4-5. Fuel Tank Filler Cap and Opening Prepared



① Place a 12-inch length of cloth-backed tape over the fuel tank drain plug.

Figure 4-6. Fuel Tank Drain Plug Prepared



- ① Remove all doors, covers, and supporting bows (not shown).
- ② Tape the windshield glass on both sides in an X.
- ③ Remove and pad the mirrors. Secure them under the driver's seat with type III nylon cord (not shown).
- ④ Tie the engine start switch in the engine stop position with type I, 1/4-inch cotton webbing.
- ⑤ Tie the steering wheel to the seat frame in two places with type III nylon cord, or use the retractable steering wheel locking cable. If the locking cable is used, secure it to the steering wheel with type III nylon cord, not a padlock.
- ⑥ Tie the emergency brake handle in the off position with type III nylon cord.
- ⑦ Place the transmission and four-wheel drive levers in the neutral position.
- ⑧ Tie the seat cushions to the seat frames with type III nylon cord. Fold the passenger seats in four-door trucks and secure them with the pins provided.
- ⑨ Tie the fire extinguisher in place in its designed rack with two lengths of type III nylon cord.
- ⑩ Tape all instrument panel gauges.

Figure 4-7. Cab Prepared

d. Secure and pad radio equipment in the cab section as shown in Figure 4-8.

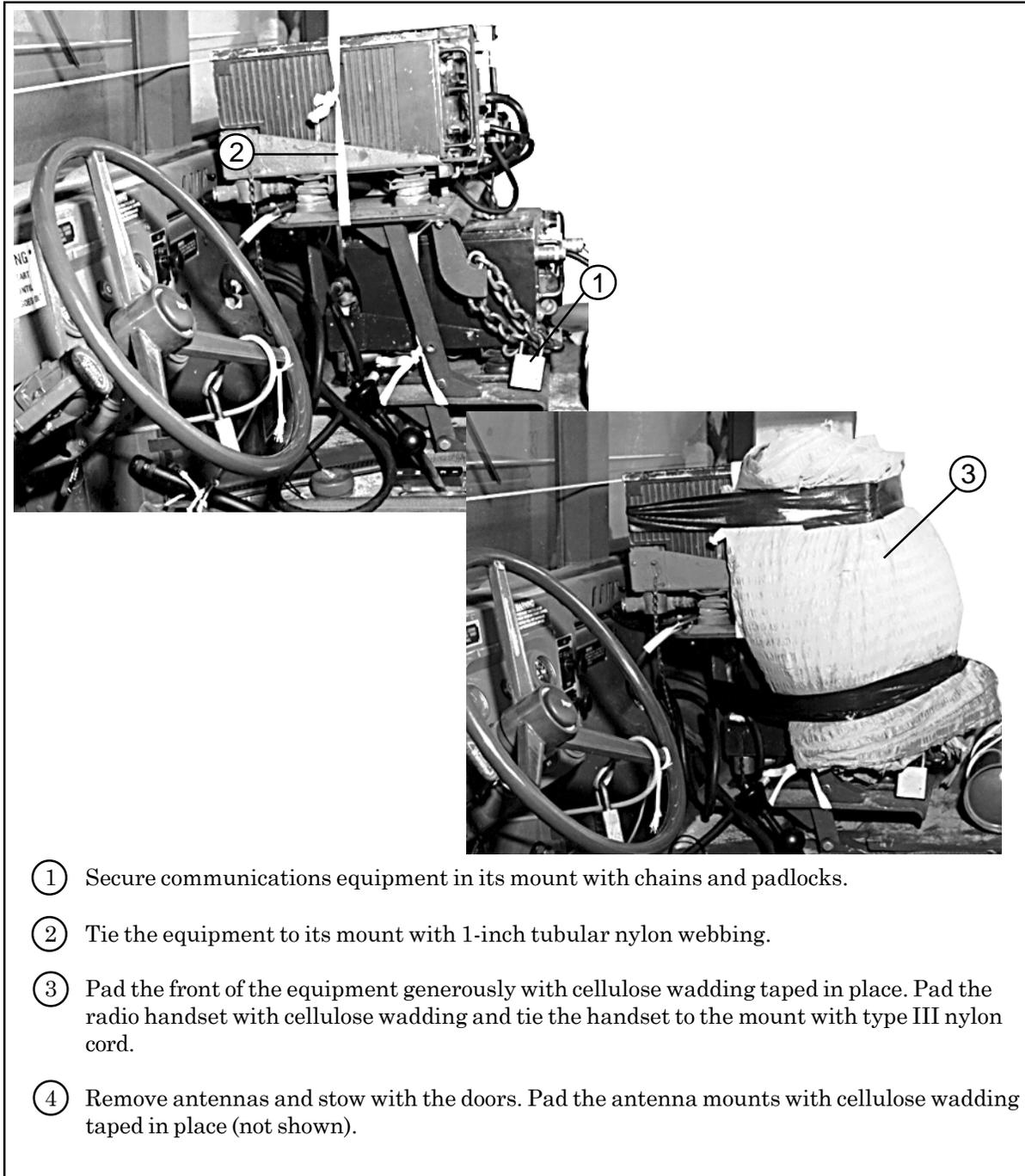
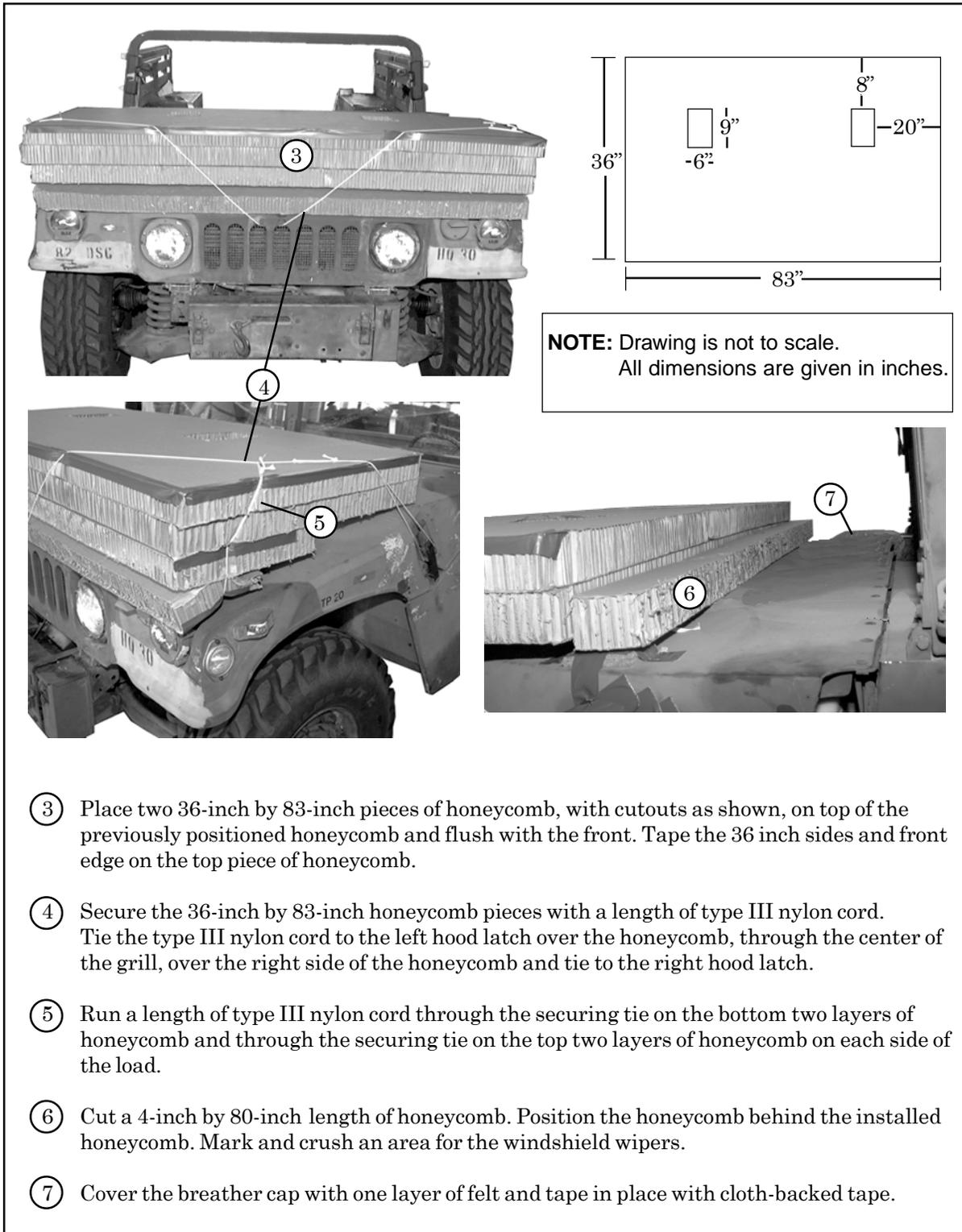
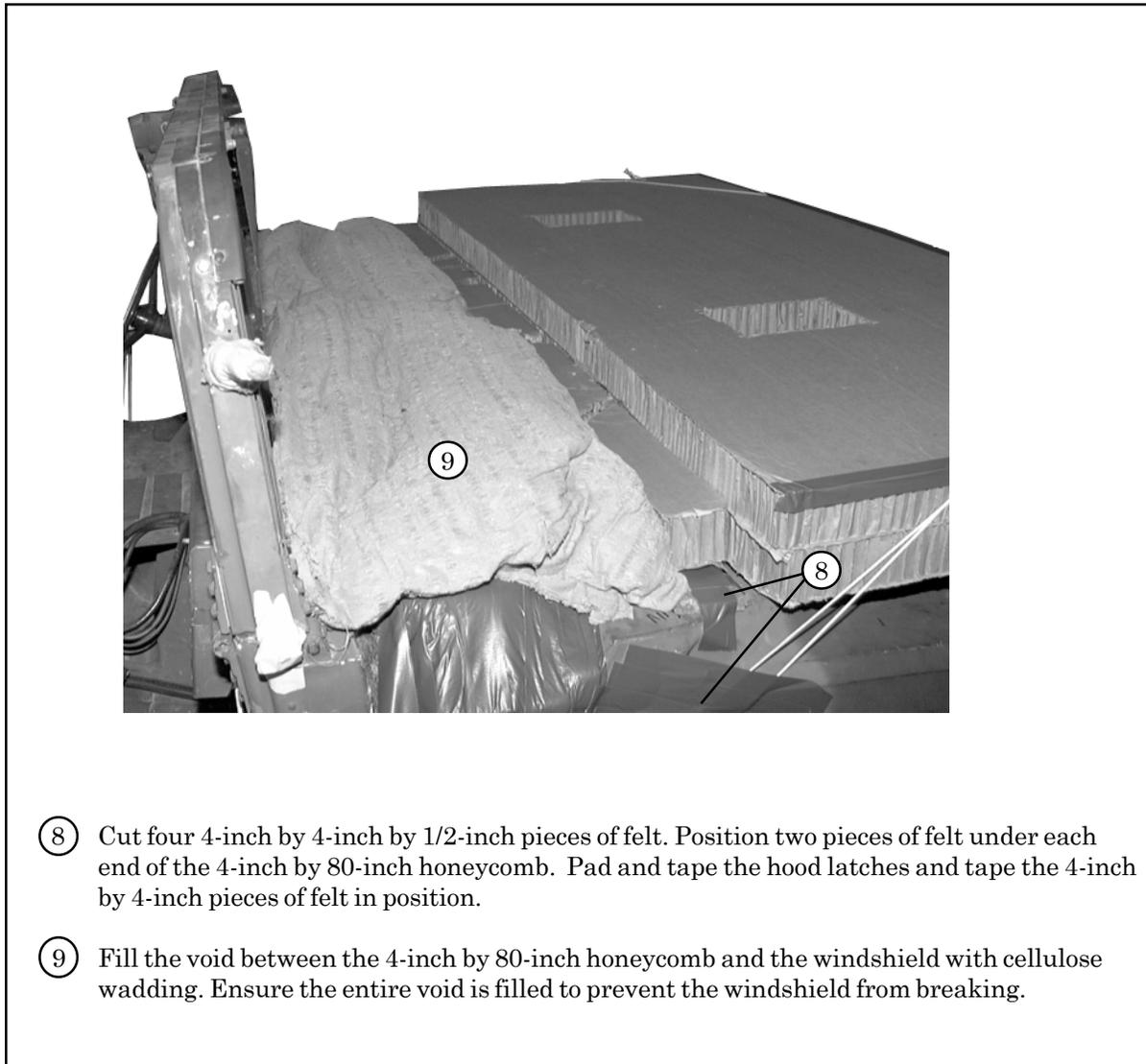


Figure 4-8. Communications Equipment Secured and Padded



- ③ Place two 36-inch by 83-inch pieces of honeycomb, with cutouts as shown, on top of the previously positioned honeycomb and flush with the front. Tape the 36 inch sides and front edge on the top piece of honeycomb.
- ④ Secure the 36-inch by 83-inch honeycomb pieces with a length of type III nylon cord. Tie the type III nylon cord to the left hood latch over the honeycomb, through the center of the grill, over the right side of the honeycomb and tie to the right hood latch.
- ⑤ Run a length of type III nylon cord through the securing tie on the bottom two layers of honeycomb and through the securing tie on the top two layers of honeycomb on each side of the load.
- ⑥ Cut a 4-inch by 80-inch length of honeycomb. Position the honeycomb behind the installed honeycomb. Mark and crush an area for the windshield wipers.
- ⑦ Cover the breather cap with one layer of felt and tape in place with cloth-backed tape.

Figure 4-9. Front of Truck Prepared (Continued)



- ⑧ Cut four 4-inch by 4-inch by 1/2-inch pieces of felt. Position two pieces of felt under each end of the 4-inch by 80-inch honeycomb. Pad and tape the hood latches and tape the 4-inch by 4-inch pieces of felt in position.
- ⑨ Fill the void between the 4-inch by 80-inch honeycomb and the windshield with cellulose wadding. Ensure the entire void is filled to prevent the windshield from breaking.

Figure 4-9. Front of Truck Prepared (Continued)

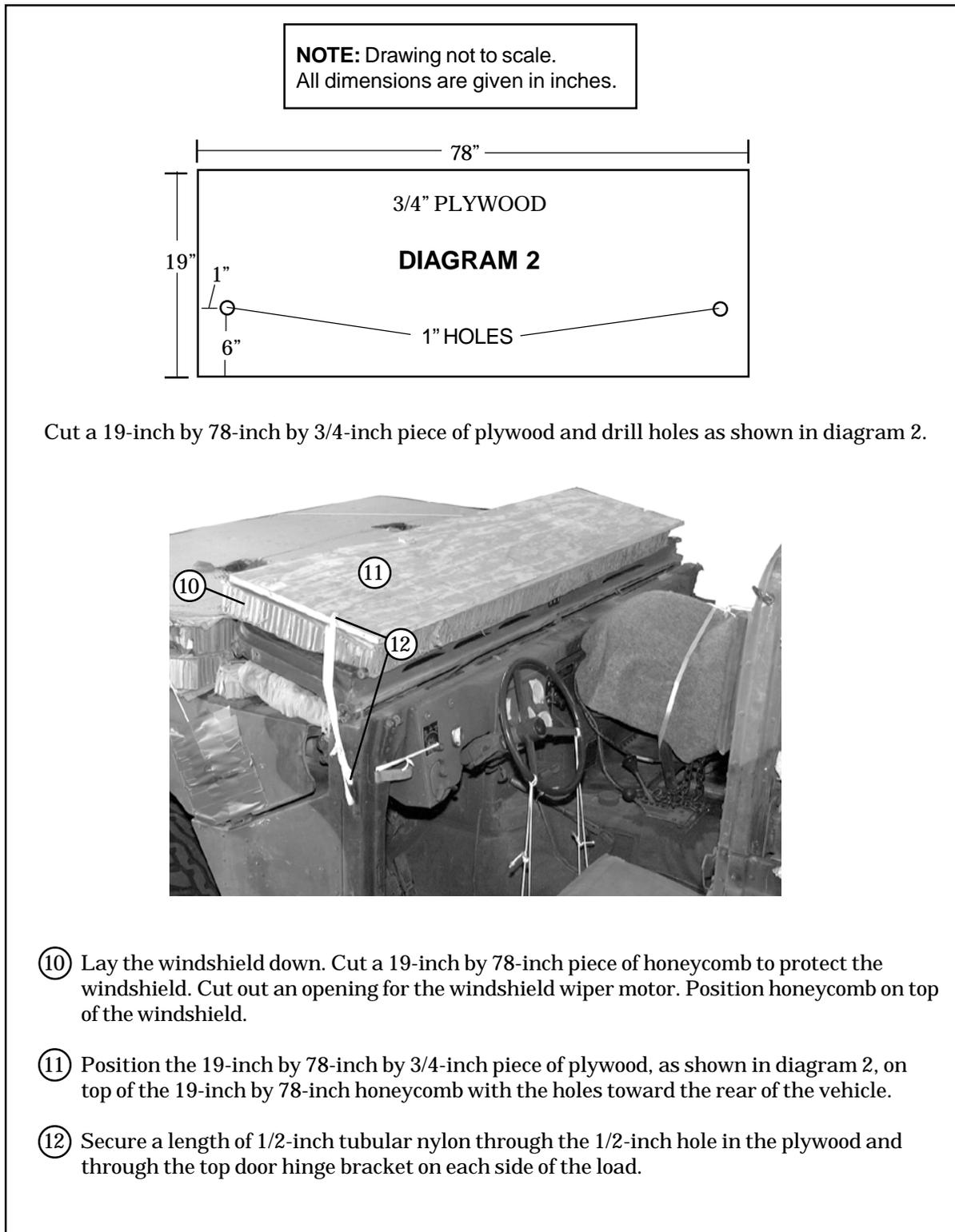


Figure 4-9. Front of Truck Prepared (Continued)

⑬ **SOFT TOP HMMWV FRONT ATTITUDE CONTROL SYSTEM**

NOTE: Drawings not to scale.
All dimensions are given in inches.

DIAGRAM 3

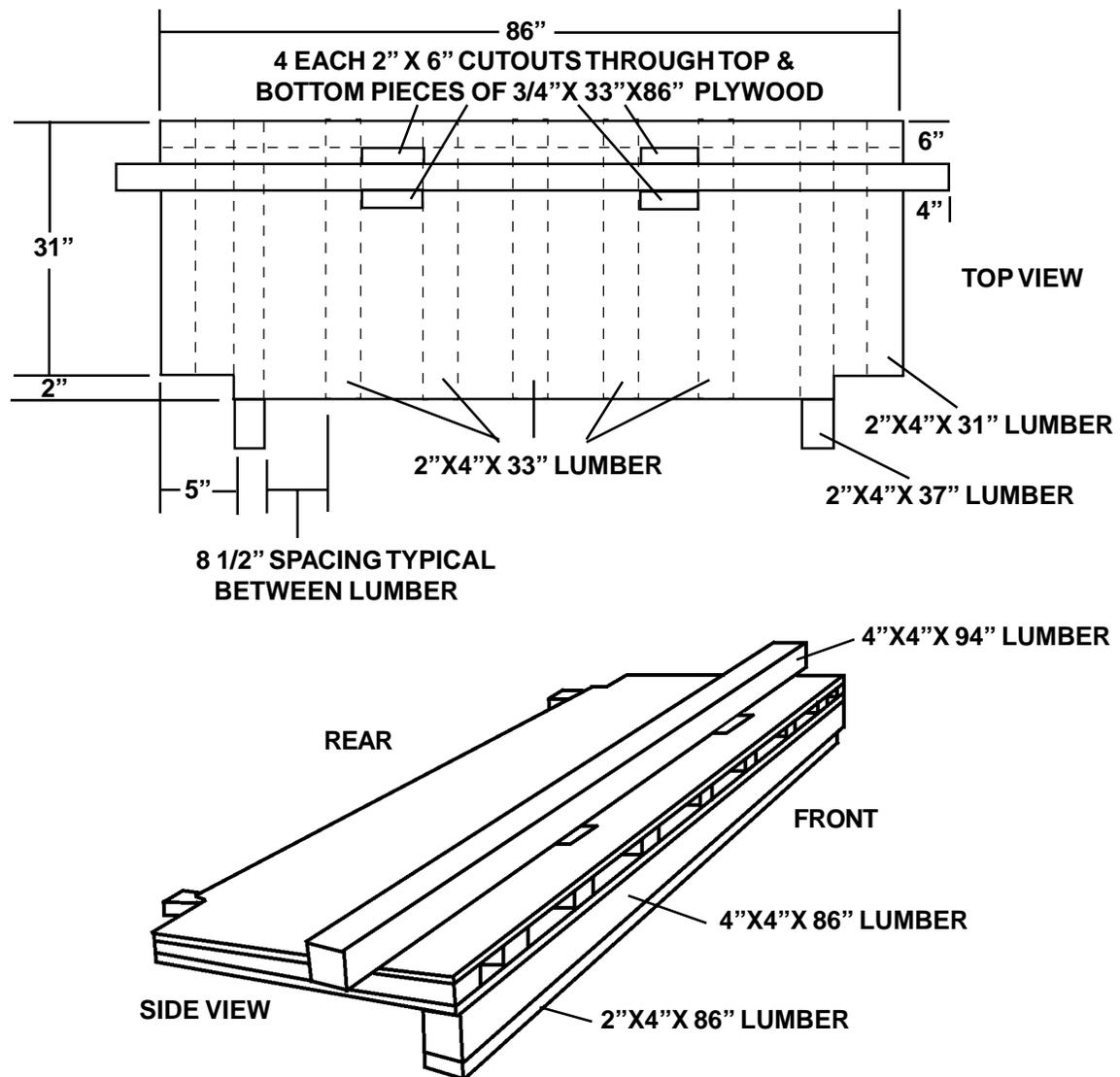
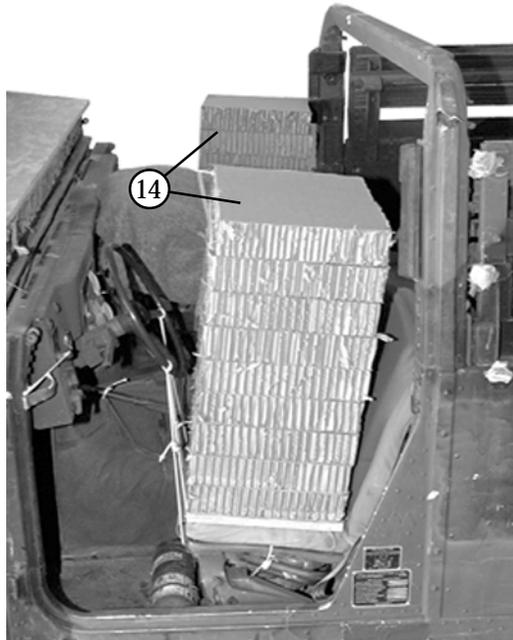


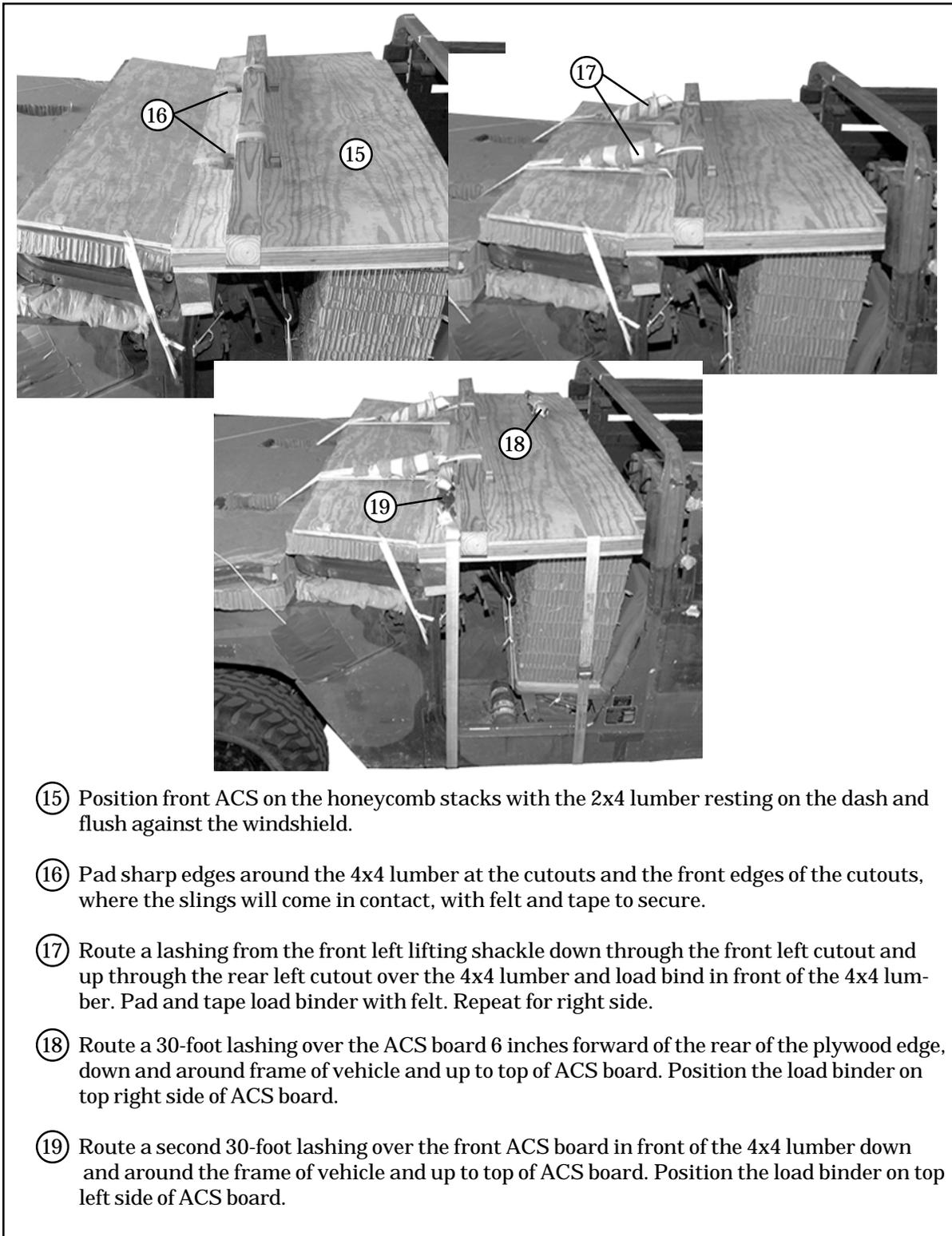
Figure 4-9. Front of Truck Prepared (Continued)

- ⑬ Build the soft top HMMWV front attitude control system (ACS) as described below and as shown in diagram 3 on previous page.
- a.* Make four 2-inch by 6-inch cutouts through the top and bottom of the plywood sheets 21 3/4-inches in from the edge of the plywood as shown in diagram 3.
 - b.* Nail two pieces of plywood with the 2x4's between them as shown in diagram 3 using 8d nails every 6 inches.
 - c.* Nail one 4x4x94-inch piece of lumber on top of the plywood sandwich, centered and 6-inches from the front edge using 40d nails every 10 inches.
 - d.* Nail one 4x4x86-inch piece of lumber on the bottom front edge of the plywood sandwich using 40d nails every 10 inches.
 - e.* Nail one 2x4x86-inch piece of lumber to the bottom of the 4x4x86 piece of lumber previously installed using 10d nails every 10 inches.



- ⑭ Build two honeycomb stacks using nine 14-inch by 20-inch sheets of honeycomb glued together with a 3/4-inch by 14-inch by 20-inch piece of plywood glued to the bottom. Place one on each seat with the plywood to the bottom.

Figure 4-9. Front of Truck Prepared (Continued)



- ⑮ Position front ACS on the honeycomb stacks with the 2x4 lumber resting on the dash and flush against the windshield.
- ⑯ Pad sharp edges around the 4x4 lumber at the cutouts and the front edges of the cutouts, where the slings will come in contact, with felt and tape to secure.
- ⑰ Route a lashing from the front left lifting shackle down through the front left cutout and up through the rear left cutout over the 4x4 lumber and load bind in front of the 4x4 lumber. Pad and tape load binder with felt. Repeat for right side.
- ⑱ Route a 30-foot lashing over the ACS board 6 inches forward of the rear of the plywood edge, down and around frame of vehicle and up to top of ACS board. Position the load binder on top right side of ACS board.
- ⑲ Route a second 30-foot lashing over the front ACS board in front of the 4x4 lumber down and around the frame of vehicle and up to top of ACS board. Position the load binder on top left side of ACS board.

Figure 4-9. Front of Truck Prepared (Continued)

f. Prepare and secure the pioneer tool kit according to TM 9-2320-280-10/TO 36A12-1A-2091-1/TM 2320-10/6 and as shown in Figure 4-10.

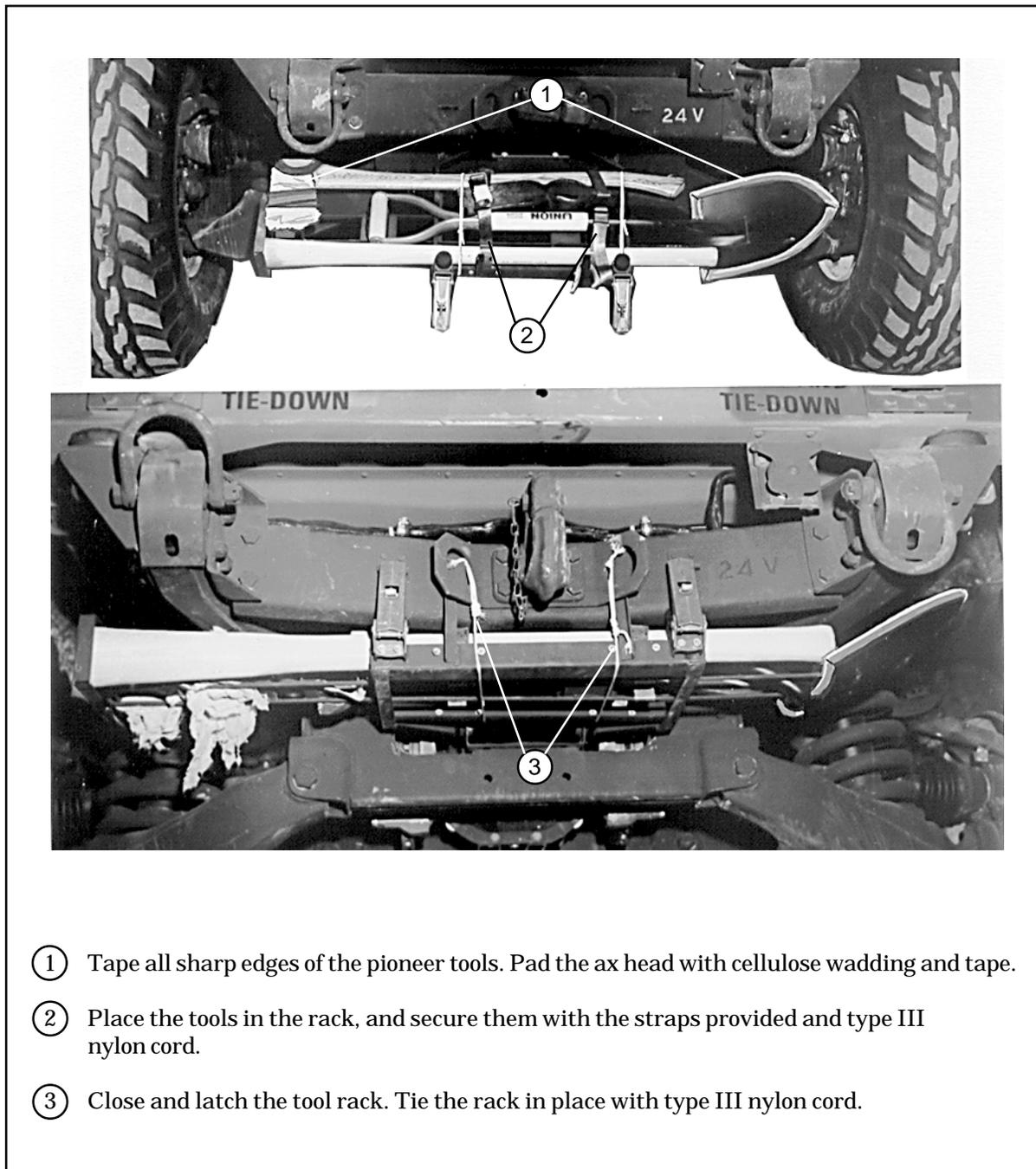
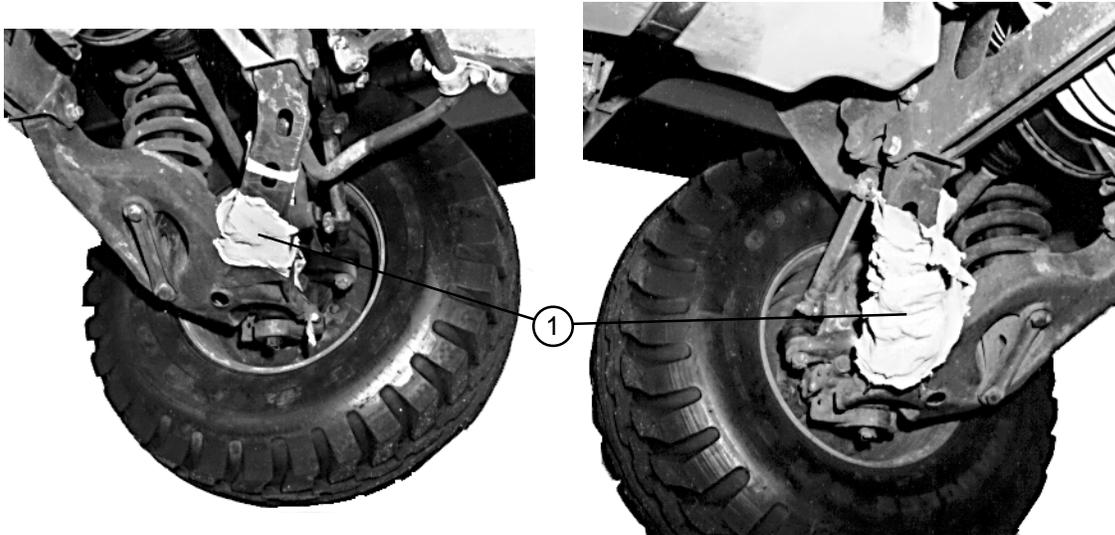
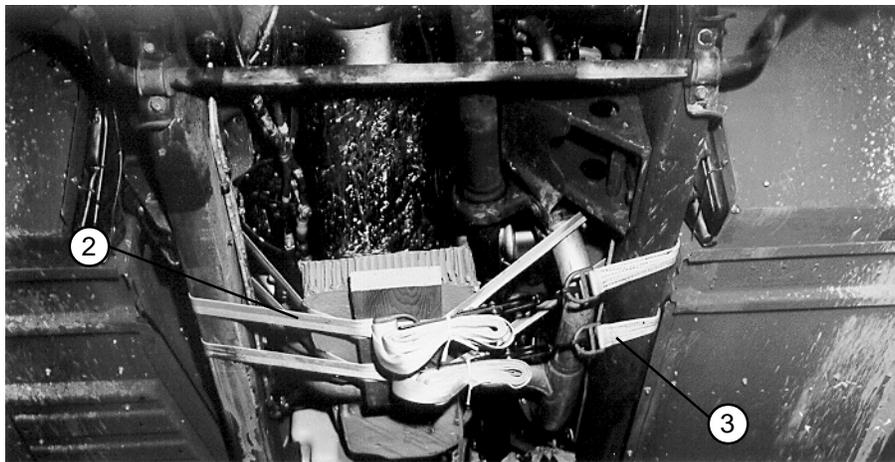


Figure 4-10. Pioneer Tool Kit Secured

g. Prepare the underside of the truck as shown in Figure 4-11.



- ① Pad the lower control arms on the front and rear of the truck with cellulose wadding and tape in place.



- ② Pass a 15-foot lashing over the right frame rail, under the oil pan, and over the left frame rail. Make sure the lashing goes over the exhaust pipe and then under it. Make sure the wires running along the frame rail are to the outside of the lashing. Place a 12-inch by 12-inch piece of honeycomb and a 2- by 6- by 16-inch piece of lumber between the lashing and the oil pan. Secure the lashing with a load binder and D-ring.
- ③ Install another lashing just to the rear of the lashing installed in step 2 above. Route the lashing in the same way.

Figure 4-11. Under Side of Truck Prepared

STOWING ACCOMPANYING LOAD

4-6. Use the procedures shown in Figure 4-12 to stow 16 boxes of 105 mm ammunition and truck equipment.

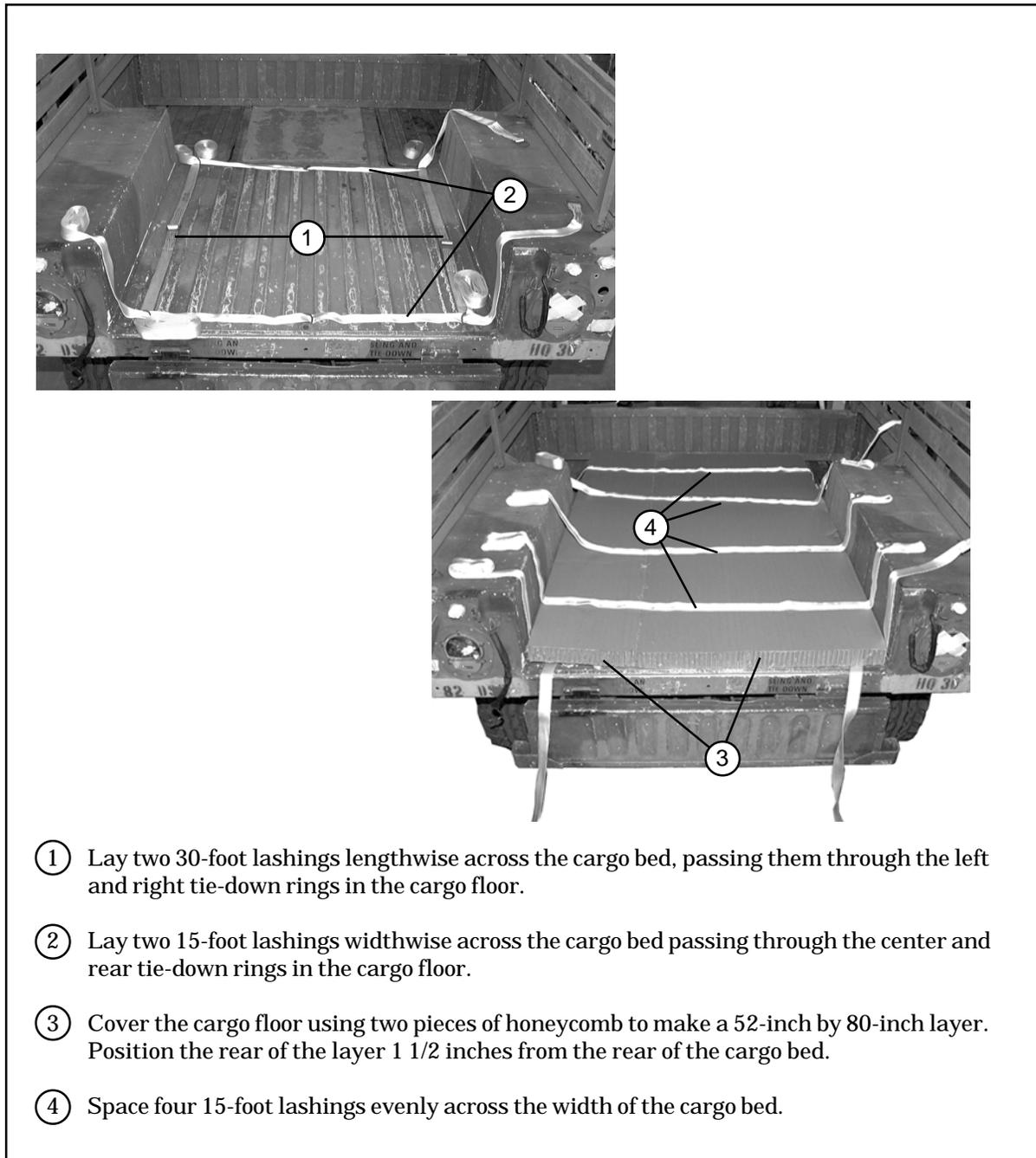
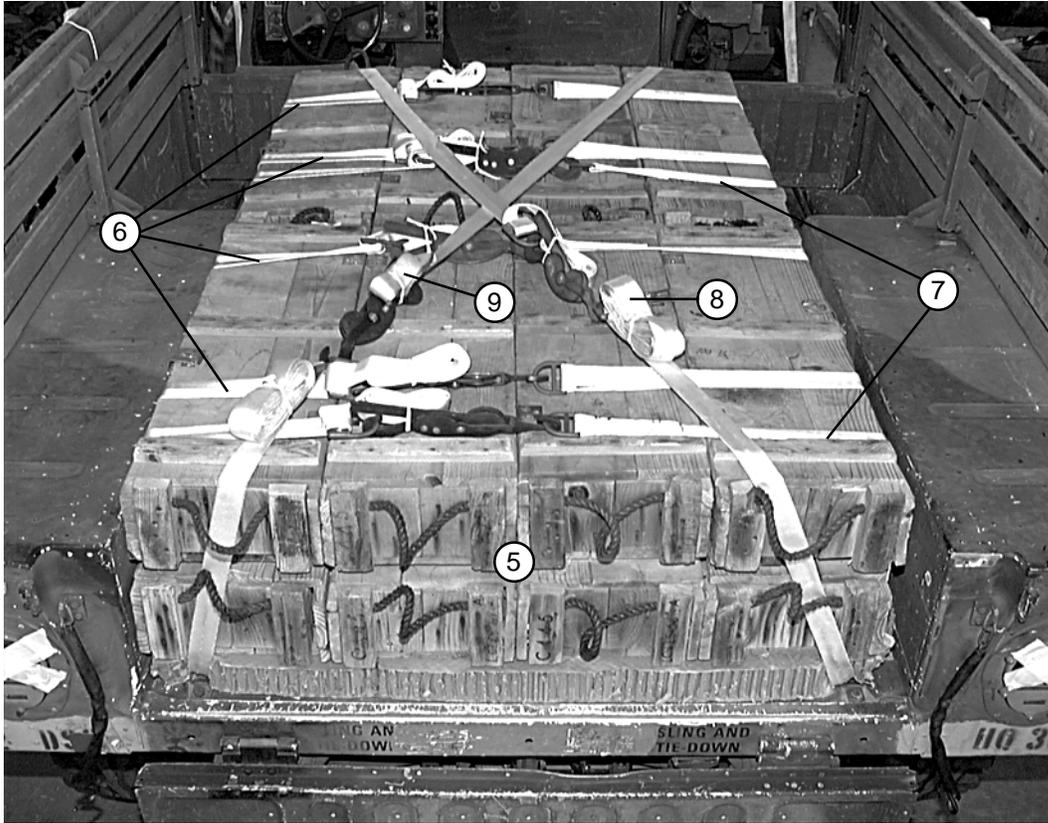
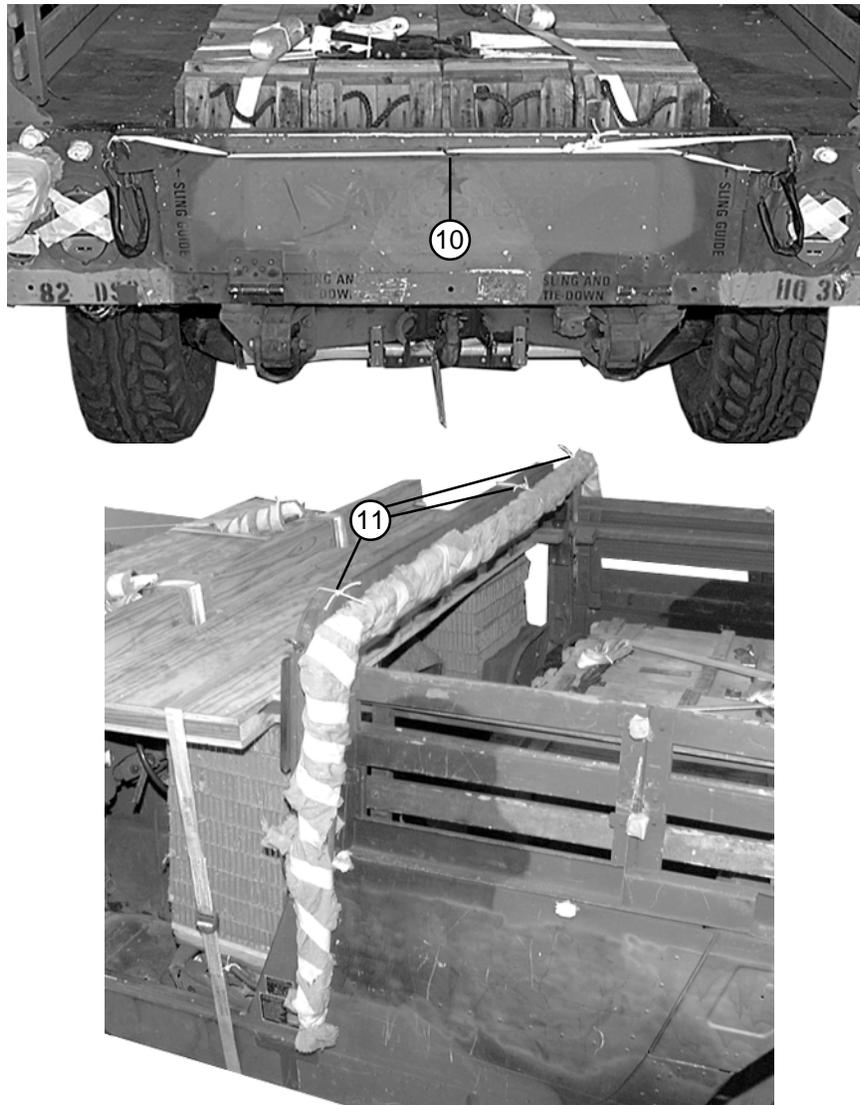


Figure 4-12. Stowing Ammunition and Truck Equipment



- ⑤ Position 16 boxes of 105 mm ammunition on the honeycomb in two layers of eight boxes.
- ⑥ Bind the boxes together with the four side-to-side lashings placed in step 4.
- ⑦ Secure the lashings placed in step 2.
- ⑧ Join the left front and right rear 30-foot lashing placed in step 1 with two D-rings and load binder.
- ⑨ Join the left rear and right front 30-foot lashing placed in step 1 in the same way as in step 8.

Figure 4-12. Stowing Ammunition and Truck Equipment (Continued)



- ⑩ Close the tailgate. Secure it to the chain hook brackets with a double length of 1/2-inch tubular nylon.
- ⑪ Wrap the truck tarpaulin bows in cellulose wadding and tape the wadding in place. Position the bows with the legs on the outside of the sideboards on the front of the cargo bed. Secure the bows to the top crew compartment cross-member with type III nylon cord.

Figure 4-12. Stowing Ammunition and Truck Equipment (Continued)

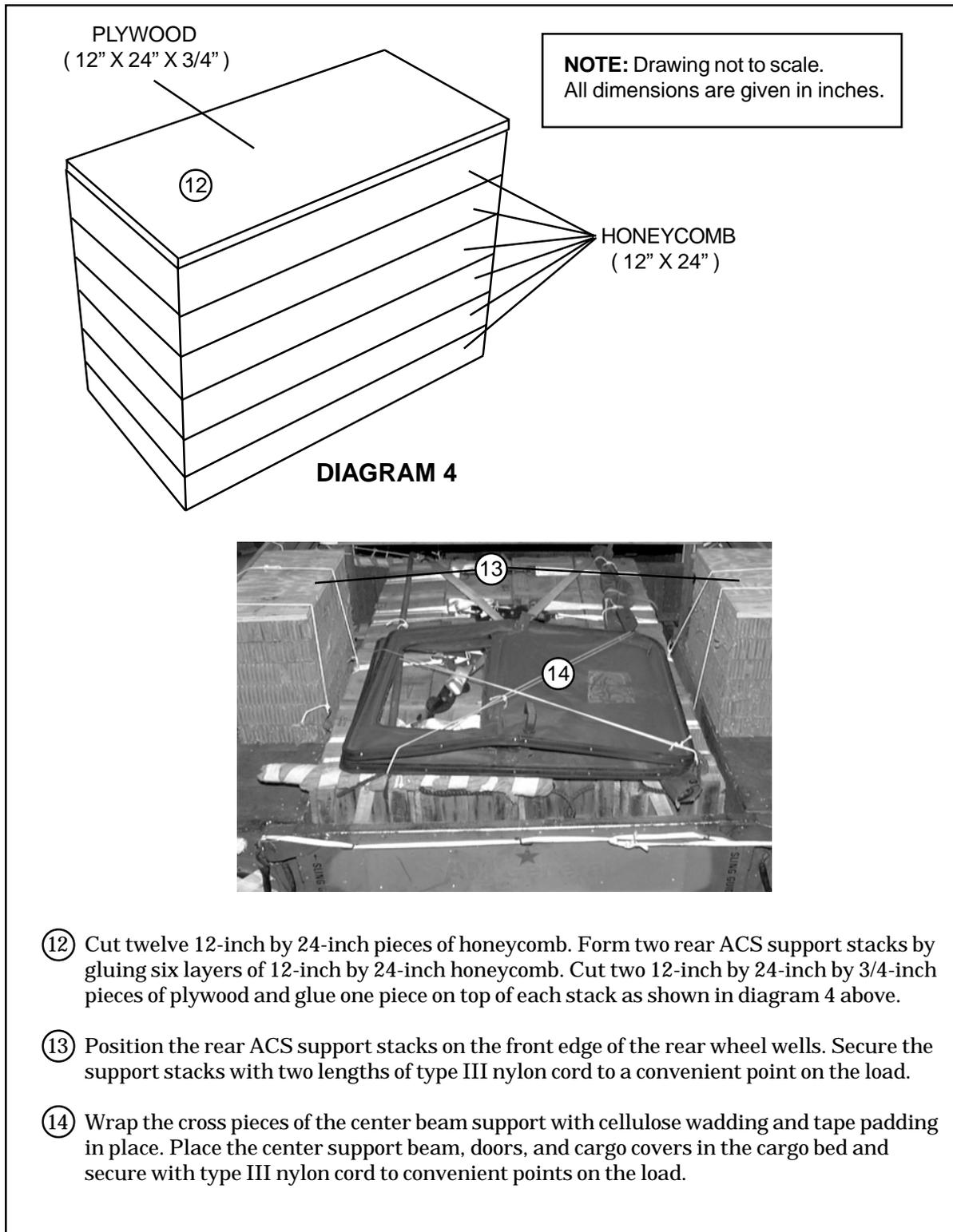


Figure 4-12. Stowing Ammunition and Truck Equipment (Continued)

LIFTING AND POSITIONING TRUCK AND INSTALLING OPTIONAL DRIVE-OFF AIDS

4-7. Install the lift slings and position the truck on the honeycomb stacks as shown in Figure 4-13. Attach the optional drive-off aids to the wheels of the truck as shown in Chapter 3.

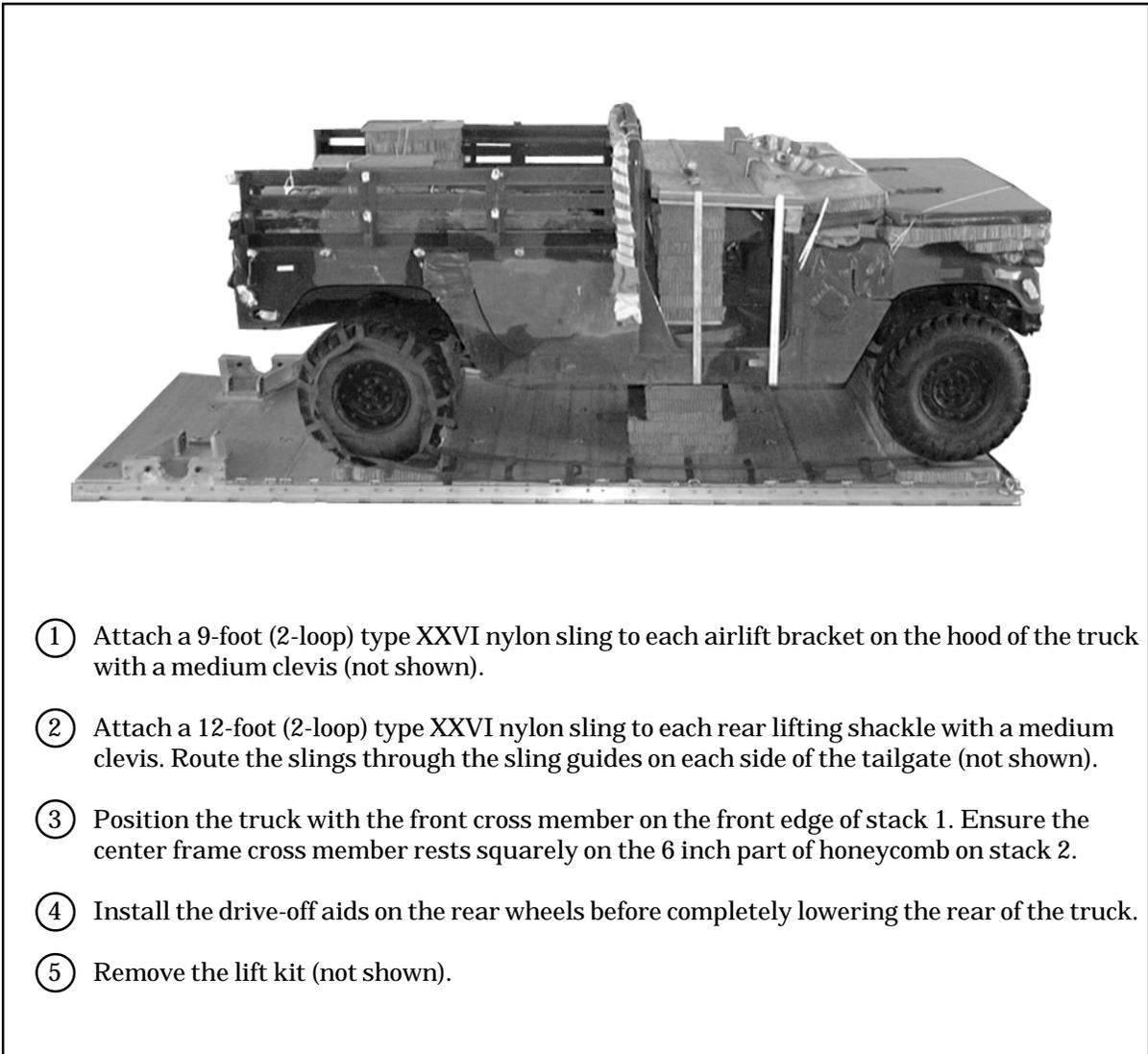
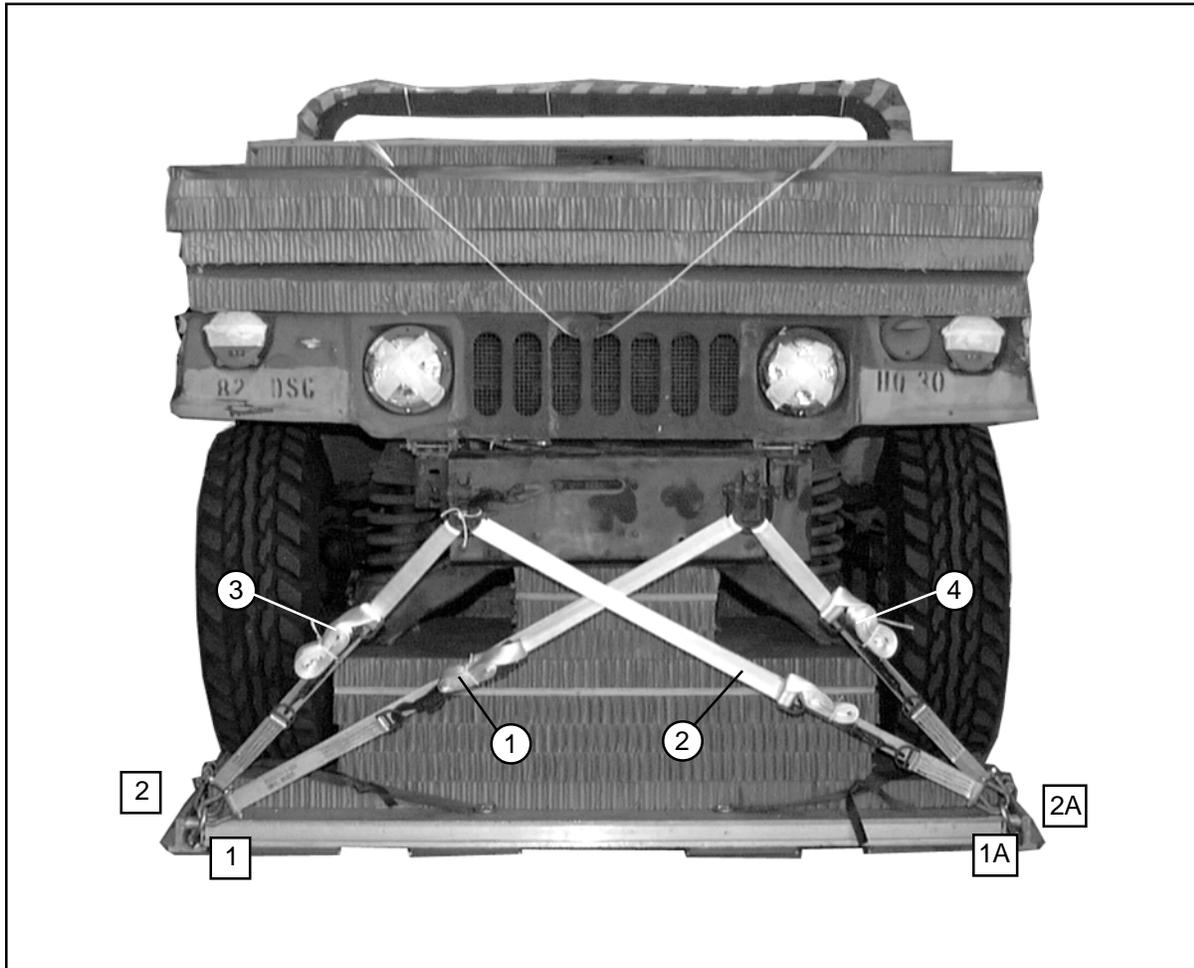


Figure 4-13. Truck Positioned

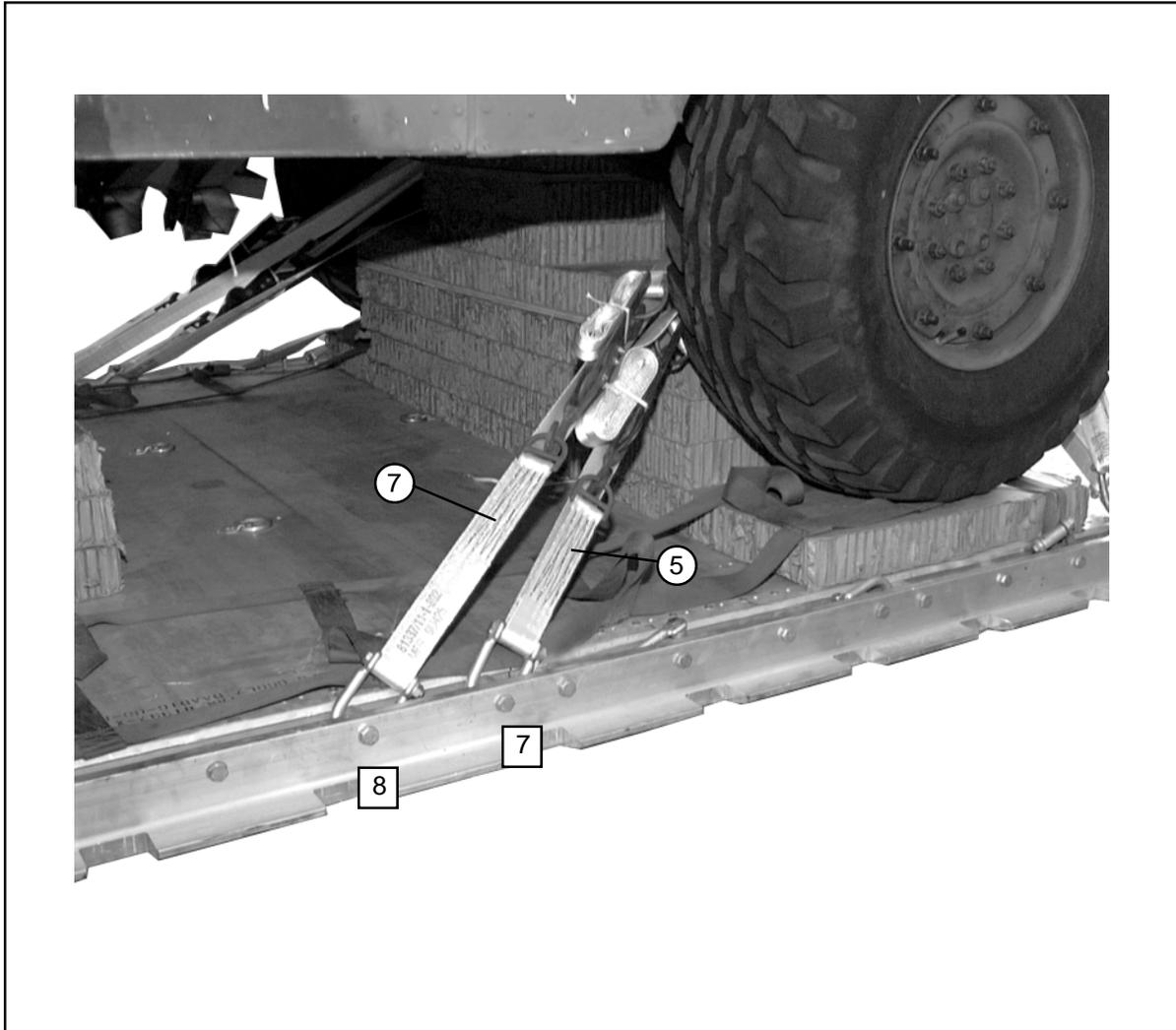
LASHING TRUCK

4-8. Lash the truck to the platform according to Chapter 3 and as shown in Figures 4-14 through 4-17.



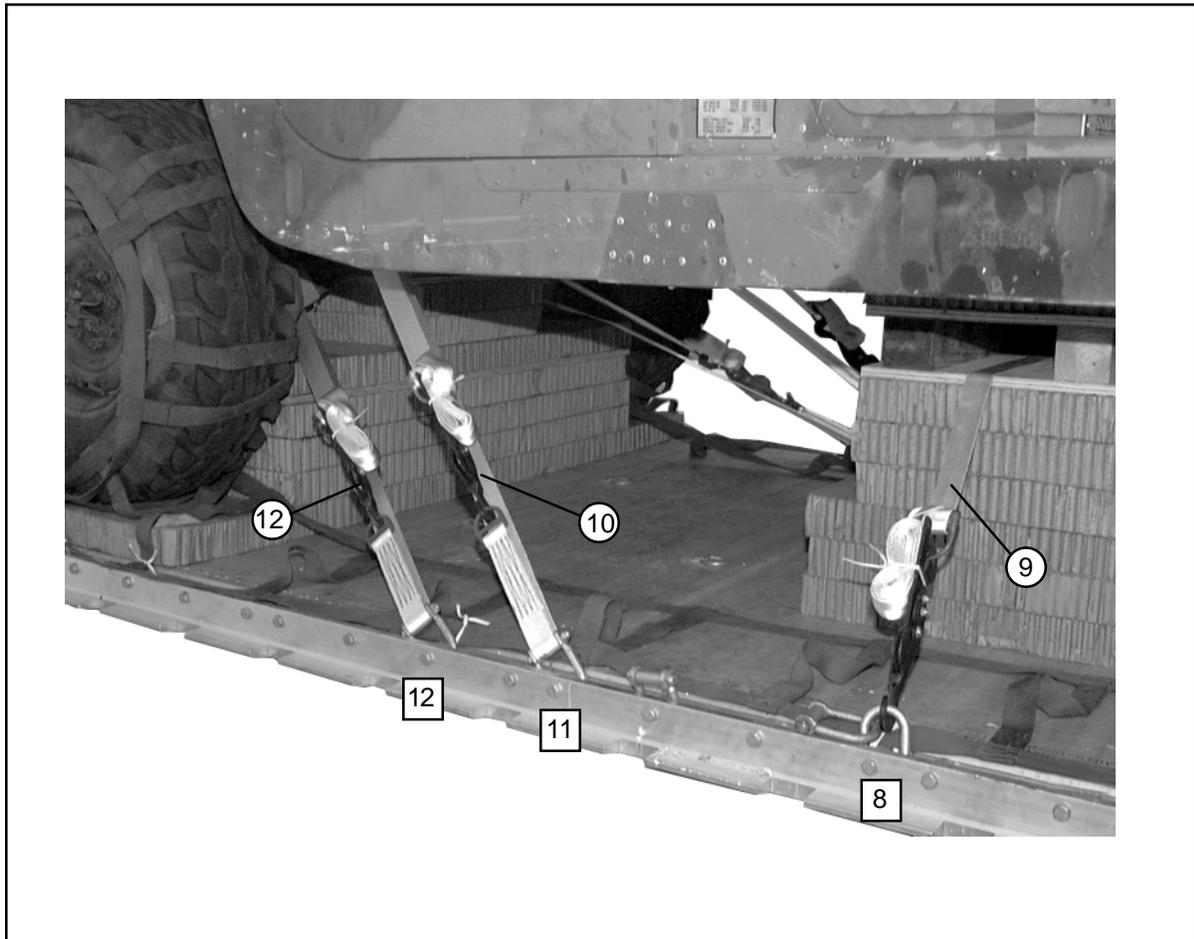
Lashing Number	Tiedown Clevis Number	Instructions
<p>1 2 3 4</p>	<p>1 1A 2 2A</p>	<p>Pass lashing: Through left front tiedown point Through right front tiedown point Through right front tiedown point Through left front tiedown point</p>

Figure 4-14. Lashings 1 through 4 Installed



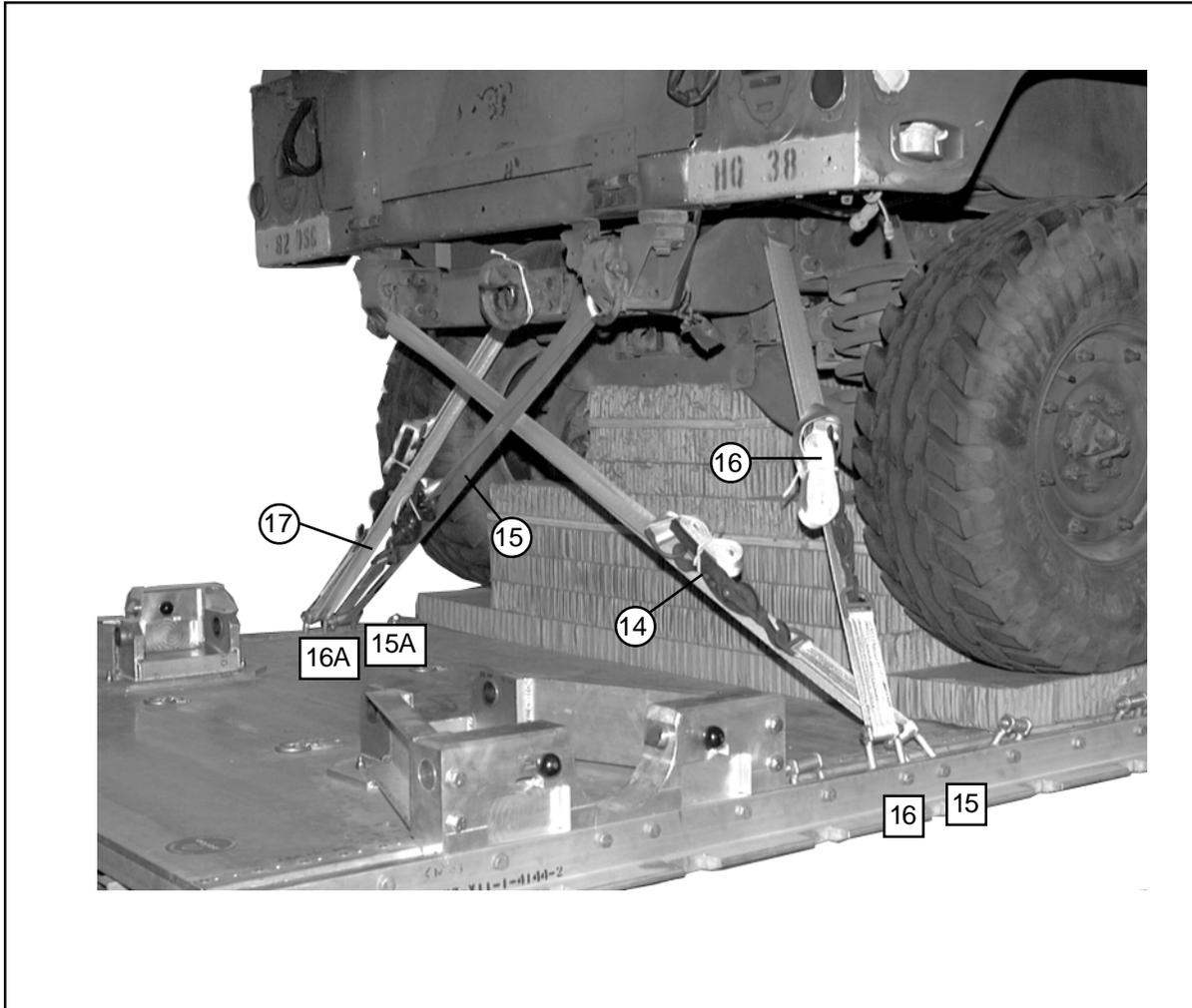
Lashing Number	Tiedown Clevis Number	Instructions
5	6	Pass lashing: Around right front lower control arm Around left front lower control arm Through tiedown bracket behind right front coil spring Through tiedown bracket behind left front coil spring
6	6A	
7	7	
8	7A	

Figure 4-15. Lashings 5 through 8 Installed



Lashing Number	Tiedown Clevis Number	Instructions
9	8A and 8	Pass lashing: Through clevis 8A and back through it's own D-ring through stack 2, Load bind to clevis 8
10	11	Through tiedown bracket in front of right rear coil spring
11	11A	Through tiedown bracket in front of left rear coil spring
12	12	Around right rear lower control arm
13	12A	Around left rear lower control arm

Figure 4-16. Lashings 9 through 13 Installed



Lashing Number	Tiedown Clevis Number	Instructions
<p>14 15 16 17</p>	<p>15 15A 16 16A</p>	<p>Pass lashing: Through left rear tiedown point Through right rear tiedown point Through right rear tiedown point behind the coil spring Through left rear tiedown point behind the coil spring</p>

Figure 4-17. Lashings 14 through 17 Installed

INSTALLING SUSPENSION SLINGS AND REAR ATTITUDE CONTROL SYSTEM

4-9. Construct, inspect, and position the rear Attitude Control System (ACS) according to Chapter 3 and as shown in Figure 4-18. Install the suspension slings and secure ACS according to Chapter 3 and as shown in Figure 4-19.

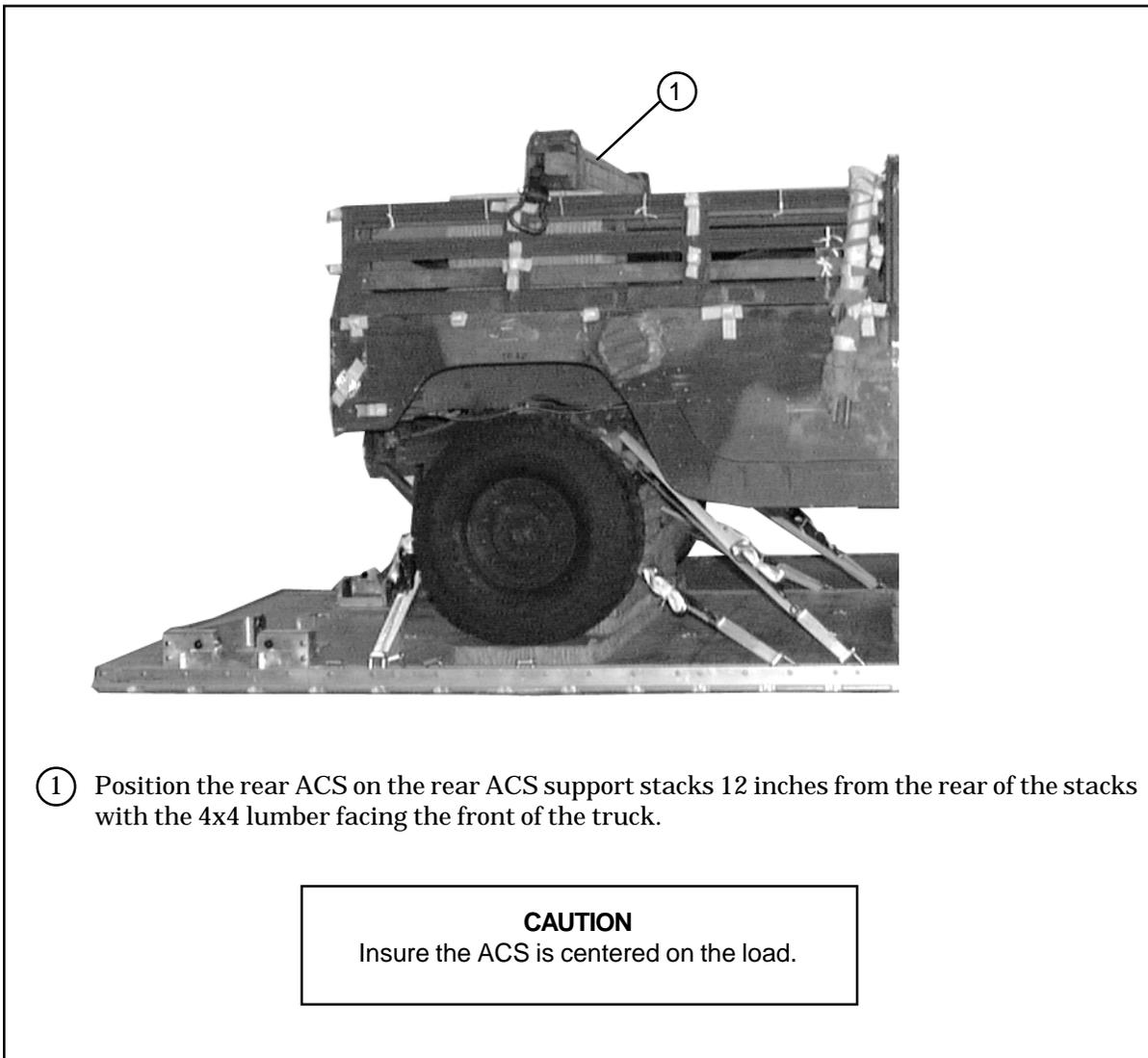
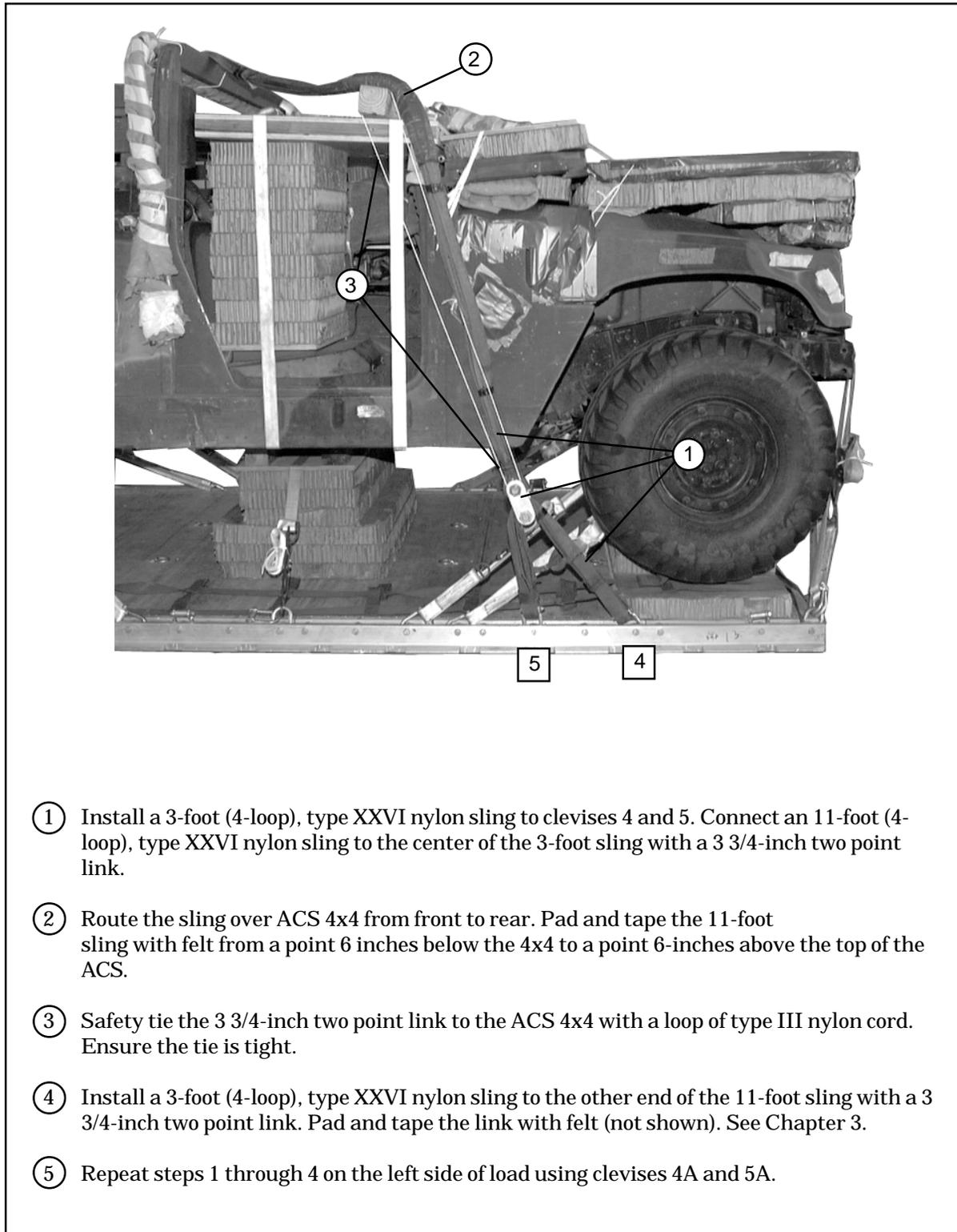
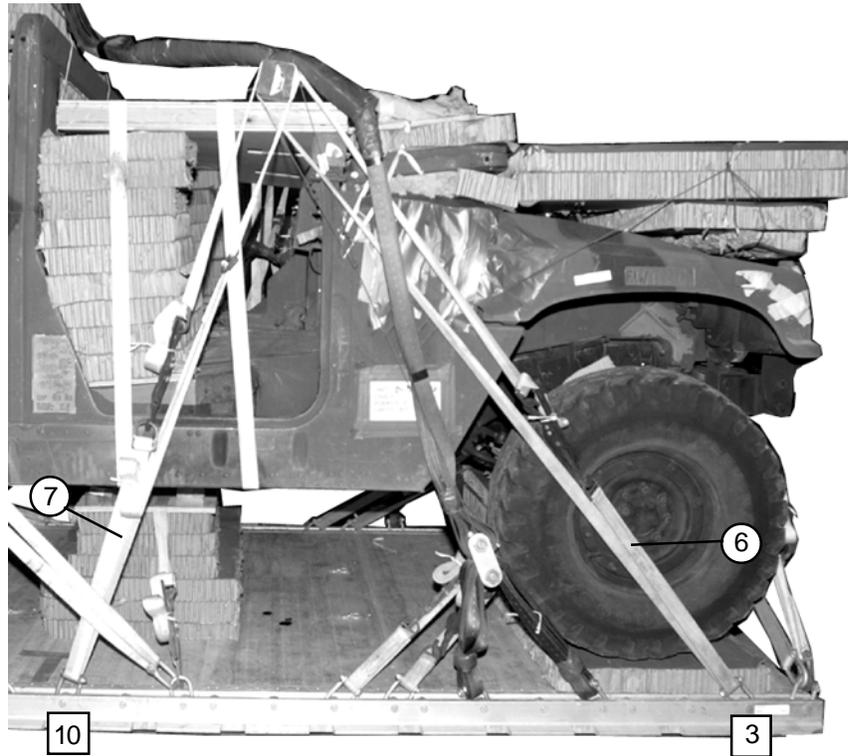


Figure 4-18. Rear Attitude Control System Positioned



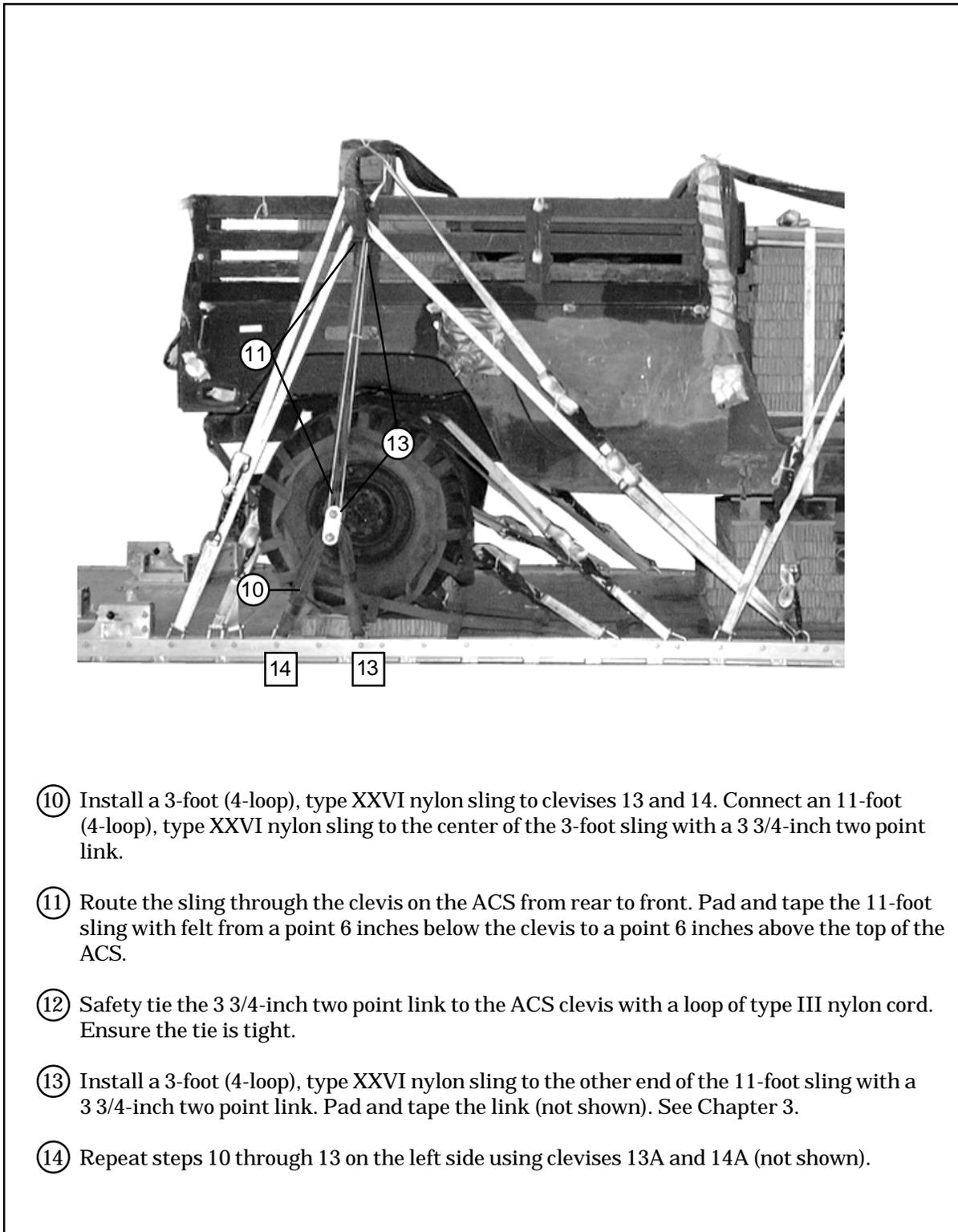
- ① Install a 3-foot (4-loop), type XXVI nylon sling to clevises 4 and 5. Connect an 11-foot (4-loop), type XXVI nylon sling to the center of the 3-foot sling with a 3 3/4-inch two point link.
- ② Route the sling over ACS 4x4 from front to rear. Pad and tape the 11-foot sling with felt from a point 6 inches below the 4x4 to a point 6-inches above the top of the ACS.
- ③ Safety tie the 3 3/4-inch two point link to the ACS 4x4 with a loop of type III nylon cord. Ensure the tie is tight.
- ④ Install a 3-foot (4-loop), type XXVI nylon sling to the other end of the 11-foot sling with a 3 3/4-inch two point link. Pad and tape the link with felt (not shown). See Chapter 3.
- ⑤ Repeat steps 1 through 4 on the left side of load using clevises 4A and 5A.

Figure 4-19. Slings Installed and ACS Secured



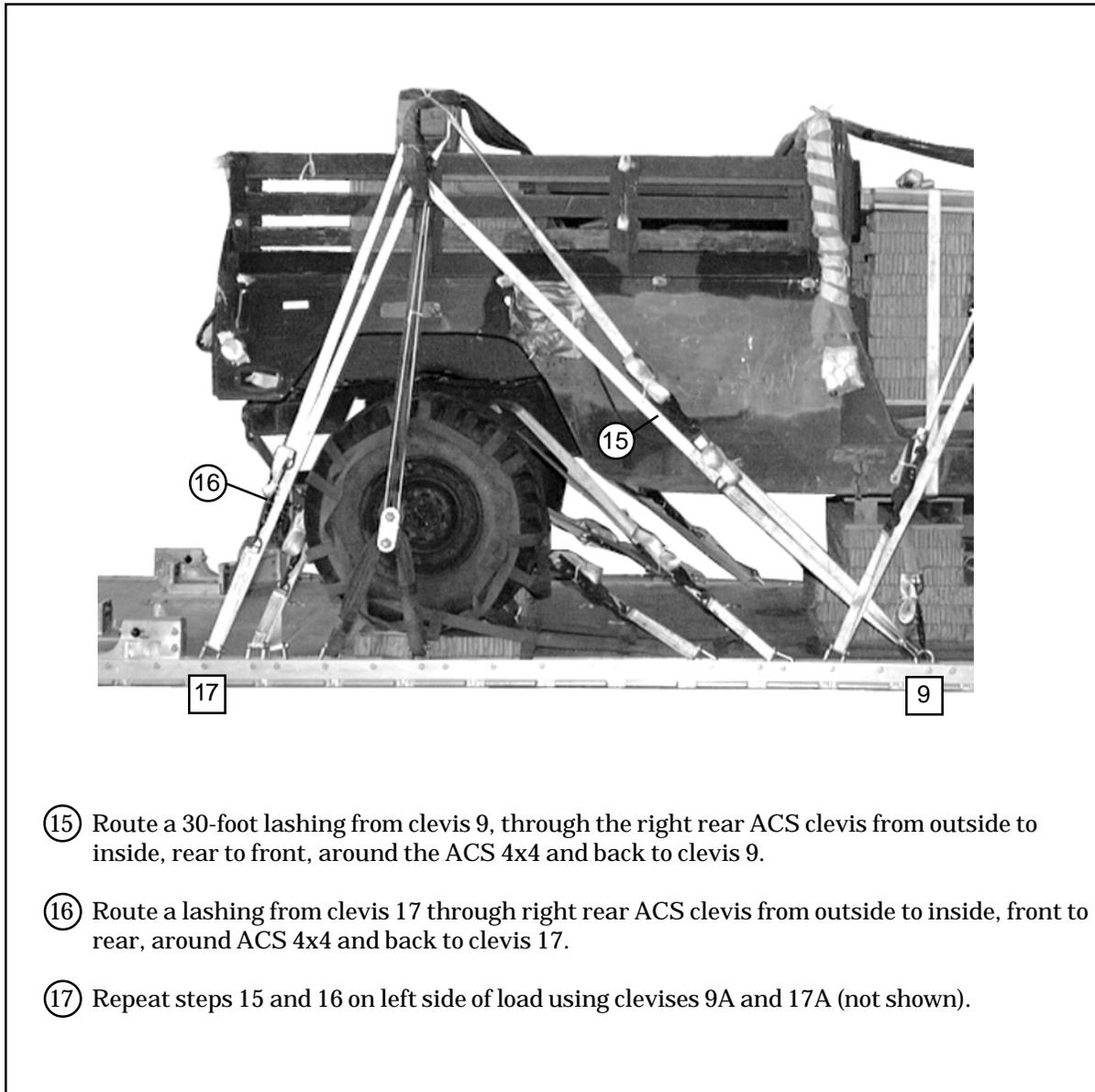
- ⑥ Route a lashing from clevis 3 over right ACS 4x4 from rear to front, around the ACS 4 by 4-inch lumber and back to clevis 3.
- ⑦ Route a lashing from clevis 10 under right ACS 4x4 from front to rear, up and around the ACS 4x4 and back to clevis 10.
- ⑧ Repeat steps 7 through 9 on the left side of load using clevises 3A and 10A (not shown).
- ⑨ Ensure the ACS is straight and centered on load. Load binders on both sides of the load must be closed at the same time in the following sequence: 3 and 3A, 10 and 10A.

Figure 4-19. Slings Installed and ACS Secured (Continued)



- ⑩ Install a 3-foot (4-loop), type XXVI nylon sling to clevises 13 and 14. Connect an 11-foot (4-loop), type XXVI nylon sling to the center of the 3-foot sling with a 3 3/4-inch two point link.
- ⑪ Route the sling through the clevis on the ACS from rear to front. Pad and tape the 11-foot sling with felt from a point 6 inches below the clevis to a point 6 inches above the top of the ACS.
- ⑫ Safety tie the 3 3/4-inch two point link to the ACS clevis with a loop of type III nylon cord. Ensure the tie is tight.
- ⑬ Install a 3-foot (4-loop), type XXVI nylon sling to the other end of the 11-foot sling with a 3 3/4-inch two point link. Pad and tape the link (not shown). See Chapter 3.
- ⑭ Repeat steps 10 through 13 on the left side using clevises 13A and 14A (not shown).

Figure 4-19. Slings Installed and ACS Secured (Continued)



- ⑮ Route a 30-foot lashing from clevis 9, through the right rear ACS clevis from outside to inside, rear to front, around the ACS 4x4 and back to clevis 9.
- ⑯ Route a lashing from clevis 17 through right rear ACS clevis from outside to inside, front to rear, around ACS 4x4 and back to clevis 17.
- ⑰ Repeat steps 15 and 16 on left side of load using clevises 9A and 17A (not shown).

Figure 4-19. Slings Installed and ACS Secured (Continued)

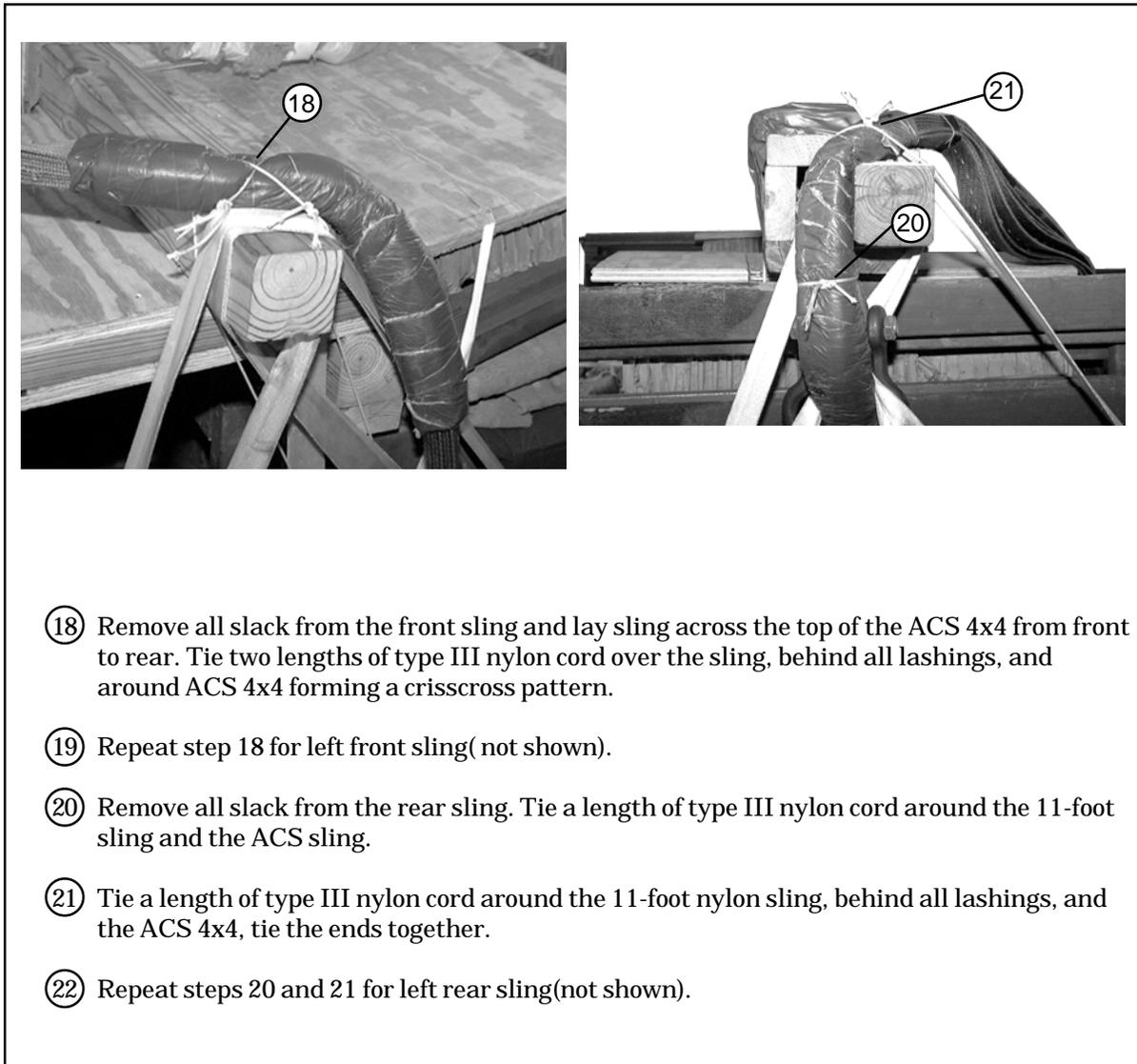


Figure 4-19. Slings Installed and ACS Secured (Continued)

INSTALLING OUTRIGGER ASSEMBLIES

4-10. Assemble, install, and safety the mast and foot assemblies on the DRAS platform according to TM 10-1670-268-20&P/TO 13C7-52-22 and as shown in Chapter 3, Figures 3-33 through 3-35 and Figure 3-36 steps 1,2,and 3.

STOWING CARGO PARACHUTES

4-11. Prepare, stow, and restrain three G-11D cargo parachutes on top of the hood of the truck as shown in Chapter 3 and as shown in Figure 4-20.

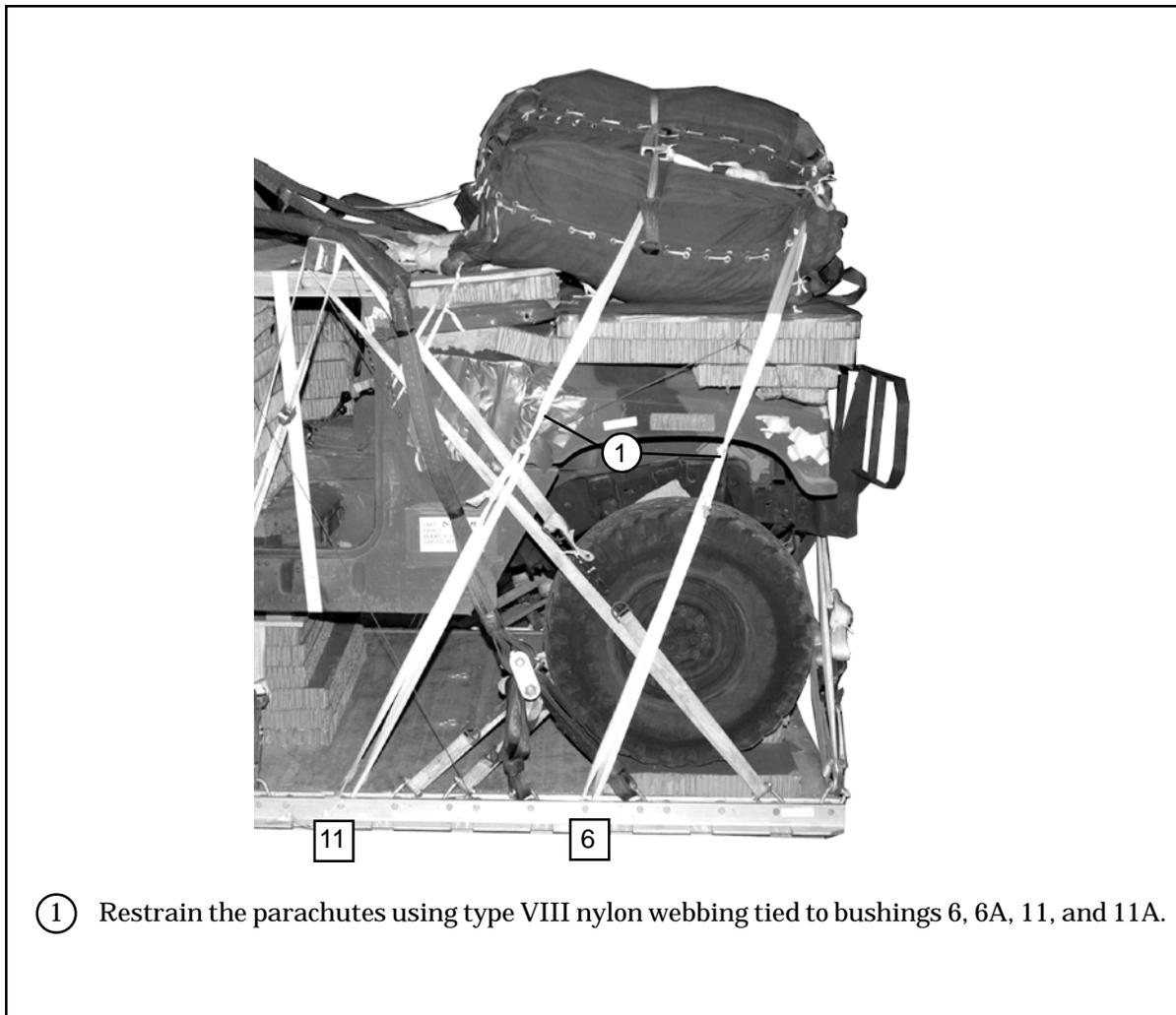


Figure 4-20. Cargo Parachutes Installed

STOWING DEPLOYMENT PARACHUTE

4-12. Prepare, stow, and install the deployment parachute according to Chapter 3, Section IV and as shown in Figure 4-21.

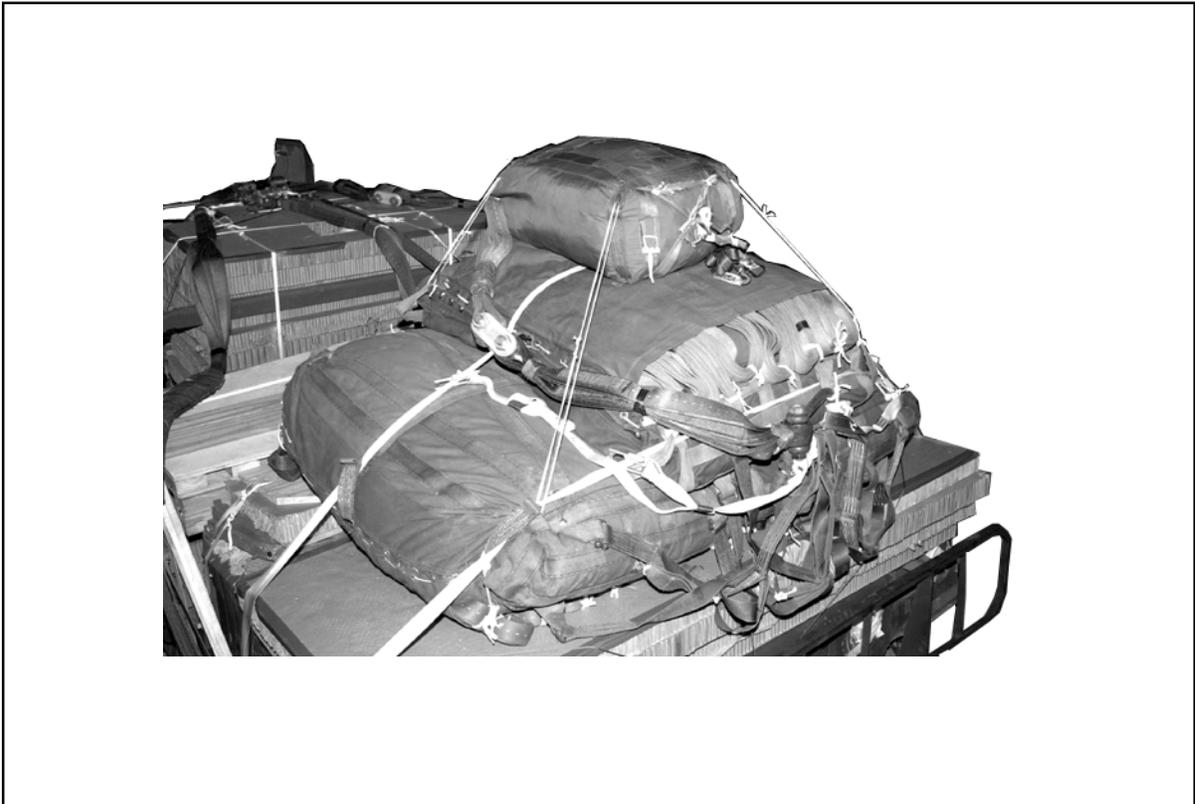


Figure 4-21. Deployment Parachute Installed

INSTALLING PARACHUTE RELEASE SYSTEM

- 4-13. Build an M-1 release stack as shown in Figure 4-22.
 Prepare and install an M-1 release system according to Chapter 3, Section V and as shown in Figure 4-23.

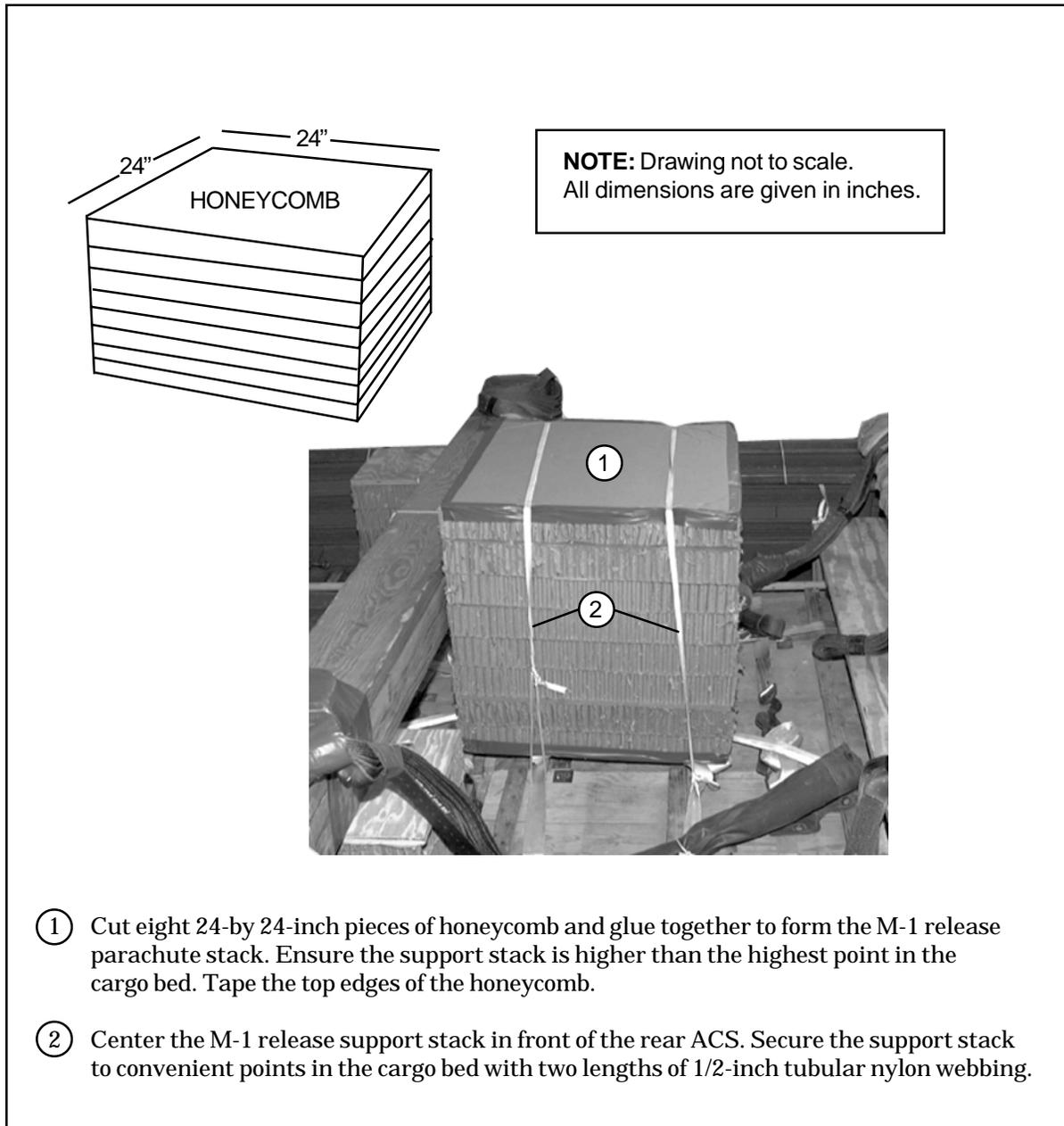


Figure 4-22. Parachute Release Stack Positioned

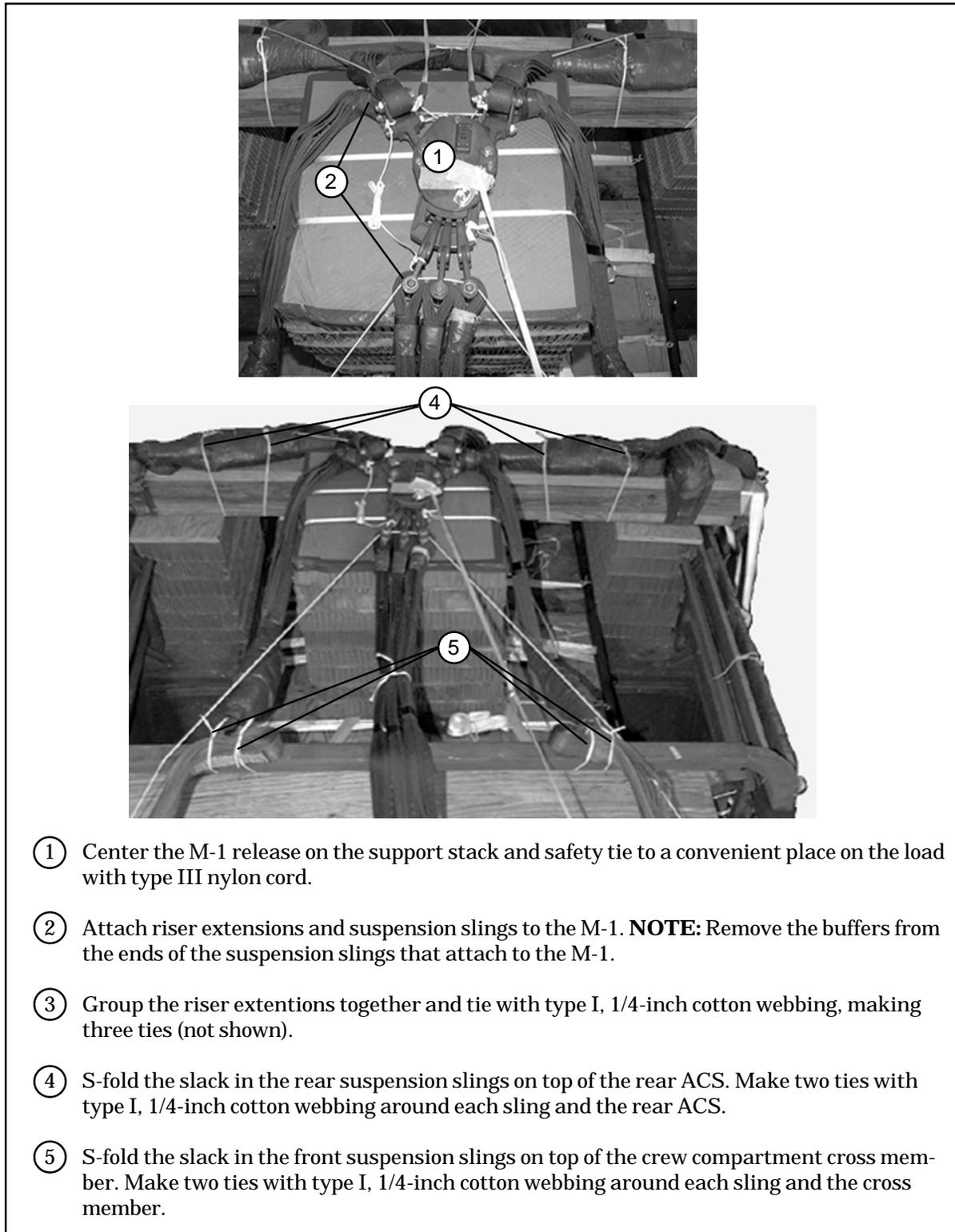
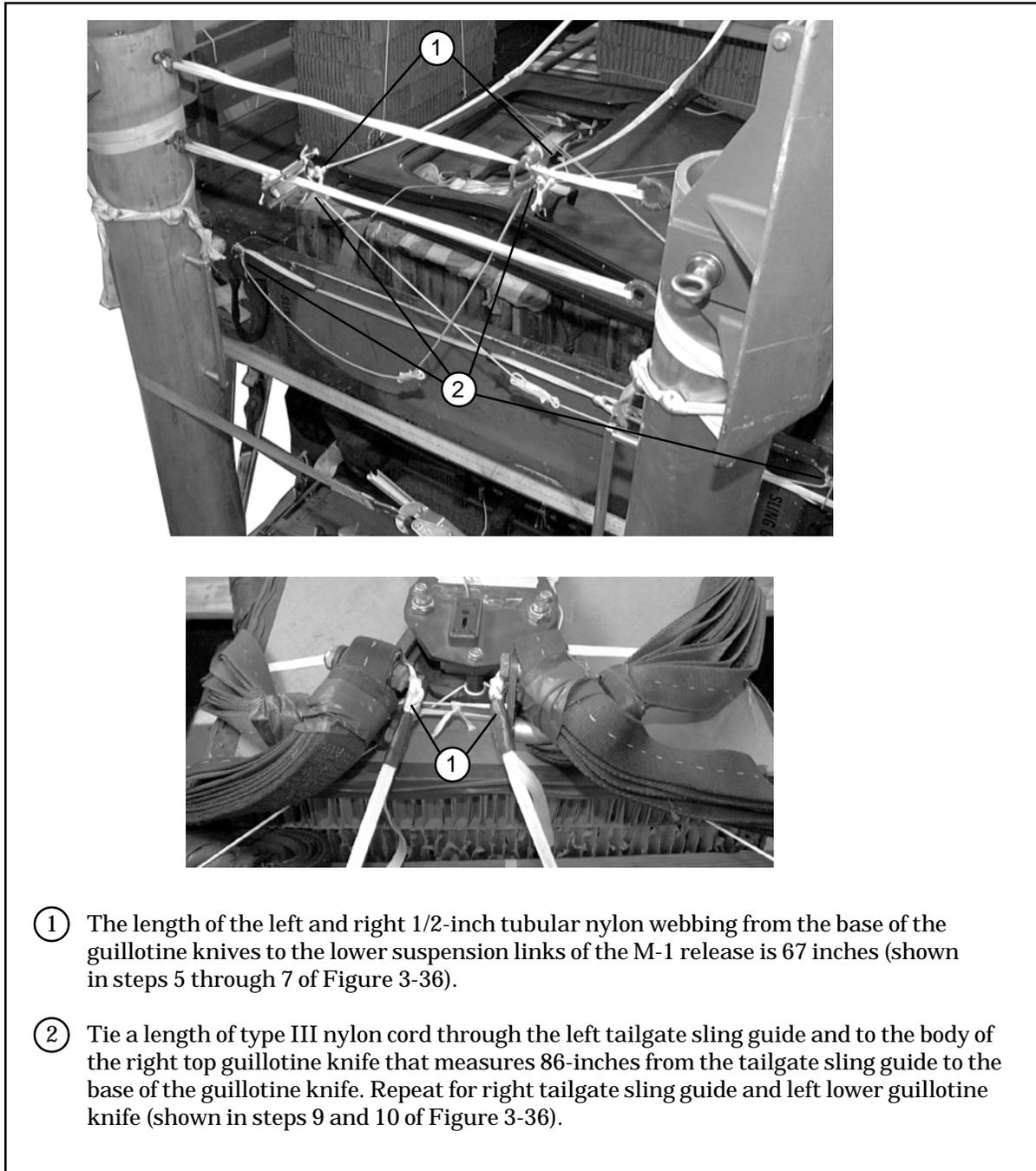


Figure 4-23. Parachute Release System

INSTALLING MAST RELEASE KNIVES

4-14. Install the mast release knives according to Chapter 3, Figure 3-36, steps 4 through 10 and as shown in Figure 4-24.



- ① The length of the left and right 1/2-inch tubular nylon webbing from the base of the guillotine knives to the lower suspension links of the M-1 release is 67 inches (shown in steps 5 through 7 of Figure 3-36).
- ② Tie a length of type III nylon cord through the left tailgate sling guide and to the body of the right top guillotine knife that measures 86-inches from the tailgate sling guide to the base of the guillotine knife. Repeat for right tailgate sling guide and left lower guillotine knife (shown in steps 9 and 10 of Figure 3-36).

Figure 4-24. Mast Release Knives Installed

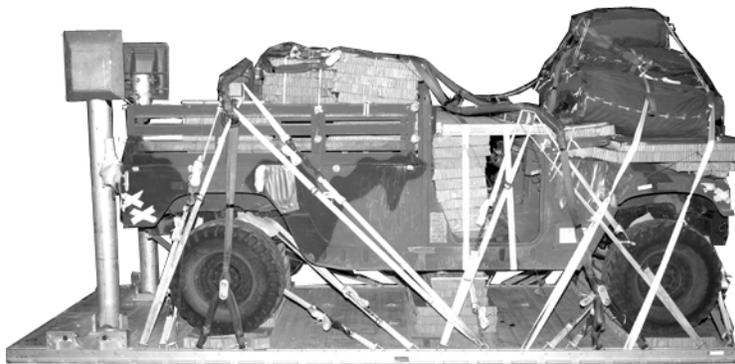
MARKING RIGGED LOAD

4-15. Mark the rigged load according to Chapter 3 and as shown in Figure 4-25. A Shipper's Declaration for Dangerous Goods is required.

EQUIPMENT REQUIRED

4-16. The equipment required to rig these loads are given in Table 4-1.

CAUTION
 Make the final rigger inspection required by Chapter 3 before load leaves rigging site.



RIGGED LOAD

Weight: M998	10,912 pounds
M1038	11,165 pounds
M1097	10,097 pounds
Height	98 inches
Width	94 inches
Overall Length	229 inches
Overhang: Front	12 inches
Rear	0 inches
Center of Balance (from front edge of platform):	
M998	89 inches
M1038	91 inches
M1097	90 inches

Figure 4-25. M998/M1038/M1097 Cargo/Troop Carriers Rigged for Dual Row Airdrop

Table 4-1. Equipment required for rigging M998/M1038/M1097 cargo/troop carriers for dual row airdrop.

National Stock Number	Item	Quantity
8040-00-273-8713	Adhesive paste, 1-gal	As required
4020-00-240-2146	Cord, nylon, type III, 550-lb	As required
4030-00-090-5354	Clevis, large	3
4030-00-678-8562	Clevis, medium	2
5306-00-435-8994 5310-00-232-5165 1670-00-003-1953 5365-00-007-3414	Link assembly: Two-point, 3 3/4-in Bolt, 1-in diam, 4-in long Nut, 1-in, hexagonal Plate, side, 3 3/4-in Spacer, large	9 18 18 18 18
5510-00-220-6146 5510-00-220-6148 5510-00-220-6274	Lumber: 2- by 4-in 2- by 6-in 4- by 4-in	As required As required As required
5530-00-618-8073	Plywood, 3/4-in	5 sheets
5315-00-010-4659 5315-00-753-3883 5315-00-010-4666	Nail, steel wire, common, 8d 10d 40d	As required As required
1670-00-753-3928	Pad, energy dissipating, honeycomb, 3- by 36- by 96-in	18 sheets
1670-01-487-5461	Static line assembly release away	1
1670-01-016-7841	Parachute: Cargo: G-11D	3
1670-00-040-8135	Cargo extraction: (deployment parachute) 28-foot	1
1670-01-485-1654 1670-01-486-1342 1670-01-486-1656	Platform, dual row, 18-foot Rail, DRAS Roller Pad, DRAS Panel Assembly, Main	2 4 9

Table 4-1. Equipment required for rigging M998/M1038/M1097 cargo/troop carriers for dual row airdrop (continued).

National Stock Number	Item	Quantity
1670-01-162-2372	Clevis assembly	36
1670-01-097-8816	Release, cargo parachute, M-1	1
	Sling, cargo airdrop	
	For suspension:	
1670-01-062-6310	11-ft (4-loop), type XXVI nylon webbing	4
1670-01-062-6306	3-ft (4-loop), type XXVI nylon webbing	8
	For deployment:	
1670-01-062-6306	3-ft (4-loop), type XXVI nylon webbing	1
	For riser extension:	
1670-01-062-6313	60-ft (3-loop), type XXVI nylon webbing	3
	For ACS:	
1670-01-063-7761	16-ft (2-loop), type XXVI nylon webbing	1
	For lifting:	
1670-01-062-6304	9-ft (2-loop), type XXVI nylon webbing	2
1670-01-062-6303	12-ft (2-loop), type XXVI nylon webbing	2
1670-00-040-8219	Strap, parachute release, multicut	2
1670-00-937-0271	Knife release,cargo (guillotine)	2
1670-01-487-5464	Outrigger assembly	2
7510-00-266-5016	Tape, adhesive, 2-in	As required
1670-00-937-0271	Tie-down assembly, 15-ft	45
1670-00-725-1437	Tie-down, cargo, aircraft, (CGU-1B)	3
	Webbing:	
8305-00-268-2411	Cotton, 1/4-in, type I	As required
	Nylon:	
8305-00-082-5752	Tubular, 1/2-in	As required
8305-00-263-3591	Type VIII	As required