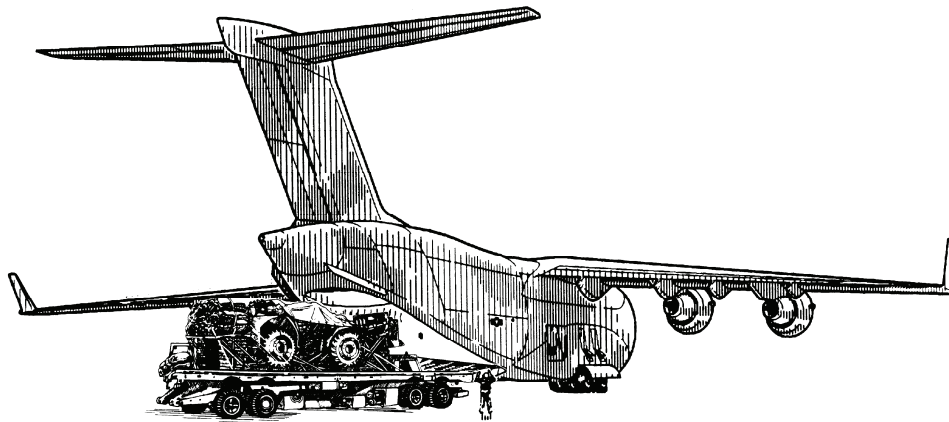


**FM 4-20.102
MCRP 4-11.3J
NAVSEA SS400-AB-MMO-010
TO 13C7-1-5**

**AIRDROP OF SUPPLIES AND EQUIPMENT:
RIGGING AIRDROP PLATFORMS**



JUNE 2006

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Headquarters
Department of the Army
United States Marine Corps
Department of the Navy
Department of the Air Force
Washington, DC, 8 June 2006

AIRDROP OF SUPPLIES AND EQUIPMENT: RIGGING AIRDROP PLATFORMS

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Preface

SCOPE

The purpose of this manual is to provide the latest approved procedures for rigging airdrop Platforms. This manual is written for use by the parachute rigger. It consists of 10 chapters.

The procedures contained in this manual are typical and serve as the standard from which all platform rigging is derived. Due to the uniqueness of some equipment and items, the procedures in a specific rigging manual may be different from those in this manual. When procedures are different, those in the specific manual will be followed. When an item of equipment is specified to be used for which its minimum or maximum capacity is exceeded, a notice of exception will be printed at the beginning of each paragraph in each rigging manual where the exception is authorized. When an item of airdrop equipment is replaced or a procedure is changed, it will be impossible to change all manuals in the field at one time. Therefore, this manual will be changed, when necessary.

Chapters 1 through 10 contain specific limitations and general information about the rigging of airdrop platform loads for low-velocity airdrop from US aircraft and also shows and tells how to prepare, attach, and safety tie some of the components and systems used in the specific rigging manuals of the FM 4-20.100/TO 13C7 series.

Note: New information concerning the Extraction Parachute Jettison System (EPJS) has been added along with some new procedures for the extraction force transfer coupling (EFTC). The C-141 and C-5 aircraft have been taken out and the C-17 aircraft information has been added. Also, a new user friendly format has been introduced combining general information and rigging information in each chapter.

USER INFORMATION

The proponent of this publication is United States Army Training and Doctrine Command (TRADOC). You are encouraged to report any errors or omissions and to suggest ways of making this a better manual.

This publication applies to Active Army, the Army National Guard (ARNG)/Army National Guard of the United States (ARNGUS), and the United States Army Reserve (USAR) unless otherwise stated.

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Chapter 1

Airdrop Information

RESPONSIBILITIES

1-1. Personnel responsible for loading rigged platform loads into aircraft and installing and operating airdrop systems are given below.

- **Air Forces Aircraft.** Air forces personnel are responsible for loading the rigged platform loads into the aircraft and for installing and operating the airdrop system.
- **US Air Force (USAF) Aircraft Foreign Joint Training.** USAF aircraft and crews conducting joint airdrop operations with foreign military governments are not authorized to airdrop equipment and configurations not included in this manual, unless authorized by specific MAJCOM.
- **Other Aircraft.** When an aircraft other than US Air Force aircraft is used, the service being airdropped may be responsible for loading their rigged platform loads into the aircraft and for installing and operating the airdrop systems.

SAFETY PRECAUTIONS

1-2. Safety precautions **MUST** be closely followed when airdrop platform loads are rigged. Failure to follow the precautions could result in serious injury to the rigger or damage to the drop item or aircraft. The following safety precautions shall be taken by the rigger:

- Make sure that when lifting heavy items, the lifting device has a rated lifting capacity that exceeds the weight of the item to be lifted.
- Be sure that items being lifted are secured to the lifting device.
- Avoid working under suspended equipment unless absolutely necessary.
- Cover all wet cell batteries in service with plastic or nonflammable material.
- Check fuel tanks to ensure that they do not exceed the fuel level of the specific rigging manuals. Check fuel cans to make sure they are performance-oriented packaging approved. When stowing fuel cans, use cellulose wadding or other suitable material to prevent metal-to-metal contact.
- Package, mark, and label hazardous materials according to AFMAN 24-204(I)/TM 38-250.

CAUTION

Only ammunition listed in FM 4-20.153/MCRP 4-11.3B/TO 13C7-18-41 may be airdropped. Hazardous material must be packaged, marked, and labeled as required by AFMAN(I) 24-204/TM 38-250.

TYPE AND METHOD OF AIRDROP

1-3. As used in this manual, airdrop is the air-to-ground delivery of platform loads from an aircraft in flight. Airdrop is designed to supplement the usual surface methods of delivering supplies and equipment to forces in the field.

- **Type of Airdrop.** Currently the only type of airdrop used to deliver platform loads is low-velocity airdrop. Low-velocity airdrop delivers platform loads from an aircraft at various altitudes. Cargo parachutes are used to slow the descent of the loads to ensure minimum landing shock. The type and number of cargo parachutes can vary as shown in Table 1-1. Due to differing deployment characteristics, parachutes of different types will not be mixed on the same load. Loads with different type parachutes and loads with quantities of the same type parachute may be airdropped from the same aircraft or element provided the following conditions are met:
 - Airdrop altitude for the aircraft or element will be determined by the type and number of parachutes on the load requiring the highest airdrop altitude.
 - Aircraft or elements with lower airdrop altitudes will drop before aircraft or elements with higher airdrop altitudes.
 - The transported force accepts strike report responsibility for loads other than the first platform to exit the aircraft or element lead for formation airdrops.

Table 1-1. Type and Number of Parachutes for Low-Velocity Airdrop

<i>MINIMUM DROP ALTITUDE (FEET ABOVE GROUND LEVEL)</i>	<i>PARACHUTES</i>
700 750	G-11B 1 2 to 4
1,150 1,200 1,300	G-11C 5 6 to 7 8
550	G-12E 2 (Not for Army Platform Loads)

CAUTION

Drop altitudes reflect Minimum drop altitudes.

- **Method of Airdrop.** The extraction method is used for platform loads delivered by low-velocity airdrop on type V platform. This method uses a cargo extraction parachute to pull the platform load from the cargo compartment of the aircraft.

COMMONLY USED ITEMS

1-4. Items commonly used for rigging platform loads are described in this section. Each rigging manual in the FM 4-20.100/TO 13C7 series contains one or more tables of equipment required. These tables list the National Stock Number (NSN), item, and quantity of each item needed to prepare and rig the load covered in the manual. Standard airdrop hardware items are shown in Figure 1-1. Standard airdrop straps and canvas items are shown in Figure 1-2. Some textile, wood, and miscellaneous items are described below.

- **Textile Items.** The most common textile items and their uses are as follows:
 - Type III nylon cord is used to make safety ties and to hold items in place. It has a tensile strength of 550 pounds.
 - 1/2-inch tubular nylon webbing is used to secure items during airdrop and to tie the deadman's safety tie. It has a tensile strength of 1,000 pounds.
 - Type I, 1/4-inch cotton webbing is used to make many of the needed safety ties used when a platform load is rigged. It has a tensile strength of 80 pounds.
 - 5/8-inch or 9/16-inch tubular nylon webbing may be used for the deadman's safety tie and parachute clustering ties in place of 1/2-inch tubular nylon webbing. Five-eighths inch tubular nylon webbing has a tensile strength of 2,250 pounds and 9/16-inch tubular nylon webbing has a tensile strength of 1,500 pounds.

- Wood Items. Wood items used when platform loads are rigged for specific airdrop are made locally. Details for building these wood items are in the specific rigging manuals.

Note. Plywood will be grade AC or AD.

- **Miscellaneous Items.** Miscellaneous items that may be used when a platform load is rigged are discussed below. The proper use of these items will be covered in detail in this manual or in other FM 4-20.100/ TO13C7 series manuals.
 - Adhesive tape (masking tape), 2 inches wide, is used to secure folds of excess webbing. It is also used to protect honeycomb from being cut by type III nylon cord and to hold padding in place. It can be used for other tasks also.
 - Type IV, cloth-backed adhesive tape, 2 inches wide, is used to protect honeycomb from being cut by type III nylon cord and to hold padding in place. It can be used for other tasks, such as securing the sling keepers.

CAUTION

The type IV, cloth-backed adhesive tape, will not be used to secure folds of extraction lines, suspension slings, and deployment lines.

- Cellulose wadding and felt sheets have many uses. They may be used to pad fragile items, to prevent sharp edges from cutting, and to protect slings during airdrop.
- Pad energy dissipating (honeycomb) are used to absorb the landing shock. Honeycomb is also used to level, pad, and fill empty spaces.

INSPECTION AND DESCRIPTION OF ITEMS

1-5. Canvas, metal, webbing, and wood items are inspected according to TM 10-1670-296-20&P/TO 13C7-49-2.

CAUTION

The maximum rated strength will reduce depending on the configuration in which it is used.

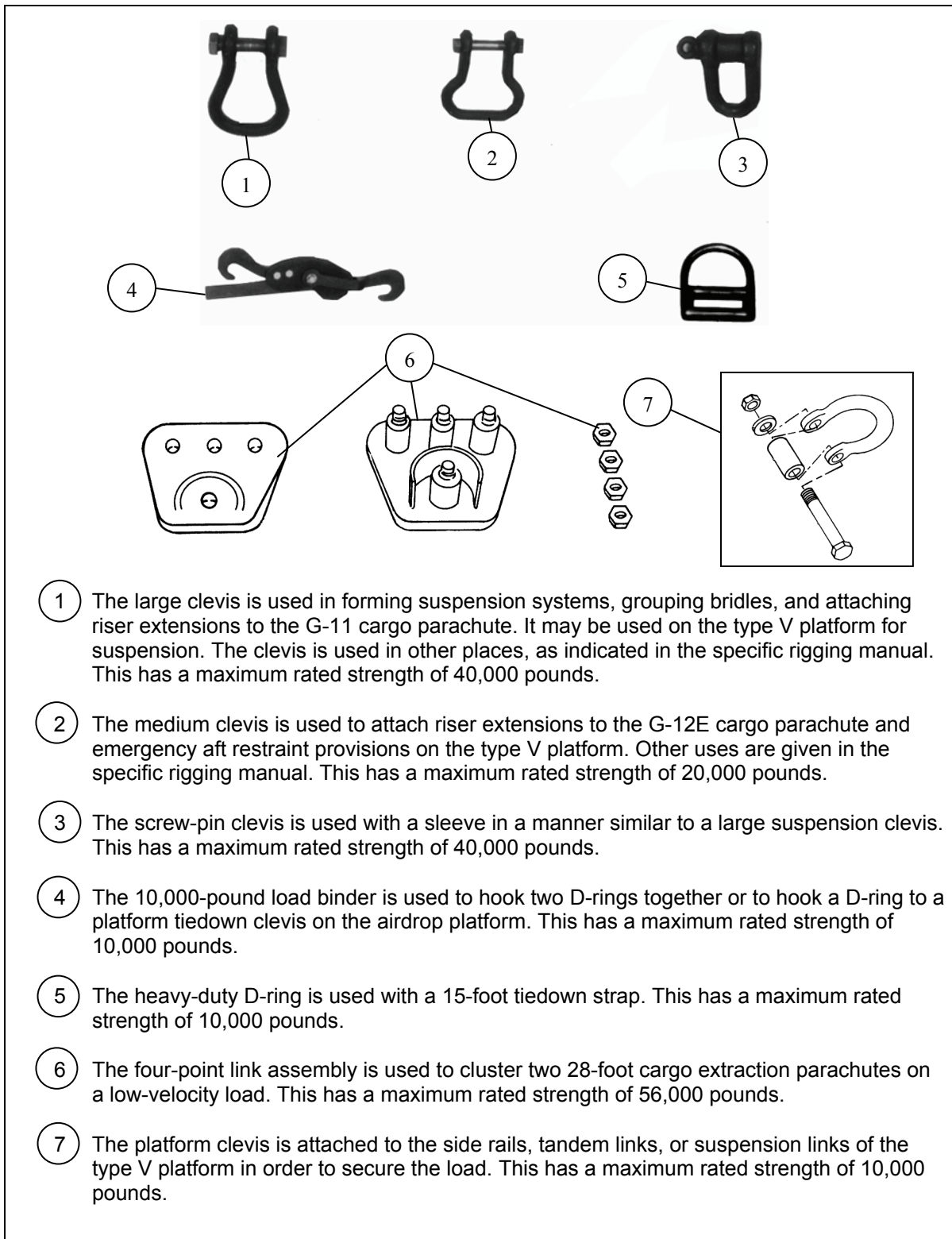
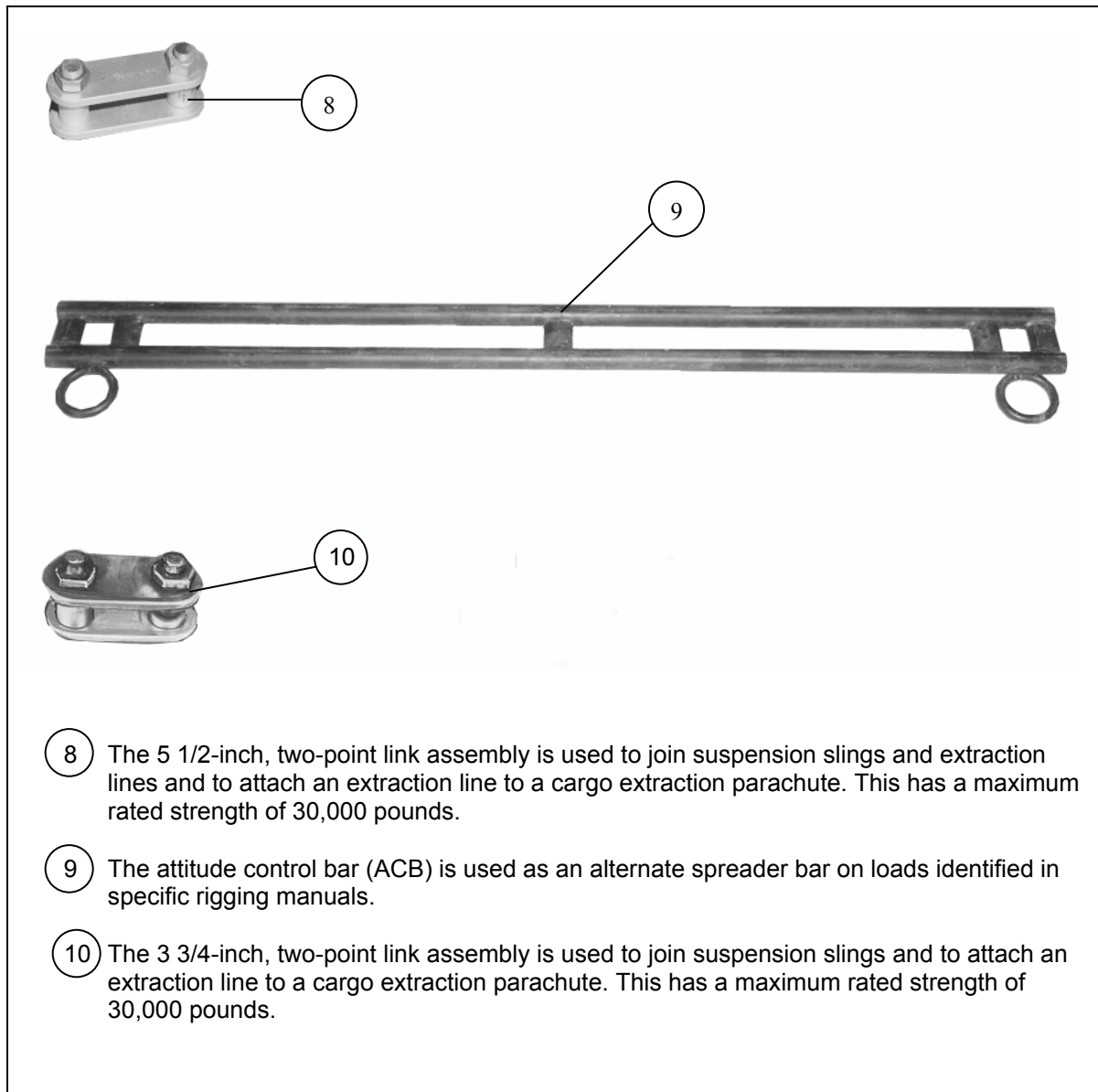


Figure 1-1. Hardware Items Used for Rigging Platform Loads



- 8 The 5 1/2-inch, two-point link assembly is used to join suspension slings and extraction lines and to attach an extraction line to a cargo extraction parachute. This has a maximum rated strength of 30,000 pounds.
- 9 The attitude control bar (ACB) is used as an alternate spreader bar on loads identified in specific rigging manuals.
- 10 The 3 3/4-inch, two-point link assembly is used to join suspension slings and to attach an extraction line to a cargo extraction parachute. This has a maximum rated strength of 30,000 pounds.

Figure 1-1. Hardware Items Used for Rigging Platform Loads (Continued)

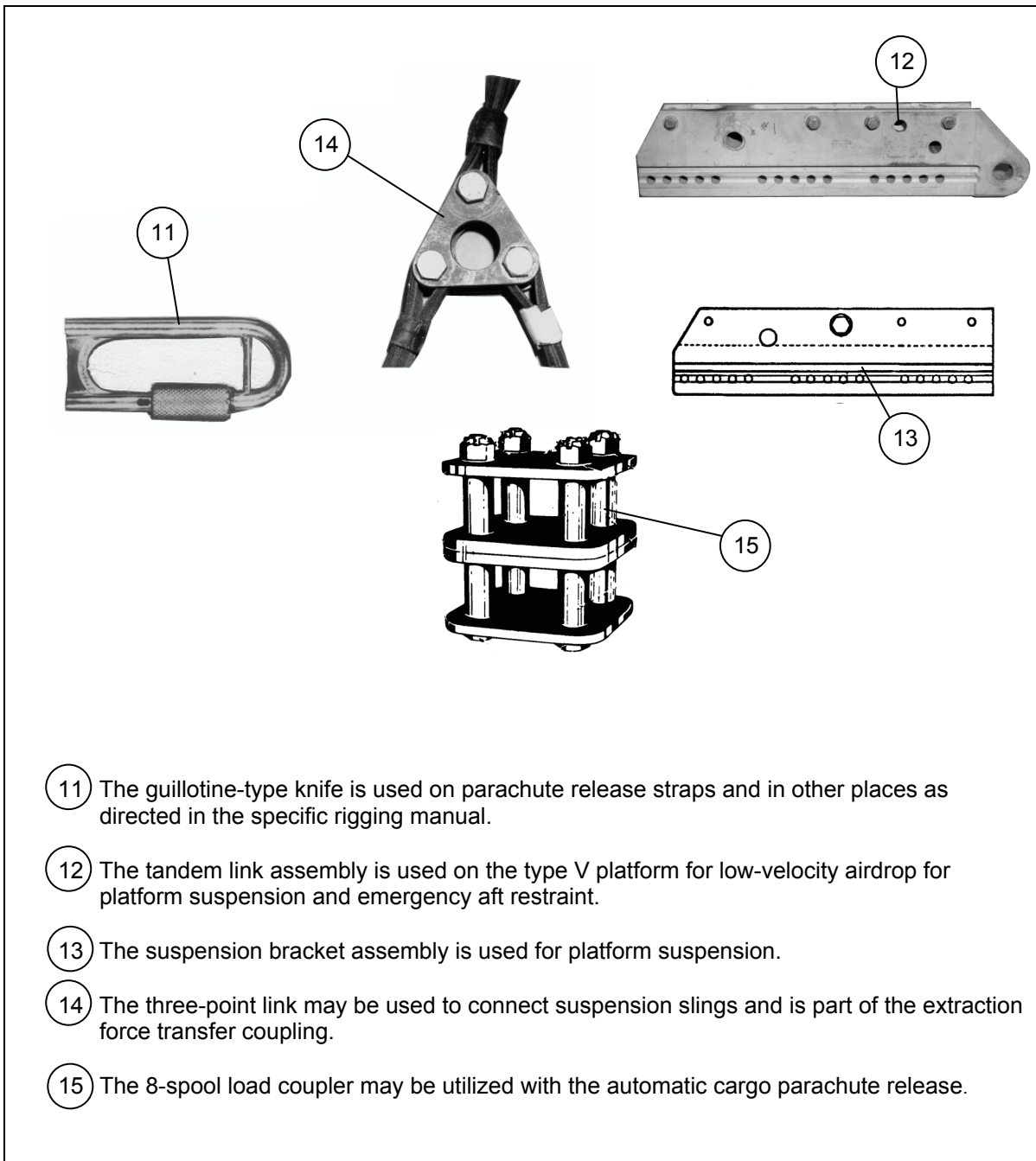


Figure 1-1. Hardware Items Used for Rigging Platform Loads (Continued)

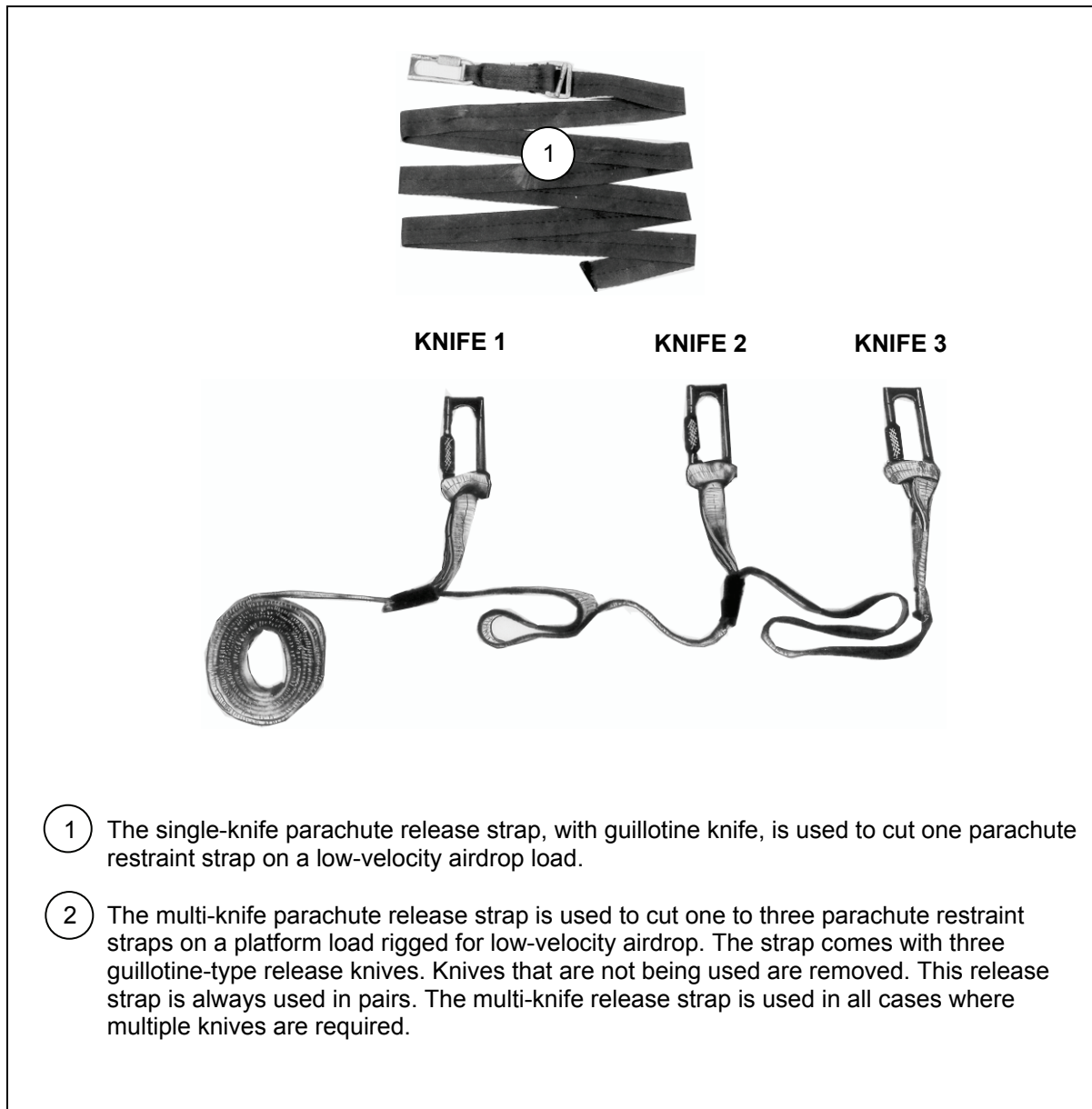
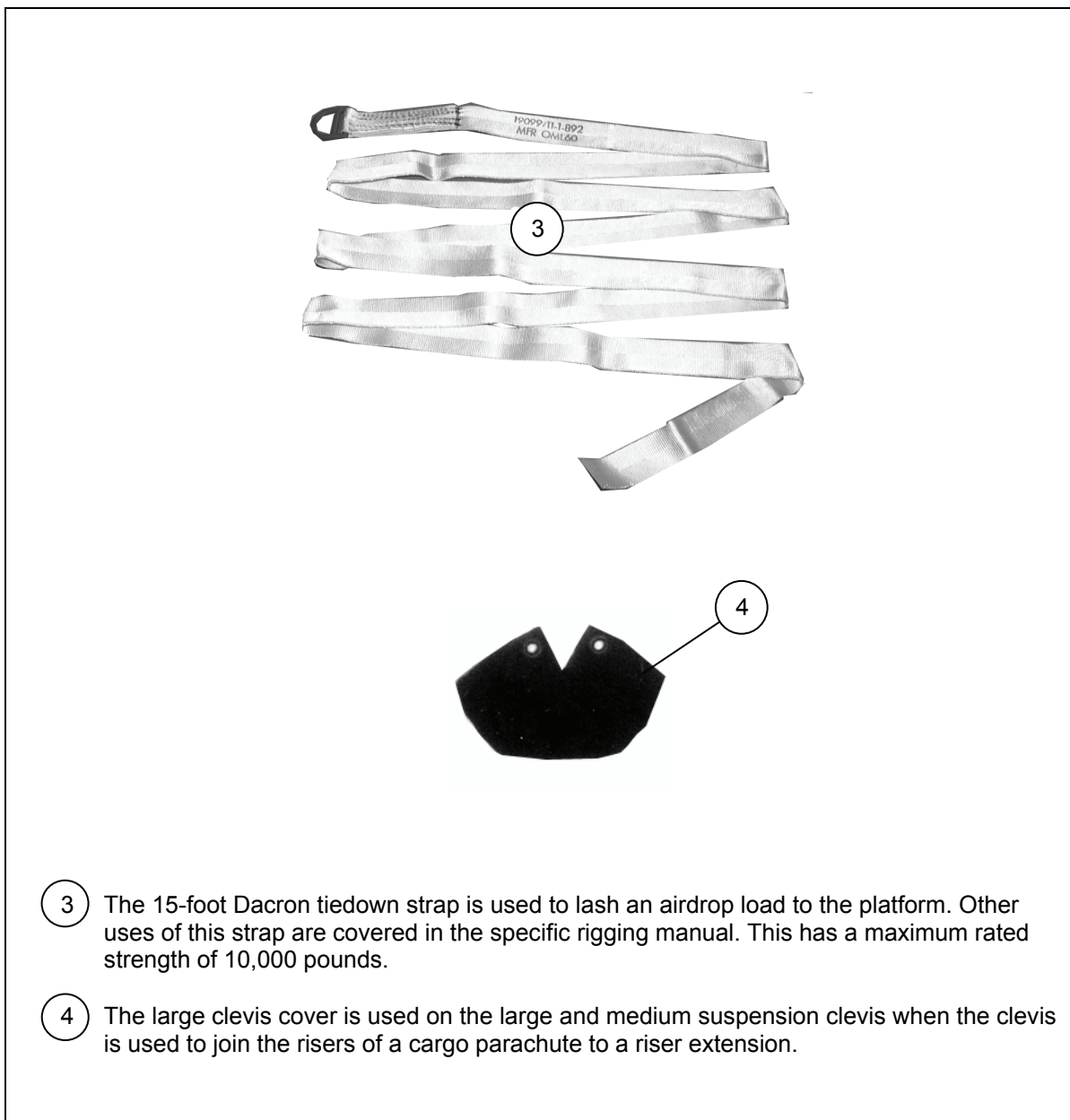


Figure 1-2. Straps and Canvas Items Used for Rigging Platform Loads



- 3 The 15-foot Dacron tiedown strap is used to lash an airdrop load to the platform. Other uses of this strap are covered in the specific rigging manual. This has a maximum rated strength of 10,000 pounds.
- 4 The large clevis cover is used on the large and medium suspension clevis when the clevis is used to join the risers of a cargo parachute to a riser extension.

Figure 1-2. Straps and Canvas Items Used for Rigging Platform Loads (Continued)

MAXIMUM RIGGED WEIGHT

1-6. The weight cited in the rigged load data for each specific load is typical for the load as shown. Some amount of overweight is allowed as long as load dimensions, rigging and extraction components, and rigging procedures are not changed.

Note. When a maximum allowable rigged weight is specified in the rigged load data, this weight is the absolute maximum and will not be exceeded.

ACCOMPANYING LOADS

1-7. Accompanying loads are items of supplies and equipment that may be added to a certain primary load as specified in the specific rigging manual for that load. Each airdrop manual states whether an accompanying load is authorized and lists the restrictions for that particular load. The following restrictions apply to all accompanying loads.

- The accompanying load must be positioned so that—
 - The primary load will not hit or crush it upon ground impact.
 - It will not interfere with the suspension slings.
- The accompanying load must not cause the--
 - Height of the rigged load to exceed the height limitations and the tip-off curve (Table 1-2 and Table 1-3) of the aircraft used.
 - Weight of the rigged load to exceed the maximum allowable weight prescribed in the specific rigging manual.
 - Center of balance (CB) of the rigged load to move outside the limitations shown in Figure 1-3.
 - Hang angle of the suspended rigged load to exceed 1 inch per linear foot of platform length.

CAUTION

The accompanying load must be lashed to meet the same restraint requirements as the primary load.

STOWING ACCOMPANYING LOADS

1-8. Each specific rigging manual contains the weight limitations, placement, and any additional restrictions on accompanying loads.

CAUTIONS

1. Only ammunition listed in FM 4-20.153/MCRP 4-11.3B/TO 13C7-18-41 may be rigged for airdrop.
2. Hazardous materials must be packaged, marked, and labeled as required by AFMAN 24-204(I)/TM 38-250.
3. At least two layers of honeycomb must be placed under all ammunition rigged for airdrop unless the specific rigging manual states differently.

PREPARING DROP ITEMS

1-9. Some items need to be prepared for rigging. This preparation can include removing, reinforcing, stowing, and securing components. Detailed preparation instructions will be included in the specific rigging manual.

COVERING LOAD

1-10. Covers may be needed to protect the load and keep the suspension slings from fouling. To keep the load from being damaged by falling hardware such as parachute releases, it may be necessary to cover portions of the load with honeycomb, plywood, or cloth protectors. If a cover is needed, the specific rigging manual will include this information and the procedures for its installation.

CENTER OF BALANCE (CB)

1-11. The CB of an airdrop platform load, based on the total rigged weight, is given in the rigging manual for a particular item. If the load varies from the one given in a particular manual, the CB must be recomputed using the procedures shown in Figure 1-4.

CAUTION

If the CB or load profile exceeds the limits of Table 1-2 or Table 1-3 or Figure 1-4, the load is not acceptable.

Table 1-2. C-130 Forward Profile Limits (Tip Off Curve) for Airdrop Platforms

<i>DISTANCE FORWARD OF CB (INCHES)</i>	<i>MAXIMUM HEIGHT (INCHES)</i>	<i>DISTANCE FORWARD OF CB (INCHES)</i>	<i>MAXIMUM HEIGHT (INCHES)</i>
0 to 45	100	153 to 155	82
46 to 75	99	156 to 160	81
76 to 87	98	161 to 162	80
88 to 93	97	163 to 165	79
94 to 100	96	166 to 168	78
101 to 107	95	169 to 170	77
108 to 113	94	171 to 172	76
114 to 117	93	173 to 174	75
118 to 122	92	175 to 177	74
123 to 124	91	178 to 179	73
125 to 128	90	180 to 181	72
129 to 133	89	182 to 183	71
134 to 138	88	184 to 186	70
139 to 141	87	187 to 188	69
142 to 144	86	189 to 190	68
145 to 146	85	191 to 192	67
147 to 150	84	193 to 195	66
151 to 152	83	196 to 197	65

Table 1-3. C-17 Forward Profile Limits (Tip Off Curve) for Airdrop Platforms

<i>DISTANCE FORWARD OF CB (INCHES)</i>	<i>MAXIMUM HEIGHT (INCHES)</i>	<i>DISTANCE FORWARD OF CB (INCHES)</i>	<i>MAXIMUM HEIGHT (INCHES)</i>
0 to 53	115	161 to 164	98
54 to 74	114	165 to 170	97
75 to 82	113	171 to 174	96
83 to 94	112	175 to 178	95
95 to 100	111	179 to 182	94
101 to 108	110	183 to 187	93
109 to 112	109	188 to 191	92
113 to 116	108	192 to 194	91
117 to 122	107	195 to 198	90
123 to 128	106	199 to 202	89
129 to 132	105	203 to 204	88
133 to 138	104	205 to 206	87
139 to 142	103	207 to 210	86
143 to 148	102	211 to 212	85
149 to 150	101	213 to 214	84
151 to 154	100	215 to 217	83
155 to 160	99	218 to 220	82

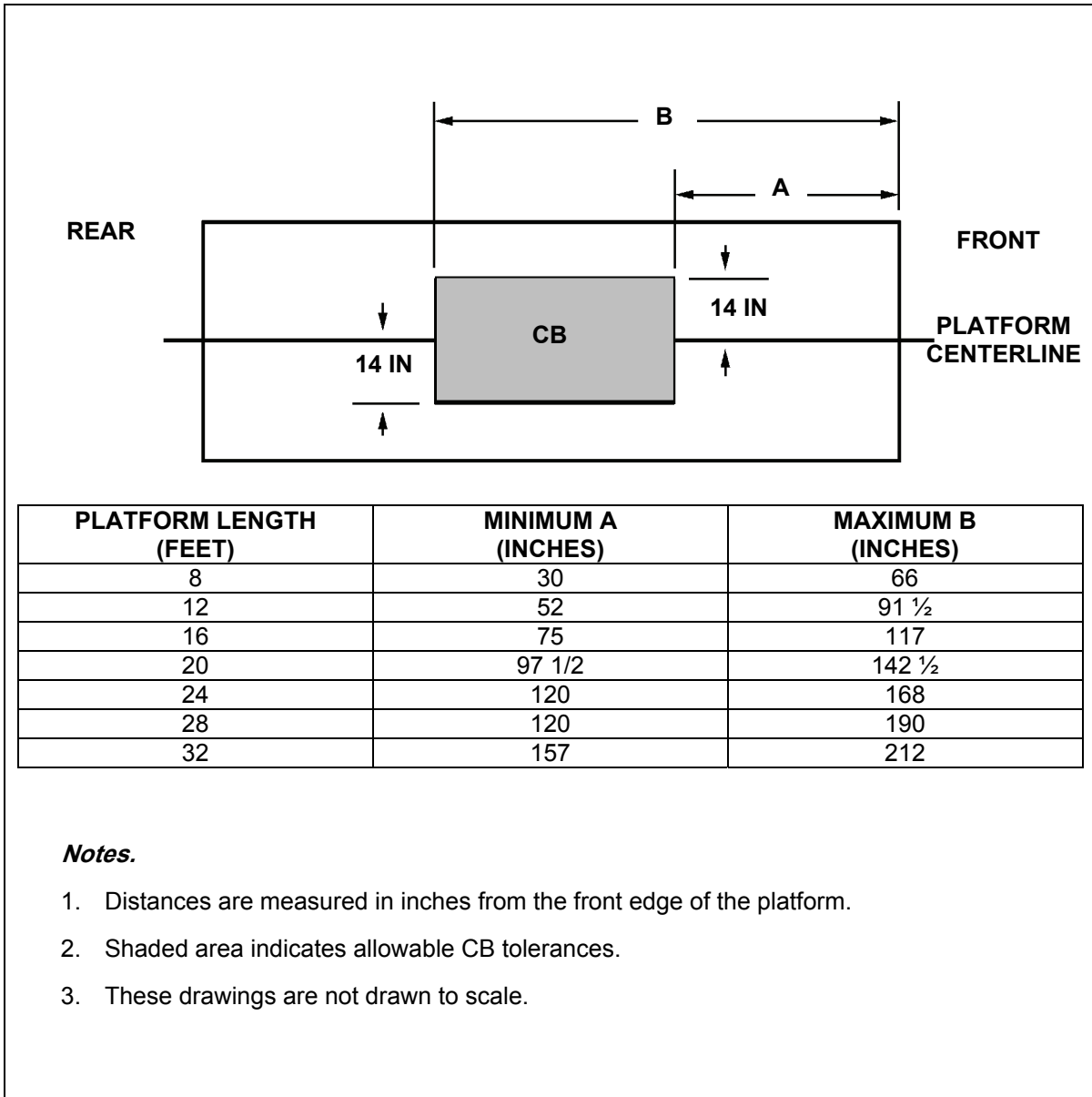


Figure 1-3. CB Limits for Airdrop Platforms

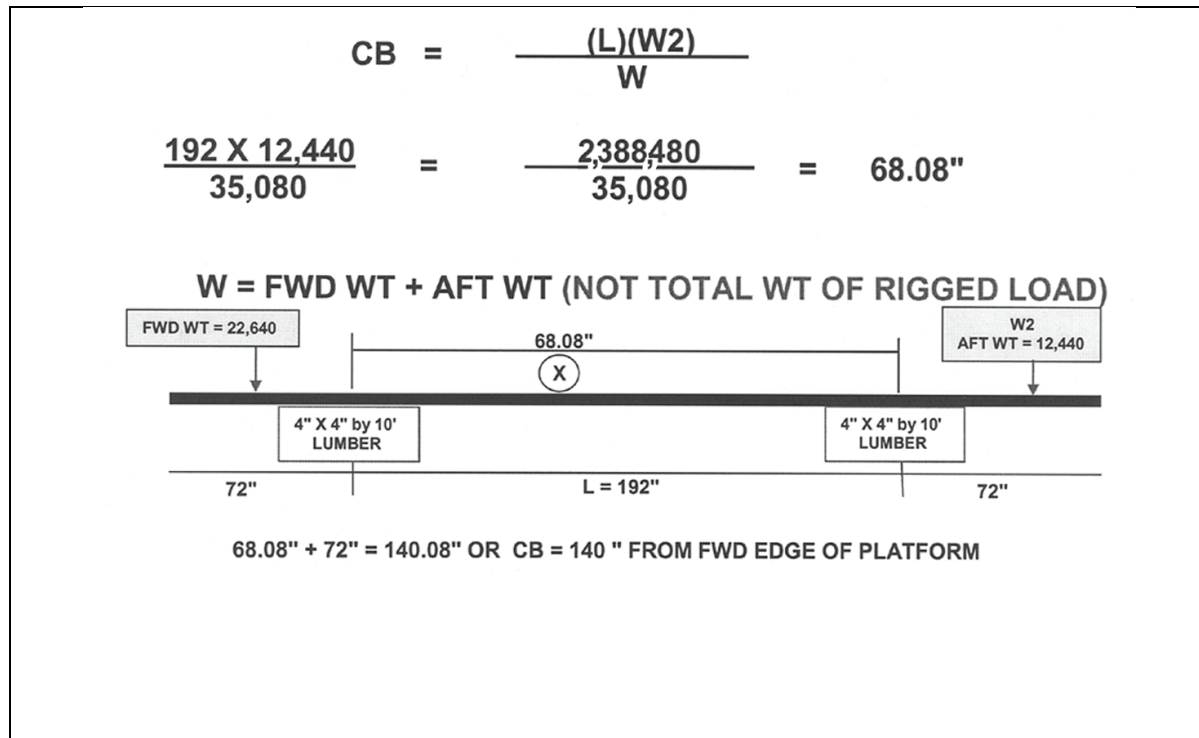


Figure 1-4. Drawing Showing Formula for Computing the CB in a 28-Foot, Type V Platform

ITEMS AND LOADS IN COLD CLIMATES

1-12. Some items to be dropped may have been modified for use in cold climates by the installation of extra equipment. Special rigging procedures may be needed when the drop item has been so modified. When loads are to be dropped in cold climates, all excess webbing of suspension slings and tie-down straps must be folded and tied with type I, 1/4-inch cotton webbing.

KNOTS

1-13. Some of the knots used for rigging platform loads are shown in Figure 1-5. When tying knots using nylon material, place an overhand knot in the running ends.

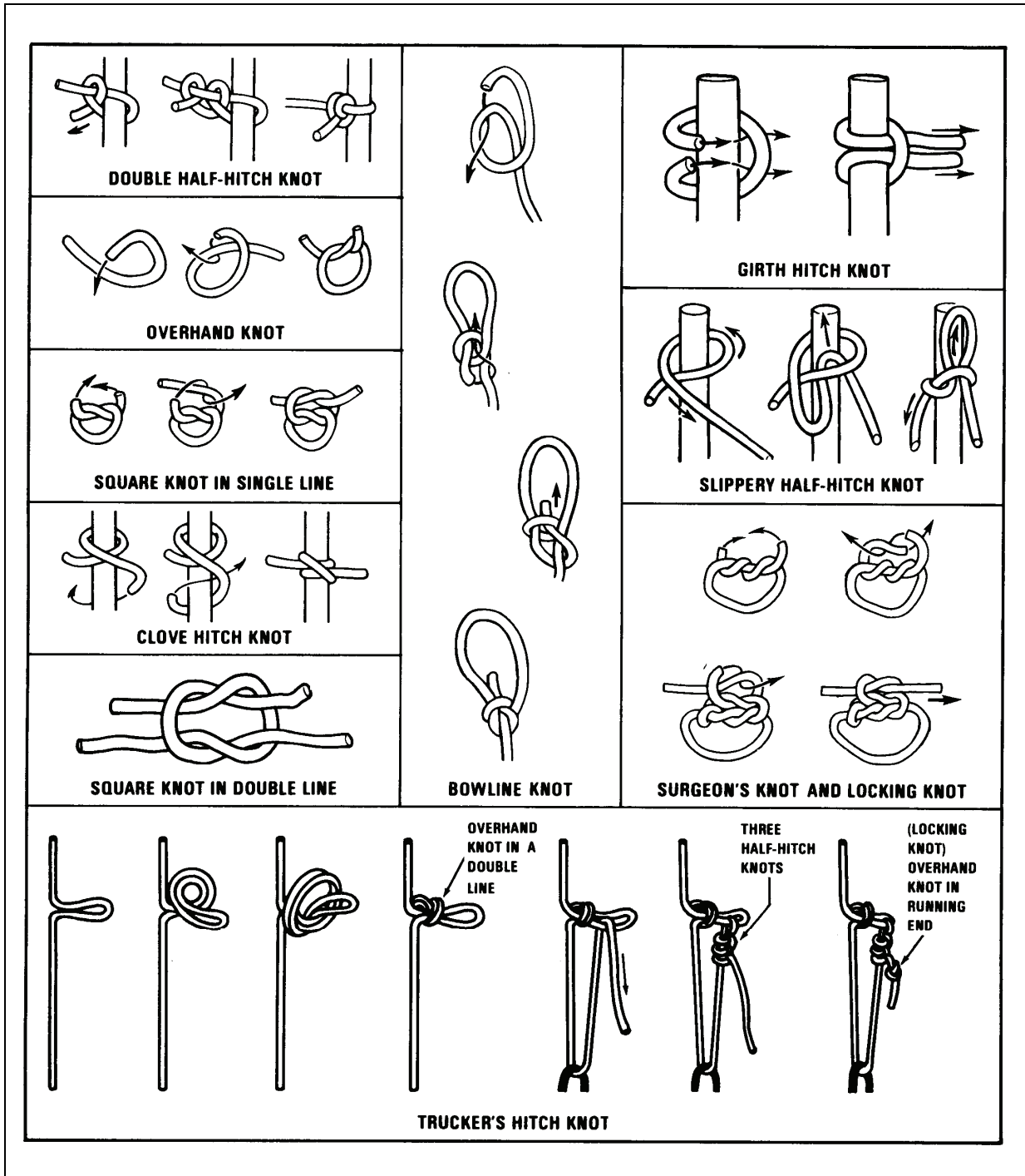


Figure 1-5. Knots Used During Rigging

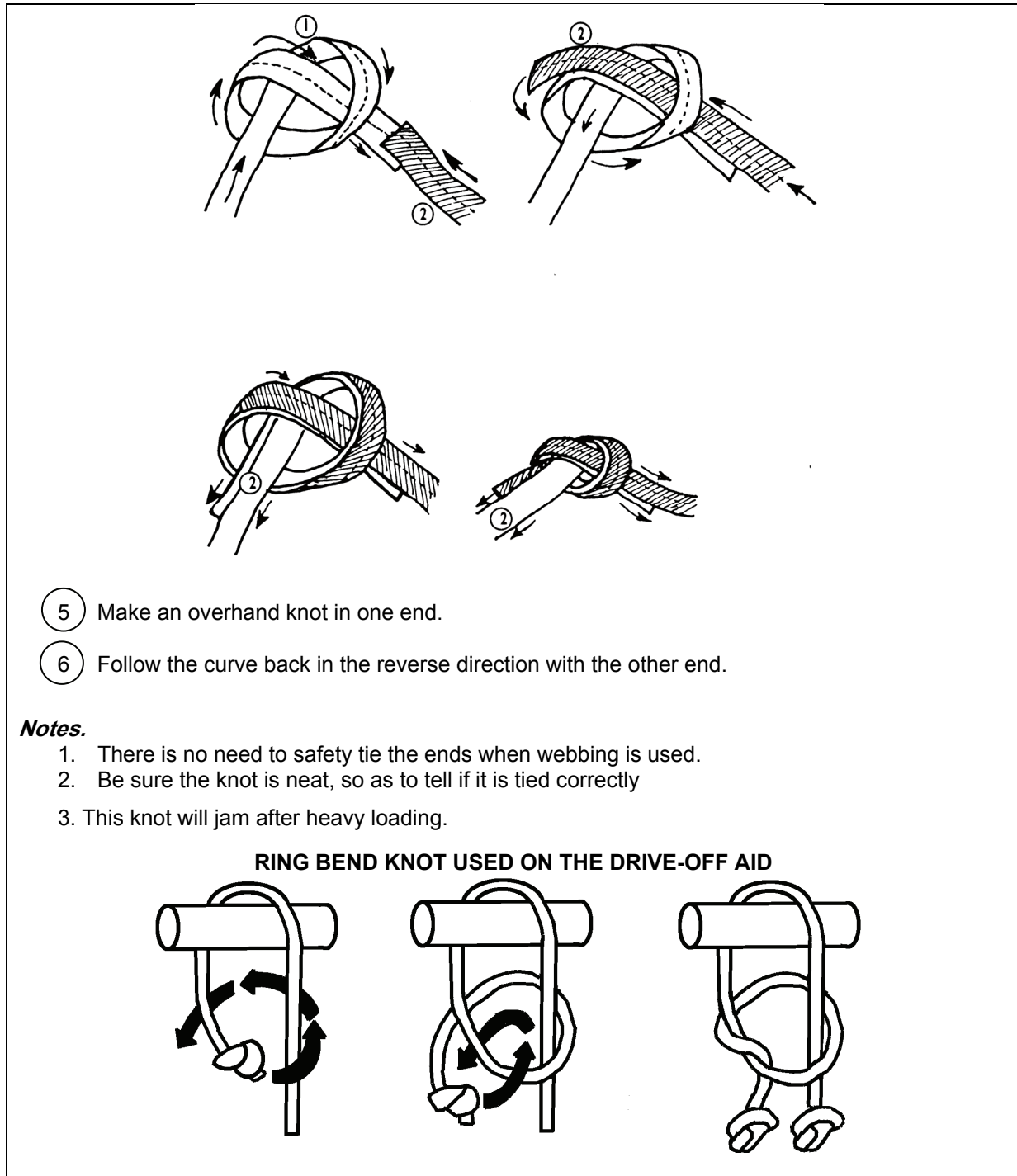
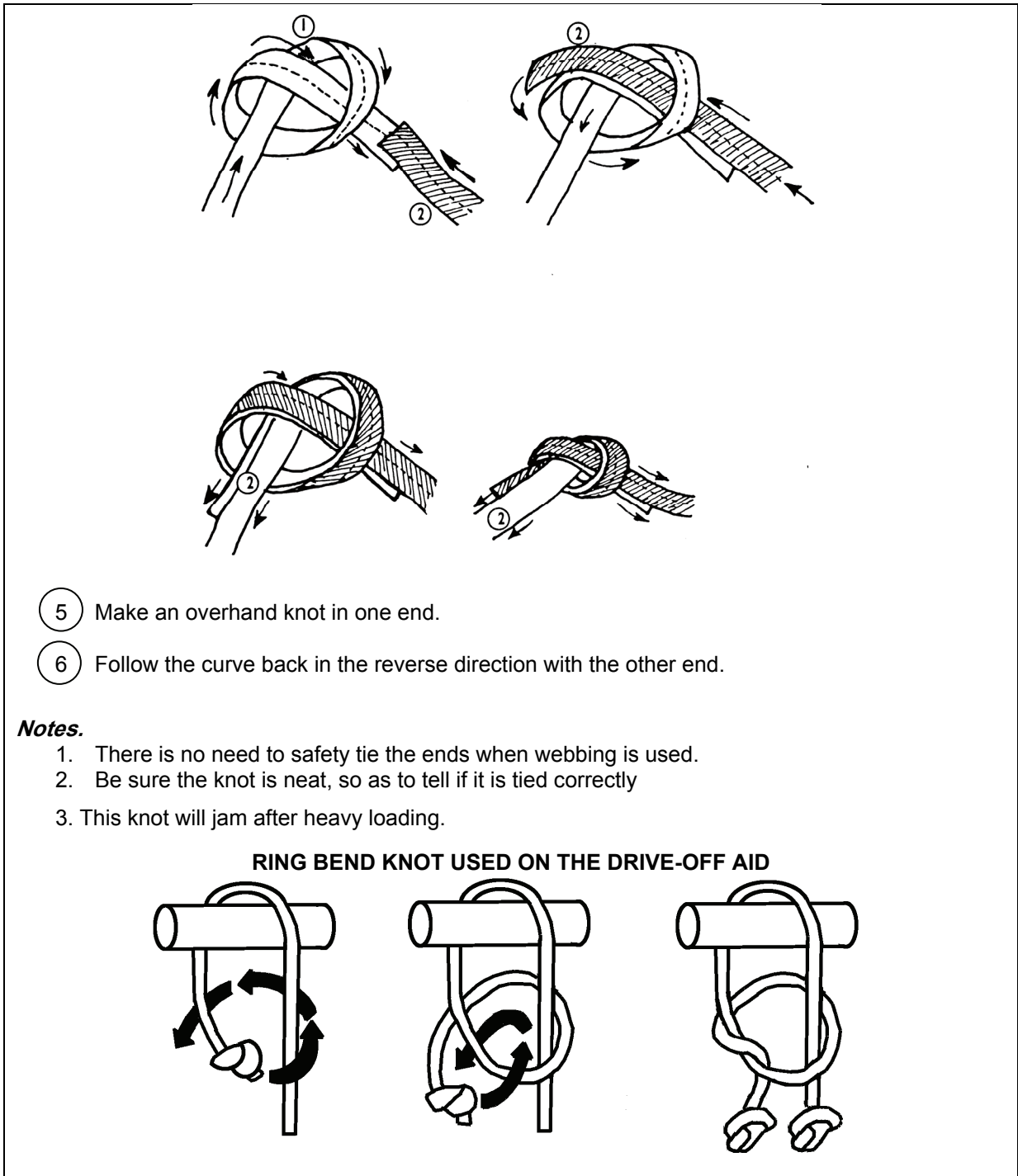


Figure 1-5. Knots Used During Rigging (Continued)



- 5 Make an overhand knot in one end.
- 6 Follow the curve back in the reverse direction with the other end.

Notes.

- 1. There is no need to safety tie the ends when webbing is used.
- 2. Be sure the knot is neat, so as to tell if it is tied correctly
- 3. This knot will jam after heavy loading.

RING BEND KNOT USED ON THE DRIVE-OFF AID

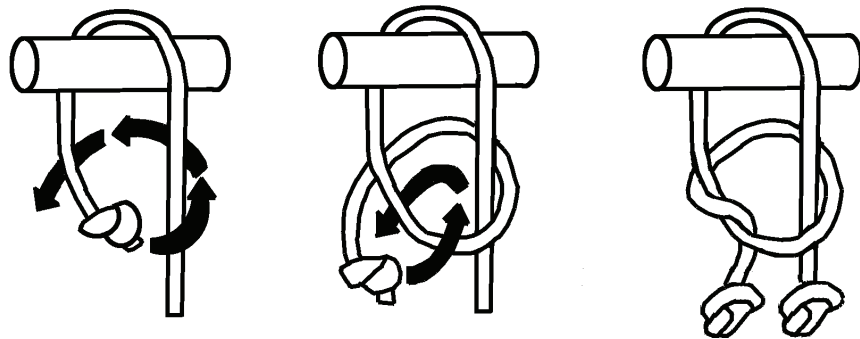


Figure 1-5. Knots Used During Rigging (Continued)

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Chapter 2

The Type V Airdrop Platform

SECTION I-GENERAL INFORMATION

USE

2-1. The type V airdrop platform, as shown in Figure 2-1, serves as the base on which supplies and equipment are restrained. This platform also supports the load during the extraction, parachute deployment, suspension, and recovery phases. The type V airdrop platform is used for low-velocity airdrop. The type V platform can be assembled in 8-, 12-, 16-, 20-, 24-, 28-, and 32-foot lengths. The assembled platform is 108 inches wide. A detailed description of this platform is in TM 10-1670-268-20&P/TO 13C7-52-22. The nose bumper is not required, unless required by a specific rigging manual. The type V platform spreads the shock of ground impact. Limitations for the type V platform are listed in Table 2-1.

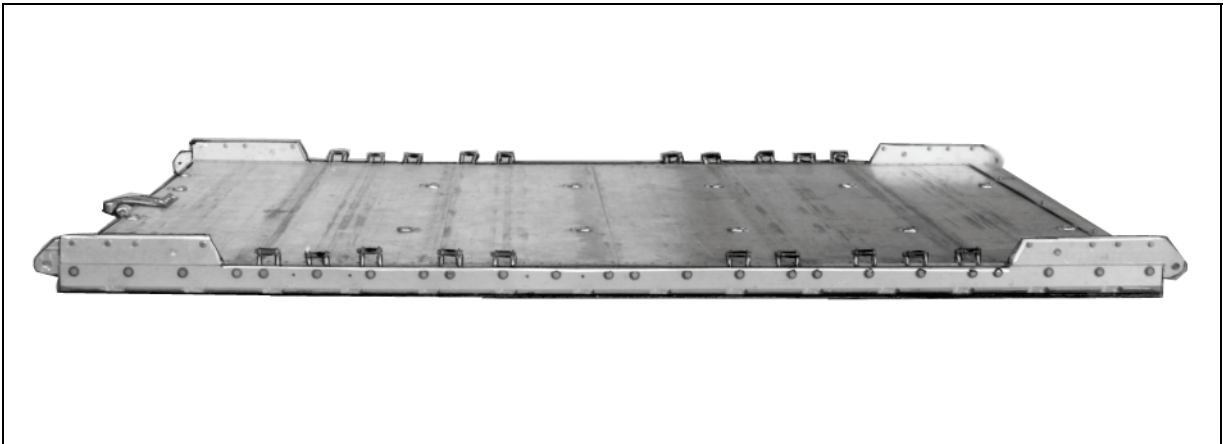


Figure 2-1. Type V Airdrop Platform

Table 2-1. Limitations for Type V Airdrop Platforms when Dropping from C-130 Series and C-17 Aircraft

C-130 Series Aircraft

<i>Length (Feet)</i>	<i>Width (Inches)</i>	<i>Width (Pounds)</i>	<i>Platform Surface (Square Feet)</i>	<i>Minimum Rigged Weight (Pounds)</i>	<i>Maximum Rigged Weight (Pounds)</i>
8	108	820	72	2,520	15,000
12	108	1,220	108	3,780	21,000
16	108	1,590	144	5,040	28,000
20	108	1,950	180	6,300	39,000
24	108	2,280	216	7,560	42,000
28	108	2,820	252	8,820	42,000
32	108	3,056	288	10,080	42,000

C-17 Aircraft

<i>Length (Feet)</i>	<i>Width (Inches)</i>	<i>Width (Pounds)</i>	<i>Platform Surface (Square Feet)</i>	<i>Minimum Rigged Weight (Pounds)</i>	<i>Maximum Rigged Weight (Pounds)</i>
8	108	820	72	2,520	10,000
12	108	1,220	108	3,780	18,500
16	108	1,590	144	5,040	28,000
20	108	1,950	180	6,300	39,000
24	108	2,280	216	7,560	42,000
28	108	2,820	252	8,820	42,000
32	108	3,056	288	10,080	42,000

PLATFORM LIMITATIONS FOR AIRCRAFT

2-2. Cargo and transport aircraft are specifically designed to deliver supplies and equipment by airdrop and are employed in airborne operations. Aircraft limitations are described below.

- **Hercules (C-130).** Platform loads are generally restricted to a height of 100 inches (measured from the bottom of the platform) and weight of 25,000 pounds for aircraft with an aircraft serial number of 62-1783 or lower. For aircraft with an aircraft serial number of 62-1784 and higher, and for aircraft with a serial number of 61-2358, the weight restriction is 42,000 pounds. MC-130E Combat Talon I and MC-130H Combat Talon II aircraft are restricted to 35,000 pounds. Single and combined platform lengths are restricted to 28 feet for MC-130E Combat Talon I aircraft and 41 feet of available floor space for all other C-130 aircraft. When the towplate is used for drogue extraction system (DES) airdrops, the extraction/drogue parachute requirements in Table 9-1 will apply. DES is the primary method of extraction for Combat Talon aircraft.
- **Globemaster (C-17).** Platform loads are generally restricted to a height of 118 inches measured from the bottom of the platform. Platform loads are generally restricted to a weight of 60,000 pounds. For multiple platforms, up to 110,000 pounds of airdrop load may be airdropped. Loads certified for low-velocity airdrop from C-130 aircraft that meets the limitations in Table 2-1 may be airdropped from the C-17 aircraft. The aircraft has a total available floor space of 64 feet.

SECTION II-PLATFORM AND HONEYCOMB PREPARATION

INSPECTING PLATFORM

2-3. Inspect or and inspect, the type V airdrop platform as outlined in TM 10-1670-268-20&P/TO 13C7-52-22.

SUSPENDING PLATFORM LOADS

2-4. The suspension points for a platform-suspended load on a type V platform are the suspension bracket assembly holes. The emergency aft restraint holes are provided in the tandem link only. The suspension bracket assembly as shown in Figure 2-2 may be positioned at various points along a platform rail.

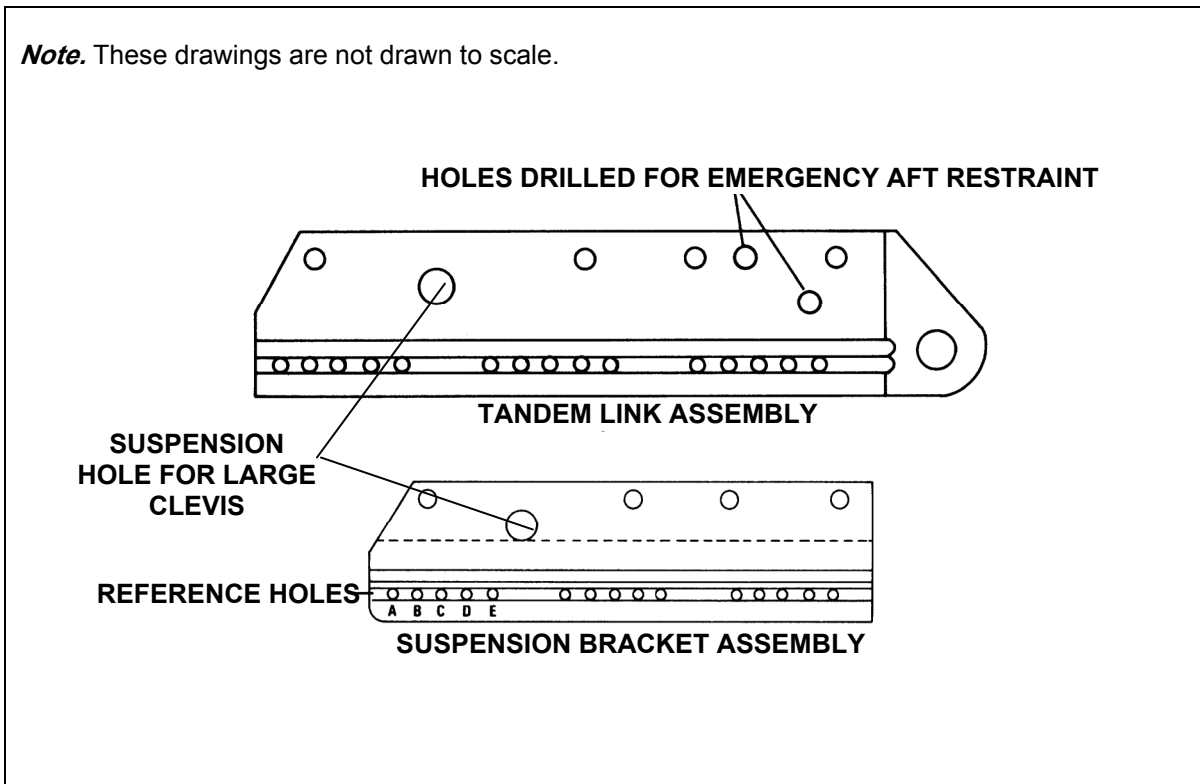


Figure 2-2. Tandem Link Assembly and Suspension Bracket Assembly

- However, their positioning is limited by the fact that the bolt hole configuration of the platform side rails only allows the suspension bracket assembly to be secured within the 2-foot panels of the platform. Every panel assembly has a four-bolt configuration on each side. These four bolts are designated as platform clevis points. The suspension bracket assembly can be positioned within the bolt configuration of a panel as shown in Figure 2-3. A reference hole “B” is used to show the appropriate position of the suspension bracket assembly as shown in Figures 2-2 and 2-3. The direction of the suspension bracket assembly is determined by matching reference hole “B” with the prescribed platform clevis number and placing the suspension bracket assembly in the direction where it can be secured within the same panel bolt configuration. Figure 2-4 shows the suspension bracket assemblies installed. Table 2-2 shows the maximum allowable suspended weights for the four-point and centerline suspension systems. Figure 2-5 details the centerline suspension system.

Note. These drawings are not drawn to scale

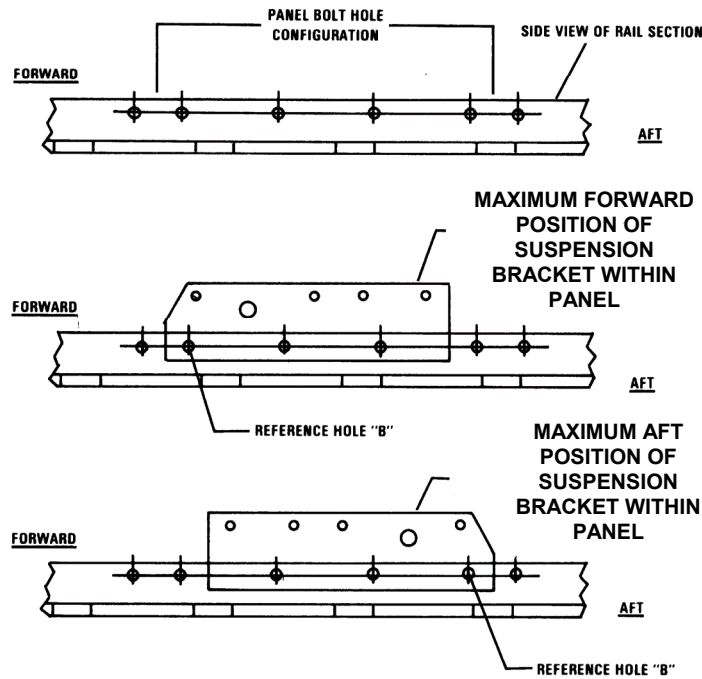
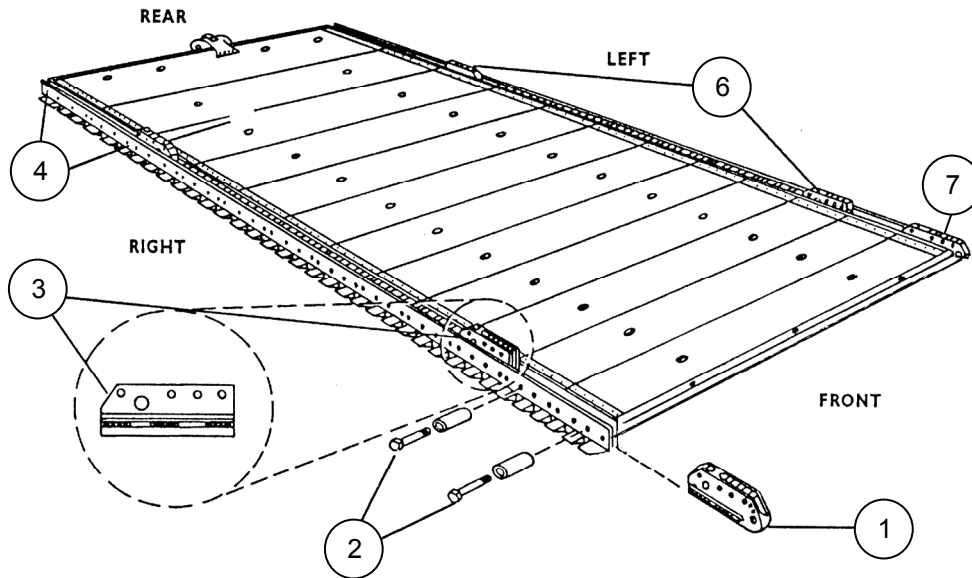


Figure 2-3. Bolt Configuration of a Panel

Note. These drawings are not drawn to scale



- 1 Remove the tandem link on the front of the right platform rail.
- 2 Remove the required bushings, as given in the specific rigging manual, from the bushing holes in the right rail.
- 3 Insert a suspension bracket assembly on the front end of the right rail. Slide the bracket assembly along the rail until the holes in the bracket assembly align with the required rail holes. Bolt the bracket assembly in place with the bushing bolts. Reinstall the required bushings and bolts.
- 4 Remove the required bushings, as given in the rigging manual, from the bushing holes in the right rail.
- 5 Insert a suspension bracket assembly on the rear of the right rail. Slide the bracket assembly along the rail until the holes in the bracket assembly align with the required rail holes. Bolt the bracket assembly in place with the bushing holes. Reinstall the required bushings and bolts.
- 6 Install two suspension bracket assemblies on the left rail, adapting the procedures in steps 1 through 5 above.
- 7 Reinstall the tandem link assembly from step 1.

Figure 2-4. Suspension Bracket Assemblies Installed

Table 2-2. Maximum Allowable Suspended Weights for the Four-Point and Centerline Suspension Systems

Four-Point Suspension System

The following table lists the maximum allowable suspended weights along with the suspension bracket assembly and/or tandem link position. All links positioned along the most forward and aft panels will be tandem links. All other positions along the platform side rail will use the suspension bracket assembly.

<i>Platform Length (feet)</i>	<i>Suspension/Tandem Link Positions(platform clevis numbers)</i>	<i>Maximum Suspended Weight (pounds)</i>
8	3, 3A, 14, 14A	16,000
12	3, 3A, 22, 22A	14,000
16	3, 3A, 30, 30A	9,300
16	8, 8A, 25, 25A	26,000
20	8, 8A, 33, 33A	19,000

Centerline Suspension System

The centerline suspension system consists of eight suspension bracket assemblies, four of which form a bridge on each side of the platform in the center and six suspension slings. Figure 2-5 details the configuration. The following table lists the maximum suspended weights along with the position of the suspension bracket assemblies on the platform rails.

<i>Platform Length (feet)</i>	<i>Suspension/Tandem Link Positions(platform clevis numbers)</i>	<i>Maximum Suspended Weight (pounds)</i>
20	5, 5A, 36, 36A 17, 17A, 24, 24A	16,000
24	8, 8A, 41, 41A 20, 20A, 29, 29A	14,000
28	8, 8A, 49, 49A 24, 24A, 33, 33A	9,300
32	8, 8A, 57, 57A 28, 28A, 37, 37A	26,000

Note. All maximum suspended weights can be higher with specific loads which increase the rigidity of the platform. Methods that differ from the suspension systems described above are given in the specific rigging manuals.

Note. This drawing is not drawn to scale.

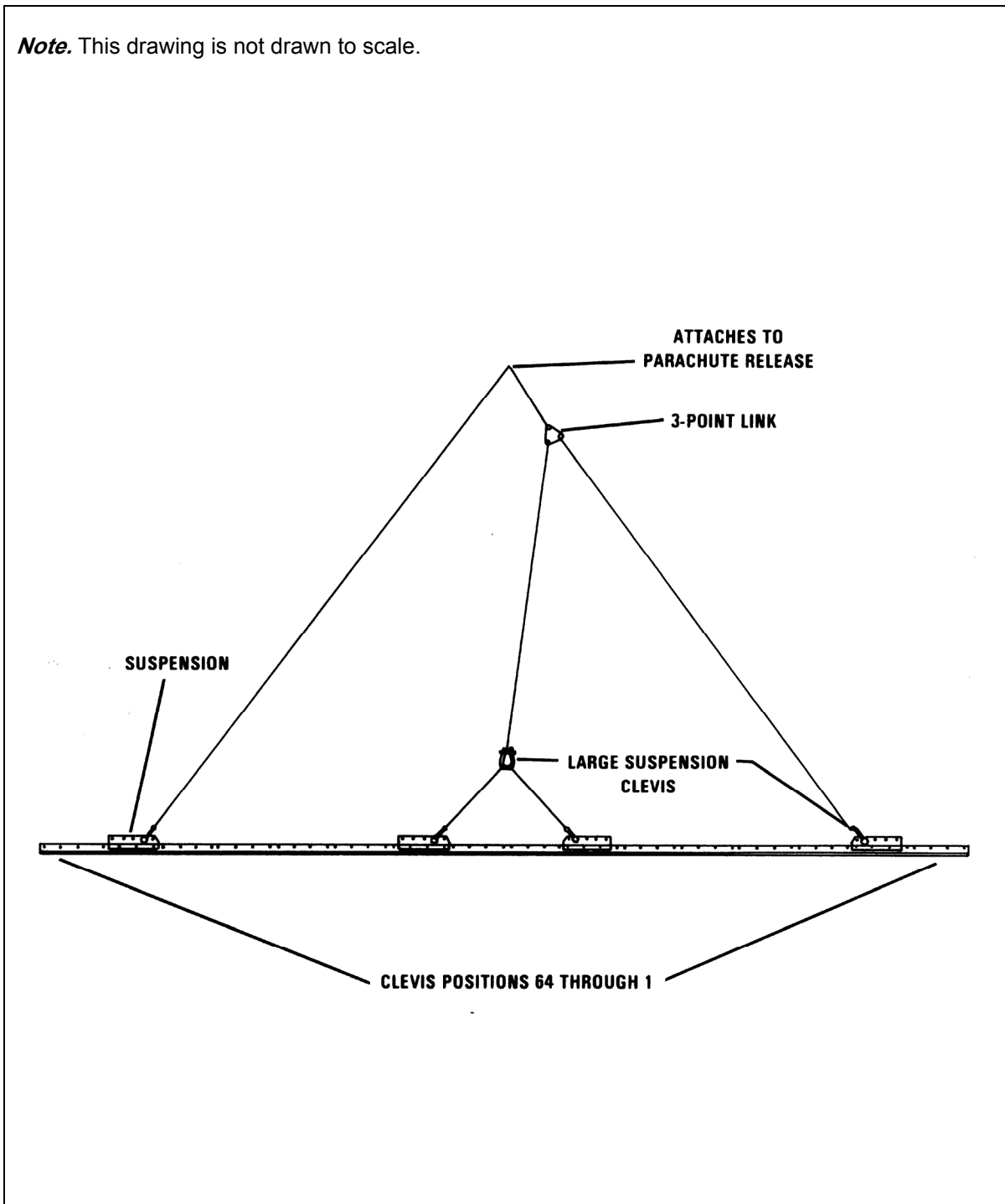


Figure 2-5. Centerline Suspension System Shown

PREPARING THE TYPE V PLATFORM

2-5. The platform must be prepared by attaching clevises, tandem links or suspension bracket assemblies according to the specific rigging manual. Figure 2-6 gives an example of how to bolt the clevises to the bushings in the platform side rails and how to number them.

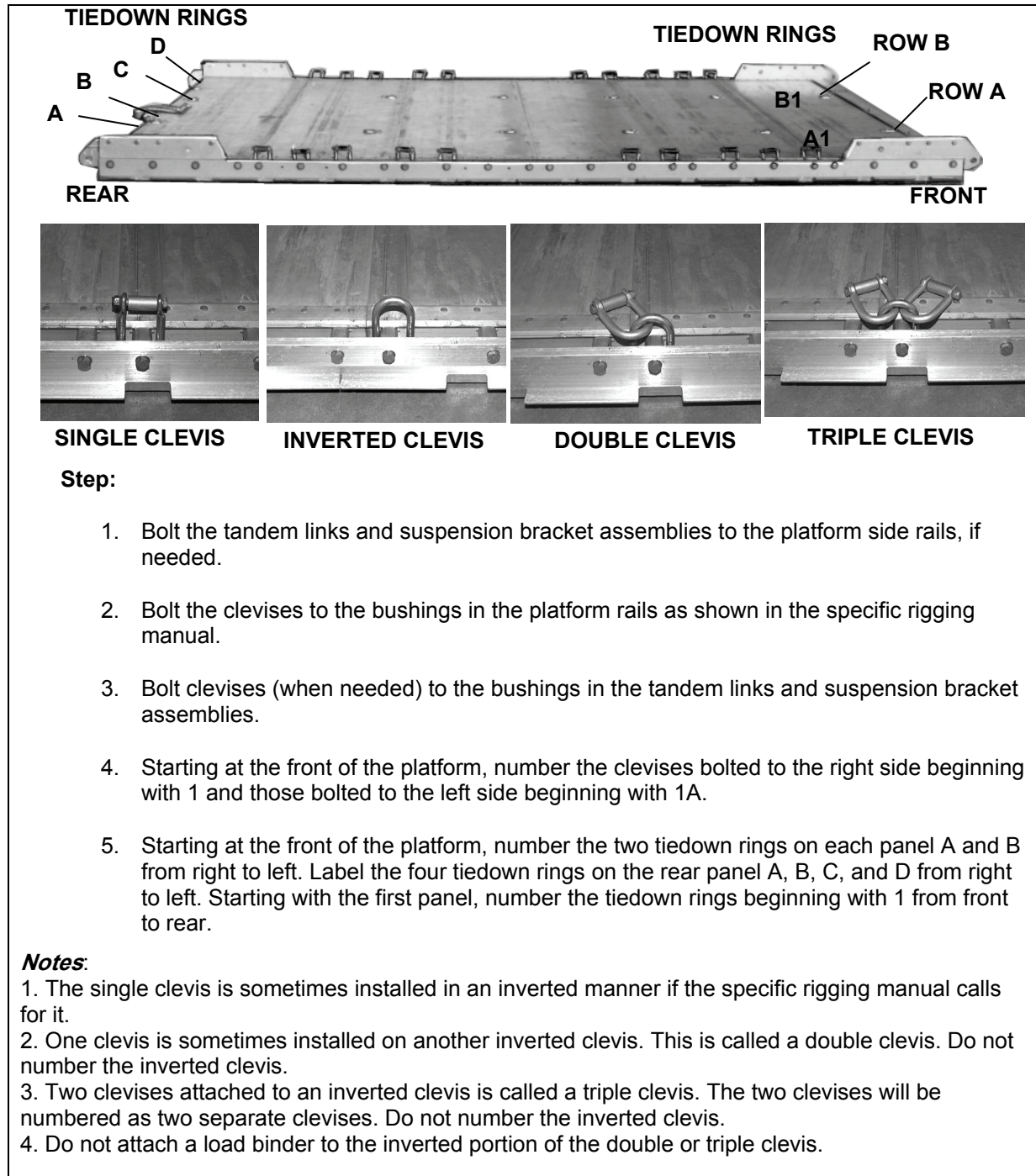
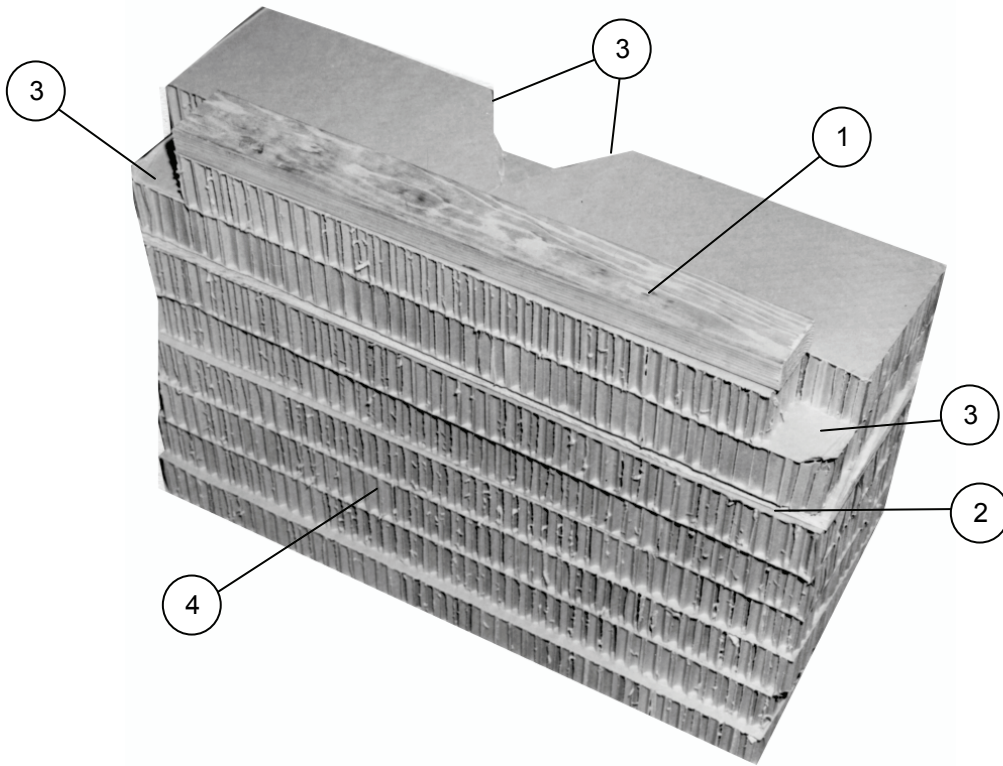


Figure 2-6. Type V Platform Prepared

BUILDING HONEYCOMB STACKS

2-6. Honeycomb stacks must be prepared according to the specific rigging manual. Honeycomb is used to absorb the landing shock. Figure 2-7 shows a typical honeycomb stack.

Note. When honeycomb layers are longer than 96 inches or wider than 36 inches, alternate the layers to build a solid, cohesive stack.



- ① Lumber
- ② Plywood
- ③ Cutouts or notches
- ④ Layers of honeycomb

Note. Glue the layers of the stack together.

Figure 2-7. Typical Honeycomb Stack

PLACING HONEYCOMB STACKS

2-7. Honeycomb stacks must be set on the platform according to instructions in the specific rigging manual. Figure 2-8 shows a typical placement of honeycomb stacks on a type V platform.

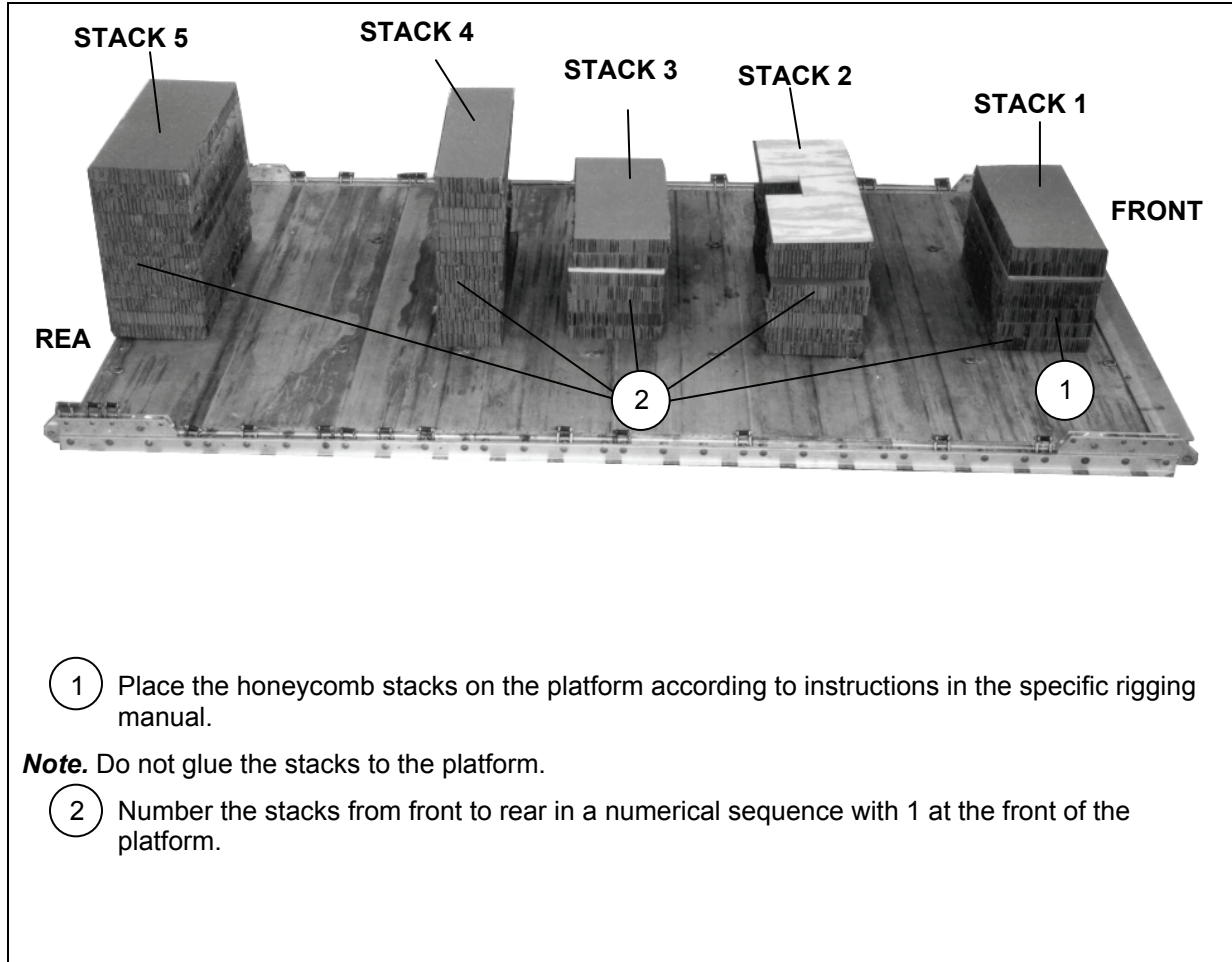


Figure 2-8. Typical Placement of Honeycomb Stacks on Platform

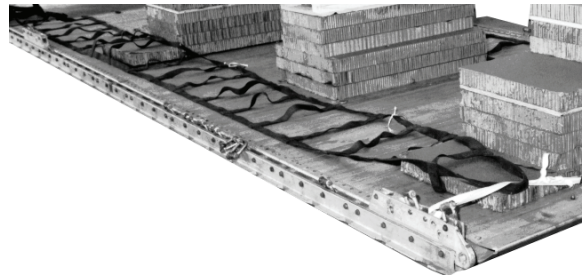
DRIVE-OFF AID

2-8. The drive-off aid may be used with the HMMWV, 2 1/2-ton truck, and the 5-ton, 900-series truck. The drive-off aid, shown in Figure 2-9, consists of a fabric track sewn into a ladder-type configuration. The system is placed on two of the identified vehicle's tires and attached to the type V platform tiedown rings with a tiedown clevis or type VIII nylon webbing. There are two tracks to each system. Each track is 30 feet long and 22 inches wide and weighs 21 pounds. When powered up, the vehicle (with tiedown assemblies removed), will progressively wrap the webbed ladder around the two tires (using the platform for leverage) and pull itself clear of the honeycomb and platform. Figure 2-10 shows the drive-off aid installed on the vehicle wheels.



REAR PLATFORM ATTACHMENT

Note. If the vehicle is to be driven off the rear of the platform, attach the drive-off aid to the outside tiedown rings on each side with a type V tie-down clevis.



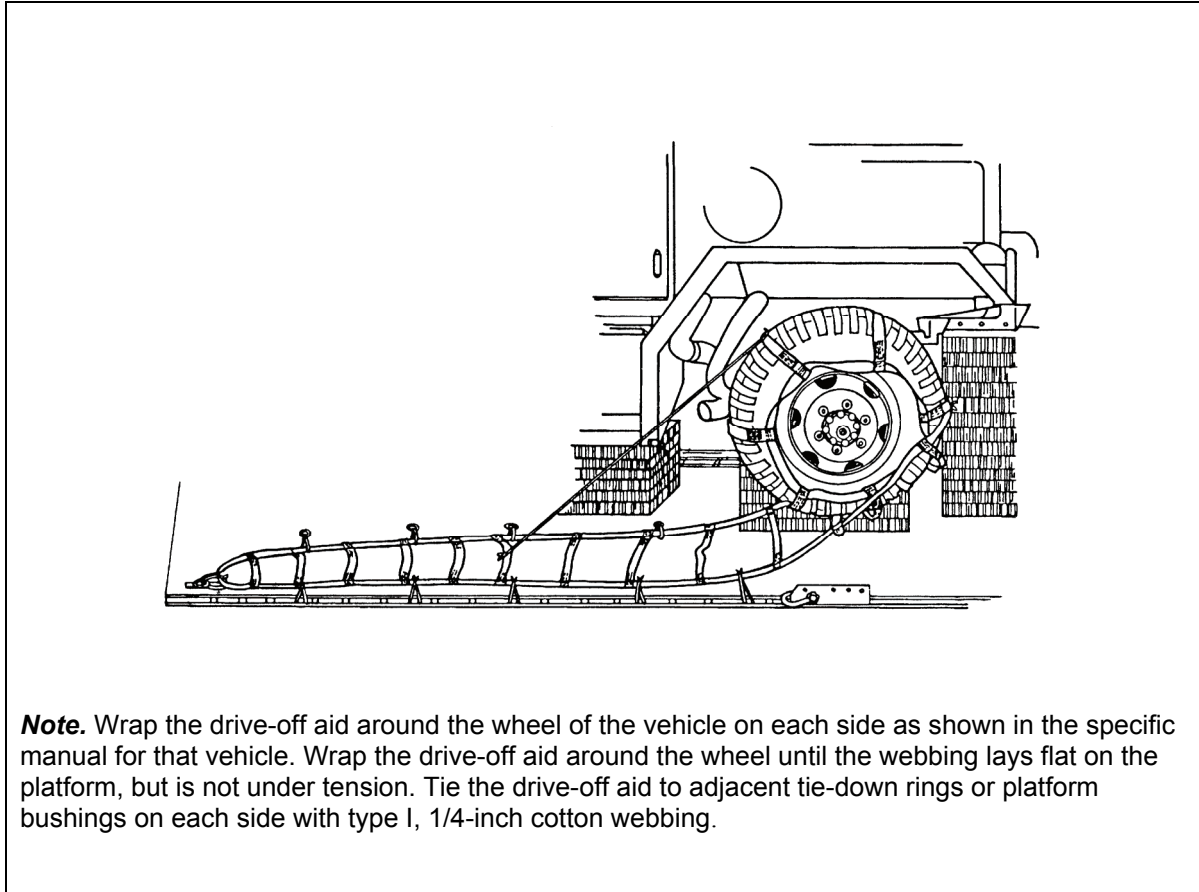
FRONT PLATFORM ATTACHMENT

Note. If the vehicle is to be driven off the front of the platform, tie a length of type VIII nylon webbing from the second bushing of the front tandem link assembly, through the end loop of the drive-off aid, and through the nearest tie-down ring. When attaching the drive-off aid to the type V platform using type VIII nylon webbing, tie the free ends with a ring bend knot as shown in Figure 1-5. Tie the drive-off aid to tie-down rings or platform bushings with type I, 1/4-inch cotton webbing.

Figure 2-9. Drive-off Aids Installed on Platform

CENTER OF BALANCE (CB)

2-9. The CB of an airdrop platform load, based on the total rigged weight, is given in the rigging manual for a particular item. If the load varies from the one given in a particular manual, the CB must be recomputed using the procedures shown in Figure 1-4.



Note. Wrap the drive-off aid around the wheel of the vehicle on each side as shown in the specific manual for that vehicle. Wrap the drive-off aid around the wheel until the webbing lays flat on the platform, but is not under tension. Tie the drive-off aid to adjacent tie-down rings or platform bushings on each side with type I, 1/4-inch cotton webbing.

Figure 2-10. Drive-off Aids Installed on Wheel of Vehicle

Chapter 3

Suspension Slings

SECTION I-GENERAL INFORMATION

LINE MULTI-LOOP

3-1. A line, multi-loop, (Figure 3-1) is used as suspension slings on platform loads rigged for low-velocity airdrop. These slings suspend the load under the cargo parachute during descent. Suspension slings connect the cargo parachute to the load using a parachute release assembly. A line, multi-loop, may also be used as deployment lines and to extend the risers of cargo parachutes or to group the bridles of a multi-parachute load.

Note. Tube edge nylon webbing suspension slings are an authorized substitute for the type XXVI nylon webbing slings. The combination of both tube edge nylon webbing and type XXVI nylon webbing slings are authorized in any configuration due to the same material characteristics.

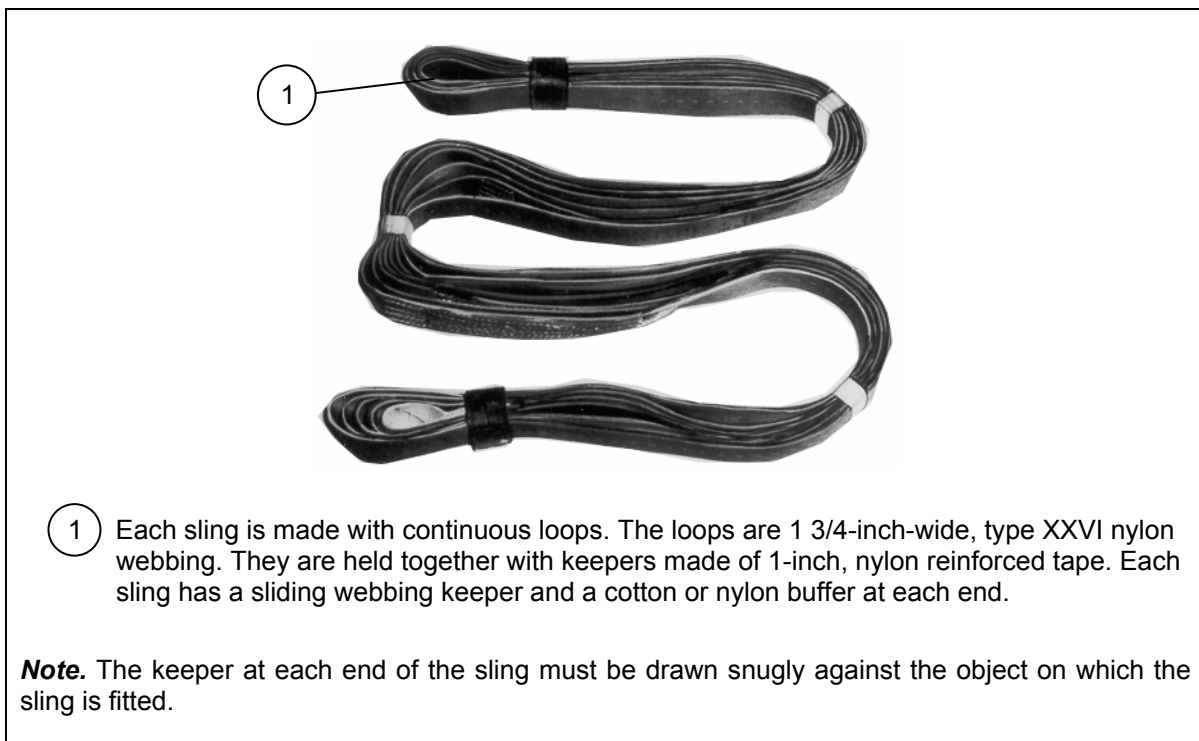


Figure 3-1. Suspension Slings

REQUIREMENTS

3-2. The size and number of suspension slings needed to rig an airdrop platform load for low-velocity airdrop depend on the suspended weight of the load. The size and number of suspension slings needed at each suspension point are listed in Table 3-1. The types and lengths of suspension slings authorized for use when a platform load is rigged for low-velocity airdrop are listed in Table 3-2. Each rigging manual lists the specific slings used on each load.

Table 3-1. Size and Number of Cargo Slings Required for Airdrop Platform Loads

<i>Weight of Rigged Load Without Cargo Parachutes (pounds)</i>	<i>Type XXVI Nylon Webbing Cargo Slings at Each Suspension Point</i>
2270 to 14,000	1 each (2-loop)
14,001 to 40,000	1 each (4-loop)

Table 3-2. Type XXVI Nylon Webbing Suspension Slings for Low-Velocity Airdrop

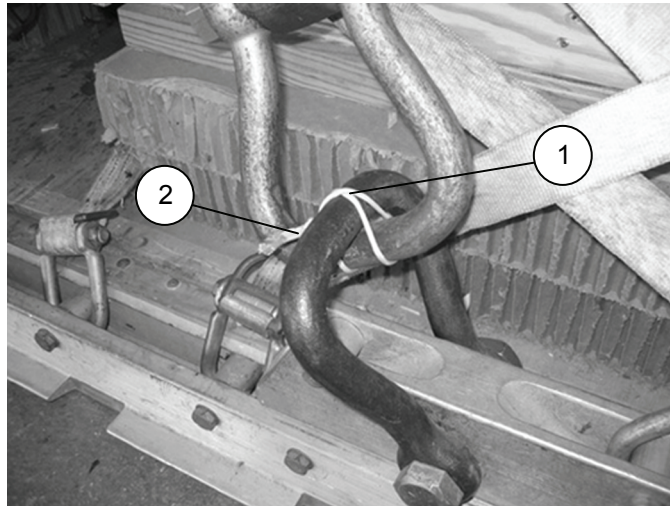
<i>National Stock Number</i>	<i>Length (feet)</i>	<i>Number of Loops</i>
1670-01-062-6301	3	2
1670-01-062-6306	3	4
1670-01-062-6304	9	2
1670-01-062-6305	9	4
1670-01-063-7760	11	2
1670-01-062-6310	11	4
1670-01-062-6303	12	2
1670-01-062-6307	12	4
1670-01-063-7761	16	2
1670-01-062-6308	16	4
1670-01-062-6302	20	2
1670-01-064-4453	20	4

SECTION II-RIGGING INFORMATION**ATTACHING SLINGS**

3-3. The specific rigging manual includes the length and loops of suspension slings needed and the method used to connect them to the platform or drop item. When suspension slings must be joined to form a longer suspension sling, a two-point link may be used. Attach suspension slings to the suspension bracket assembly or tandem links using large suspension clevises. When using a double suspension clevis configuration, follow the procedures in Figure 3-2.

CAUTION

Ensure the nut is wrench tightened to keep it from loosening during transport and airdrop.



- 1 Use a single length of type III nylon cord to route a running end through and around the clevises forming an X on the top clevis.
- 2 Secure with a slip knot ensuring the clevises are centered on each other.

Figure 3-2. Double Suspension Clevis Configuration Safety Tied

SAFETY TIEING SLINGS

3-4. Safety tying the suspension slings keeps them from entangling with the load. Safety tie the slings according to the instructions given in the specific rigging manual for the particular load.

Note. When using four-loop, type XXVI suspension slings, wrap each set of four plies with a 10- by 10-inch piece of cotton muslin. Secure each wrap with one single turn of 1/4-inch cotton webbing.

- **Deadman's Tie.** Safety tie all suspension slings with a deadman's tie as shown in Figure 3-3.

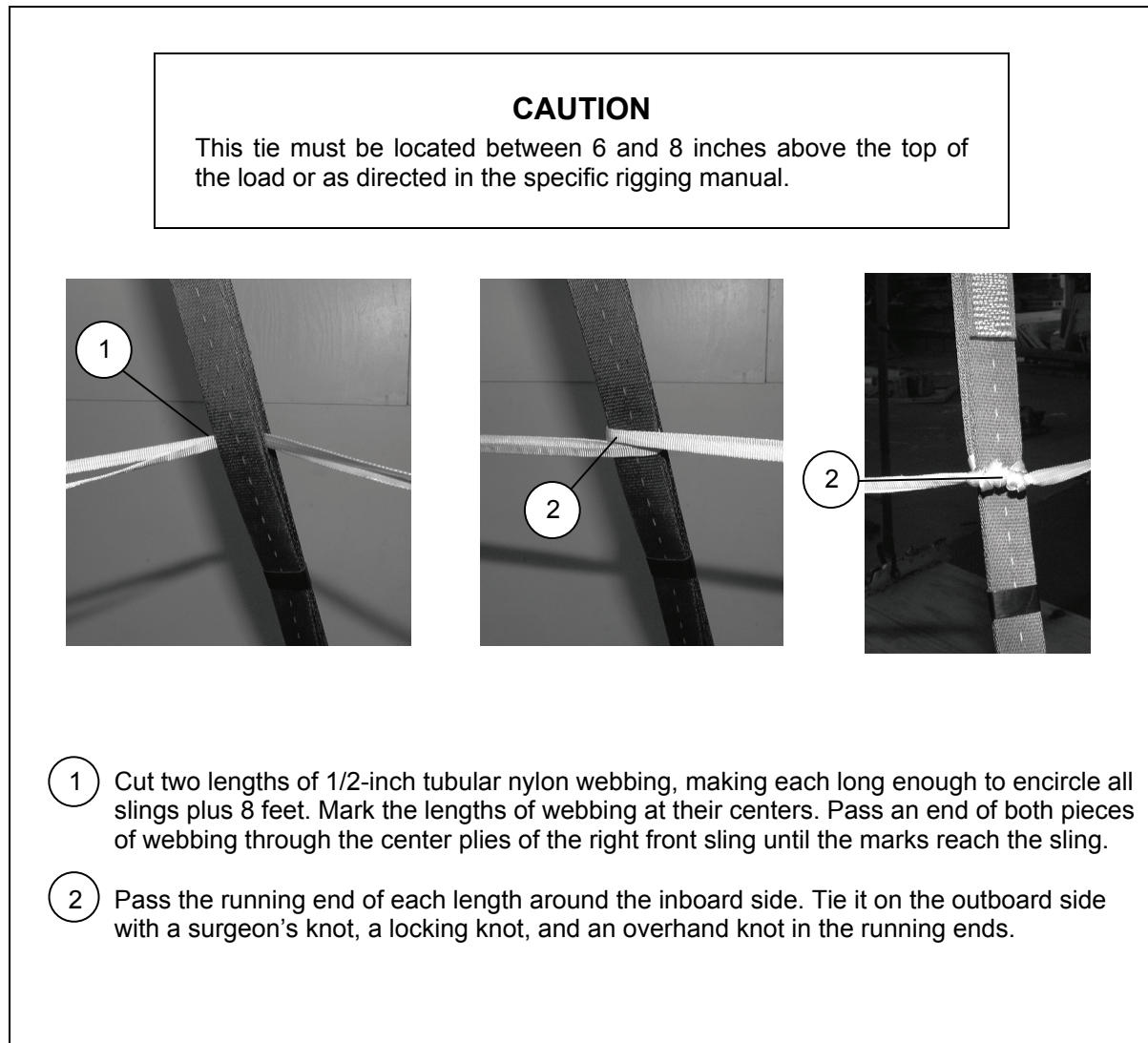


Figure 3-3. Safety Slings Tied with a Deadman's Tie

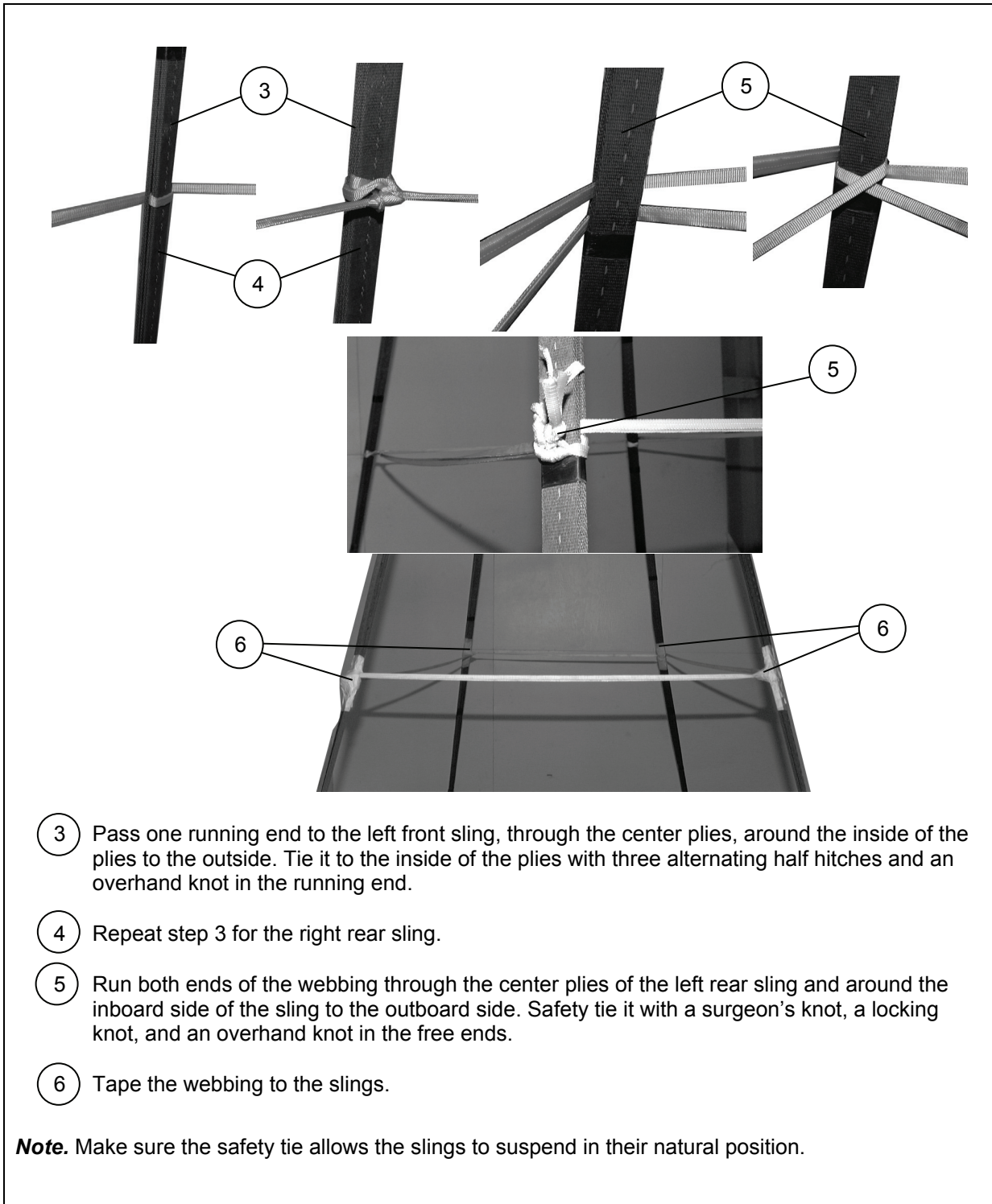


Figure 3-3. Safety Slings Tied with a Deadman's Tie (Continued)

- **Modified Deadman's Tie.** Safety tie suspension slings with a modified deadman's tie when specified by the individual rigging manual and as shown in Figure 3-4.

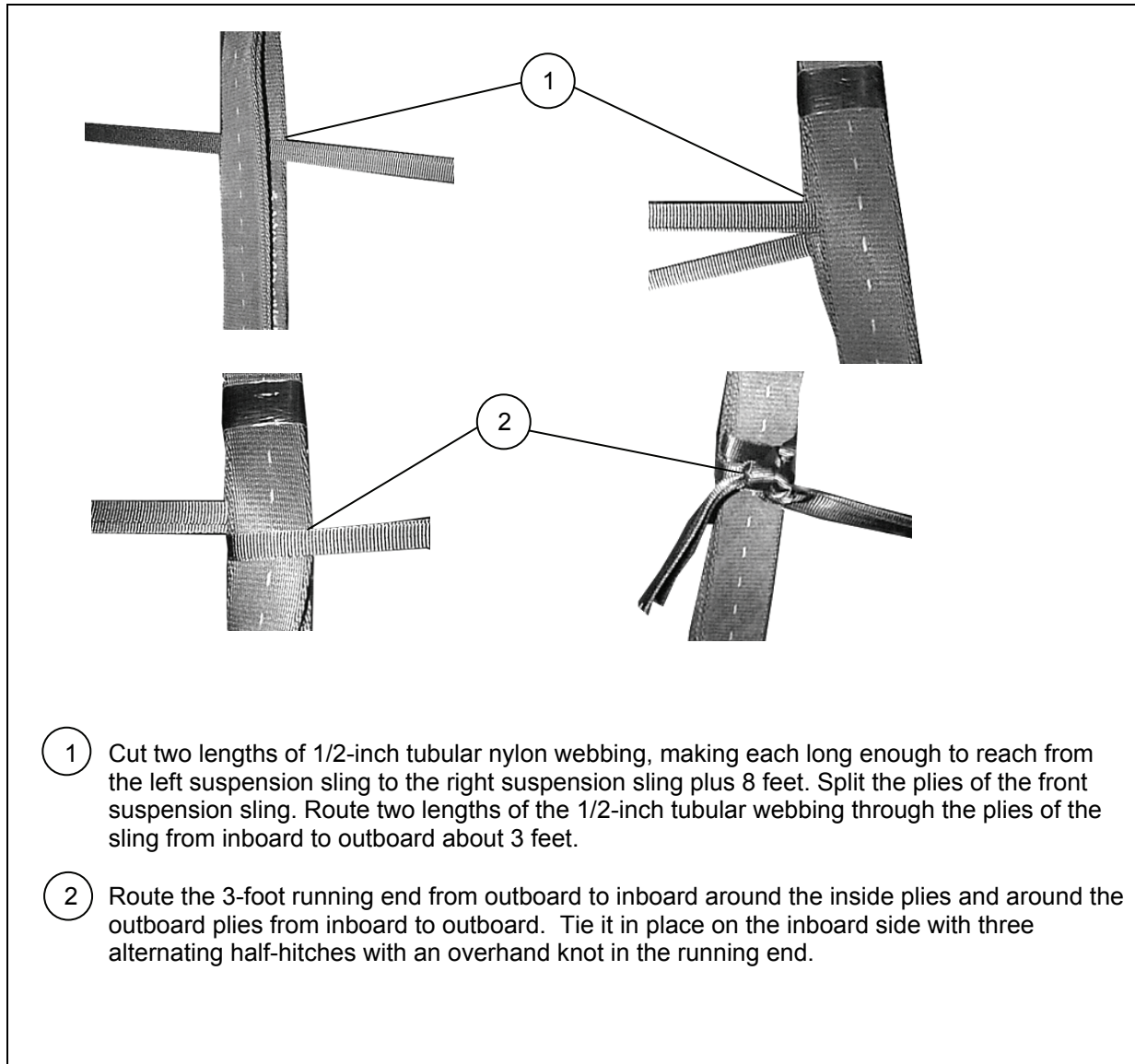


Figure 3-4. Safety Slings Tied with a Modified Deadman's Tie

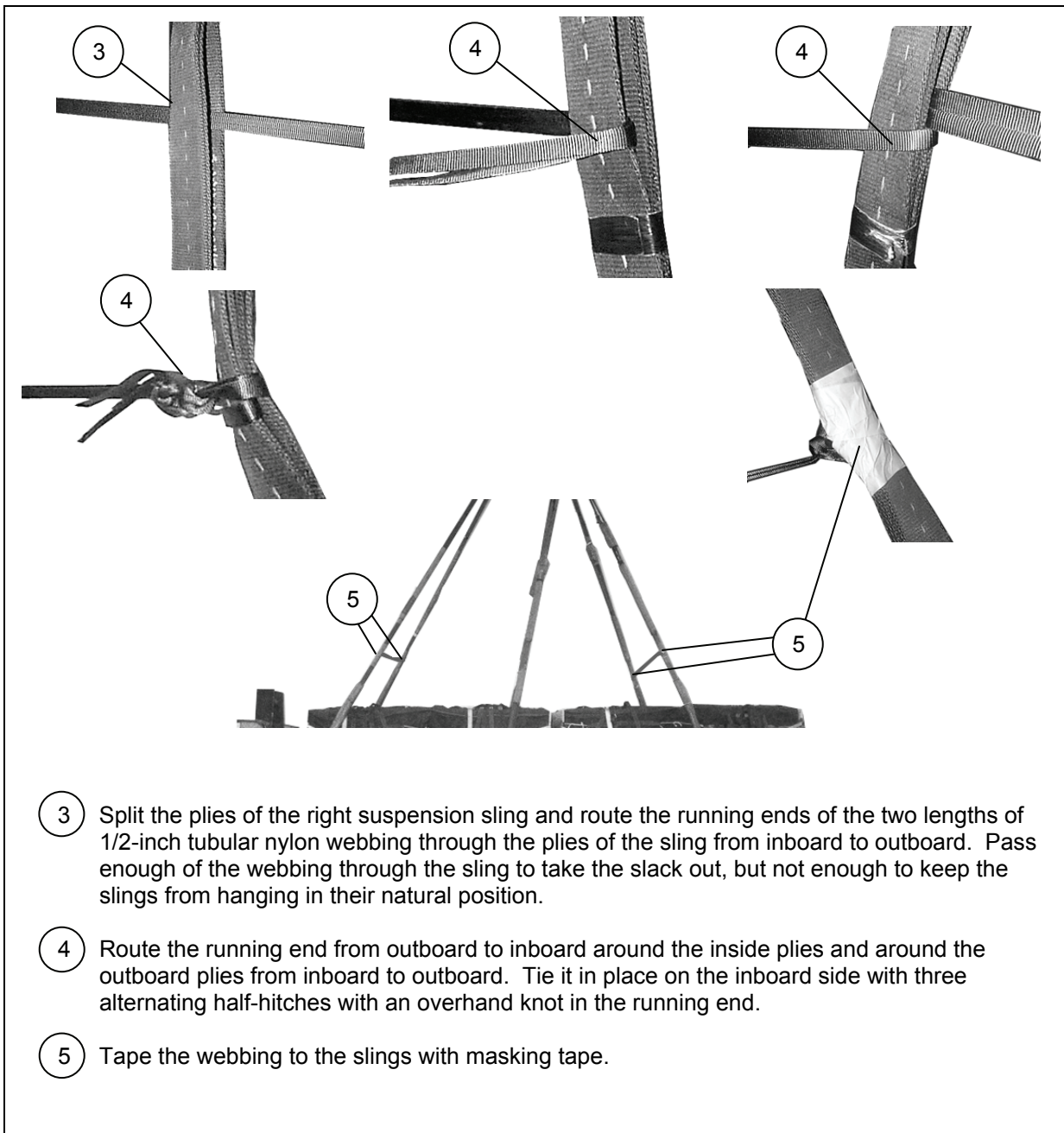


Figure 3-4. Safety Slings Tied with a Modified Deadman's Tie (Continued)

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Chapter 4

Lashings

SECTION I-GENERAL INFORMATION

USE

4-1. The drop item and the accompanying load are lashed to the platform to prevent damage to the load or to the aircraft during airdrop. The accompanying load is lashed to the platform to withstand the same force as the drop item.

COMPONENTS AND STRENGTHS

4-2. The components of the lashings used on airdrop loads are shown in Figure 4-1. The effective strength of a lashing is determined by the angle of lashing. Table 4-1 illustrates a method of determining lashing effectiveness forward, aft, lateral, and vertical thrusts. The maximum strengths of the various forms of lashings are given in Figure 4-2.

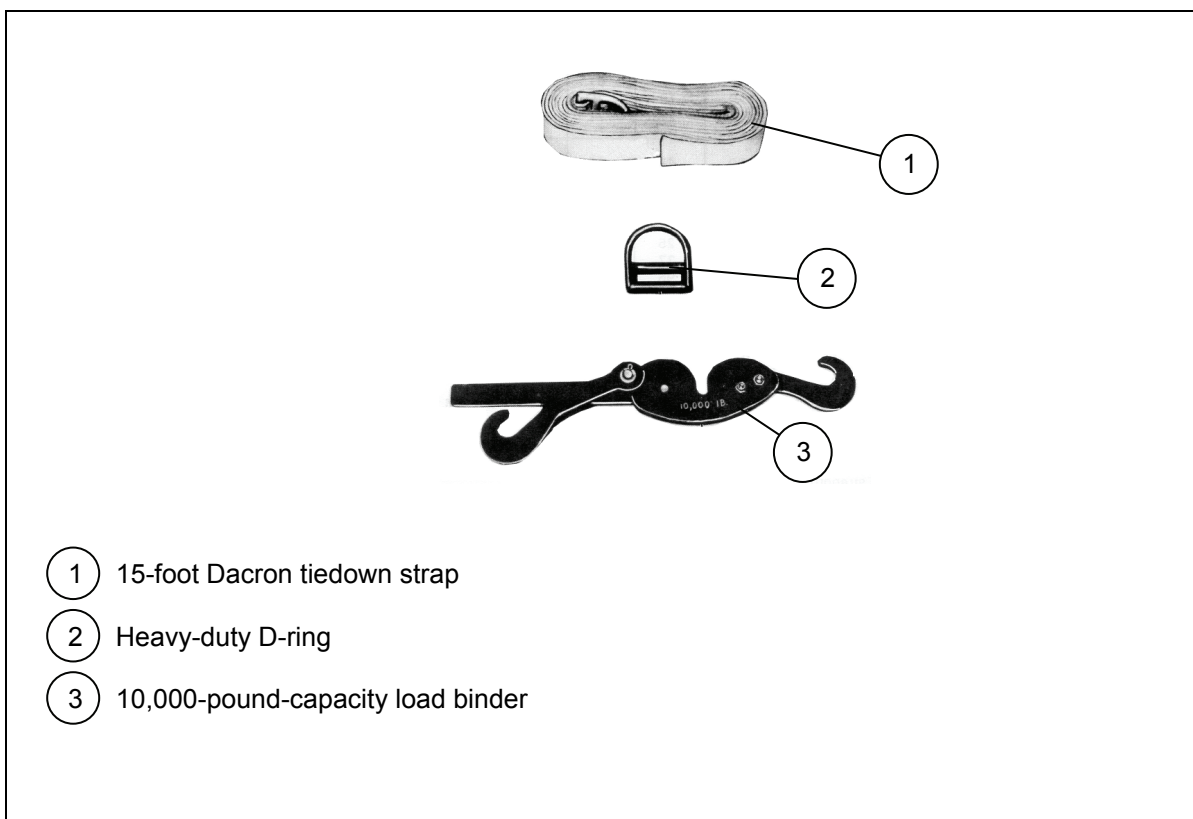
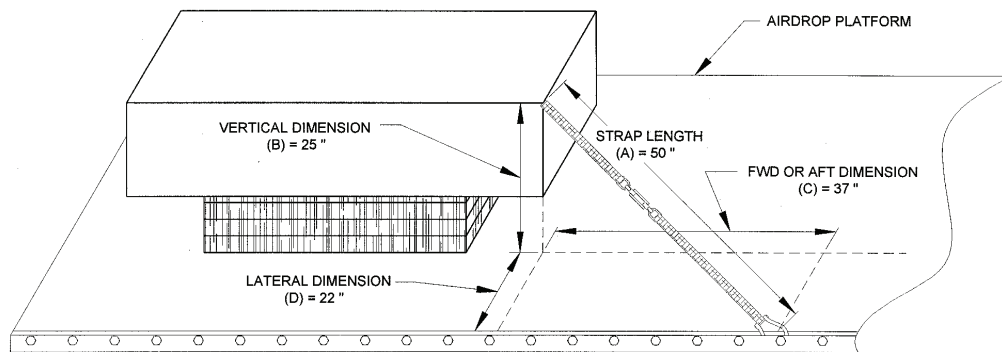


Figure 4-1. Components of a Tiedown Assembly

Table 4-1. Lashing Effectiveness



THIS FIGURE ILLUSTRATES A METHOD OF DETERMINING RESTRAINT PROVIDED BY A GIVEN AIRDROP TIEDOWN. AS ILLUSTRATED, TIEDOWN RATIOS CAN BE DETERMINED BY DIVIDING THE DIRECTIONAL DISTANCE IN WHICH RESTRAINT IS REQUIRED BY THE STRAP LENGTH. THIS RATIO IS THEN MULTIPLIED BY THE STRENGTH OF THE TIEDOWN STRAP OR ATTACHMENT POINT, WHICHEVER IS LESS, TO FIND THE EFFECTIVE RESTRAINT RECEIVED FROM THE TIEDOWN PATTERN USED.

EXAMPLE: (Note: Quantities used are from the example above)

- 1) FIRST, MEASURE THE TIEDOWN STRAP LENGTH (A) FROM THE ATTACHMENT POINT ON THE AIRDROP LOAD TO THE TIEDOWN FITTING ON THE AIRDROP PLATFORM (50 INCHES). YOU WILL USE THIS MEASUREMENT IN EACH CALCULATION.
- 2) **CALCULATING THE VERTICAL RESTRAINT:**
 - a) FOR DETERMINING VERTICAL RESTRAINT, MEASURE THE VERTICAL DIMENSION (B) FROM THE ATTACHMENT POINT ON THE AIRDROP LOAD TO A POINT DIRECTLY BENEATH IT ON THE AIRDROP PLATFORM SURFACE (25 INCHES).
 - b) DIVIDE THE VERTICAL DIMENSION (B) BY THE TIEDOWN STRAP LENGTH (A) TO DETERMINE A RATIO:

$$\frac{25}{50} = 0.50 \text{ RATIO}$$
 - c) MULTIPLY THIS RATIO BY THE RATED STRENGTH OF THE TIEDOWN STRAP OR TIEDOWN FITTING, WHICHEVER IS LESS:

$$0.50 \times 10,000^* = 5,000 \text{ POUNDS}$$
 ← VERTICAL RESTRAINT RECEIVED FROM STRAP
- 3) **CALCULATING THE FORWARD OR AFT RESTRAINT:**
 - a) FOR DETERMINING FORWARD OR AFT RESTRAINT, OBTAIN A FORWARD OR AFT DIMENSION (C) BY MEASURING FROM A POINT DIRECTLY BENEATH THE ATTACHMENT POINT ON THE AIRDROP LOAD ALONG A LONGITUDINAL AXIS TO A POINT LATERAL TO THE TIEDOWN FITTING BEING USED ON THE AIRDROP PLATFORM (37 INCHES).
 - b) DIVIDE THE FORWARD OR AFT DIMENSION (C) BY THE TIEDOWN STRAP LENGTH (A) TO DETERMINE A RATIO:

$$\frac{37}{50} = 0.74 \text{ RATIO}$$
 - c) MULTIPLY THIS RATIO BY THE RATED STRENGTH OF THE TIEDOWN STRAP OR TIEDOWN FITTING, WHICHEVER IS LESS:

$$0.74 \times 10,000^* = 7,400 \text{ POUNDS}$$
 ← FWD OR AFT RESTRAINT RECEIVED FROM STRAP
- 4) **CALCULATING THE LATERAL RESTRAINT:**
 - a) FOR DETERMINING LATERAL RESTRAINT, OBTAIN A LATERAL DIMENSION (D) BY MEASURING FROM A POINT DIRECTLY BENEATH THE ATTACHMENT POINT ON THE PLATFORM SURFACE TO THE SIDERAIL OF THE PLATFORM (22 INCHES).
 - b) DIVIDE THE LATERAL DIMENSION (D) BY THE TIEDOWN STRAP LENGTH (A) TO DETERMINE A RATIO:

$$\frac{22}{50} = 0.44 \text{ RATIO}$$
 - c) MULTIPLY THIS RATIO BY THE RATED STRENGTH OF THE TIEDOWN STRAP OR TIEDOWN FITTING, WHICHEVER IS LESS:

$$0.44 \times 10,000^* = 4,400 \text{ POUNDS}$$
 ← LATERAL RESTRAINT RECEIVED FROM STRAP

* THIS QUANTITY SHOULD ALWAYS REPRESENT THE WEAKEST LINK IN THE SYSTEM. IF THE RATED STRENGTH OF THE STRAP OR ATTACHMENT POINT BEING USED IS LESS THAN 10,000 POUNDS, THE RATIO SHOULD BE MULTIPLIED BY THE WEAKEST RATED STRENGTH IN EXAMPLE, A PANEL TIEDOWN RING RATED STRENGTH IS 5,000 POUNDS.

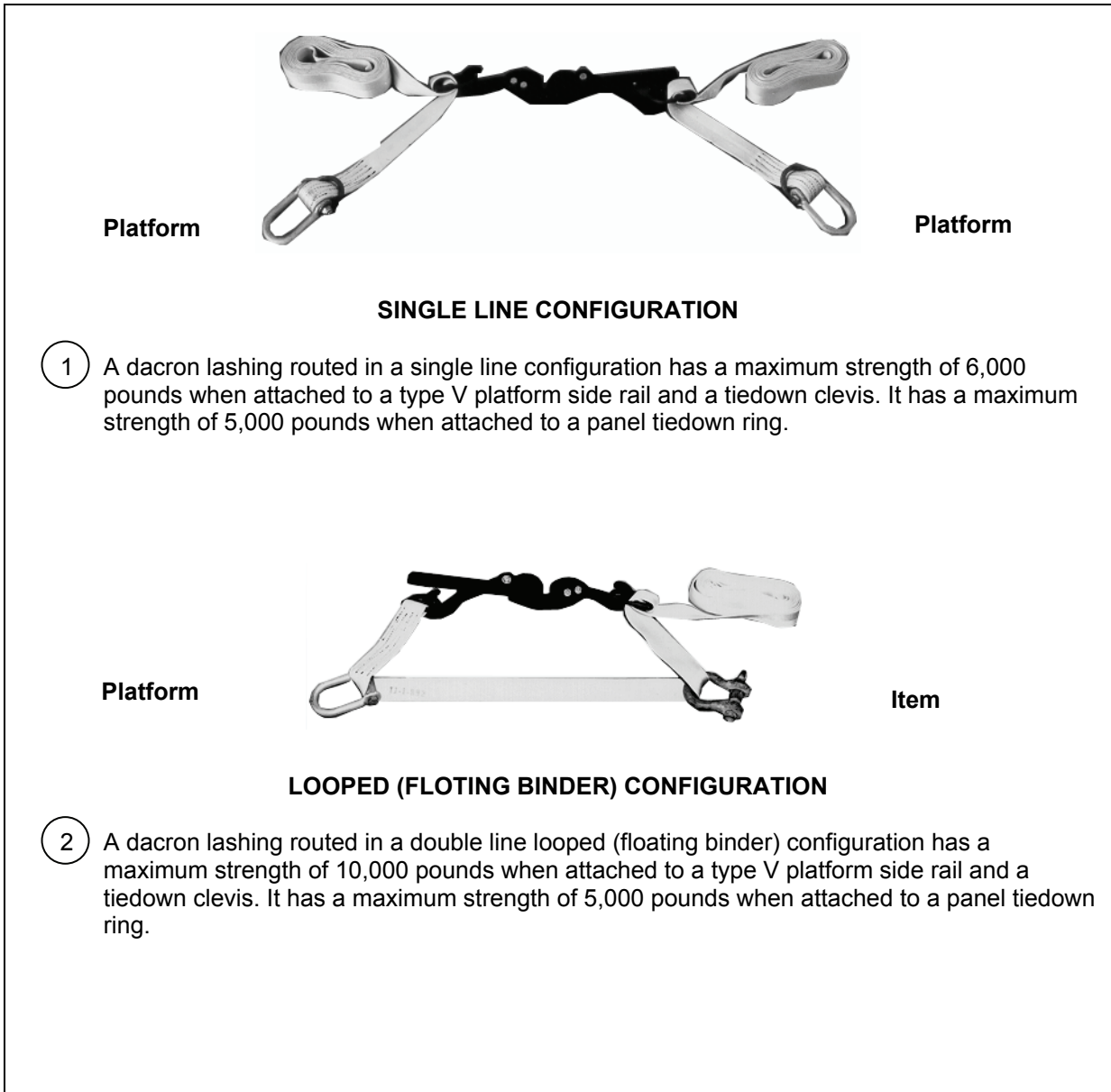


Figure 4-2. Strengths of Dacron Lashings

SECTION II-RIGGING INFORMATION**FITTING D-RINGS**

4-3. Fit a D-ring to the end of each tiedown strap as shown in Figure 4-3.

LASHING LOAD

4-4. Lash a low-velocity airdrop load to the platform according to the instructions in the specific rigging manual. Install the lashings as shown in Figures 4-4 and 4-5. When a load is rigged for which there is no specific rigging manual, lashings must provide restraint to withstand extraction, deployment recovery, and ground impact forces. Airdrop loads that do not have specific rigging procedures must be restrained to the airdrop platform to the following criteria: 3Gs forward, 2.25 Gs aft, 1.5 Gs lateral, and 2 Gs vertical. The total force that is necessary to restrain a load in a given direction is determined by multiplying the weight of the load times the specific G value for that restraint direction. Lashing effective strength is determined as shown in Table 4-1.

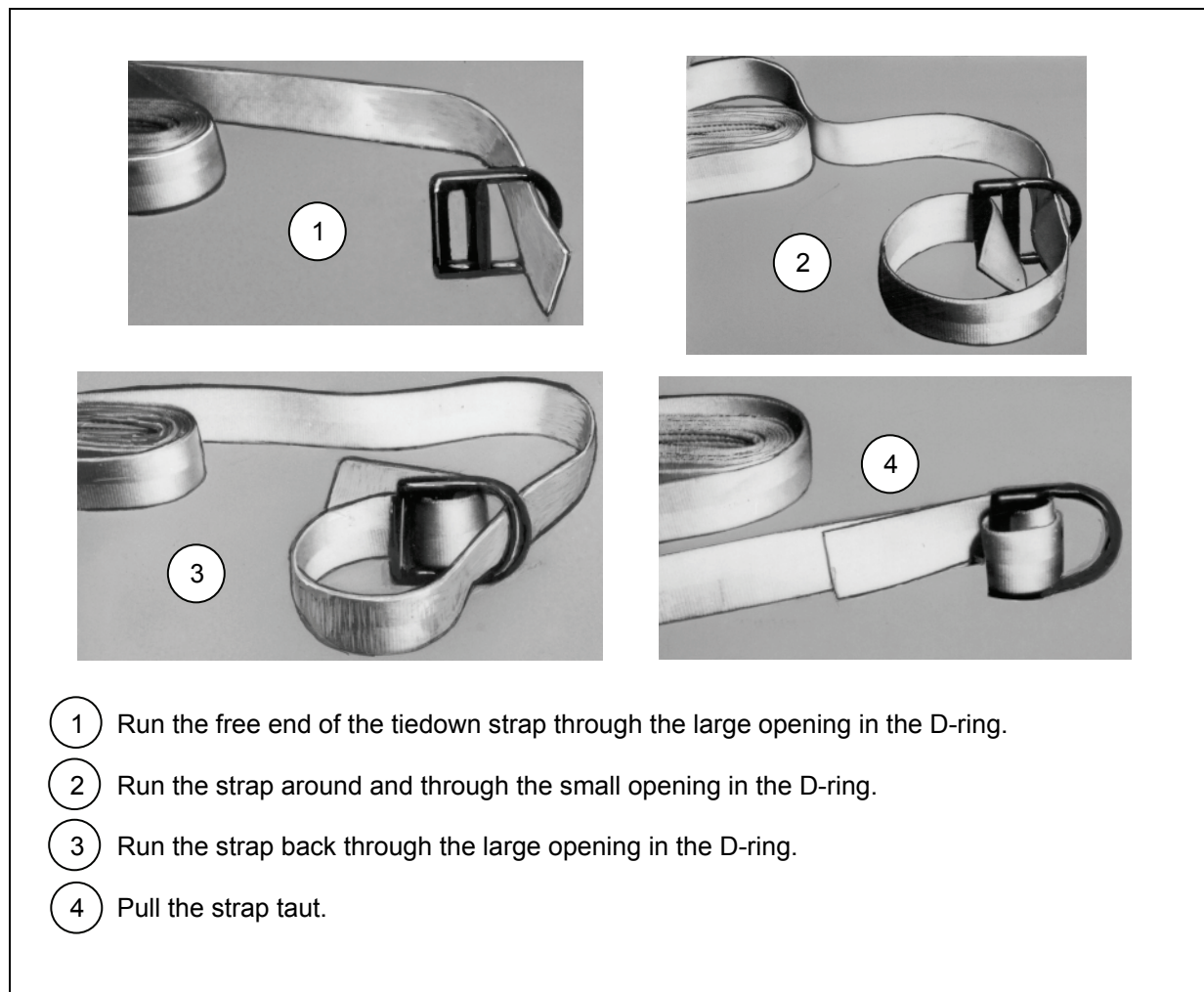
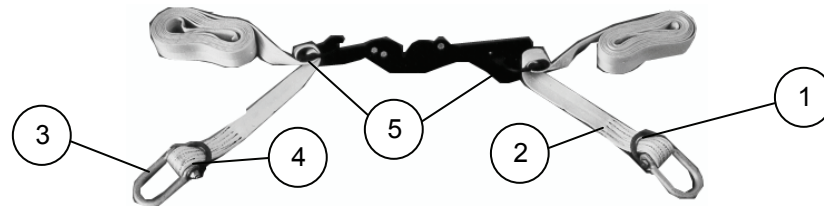
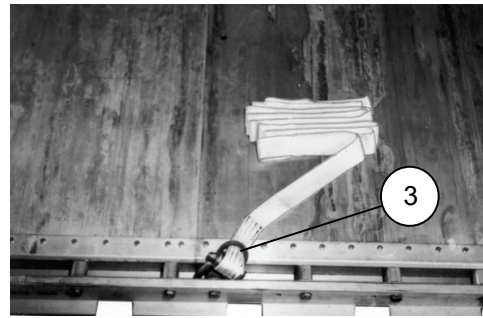
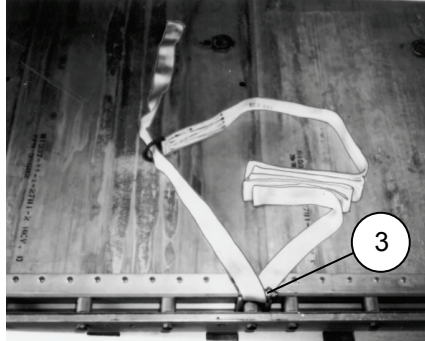


Figure 4-3. D-Ring Fitted to Tiedown Strap

CAUTION

Do not tighten the lashings so tight that they cause the platform to bow.

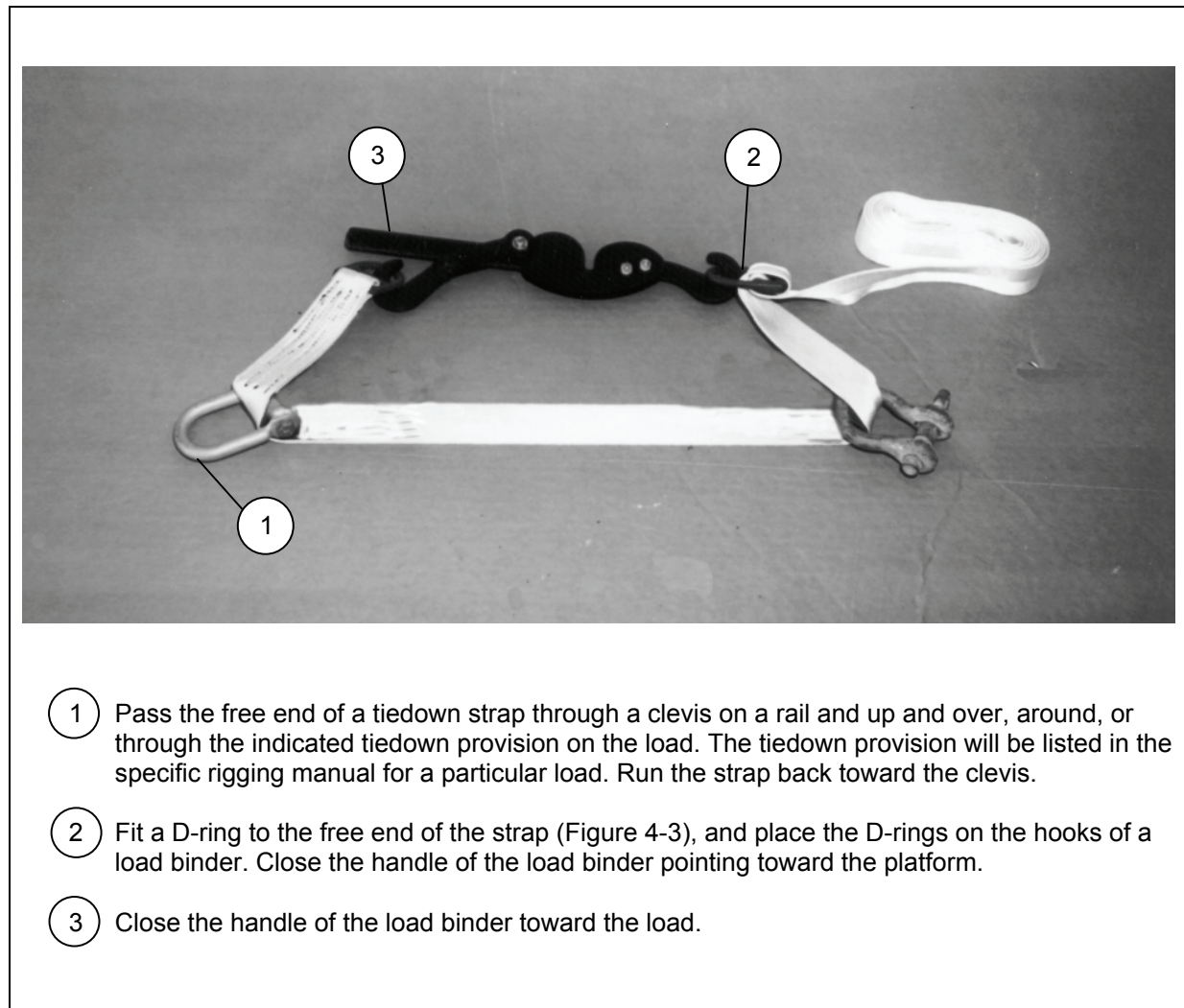


- 1 Pass the free end of one tiedown strap through a clevis on the right rail and through its own D-ring. Pull the strap taut.
- 2 Run the free end of the strap up over the load.
- 3 Pass the free end of a second tiedown strap through a clevis on the left rail and through its own D-ring. Pull the strap taut.
- 4 Run the free end of the strap up over the load.
- 5 Fit a D-ring on the free end of each strap as described in Figure 4-3, and place the D-rings on the hooks of a load binder. Safety the binder handle closed as shown in Figure 4-6.

Notes.

1. When the tiedown strap length is not a factor, it is permissible to use a single tiedown strap and D-ring with a load binder attached directly to a side rail clevis or tiedown ring.
2. Pad all sharp edges that may touch the strap with cellulose wadding or other suitable material.

Figure 4-4. Single Line Lashing



- ① Pass the free end of a tiedown strap through a clevis on a rail and up and over, around, or through the indicated tiedown provision on the load. The tiedown provision will be listed in the specific rigging manual for a particular load. Run the strap back toward the clevis.
- ② Fit a D-ring to the free end of the strap (Figure 4-3), and place the D-rings on the hooks of a load binder. Close the handle of the load binder pointing toward the platform.
- ③ Close the handle of the load binder toward the load.

Figure 4-5. A Looped (Floating Binder) Lashing

SAFETY TIEING LOAD BINDER HANDLES

4-5. Roll the excess tiedown strap, and place alongside the load binder handle. Safety tie the load binder handle closed as shown in Figure 4-6.

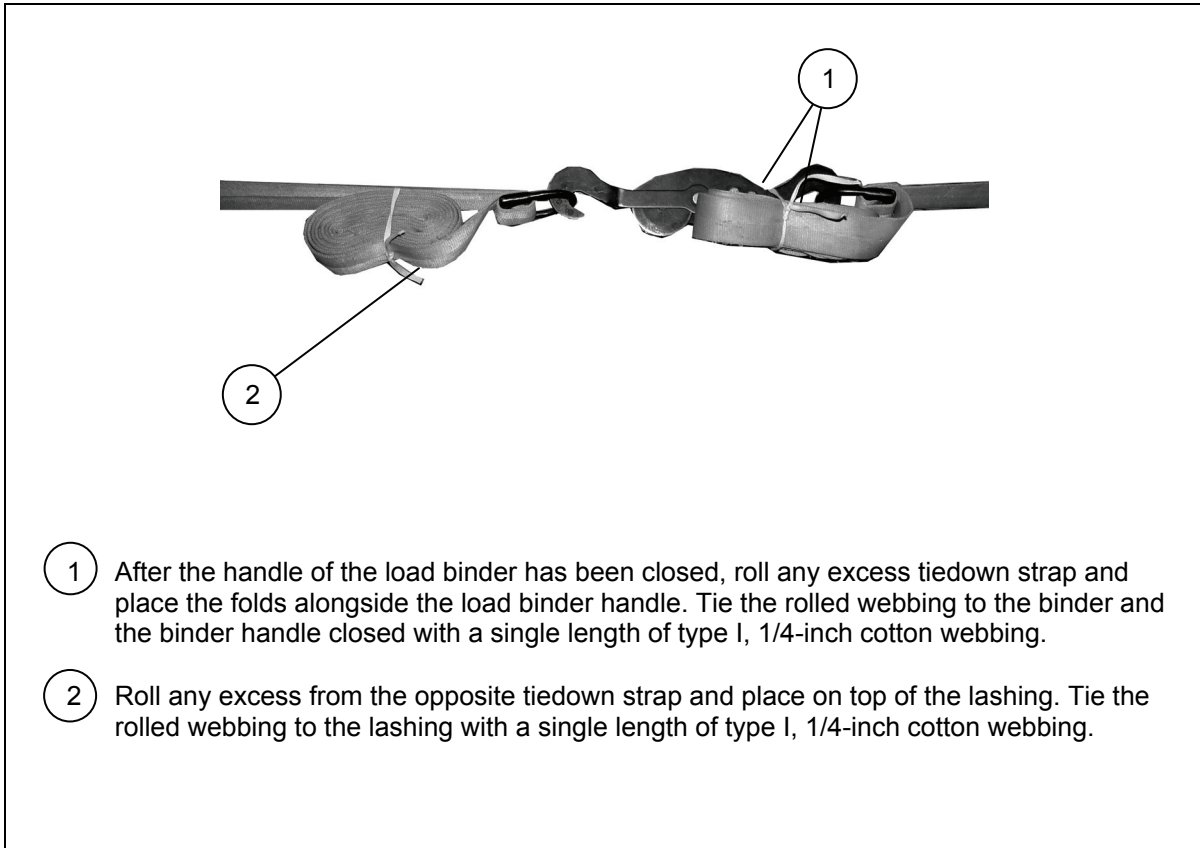


Figure 4-6. Load Binder Handle and Excess Webbing Safety Tied

FORMING A 30-FOOT, 45-FOOT, OR GREATER LENGTH TIEDOWN STRAP

4-6. When needed, attach 15-foot tiedown straps together to form a 30-foot, 45-foot, or greater length tiedown strap as shown in Figure 4-7.

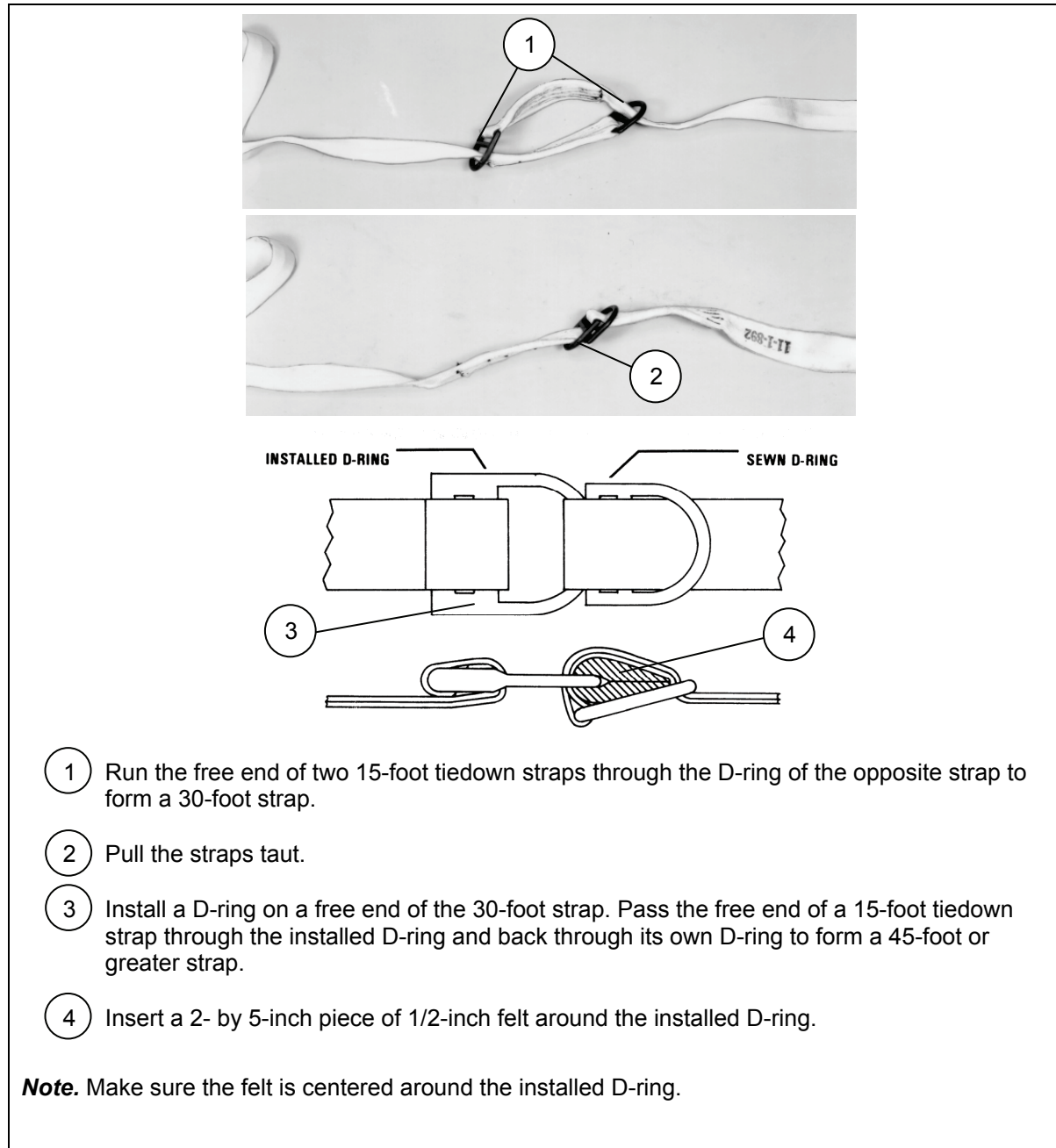


Figure 4-7. A 30-Foot, 45-Foot, or Greater Length Tiedown Strap Formed

Chapter 5

Cargo Parachutes

SECTION I-GENERAL INFORMATION

USE

5-1. Cargo parachutes, also called recovery parachutes, are used to slow the descent of a low-velocity platform load. Table 5-1 lists the weight limitations for cargo parachutes used with airdrop platform loads.

TYPES

- 5-2. The following cargo parachutes are used when loads are rigged for low-velocity airdrop.
- **G-11B Cargo Parachute.** The parachute has a 100-foot-diameter canopy. It has 120 suspension lines (35-foot, type III nylon cord). The apex vent lines have been pulled down with a 95-foot, type V nylon webbing center line. The parachute has four 2-second cutters. When packed, the assembly weighs 250 pounds.
 - **G-11C Cargo Parachute.** This is the same parachute as the G-11B except this parachute has two 2-second cutters with two reusable reefing lines. The apex vent lines have been pulled down with a 100-foot, type V nylon webbing center line. When packed, the assembly weighs 250 pounds.
 - **G-12E Cargo Parachute.** This parachute has a 64-foot-diameter canopy. It has sixty-four 51-foot, type IV braided nylon cord suspension lines. The apex vent lines have been pulled down with a 55-foot, type V nylon webbing center line. When packed, the assembly weighs 125 pounds.

Table 5-1. General Suspended Weight Limitations in Pounds for Cargo Parachutes

<i>Parachutes</i>	<i>Minimum</i>	<i>Maximum</i>
G-11B		
1	2,270	5,000
2	5,001	10,000
3	10,001	15,000
4	15,001	20,000
G-11C		
5	20,001	25,000
6	25,001	30,000
7	30,001	35,000
8	35,001	40,000
G-11E		
2	2,270	3,500

Note. Suspended weight in pounds is the total rigged weight less the weight of the cargo parachutes.

RISER EXTENSIONS

5-3. Cargo parachutes are used singularly or in a cluster. When parachutes are used in a cluster, the risers of each parachute are lengthened so the canopies remain almost vertical as they descend to increase the effectiveness of each canopy. The length of a riser extension and the number of stows used in stowing the extensions are given in Table 5-2.

Table 5-2. Riser Requirements for G-11B, G-11C, and G-12E Cargo Parachutes

<i>Number of Parachutes</i>	<i>Length of Riser Extension (feet)</i>	<i>Number of Extension Stows</i>	<i>Type XXVI Nylon Webbing Slings</i>
1	3	0	3-foot (2-loop)
2	20	2	20-foot (2-loop)
3 or 4	60	8	6-foot (3-loop)
5 to 8	120	16	120-foot (2-loop)

Notes.

1. All riser extensions must be continuous type XXVI nylon slings. Each parachute must have identical riser extensions and each must be of the same length.
 2. G-12E parachutes have three stows.
-

SECTION II-RIGGING INFORMATION

FORMING AND BOLTING RISER EXTENSIONS

5-4. The risers of a cluster of cargo parachutes used on low-velocity airdrop loads must be extended (lengthened) using the following methods.

- **Forming Extensions.** Only continuous riser extensions may be used.
- **Bolting Extensions to Risers.** Bolt the riser extension to the risers of a cargo parachute as shown in Figure 5-1.

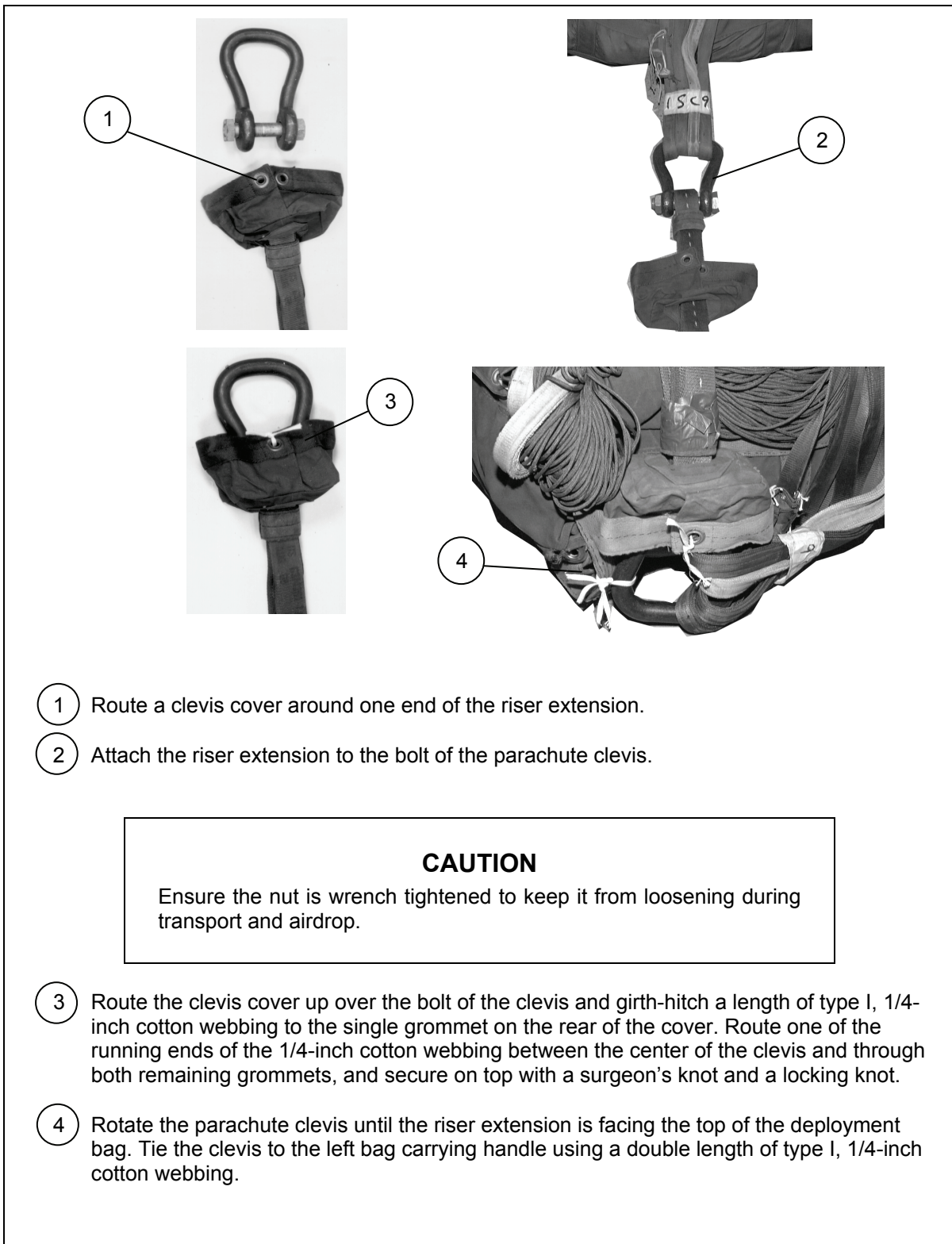


Figure 5-1. Riser Extension Bolted to Risers

STOWING RISER EXTENSIONS

5-5. The riser extensions for the parachutes must be stowed as described below.

- **G-12E Cargo Parachute.** There are two deployment bags that may be used in packing the G-12E. There is the modified G-12 deployment bag, Part Identification Number (PIN) 54K6299 or the G-12E deployment bag, PIN 11-1-3967. Stow the riser extension as shown in Figures 5-2 and 5-3.
- **G-11B or G-11C Cargo Parachute.** Stow the riser extensions of a G-11B or G-11C cargo parachute as shown in Figures 5-4 and 5-5.

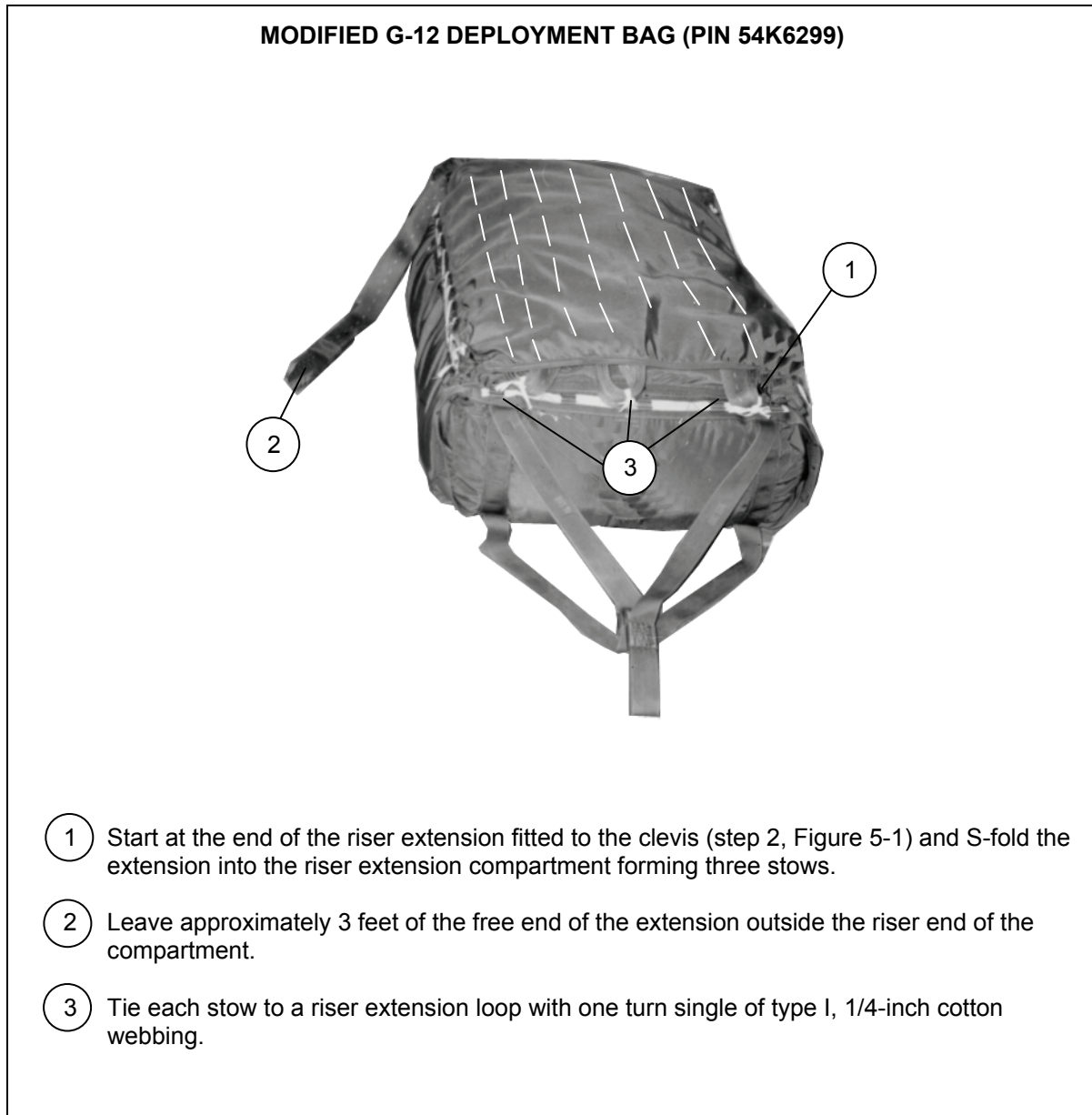
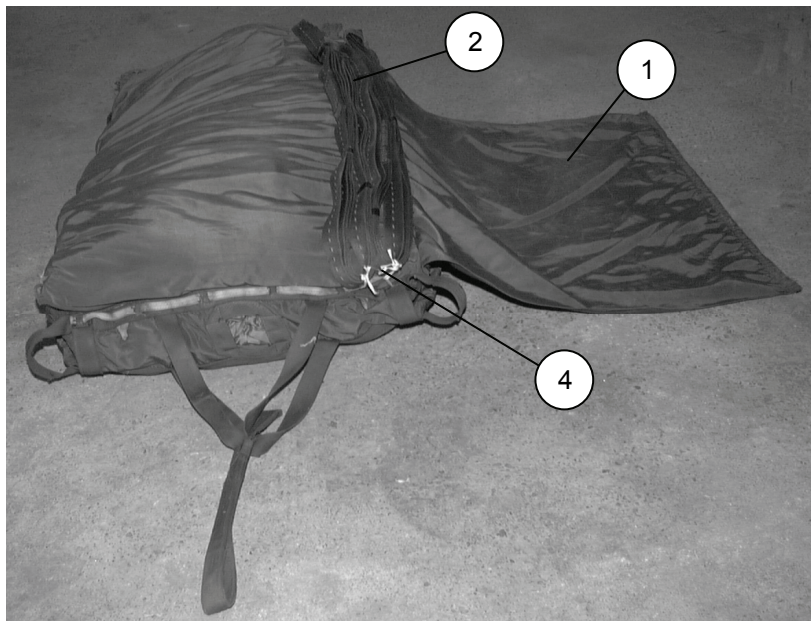


Figure 5-2. Riser Extension of a Modified G-12 Deployment Cargo Parachute Stowed

G-12 DEPLOYMENT BAG (PIN 11-1-3967)

- ① Open the riser extension flap which is attached with type I, 1/4-inch cotton webbing.
- ② Start at the end of the riser extension fitted to the clevis and S-fold the extension into the riser extension compartment forming three stows.
- ③ Leave approximately 3 feet of the free end of the extension outside the riser extension compartment. (Not shown)

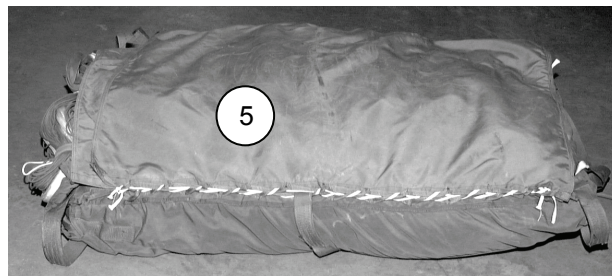
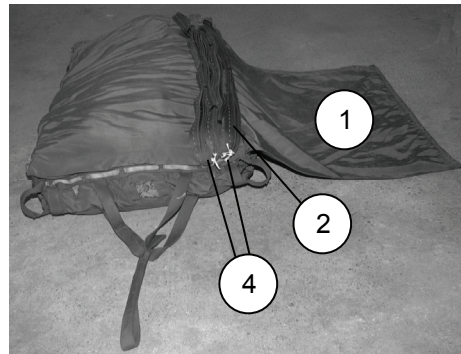
CAUTION

Do not girth hitch the type I, 1/4-inch cotton webbing ties to the riser extension securing line.

- ④ Tie each stow to a riser extension loop with one turn single of type I, 1/4-inch cotton webbing.
- ⑤ Close the riser flap according to TM 10-1670-281-23&P/NAVAIR 13-1-32/TO 13C5-32-2. (Not shown)

Figure 5-3. Riser Extension of a G-12 Deployment Cargo Parachute Stowed

NYLON BAG



Note. The nylon deployment bags have the riser extension securing line permanently attached.

- ① Open the riser extension flap which is attached with type I, 1/4-inch cotton webbing.
- ② Start at the end of the riser extension fitted to the clevis and S-fold the extension into the riser extension compartment.
- ③ Leave approximately 3 feet of the free end of the extension outside the riser end of the compartment. (Not shown)
- ④ Tie each stow to the riser extension securing line with one turn double, type I, 1/4-inch cotton webbing.

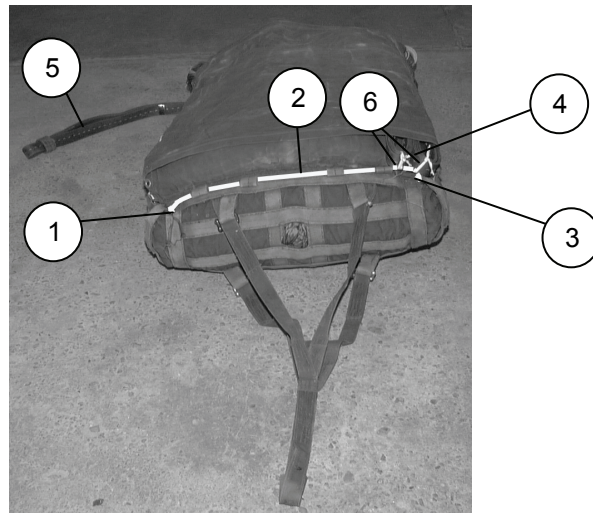
CAUTION

Do not girth hitch the type I, 1/4-inch cotton webbing ties to the riser extension securing line.

- ⑤ Close the riser flap according to TM 10-1670-280-23&P/NAVAIR 13-1-31/TO 13C5-32-2.

Figure 5-4. Riser Extension of a G-11 Cargo Parachute (Nylon Bag) Installed and Stowed

COTTON BAG



- 1 Fold an 8-foot length of 1/2-inch tubular nylon webbing in half lengthwise. Run the loop in the folded end through the right carrying handle. Run the free ends of the webbing through this loop, and pull the webbing taut.
- 2 Run the webbing across the parachute, passing it through the riser extension retaining loops (end tabs).

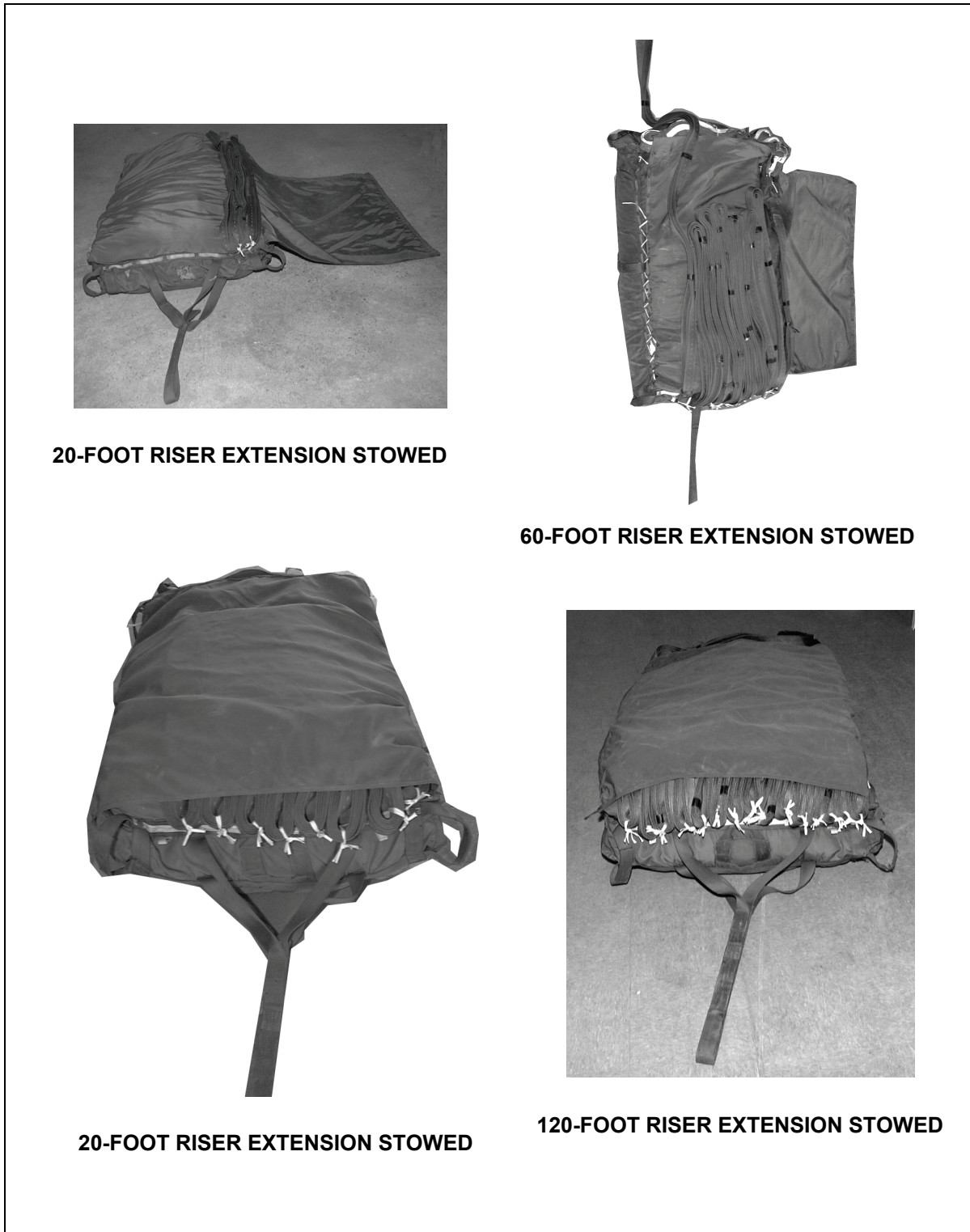
Note. Do not pull the webbing tight across the parachute.

- 3 Tie the webbing to the left front carrying handle with three alternating half hitches and an overhand knot in each free running end.
- 4 Start at the end of the riser extension fitted to the clevis and S-fold the extension into the riser extension compartment.
- 5 Leave about 3 feet of the free end of the extension outside the riser end of the compartment.
- 6 Tie each stow to the riser extension securing line with one turn double type I, 1/4-inch cotton webbing.

CAUTION

Do not girth hitch the type I, 1/4-inch cotton webbing ties to the riser extension securing line.

Figure 5-4. Riser Extension Securing Line of a G-11 Cargo Parachute (Cotton Bag) Installed and Riser Extension Stowed (Continued)



20-FOOT RISER EXTENSION STOWED

60-FOOT RISER EXTENSION STOWED

20-FOOT RISER EXTENSION STOWED

120-FOOT RISER EXTENSION STOWED

Figure 5-5. The 20-, 60-, and 120-Footer Riser Extensions Stowed

STOWING CARGO PARACHUTES

5-6. When referring to cargo parachutes, stowing consists of three steps. First, place the cargo parachutes on the load or on a parachute stowage platform. Second, cluster the parachutes by tying their deployment bags handles together. Third, group the bridles of a multiparachute load. When attaching parachute bridles to the clevis, make sure they are not twisted, misrouted, or entangled. Route parachute bridles straight from the D-bag to the clevis. Stow the parachutes as shown in Figures 5-6 through 5-14.

Note. Nylon and cotton bags may be mixed on the same load.

USING DEPLOYMENT LINES

5-7. The correct size and length of the deployment line will be given in each specific rigging manual. As a rule, use 9-foot, (2-loop), type XXVI nylon slings as deployment lines. One end of the deployment line is fitted to the coupling link assembly of the EFTC. The other end of the line is fitted to the bolt of the large clevis grouping the bridles of a cluster of parachutes.

Note. 4-loop slings may be substituted for 2-loop slings for deployment lines.

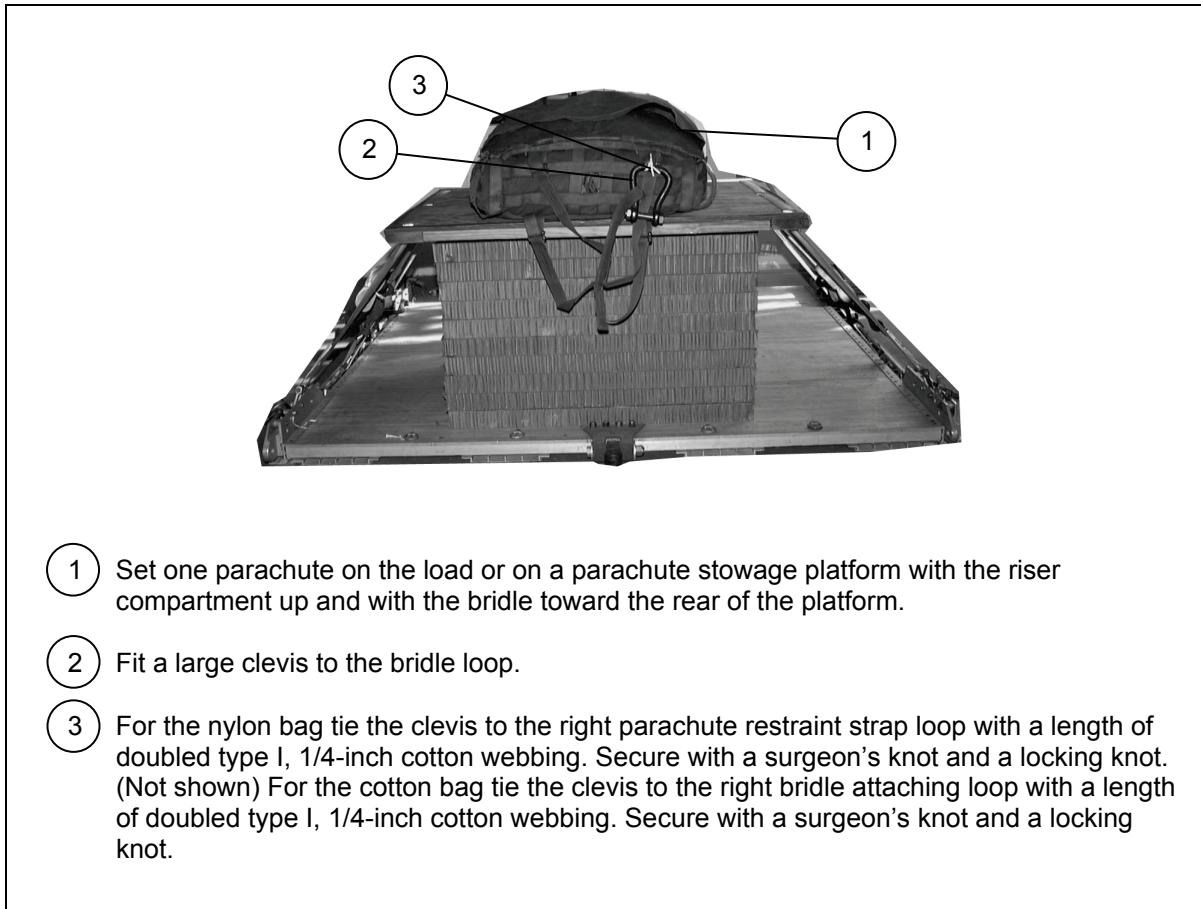
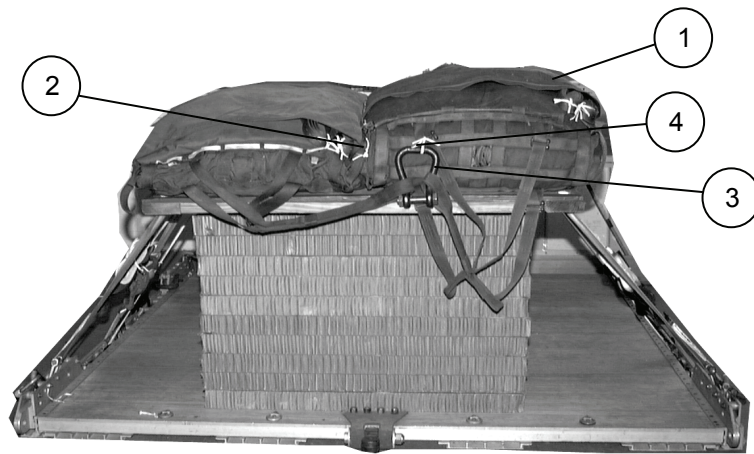


Figure 5-6. One Parachute Stowed

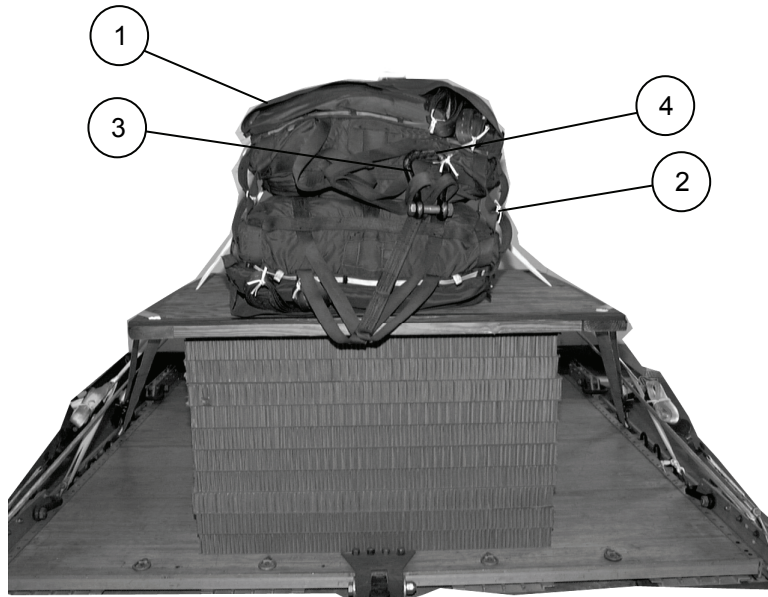


- 1 Set two parachutes side by side on the load with the riser compartments up and the bridles toward the rear of the platform.
- 2 Tie the inside front and rear cluster attaching loops (hereafter called carrying handles) together with one turn single of type III nylon cord.

Note. G-12E cargo parachutes are tied together with the clustering straps on each corner of the deployment bag or with a single length of type III nylon cord through the bag carrying handles unless the individual rigging manual states otherwise.

- 3 Fit the bridle loops on the arms of a large clevis.
- 4 For the nylon bag tie the clevis to the right parachute restraint strap loop with a length of doubled type I, 1/4-inch cotton webbing. Secure with a surgeon's knot and a locking knot. For the cotton bag tie the clevis to the right bridle attaching loop with a length of doubled type I, 1/4-inch cotton webbing. Secure with a surgeon's knot and a locking knot.

Figure 5-7. Two Parachutes Stowed Side by Side

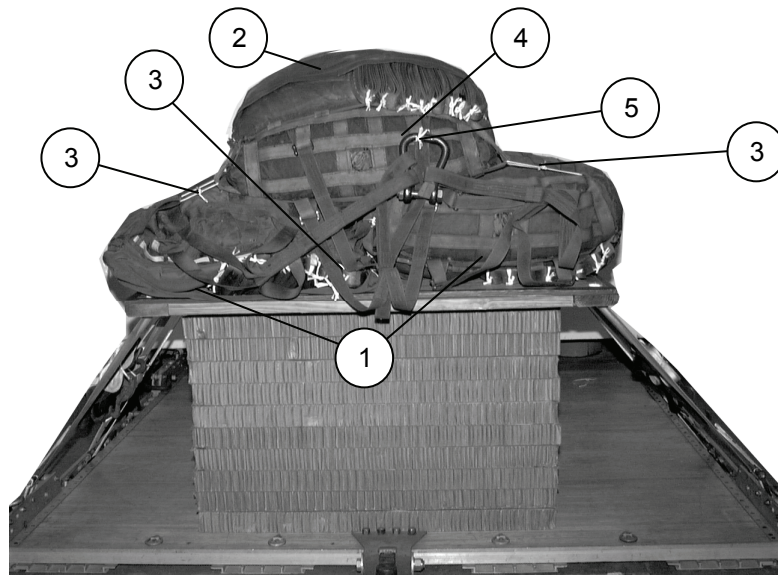


- ① Stack two parachutes with the riser compartment of the bottom parachute down and the riser compartment of the top parachute up.
- ② Tie the outside front and rear carrying handles together with one turn single of type III nylon cord.

Note. G-12E cargo parachutes are tied together with the clustering straps on each corner of the deployment bag or with a single length of type III nylon cord through the bag carrying handles unless the individual rigging manual states otherwise.

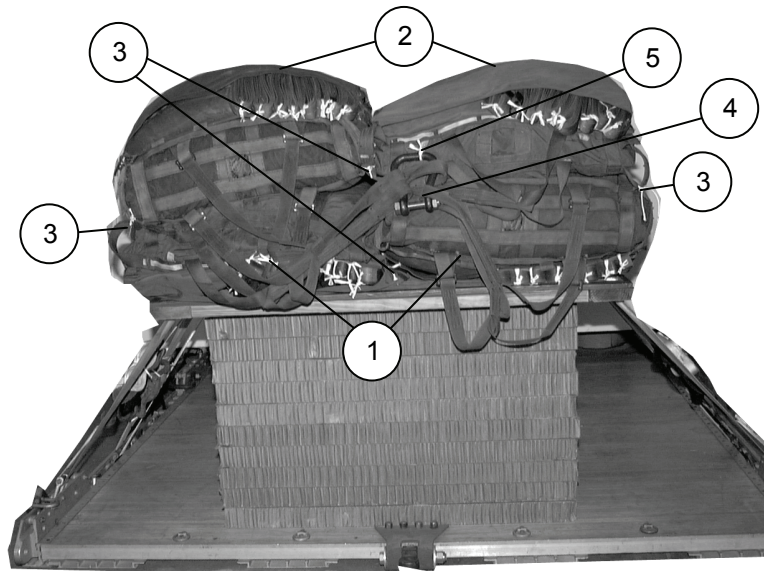
- ③ Fit the bridle loops on the arms of a large clevis.
- ④ For the nylon bag tie the clevis to the top right parachute left parachute restraint strap loop with a length of doubled type I, 1/4-inch cotton webbing. Secure with a surgeon's knot and a locking knot. For the cotton bag tie the clevis to the top right parachute's left bridle attaching loop with a length of doubled type I, 1/4-inch cotton webbing. Secure with a surgeon's knot and a locking knot.

Figure 5-8. Two Parachutes Stowed and Stacked



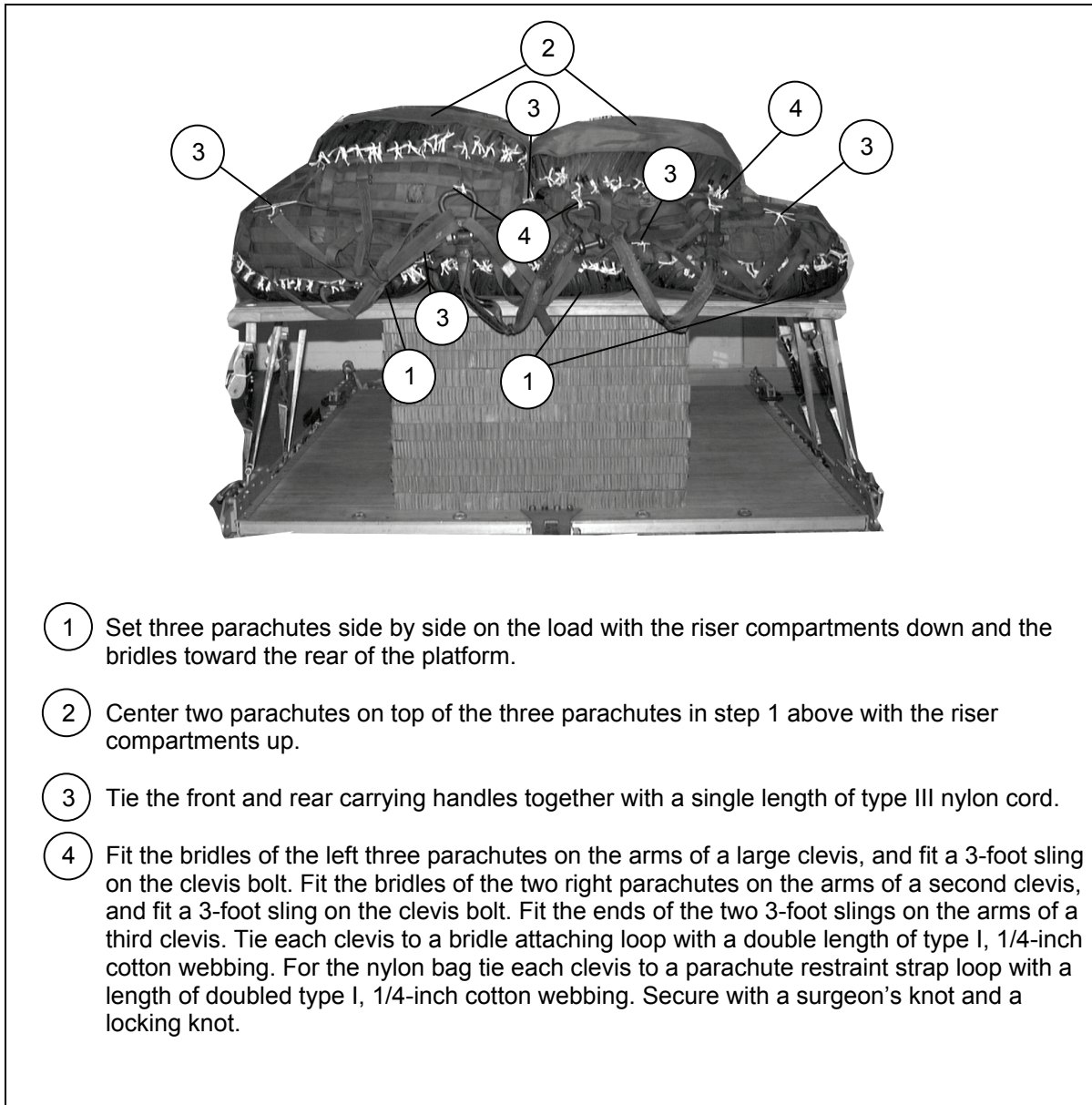
- ① Set two parachutes side by side on the load with the riser compartments down and the bridles toward the rear of the platform.
- ② Center one parachute on top of the two parachutes in step 1 above with the riser compartment up.
- ③ Tie the front and rear carrying handles together with a single length of type III nylon cord.
- ④ Fit the bridle loops on the arms of a large clevis.
- ⑤ For the nylon bag tie the clevis to the top right parachute restraint strap loop with a length of doubled type I, 1/4-inch cotton webbing. Secure with a surgeon's knot and a locking knot. For the cotton bag tie the clevis to the top right bridle attaching loop with a length of doubled type I, 1/4-inch cotton webbing. Secure with a surgeon's knot and a locking knot.

Figure 5-9. Three Parachutes Stowed



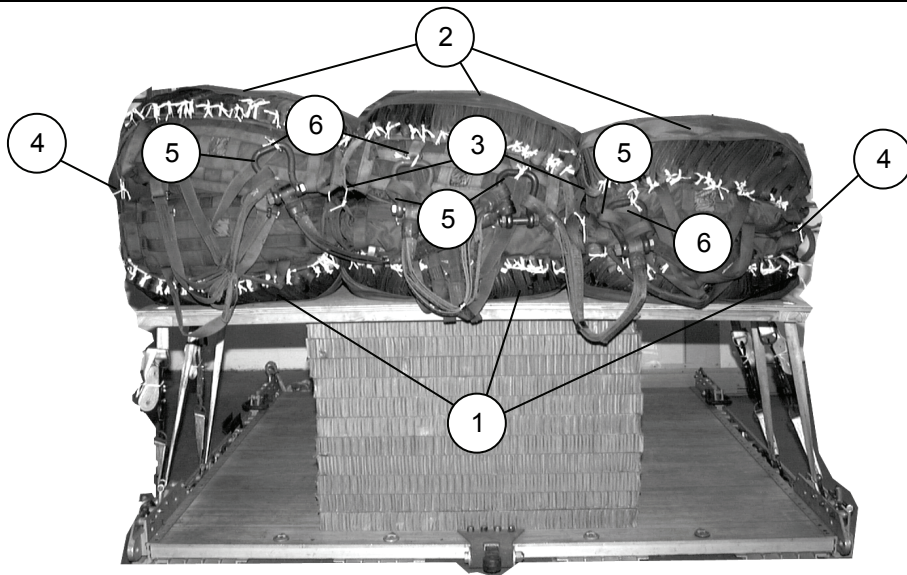
- ① Set two parachutes side by side on the load with the riser compartments down and with bridles toward the rear of the platform.
- ② Set two parachutes side by side on top of the two parachutes in step 1 above with the riser compartments up.
- ③ Tie the four center front and four center rear carrying handles together with a single length of type III nylon cord. Tie the outside carrying handles together with type III nylon cord.
- ④ Fit the bridle loops on the arms of a large clevis.
- ⑤ For the nylon bag tie the clevis to the top right parachute left parachute restraint strap loop with a length of doubled type I, 1/4-inch cotton webbing. Secure with a surgeon's knot and a locking knot. For the cotton bag tie the clevis to the top right parachute's left bridle attaching loop with a length of doubled type I, 1/4-inch cotton webbing. Secure with a surgeon's knot and a locking knot.

Figure 5-10. Four Parachutes Stowed



- ① Set three parachutes side by side on the load with the riser compartments down and the bridles toward the rear of the platform.
- ② Center two parachutes on top of the three parachutes in step 1 above with the riser compartments up.
- ③ Tie the front and rear carrying handles together with a single length of type III nylon cord.
- ④ Fit the bridles of the left three parachutes on the arms of a large clevis, and fit a 3-foot sling on the clevis bolt. Fit the bridles of the two right parachutes on the arms of a second clevis, and fit a 3-foot sling on the clevis bolt. Fit the ends of the two 3-foot slings on the arms of a third clevis. Tie each clevis to a bridle attaching loop with a double length of type I, 1/4-inch cotton webbing. For the nylon bag tie each clevis to a parachute restraint strap loop with a length of doubled type I, 1/4-inch cotton webbing. Secure with a surgeon's knot and a locking knot.

Figure 5-11. Five Parachutes Stowed

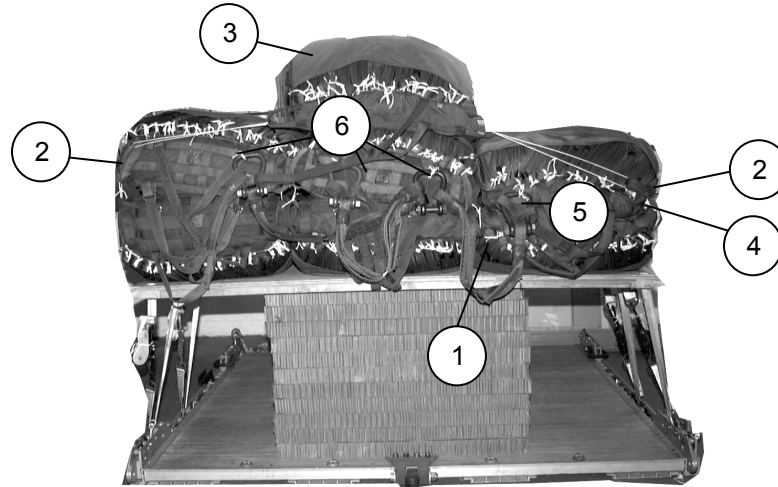


- ① Set three parachutes side by side on the load with the riser compartments down and with the bridles toward the rear of the platform.
- ② Set three parachutes on top of the parachutes in step 1 above with the riser compartments up.
- ③ Tie the inside front four carrying handles together with a single length of type III nylon cord on all the bags. Repeat for the rear four carrying handles.
- ④ Tie the outside front two and rear two carrying handles together with a single length of type III nylon cord.
- ⑤ Fit the bridles of the left stack of parachutes on the arms of a large clevis, and fit a 3-foot sling on the clevis bolt. Fit the bridles of the center stack of parachutes on the arms of a second large clevis, and fit a 3-foot sling on the clevis bolt. Fit the bridles of the right stack of parachutes on the arms of a third large clevis, and fit a 3-foot sling on the clevis bolt. Fit the ends of the 3-foot slings on the arms of a fourth large clevis.
- ⑥ For the cotton bag tie each clevis to a bridle attaching loop with a doubled length of type I, 1/4-inch cotton webbing and secure with a surgeon's knot and a locking knot. For the nylon bag tie each clevis to a parachute restraint strap loop with a doubled length of type I, 1/4-inch cotton webbing and secure with a surgeon's knot and a locking knot.

Figure 5-12. Six Parachutes Stowed

CAUTION

The front clustering ties **MUST NOT** interfere with the deployment of the parachutes.

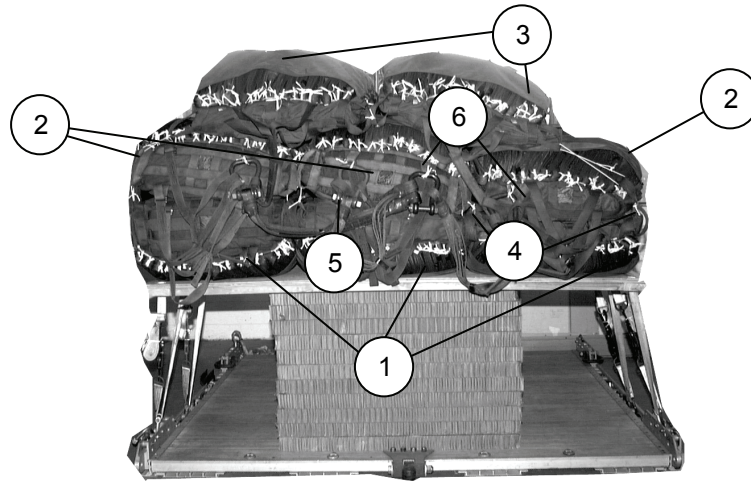


- ① Set three parachutes side by side on the load with the riser compartments down and with the bridles toward the rear of the platform.
- ② Set three parachutes on top of the parachutes in step 1 above with the riser compartments up.
- ③ Set a parachute on top of the center parachutes with the riser compartment up.
- ④ Tie the inside front four and rear four carrying handles together with lengths of 1/2-inch tubular nylon webbing. Tie the two outside corners of the middle and bottom parachutes together with lengths of 1/2-inch tubular nylon webbing. Tie the top two front and top two rear parachute carrying handles to the outside carrying handles of the middle parachutes using 1/2-inch tubular nylon webbing.
- ⑤ Fit the bridles of the left stack and top parachute on the arms of a large clevis, and fit a 3-foot sling on the clevis bolt. Fit the bridles of the center two parachutes on the arms of a second large clevis, and fit a 3-foot sling on the clevis bolt. Fit the bridles of the right stack of parachutes on the arms of a third large clevis, and fit a 3-foot sling on the clevis bolt. Fit the ends of the 3-foot slings on the arms of a fourth large clevis.
- ⑥ For the cotton bag tie each clevis to a bridle attaching loop with a doubled length of type I, 1/4-inch cotton webbing and secure with a surgeon's knot and a locking knot. For the nylon bag tie each clevis to a parachute restraint strap loop with a doubled length of type I, 1/4-inch cotton webbing and secure with a surgeon's knot and a locking knot.

Figure 5-13. Seven Parachutes Stowed

CAUTION

The front clustering ties **MUST NOT** interfere with the deployment of the parachutes.



- 1 Set three parachutes side by side on the load with the riser compartments down and with the bridles toward the rear of the platform.
- 2 Set three parachutes on top of the parachutes in step 1 above with the riser compartments up.
- 3 Set two parachutes on top of the parachutes in step 2 with the riser compartments up.
- 4 Tie the inside front four and rear four carrying handles of the middle and bottom parachutes together with lengths of 1/2-inch tubular nylon webbing. Tie the two top front and rear inside carrying handles with lengths of 1/2-inch tubular nylon webbing. Tie the two outside front and rear carrying handles of the middle and bottom parachutes with lengths of 1/2-inch tubular nylon webbing. Tie the top two outside front and rear parachute carrying handles to the outside front and rear carrying handles of the middle parachutes together using 1/2-inch tubular nylon webbing.
- 5 Fit the bridles of the left stack and the left top parachute on the arms of a large clevis, and fit a 3-foot sling on the clevis bolt. Fit the bridles of the center stack of parachutes on the arms of a second large clevis, and fit a 3-foot sling on the clevis bolt. Fit the bridles of the right stack and the right top parachute on the arms of a third large clevis, and fit a 3-foot sling on the clevis bolt. Fit the ends of the 3-foot slings on the arms of a fourth large clevis.
- 6 For the cotton bag tie each clevis to a bridle attaching loop with a doubled length of type I, 1/4-inch cotton webbing and secure with a surgeon's knot and a locking knot. For the nylon bag tie each clevis to a parachute restraint strap loop with a doubled length of type I, 1/4-inch cotton webbing and secure with a surgeon's knot and a locking knot.

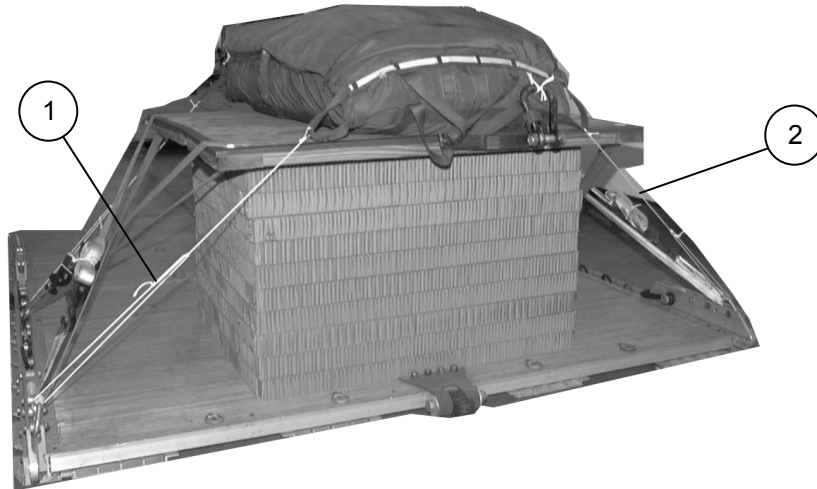
Figure 5-14. Eight Parachutes Stowed

RESTRAINING ONE PARACHUTE

5-8. Restrain one cargo parachute as shown in Figure 5-15.

CAUTION

Be sure that each point to which a restraining tie is made can withstand a pull of 550 pounds.



- 1 Tie each corner carrying handle to a convenient point on the drop item or platform with a single length of type III nylon cord.

Figure 5-15. One Parachute Restrained

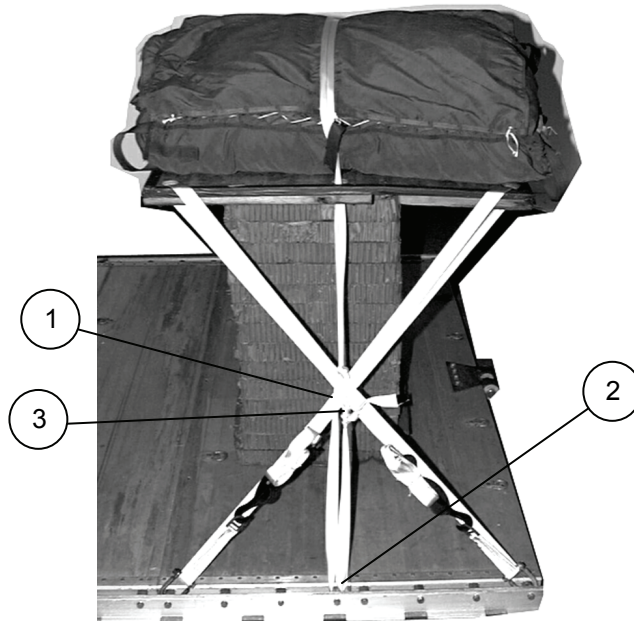
RESTRAINING TWO TO EIGHT PARACHUTES

5-9. The following parachute restraint systems are used to restrain two to eight cargo parachutes.

CAUTION

Ensure tension is tight on the multi-knife straps.

- **Two Parachutes.** Restrain two cargo parachutes as shown in Figures 5-16 and 5-17. The restraint system for two cargo parachutes consists of one length of type VIII nylon webbing (restraint strap). When using a guillotine knife parachute release strap follow Figures 5-18 and 5-19. When using a multicut parachute release strap follow Figures 5-20 and 5-21.



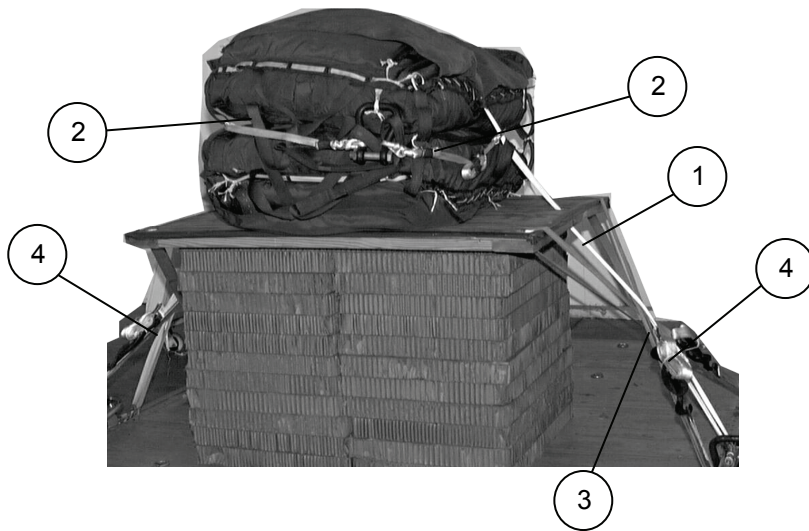
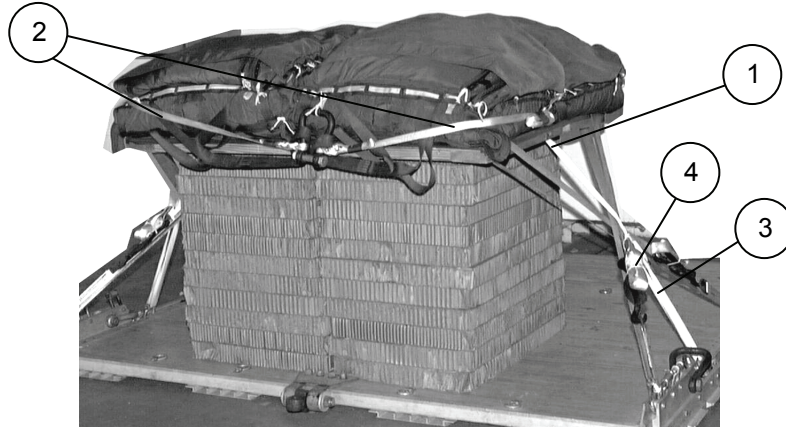
- 1 Tie a trucker's hitch a suitable distance in each end of the restraint strap.
- 2 Run each free end of the strap through or around the indicated point on the load and back up through the trucker's hitch.

Note. The indicated point for tying the parachute restraint strap to the load will be given in the specific rigging manual.

- 3 Pull on both ends of the restraint strap at the same time. When the strap is tight, tie the ends with three alternating half hitches and an overhand knot in the running end.

Figure 5-16. Restraint Strap Tied

Note. The restraint strap must run through the parachute stowage platform.



- ① Restraint strap
- ② Release strap
- ③ Trucker's hitch
- ④ Half hitches and overhand knot

Figure 5-17. Two Parachutes Restrained

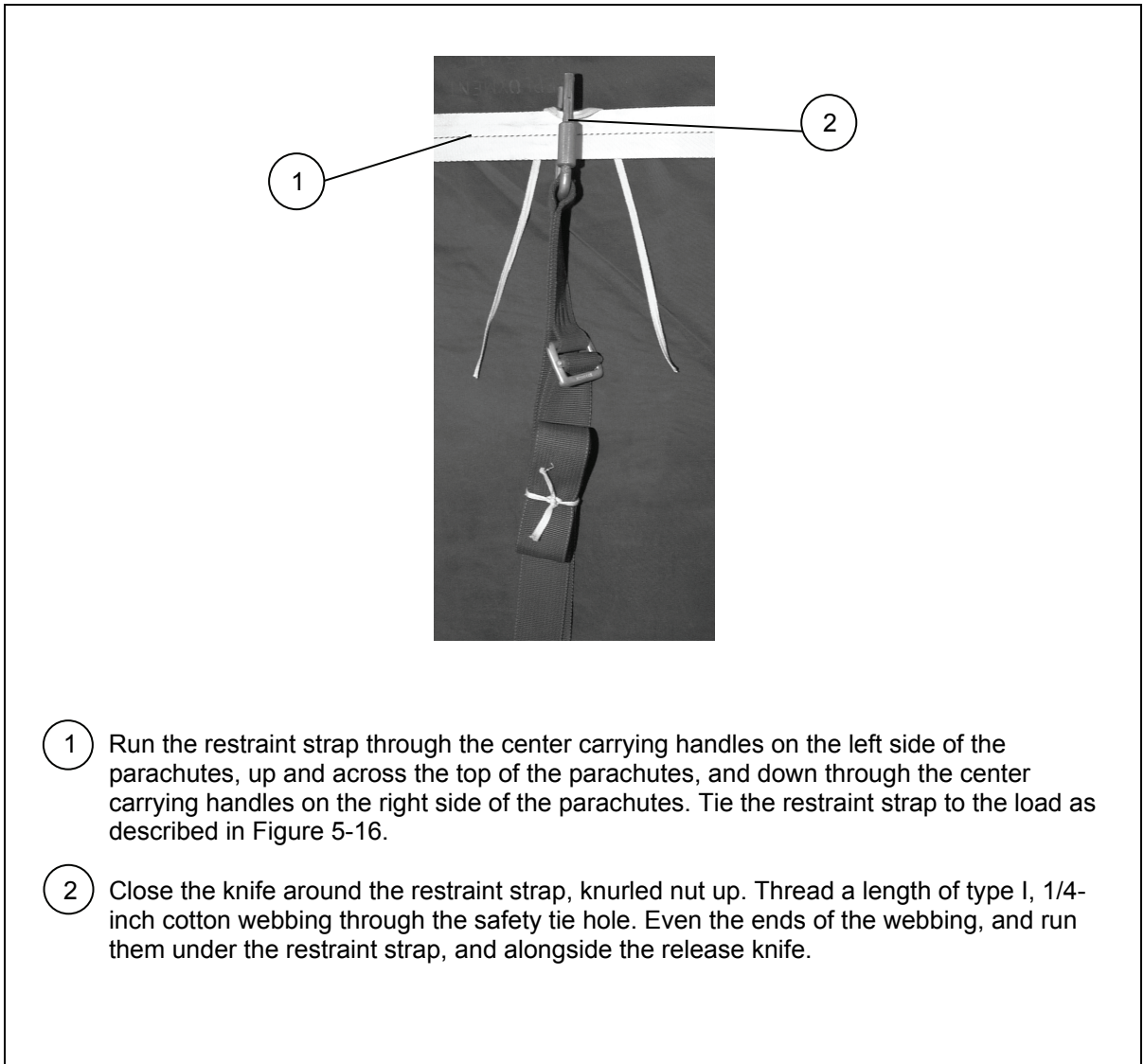
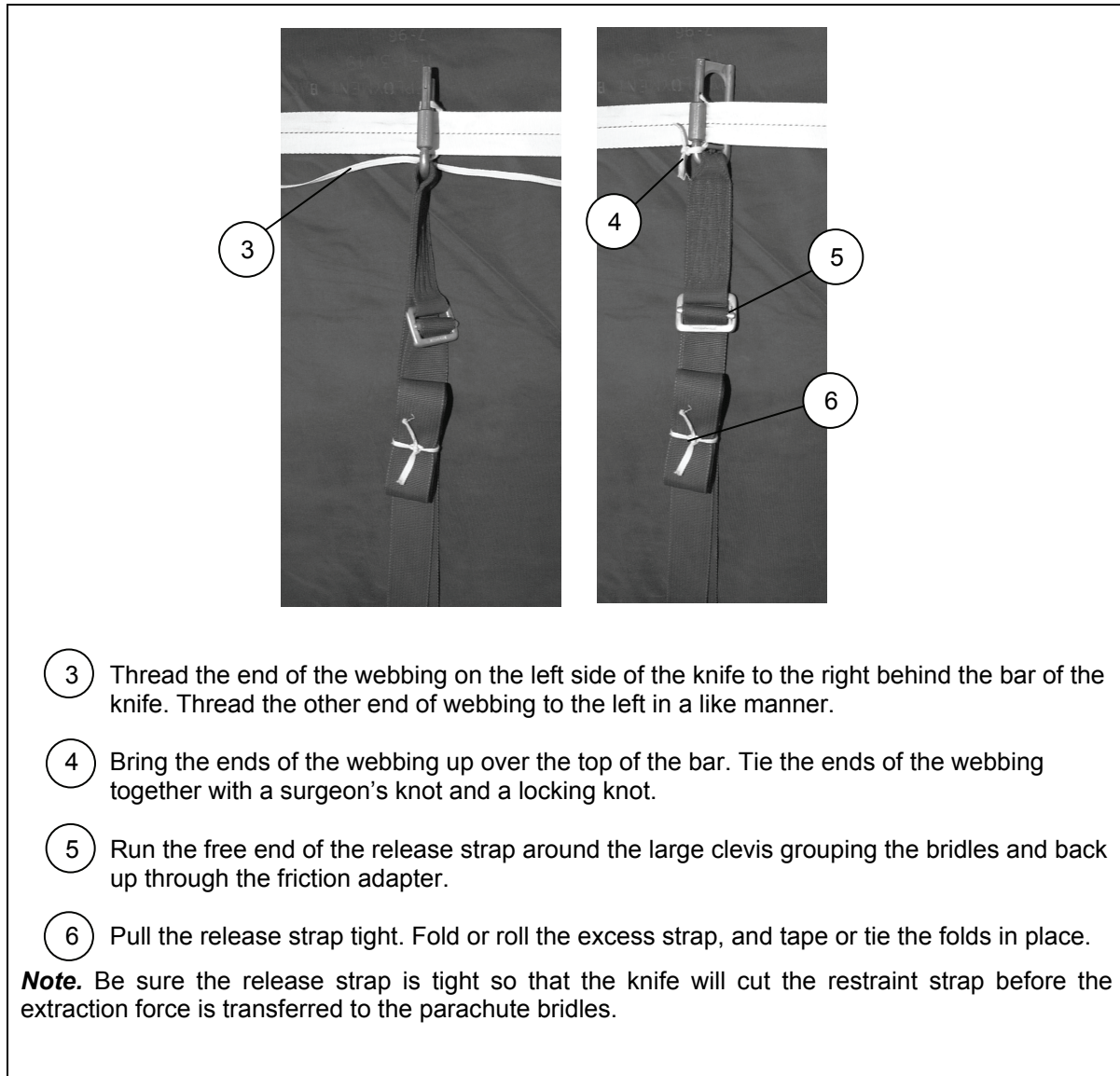


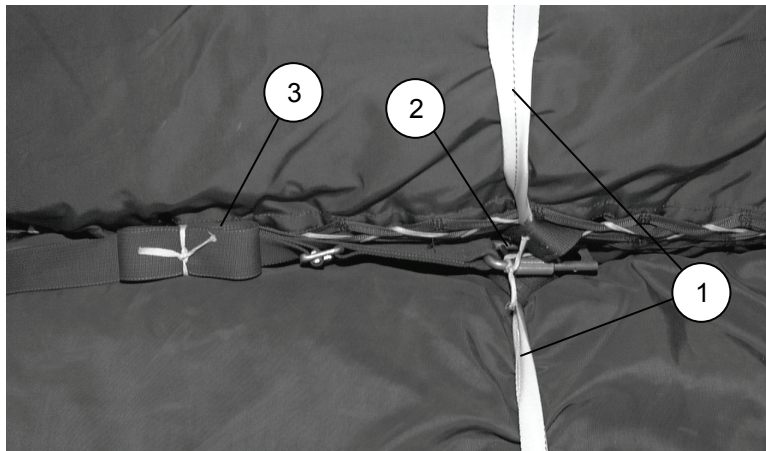
Figure 5-18. Single-knife Parachute Release Strap Installed on Two Stacked Parachutes



- 3 Thread the end of the webbing on the left side of the knife to the right behind the bar of the knife. Thread the other end of webbing to the left in a like manner.
- 4 Bring the ends of the webbing up over the top of the bar. Tie the ends of the webbing together with a surgeon's knot and a locking knot.
- 5 Run the free end of the release strap around the large clevis grouping the bridles and back up through the friction adapter.
- 6 Pull the release strap tight. Fold or roll the excess strap, and tape or tie the folds in place.

Note. Be sure the release strap is tight so that the knife will cut the restraint strap before the extraction force is transferred to the parachute bridles.

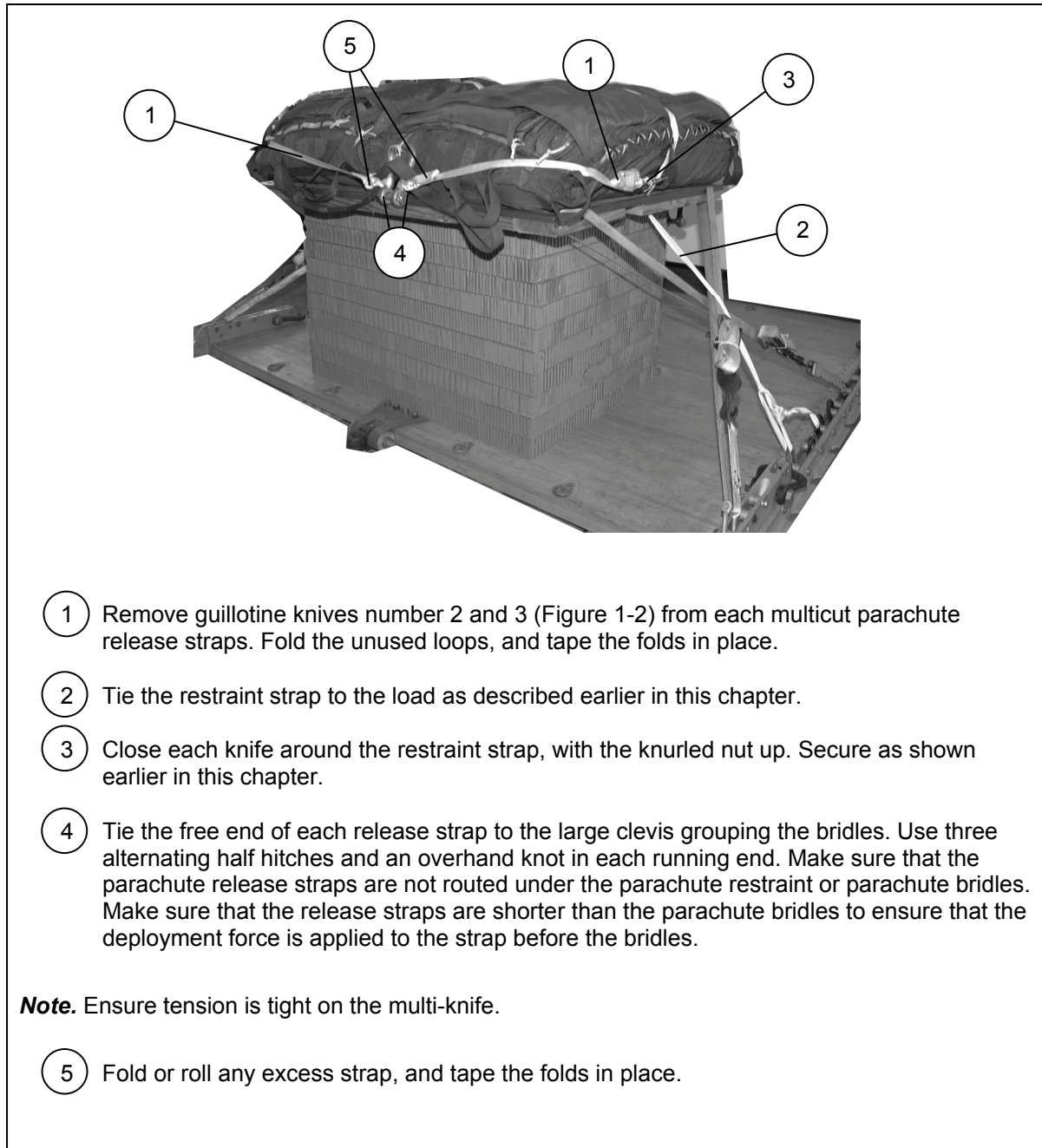
Figure 5-18. Single-knife Parachute Release Strap Installed on Two Stacked Parachutes (Continued)



- ① Run the restraint strap up through the outside carrying handle of the left parachute, across the left parachute, down through the inside center carrying handle of the left parachute, up through the inside center carrying handle of the right parachute, across the right parachute, and down through the outside center carrying handle of the right parachute. Tie the restraint strap to the load as described earlier in this chapter.
- ② Close the knife around the restraint strap with the knurled nut up, between the inside carrying handles. Thread a length of type I, 1/4-inch cotton webbing through the safety tie hole. Even the ends of the webbing, and run them under the restraint strap, and alongside the release knife. Thread the end of the webbing on the left of the knife to the right behind the bar of the knife. Thread the other end of webbing to the left in a like manner. Bring the ends of the webbing up over the top of the bar. Tie the ends of the webbing together with a surgeon's knot and locking knot as shown earlier. Run the free end of the release strap down through the large clevis grouping the bridles and back up through the friction adapter as described in earlier in this chapter.
- ③ Pull the release strap tight. Fold or roll the excess strap, and tape or tie the folds in place as described earlier in this chapter.

Note. Be sure the release strap is tight so that the knife will cut the restraint strap before the extraction force is transferred to the parachute bridles.

Figure 5-19. Single-Knife Parachute Release Strap Installed on Two Side-by-Side Parachutes

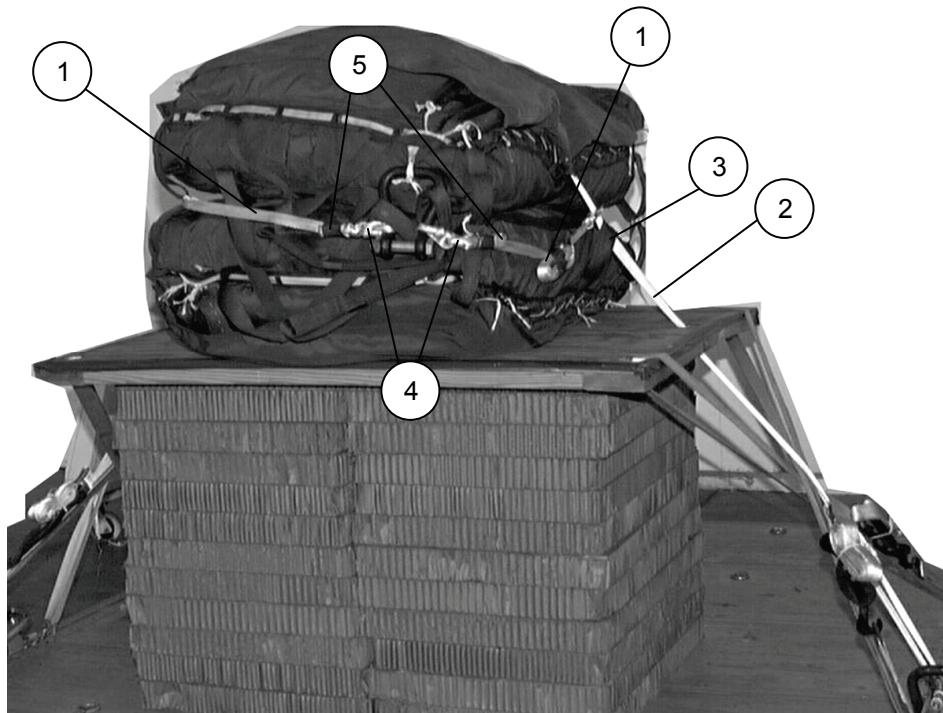


- 1 Remove guillotine knives number 2 and 3 (Figure 1-2) from each multicut parachute release straps. Fold the unused loops, and tape the folds in place.
- 2 Tie the restraint strap to the load as described earlier in this chapter.
- 3 Close each knife around the restraint strap, with the knurled nut up. Secure as shown earlier in this chapter.
- 4 Tie the free end of each release strap to the large clevis grouping the bridles. Use three alternating half hitches and an overhand knot in each running end. Make sure that the parachute release straps are not routed under the parachute restraint or parachute bridles. Make sure that the release straps are shorter than the parachute bridles to ensure that the deployment force is applied to the strap before the bridles.

Note. Ensure tension is tight on the multi-knife.

- 5 Fold or roll any excess strap, and tape the folds in place.

Figure 5-20. Multicut Parachute Release Straps Installed on Two Side-by-Side Parachutes



- ① Remove guillotine knives number 2 and 3 (Figure 1-2) from each multicut parachute release straps. Fold the unused loops, and tape the folds in place.
- ② Tie the restraint strap to the load as described earlier in this chapter.
- ③ Close each knife around the restraint strap, with the knurled nut out between the top and bottom carrying handles. Secure as shown earlier in this chapter.
- ④ Tie the free end of each release strap to the large clevis grouping the bridles. Use three alternating half hitches and an overhand knot in each running end. Make sure that the parachute release straps are not routed under the parachute restraint or parachute bridles. Make sure that the release straps are shorter than the parachute bridles to ensure that the deployment force is applied to the strap before the bridles.

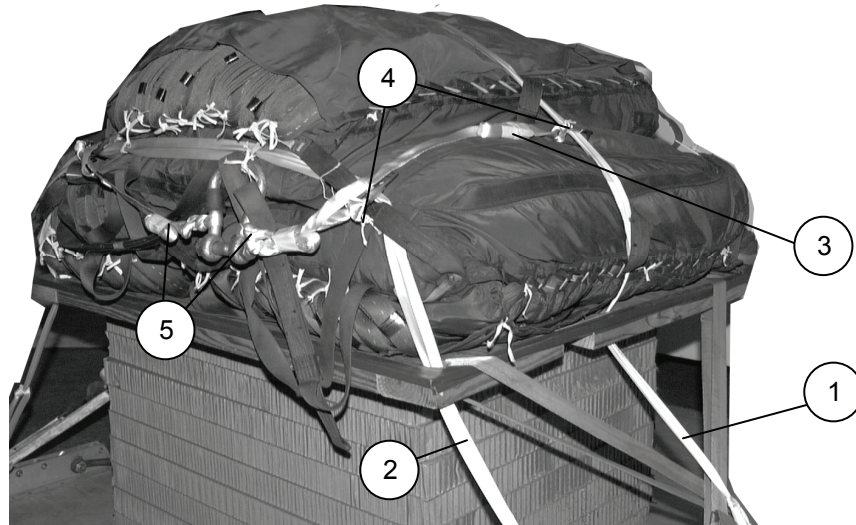
Note. Ensure the release straps are tied evenly so the guillotine knives cut simultaneously.

- ⑤ Fold or roll any excess strap, and tape the folds in place.

Figure 5-21. Multicut Parachute Release Straps Installed on Two Stacked Parachutes

- **Three to Five Parachutes.** The restraint system for three to five cargo parachutes consists of two lengths of type VIII nylon webbing (restraint strap) and two multicut parachute release straps. Restrain three to five cargo parachutes as shown in Figures 5-22 through 5-24.

Note. Always use multicut parachute release straps in pairs.

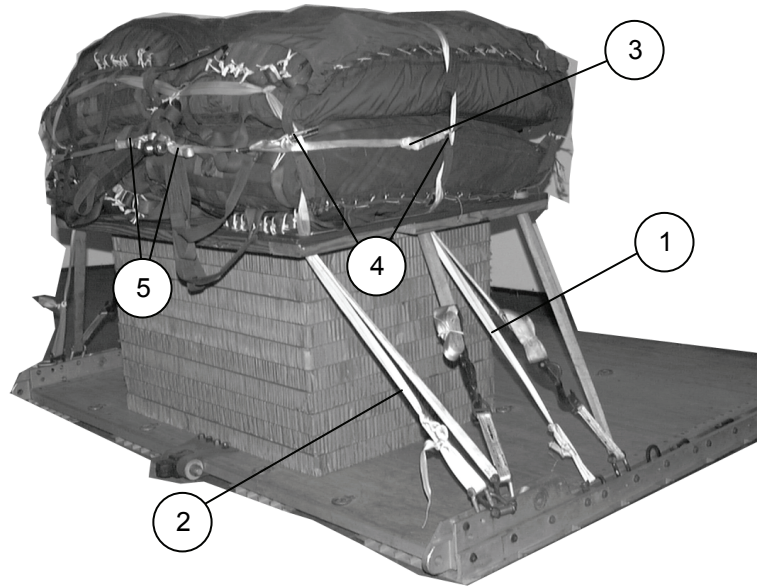


- ① Install the first restraint strap as described earlier in this chapter.
- ② Run the second restraint strap through the outside rear carrying handle of the bottom left parachute, up through the top left rear carrying handle and both bridle attaching loops of the top parachute for the cotton bags or through the parachute restraint strap loops for the nylon bag, and down through the outside rear carrying handles of the top and bottom right parachute. Tie the restraint strap to the load as described earlier in this chapter.
- ③ Remove guillotine knife number 3 (Figure 1-2) from each of two multicut parachute release straps. Fold the unused loops, and tape the folds in place.
- ④ Close and safety the guillotine knives as described earlier in this chapter.
- ⑤ Tie the release straps to the large clevis as described earlier in this chapter.

Note. Place the knives around the restraint straps between the carrying handles of the top and bottom parachutes.

Figure 5-22. Three Parachutes Restrained and Multi-Knife Installed

Note. Always use multicut release straps in pairs.



- ① Run the restraint strap through the center carrying handles on the left side of the parachutes. Run the restraint strap over the top of the parachute, and down through the left inside center carrying handle. Continue to run the restraint strap up through the right inside center carrying handle. Run the restraint strap over the right parachute and down to the right outside carrying handles. Tie the ends of the restraint strap to the load as described earlier in this chapter.
- ② Run the second restraint strap through the outside rear carrying handles of the left parachutes. Run the restraint strap through the bridle attaching loops of the top parachutes for the cotton bags or through the parachute restraint strap loops for the nylon bag, and down through the outside rear carrying handles of the right parachutes. Tie the ends of the restraint strap to the load as described earlier in this chapter.
- ③ Remove guillotine knife number 3 (Figure 1-2) from each of two multicut parachute release straps. Fold the unused loops, and tape the folds in place.
- ④ Close and safety the guillotine knives as described earlier in this chapter.
- ⑤ Tie the release straps to the large clevis as described earlier in this chapter.

Note. Place the knives around the restraint straps between the carrying handles of the top and bottom parachutes.

Figure 5-23. Four Parachutes Restrained and Multi-Knife Installed

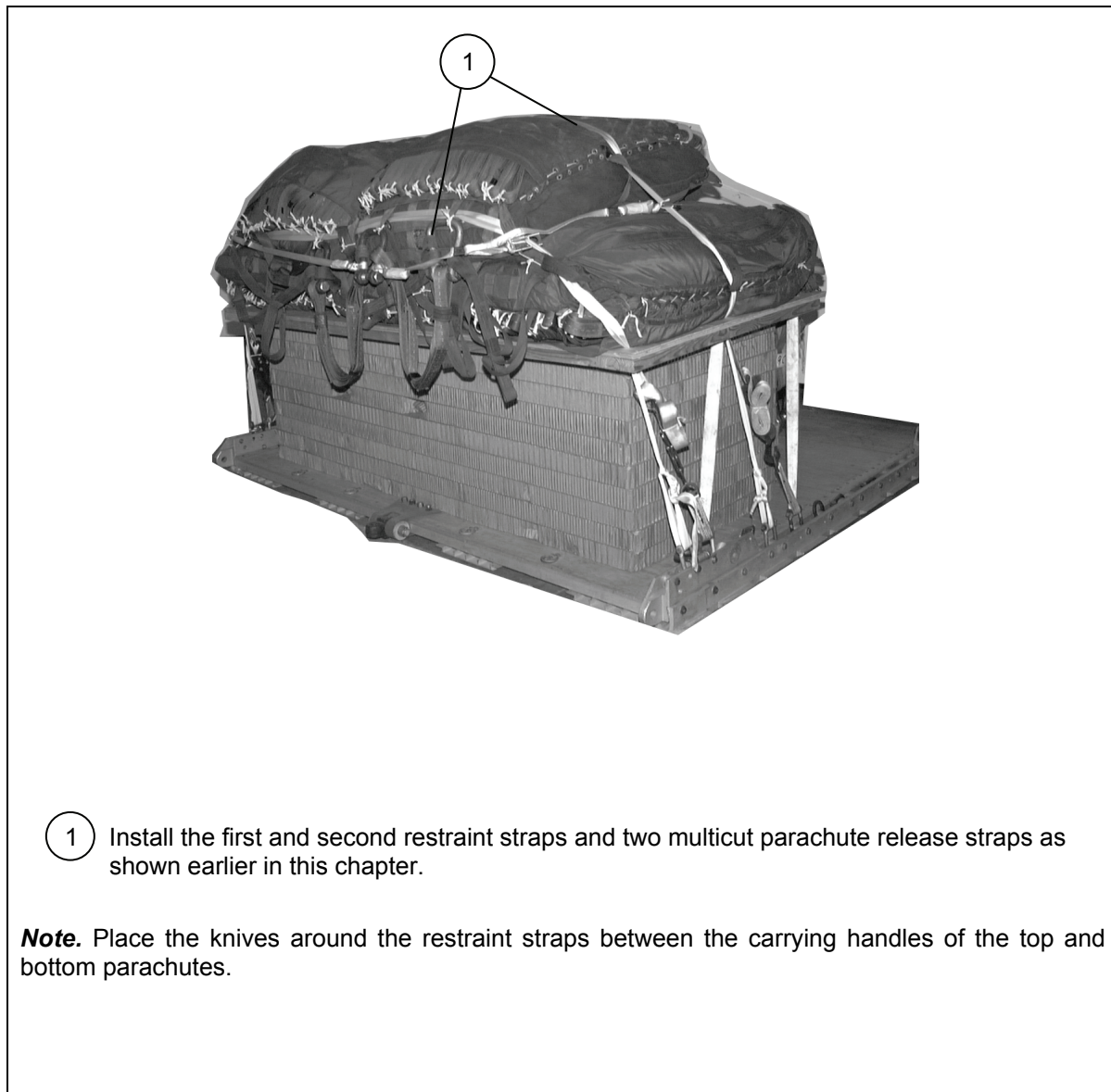
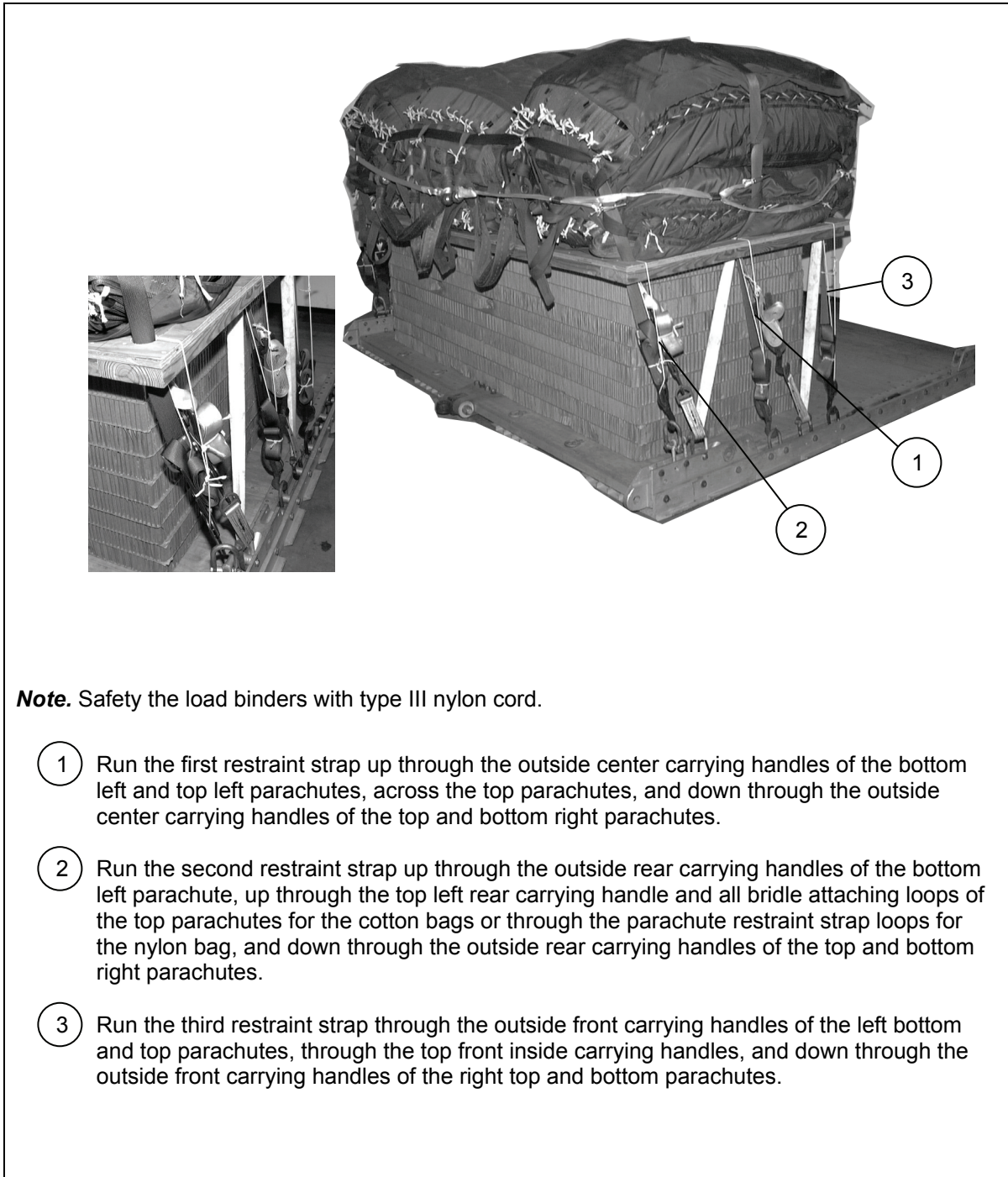


Figure 5-24. Five Parachutes Restrained and Multi-Knife Installed

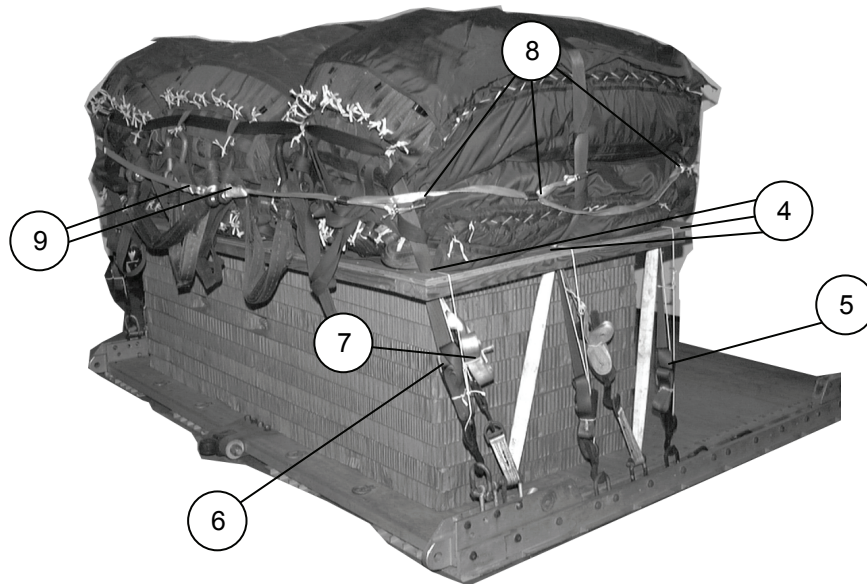
- **Six, Seven, or Eight Parachutes.** The restraint system for six, seven, or eight cargo parachutes consists of three type X restraint straps, two multicut parachute release straps, six D-rings, and six load binders. Restrain six, seven, or eight cargo parachutes as shown in Figures 5-25 through 5-27.



Note. Safety the load binders with type III nylon cord.

- ① Run the first restraint strap up through the outside center carrying handles of the bottom left and top left parachutes, across the top parachutes, and down through the outside center carrying handles of the top and bottom right parachutes.
- ② Run the second restraint strap up through the outside rear carrying handles of the bottom left parachute, up through the top left rear carrying handle and all bridle attaching loops of the top parachutes for the cotton bags or through the parachute restraint strap loops for the nylon bag, and down through the outside rear carrying handles of the top and bottom right parachutes.
- ③ Run the third restraint strap through the outside front carrying handles of the left bottom and top parachutes, through the top front inside carrying handles, and down through the outside front carrying handles of the right top and bottom parachutes.

Figure 5-25. Six Parachutes Restrained



- ④ Run the six ends of the three restraint straps down through the holes in the parachute stowage platform.
- ⑤ Fit a D-ring to each end of the three restraint straps. Hook the D-ring to the clevis (indicated in the specific rigging manual) with a load binder.
- ⑥ Fold or roll all excess straps, and tie the folds to the load binders with type I, 1/4-inch cotton webbing.
- ⑦ Tie the load binders and D-rings to the stowage platform with lengths of type III nylon cord.
- ⑧ Close and safety tie the guillotine knives of two multicut parachute release straps as described earlier in this chapter.
- ⑨ Tie the release straps to the large clevis as shown earlier in this chapter.

Notes.

- 1. Place the knives around the restraint straps between the carrying handles of the top and bottom parachutes.
- 2. Secure the load binders and D-rings to a convenient point on the load when there is no stowage platform.

Figure 5-25. Six Parachutes Restrained (Continued)

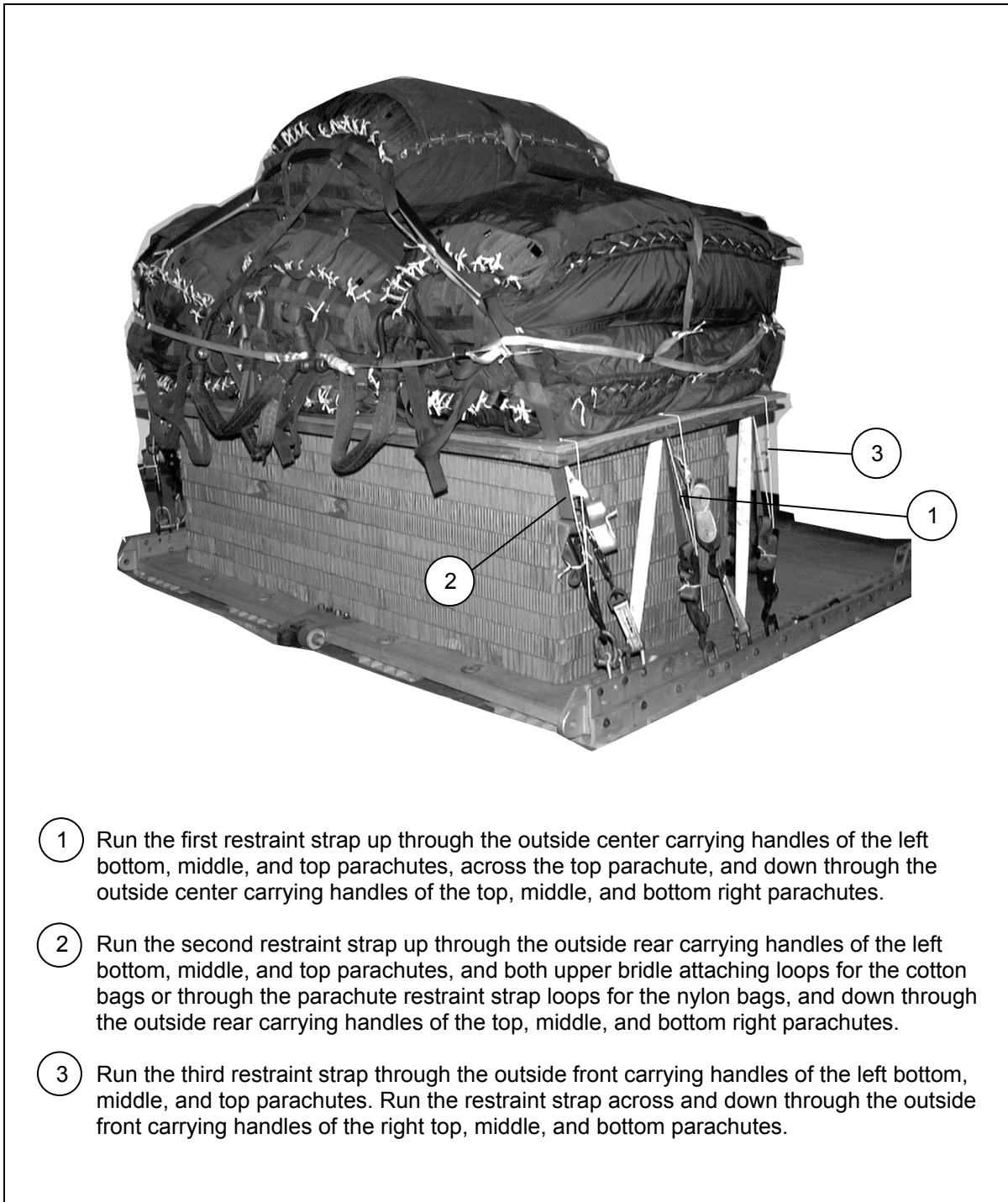
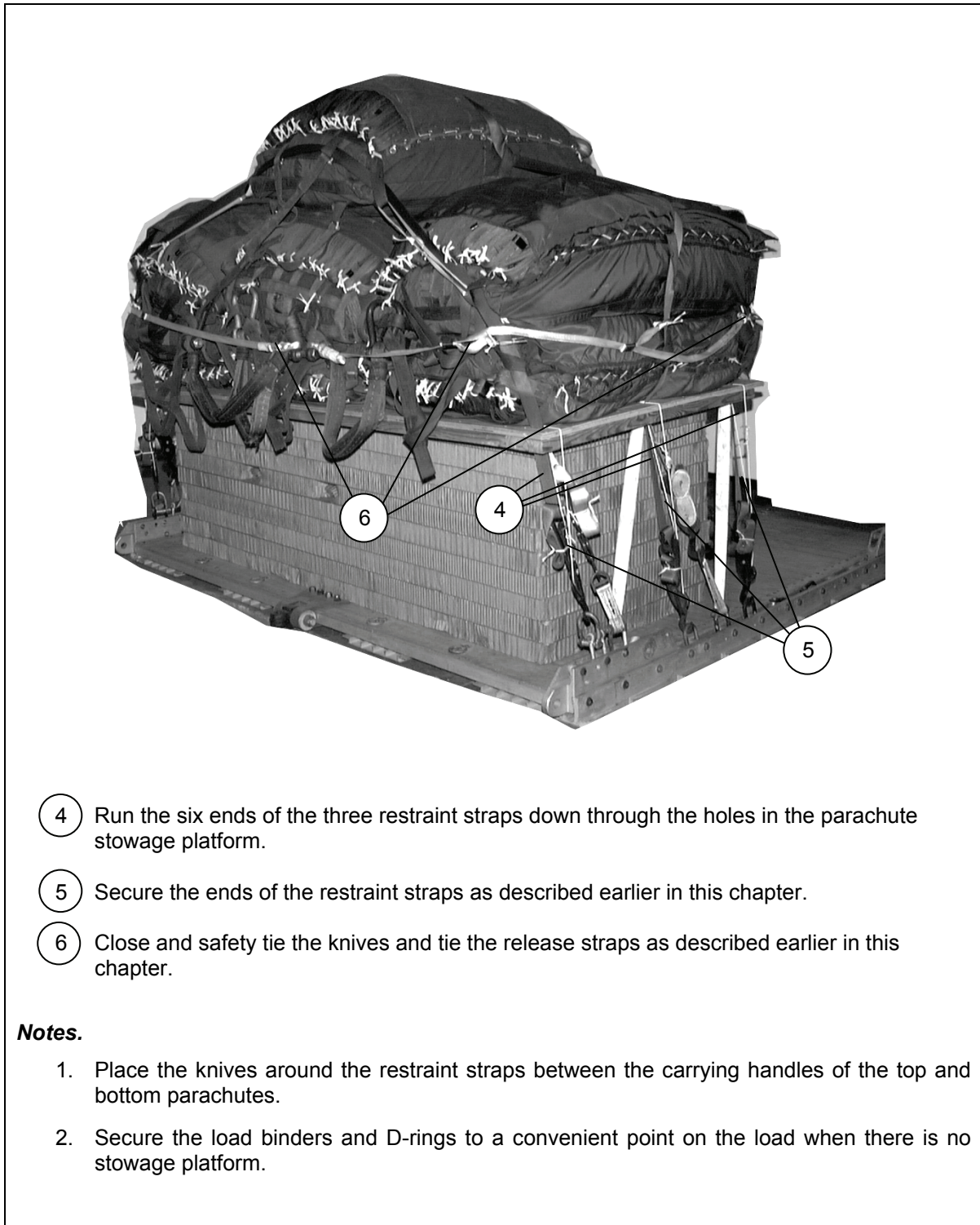


Figure 5-26. Seven Parachutes Restrained

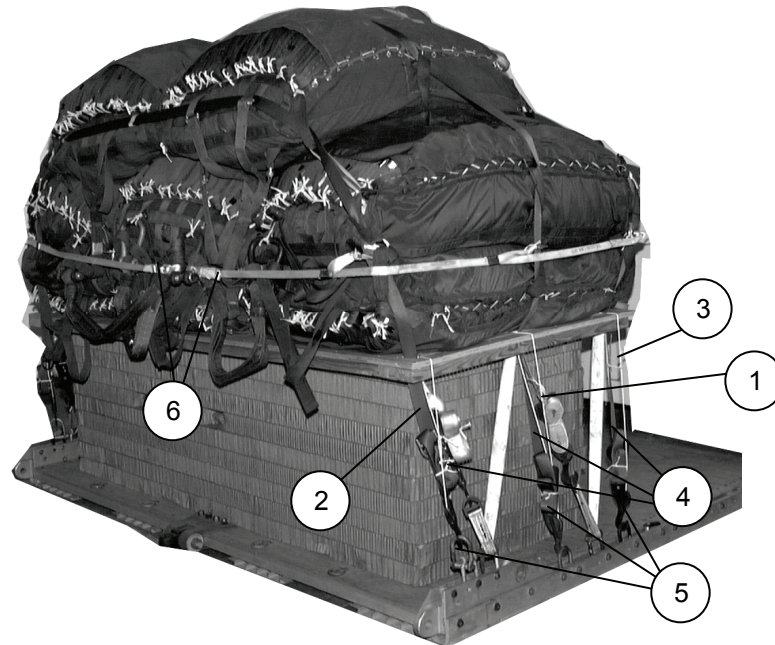


- ④ Run the six ends of the three restraint straps down through the holes in the parachute stowage platform.
- ⑤ Secure the ends of the restraint straps as described earlier in this chapter.
- ⑥ Close and safety tie the knives and tie the release straps as described earlier in this chapter.

Notes.

- 1. Place the knives around the restraint straps between the carrying handles of the top and bottom parachutes.
- 2. Secure the load binders and D-rings to a convenient point on the load when there is no stowage platform.

Figure 5-26. Seven Parachutes Restrained (Continued)



- ① Run the first restraint strap up through the outside center carrying handles of the left bottom, middle, and top parachutes, across the top parachutes, and down through the outside center carrying handles of the top, middle, and bottom right parachutes.
- ② Run the second restraint strap up through the outside rear carrying handles of the left bottom, middle, and top parachutes, and all upper bridle attaching loops for the cotton bags or through the parachute restraint strap loops for the nylon bags, and down through the outside rear carrying handles of the top, middle, and bottom right parachutes.
- ③ Run the third restraint strap through the outside front carrying handles of the left bottom, middle, and top parachutes. Run the restraint strap across and down through the outside front carrying handles of the right top, middle, and bottom parachutes.
- ④ Run the six ends of the three restraint straps down through the holes in the parachute stowage platform.
- ⑤ Secure the ends of the restraint straps as described earlier in this chapter.
- ⑥ Close and safety tie the knives, and tie the release strap as described earlier in this chapter.

Note. Place the knives around the restraint straps between the carrying handles of the outside middle and bottom parachutes.

Figure 5-27. Eight Parachutes Restrained

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Chapter 6

Extraction System

SECTION I-GENERAL INFORMATION

USE

6-1. The extraction system is made up of the extraction parachute, the extraction lines, line panels, and the extraction force transfer coupling (EFTC). The EFTC is bolted to the airdrop platform and is used to pull the load from the aircraft. The load exits through the cargo ramp and door of the aircraft and the extraction force is then transferred to the deployment line of the cargo parachute. The weight range of the EFTC is from 2,520 to 42,000 pounds.

COMPONENTS

6-2. The components of the EFTC used on low-velocity airdrop loads are shown in Figure 6-1.

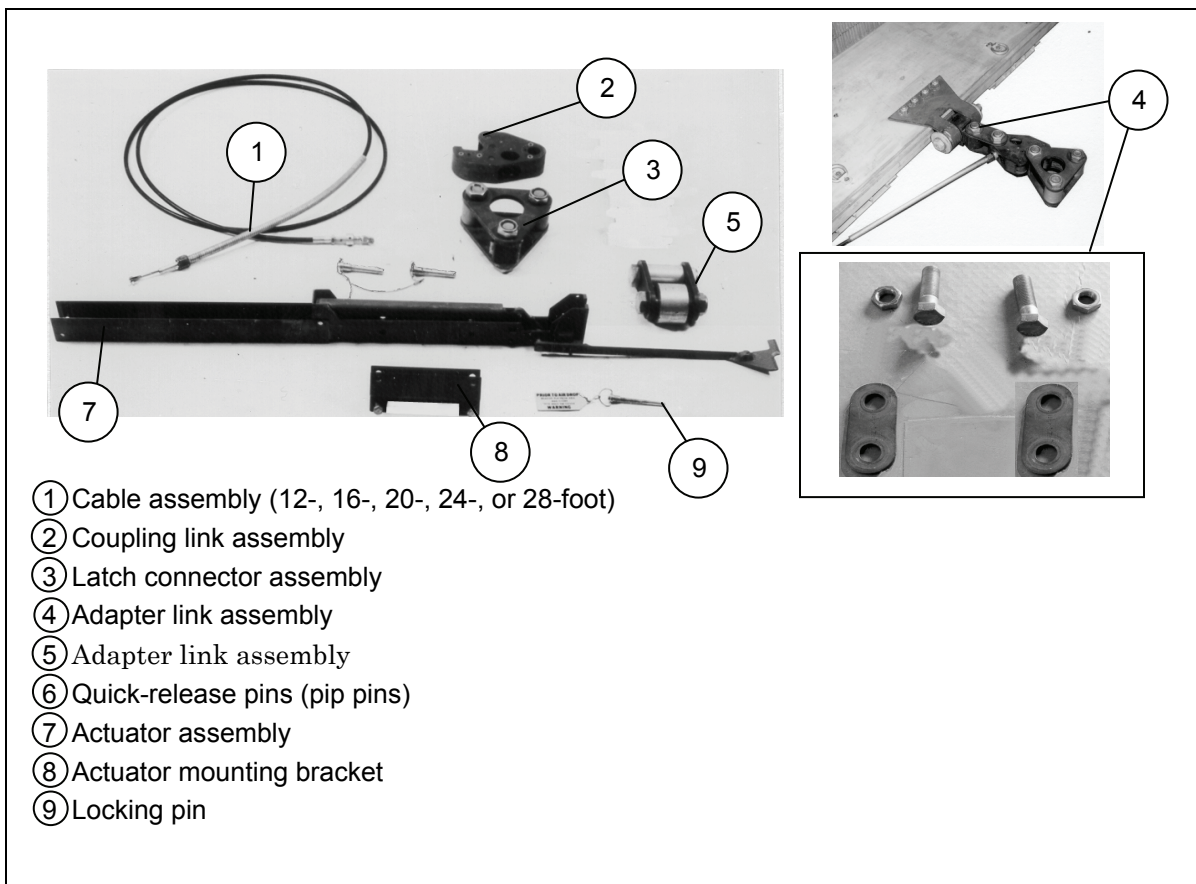


Figure 6-1. Components of EFTC

OPERATION

- 6-3. The EFTC is used for low-velocity airdrop and how it operates is described below.
- After the extraction parachute deploys, it pulls the extraction line and coupling link assembly or the adapter link assembly (Items 3 and 5, Figure 6-1).
 - The arm of the actuator assembly (Item 7, Figure 6-1) rides on top of the aircraft's left side restraint rail. When the load and actuator are pulled out and cleared of the rails, the arm rotates downward and pulls on the cable (Item 1, Figure 6-1) attached to the catch inside the latch assembly (Item 2, Figure 6-1). This causes the catch to release the coupling link assembly from the latch assembly.
 - The extraction parachute then pulls on the deployment line and pulls on the parachute release knife, cutting the parachute restraint and starting the recovery parachute deployment.

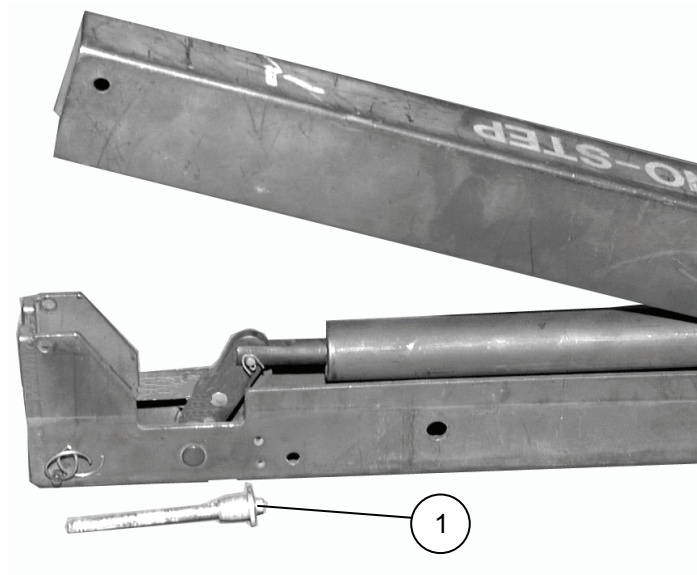
SECTION II-RIGGING INFORMATION**EXTRACTION FORCE TRANSFER COUPLING**

6-4. Inspect, maintain, and test the components of the EFTC extraction system as outlined in TM 10-1670-296-20&P/TO 13C7-49-2 and this manual.

- **Inspecting and Assembling Components.** Before each use, inspect and assemble the components of the EFTC extraction system as follows:
 - Inspect the components according to TM 10-1670-296-20&P/TO 13C7-49-2.
 - Assemble the EFTC extraction system as shown in Figures 6-2 through 6-6.

CAUTION

The compression rod spring will be under 175 pounds of pressure when the actuator is fully armed.

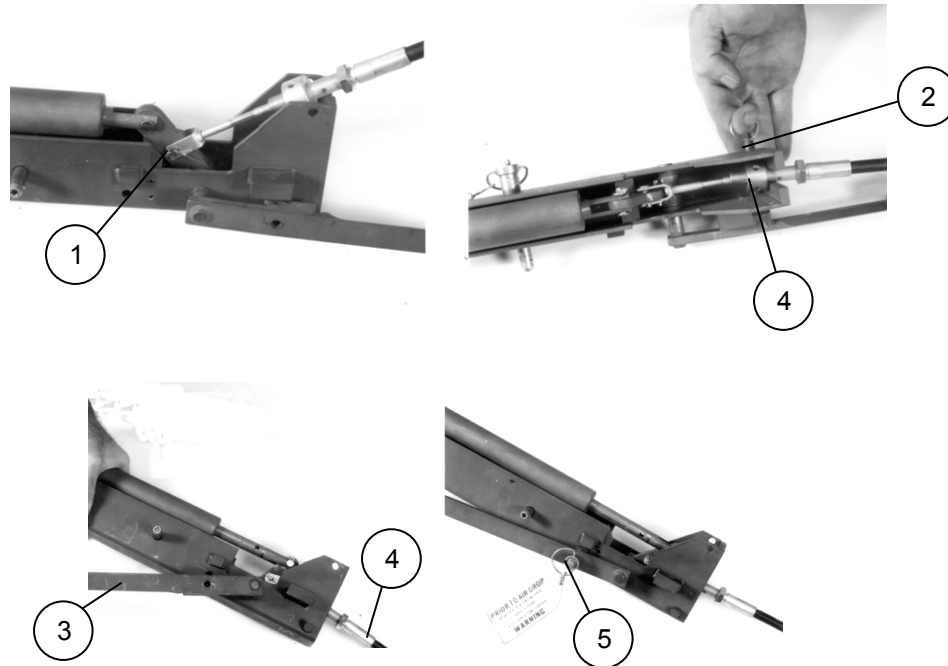


- ① Remove the locking pin, and rotate the cover upward and rearward.

Figure 6-2. Locking Pin Removed

CAUTION

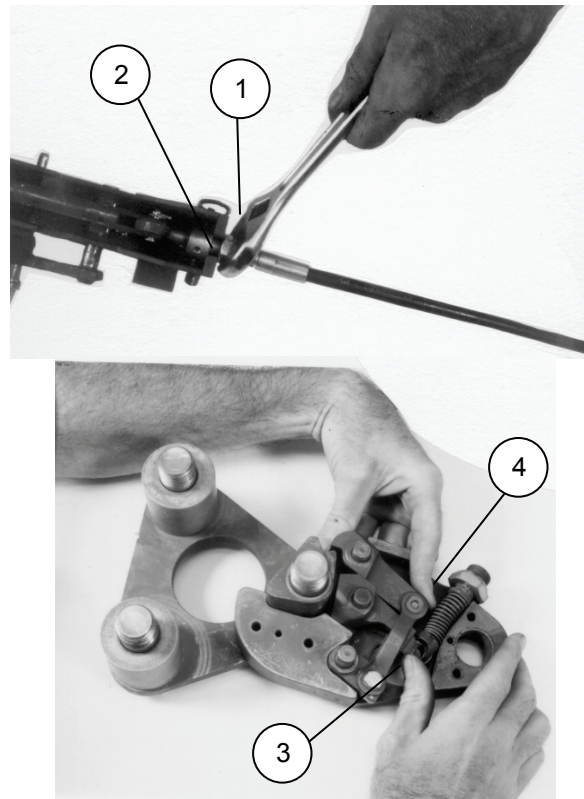
If the adjusting collar is loose, replace the cable.

**Notes.**

1. Before attaching the cable clevis, make sure the cable at both ends moves freely in the housing and that the cable is the proper length for the load to be rigged. This length will be cited in the specific rigging manual.
2. The EFTC is functional with all lengths of cable assemblies. When shortages of specific lengths of cable occur, the next longer cable assembly can be used.

- ① Attach the clevis on the cable to the cable actuator with the straight pin and cotter pin.
- ② Pull on the spring-loaded pin to release the actuator arm from the unlocked position.
- ③ Turn the actuator arm clockwise.
- ④ As the arm is turned, make sure the adjusting collar on the cable fits inside the end slot of the actuator.
- ⑤ When the actuator is armed, insert the locking pin to hold the actuator arm in place.

Figure 6-3. Cable Installed and Actuator Armed



Note. The top plate of the latch assembly is removed for clarity.

- ① Use a wrench to tighten the locking nut on the cable until the nut is flush against the actuator body.
- ② Make sure the adjusting collar is flush against the inside of the actuator body.

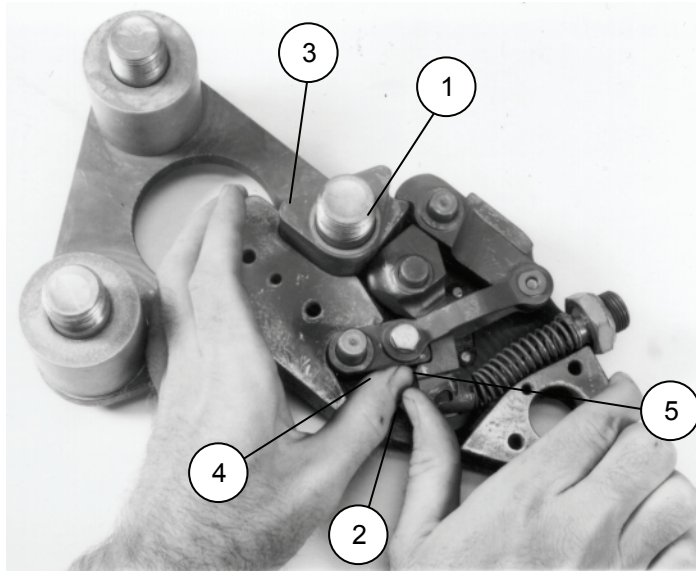
CAUTION

Do not over tighten the locking nut. This may cause the housing to crack.

Note. To ensure that the cam of the link assembly is properly seated in the latch assembly with the retainer hook holding the cam, release and then reseat the cam as follows:

- ③ Push up on the catch.
- ④ Push down on the retainer hook and idler link to free the cam, and remove the link assembly.

Figure 6-4. Cable Installed and the Link Assembly Cam Seated



Note. The top plate of the latch assembly is removed for clarity.

Reseat the cam of the link assembly in the latch assembly as follows:

- ① Set the edge of the cam in place within the latch.
- ② Repeat steps 3 and 4, Figure 6-4.
- ③ Push cam into place.
- ④ Push the lock link up to engage the retainer hook.
- ⑤ Align the dot on the lock link with the arrow on the catch.

Note. The cam of the link assembly is now properly seated under the retainer hook of the latch assembly.

Figure 6-5. Link Assembly Cam Reseated

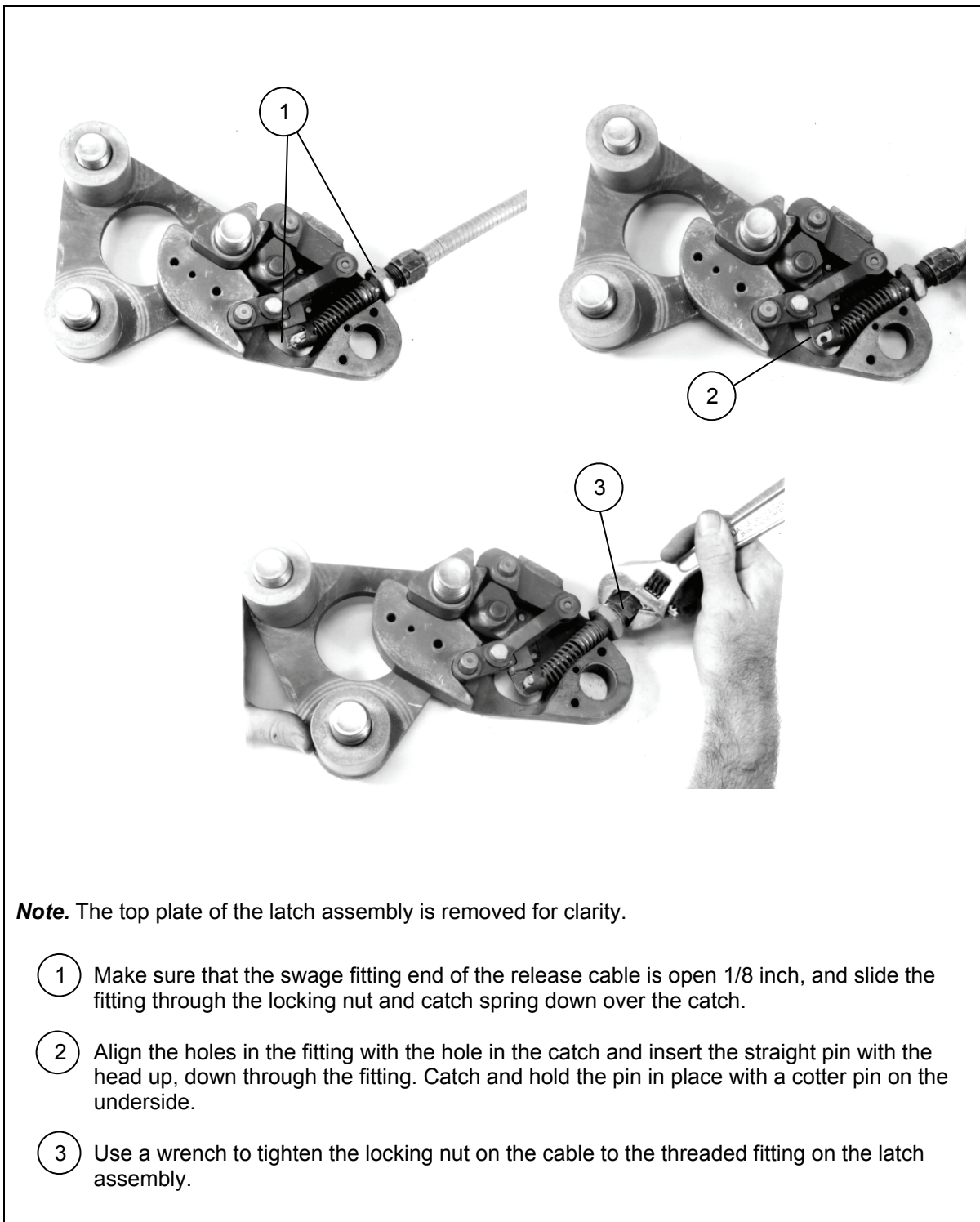
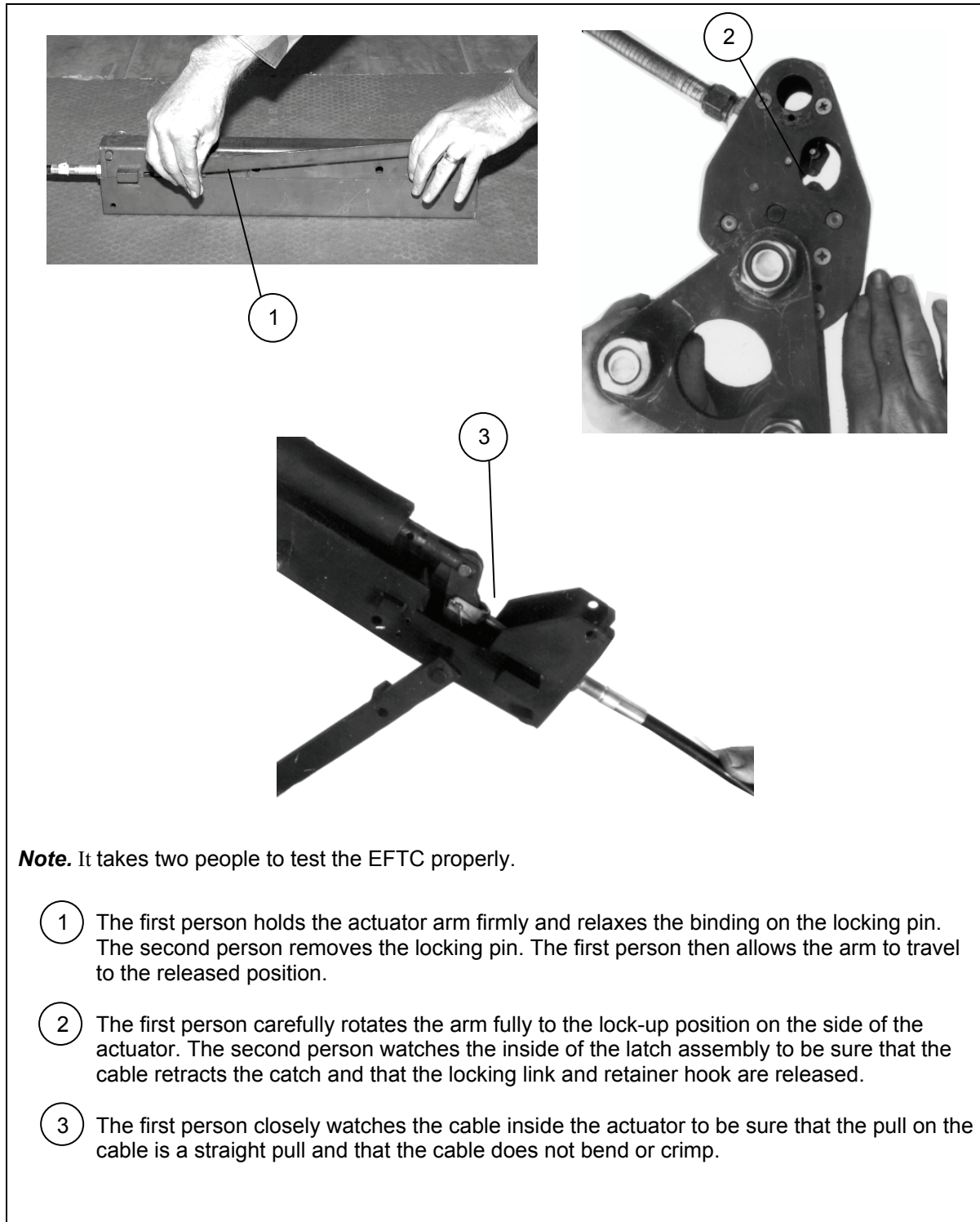


Figure 6-6. Latch Assembly Cable Adjusted

- **Testing EFTC Extraction System.** Before each use of the EFTC extraction system, test it as shown in Figure 6-7.



Note. It takes two people to test the EFTC properly.

- 1 The first person holds the actuator arm firmly and relaxes the binding on the locking pin. The second person removes the locking pin. The first person then allows the arm to travel to the released position.
- 2 The first person carefully rotates the arm fully to the lock-up position on the side of the actuator. The second person watches the inside of the latch assembly to be sure that the cable retracts the catch and that the locking link and retainer hook are released.
- 3 The first person closely watches the cable inside the actuator to be sure that the pull on the cable is a straight pull and that the cable does not bend or crimp.

Figure 6-7. EFTC Tested

- **Preparing and Attaching the EFTC to the Type V Platform.** After the EFTC has been tested, disassemble it. Prepare the EFTC components and attach them to the type V platform as shown in Figures 6-8 through 6-10.

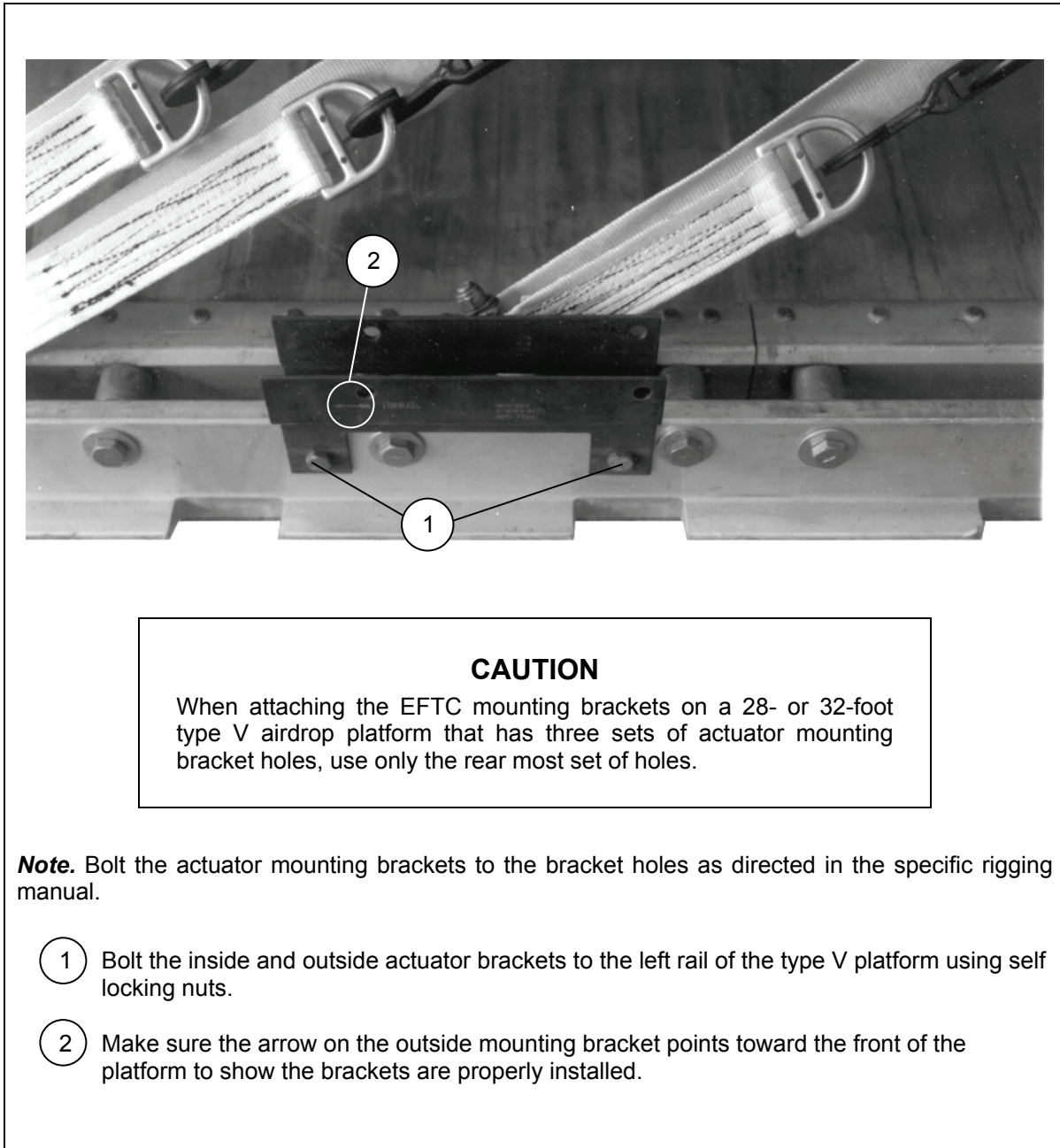
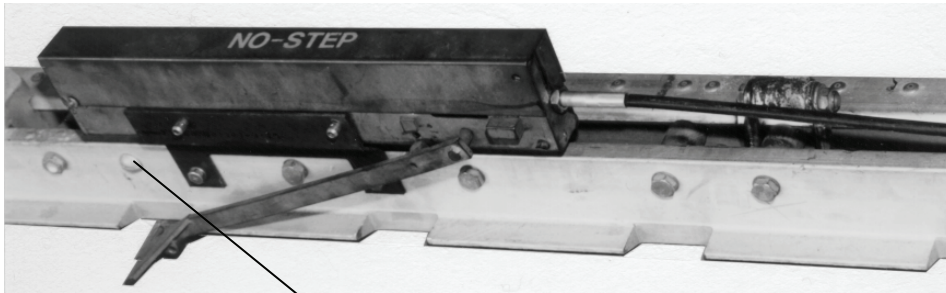


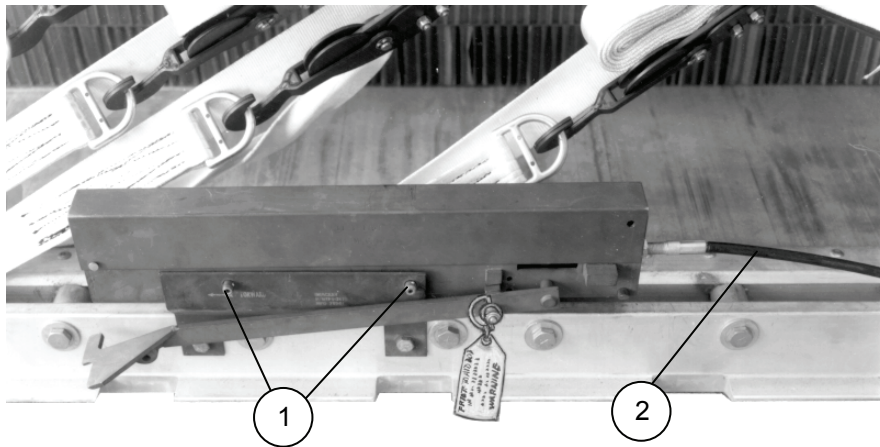
Figure 6-8. Actuator Mounting Brackets Installed to the Type V Platform Side Rail

CAUTION

When the actuator arm falls directly over the side rail bolt, use a round head replacement bolt. (NSN 5306-00-151-0653)



ROUND HEAD BOLT



Step:

3. Pin the actuator to the actuator brackets with the push in, pull out (PIP) pins provided. Make sure the PIP pins are put in from the inboard side of the bracket.
4. Pass the cable to the inside of the side rail tiedown straps to prevent movement of the cable. Tie the cable in place as directed by the specific rigging manual.

Note. If a longer cable than specified in the specific rigging manual is used, make sure that it is routed in smooth S-shaped bends with no 360 degree circles.

Figure 6-9. Actuator Pinned to Brackets and Position Verified

**Step:**

5. Verify the positioning of the installed actuator as follows:
 - Hold the actuator arm in place, and remove the locking pin.

CAUTION

The actuator arm is under 175 pounds of force.

- Allow the arm to rotate down through the forward indent in the side rail.
- Make sure the arm clears the indent by 1/4-inch.
- If the arm **CLEAR**S the indent by 1/4-inch, return the arm to the armed position and replace the PIP pin.
- If the arm **FAILS** to clear the indent by 1/4-inch, make sure the correct mounting holes were used. If the correct holes were used, **REPLACE** the actuator.

Figure 6-9. Actuator Pinned to Brackets and Position Verified (Continued)

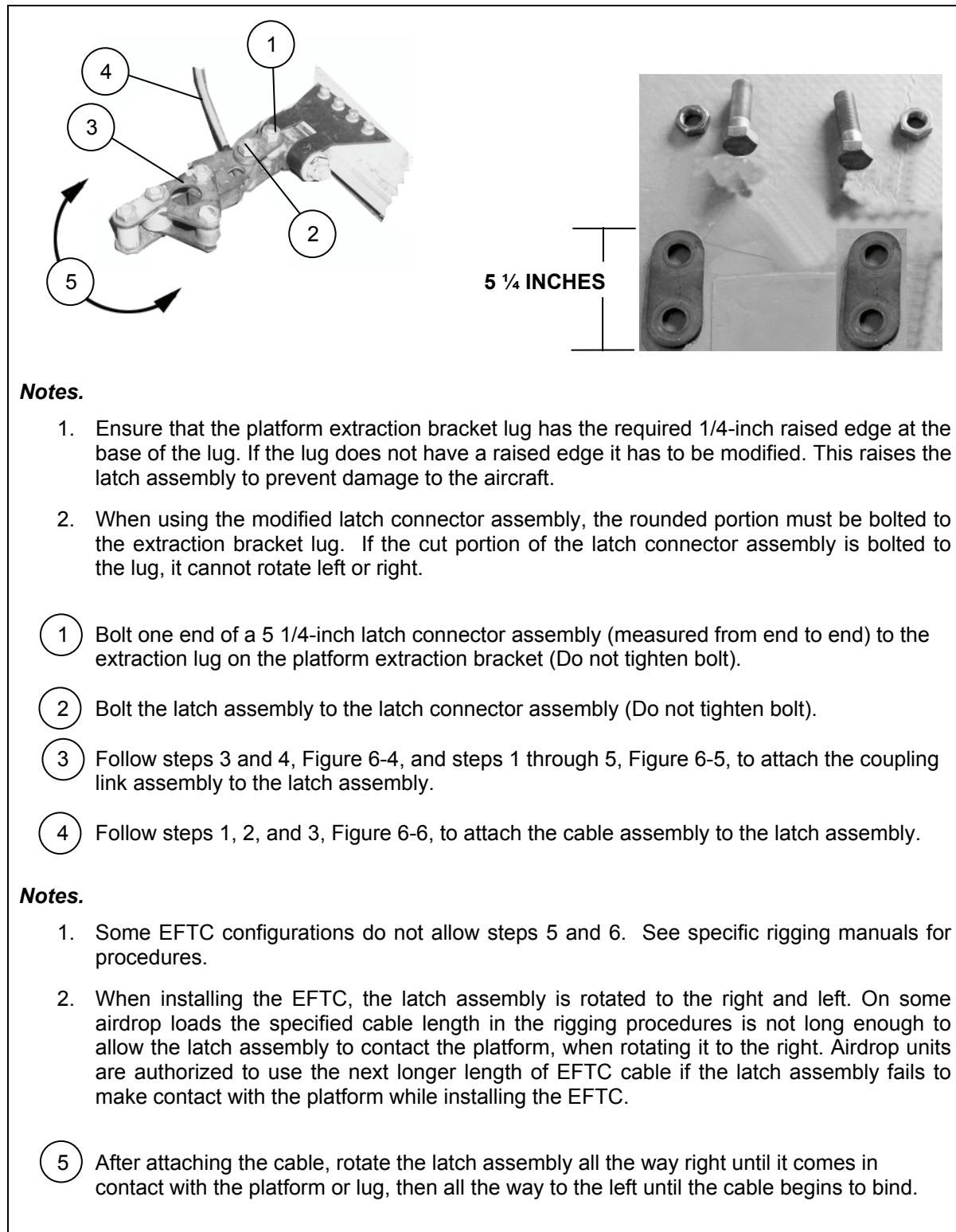
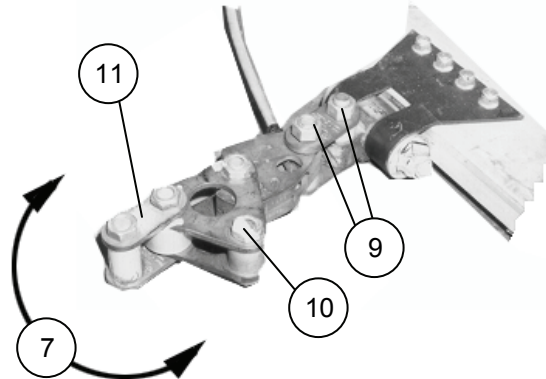


Figure 6-10. Latch Assembly Bolted to Type V Platform Extraction Bracket



CAUTION

Tie the slack in the cable in a smooth S-shaped bend. This should be tied to the side of the load or to a lashing on the type V platform in such a way to allow free play in the cable. This will avoid binding problems in the cable. Do not make a tie around the metal reinforced portion of the EFTC cable.

- 6 With the latch assembly in the far right position, make the securing ties to the cable using Type I, 1/4-inch cotton webbing, one turn single with a surgeon's knot and locking knot allowing free play in the cable.(Not Shown)
- 7 Rotate the latch assembly left and right once again to verify sufficient play. The cable SHALL NOT bind. Ensure that dot/arrow on the latch assembly stays aligned.
- 8 Repeat step 7 with the latch assembly in the transportation (vertical) position.
- 9 Tighten bolts from steps 1 and 2.
- 10 Bolt one end of the deployment line to the right spacer of the coupling link assembly.
- 11 When a 6-loop extraction line is used, the adapter link assembly MUST be used to separate the loops of the line.

Note. After you verify sufficient slack in the cable on the EFTC, remove the quick-release pins from the actuator. Lay the actuator on the platform, and secure the actuator. This will keep the actuator from being damaged while the platform is being loaded in the aircraft.

Figure 6-10. Latch Assembly Bolted to Type V Platform Extraction Bracket (Continued)

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Chapter 7

Extraction Parachute Jettison System (EPJS)

SECTION I-GENERAL INFORMATION

USE

7-1. The EPJS allows jettisoning of an extraction parachute, extraction line and line panel in the event of a malfunction during the extraction phase of airdrop. The system is capable of jettisoning a single 15, 22, or 28-foot extraction parachute.

CAUTION

The load range of the EPJS is 2,520 pounds to 30,000 pounds. The EPJS is not authorized for use with clusters of two 28-foot extraction parachutes.

DESCRIPTION

7-2. The EPJS consists of four extraction parachute jettison devices (EPJDs) and the aircraft electrical control components that accommodate four airdrop loads. The EPJD connects directly to the airdrop load and the EPJS aircraft electrical components are routed and secured inside the cargo compartment of the aircraft. Modifications to existing hardware are not required. The EPJD is prepared and attached to an extraction line prior to loading the aircraft. The aircraft electrical control components will be installed in the aircraft by the aircrew prior to aircraft loading. The aircrew will attach the EPJD to the platform after the platform is locked into position on the aircraft. The EPJS may be utilized with the C-17 and the C-130 aircraft. Figure 7-1 shows the location of the major components.

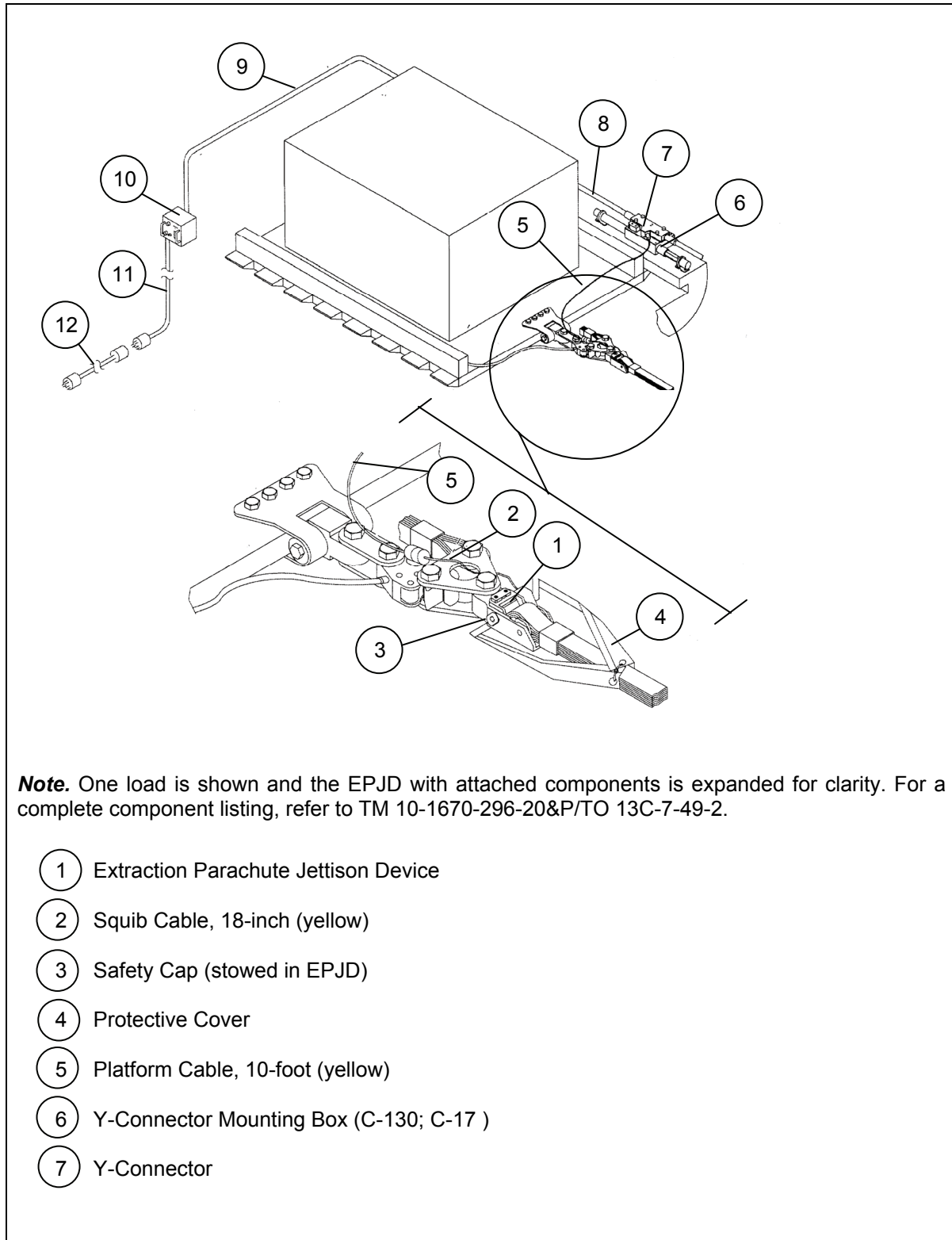


Figure 7-1. Major Components of the Extraction Parachute Jettison System

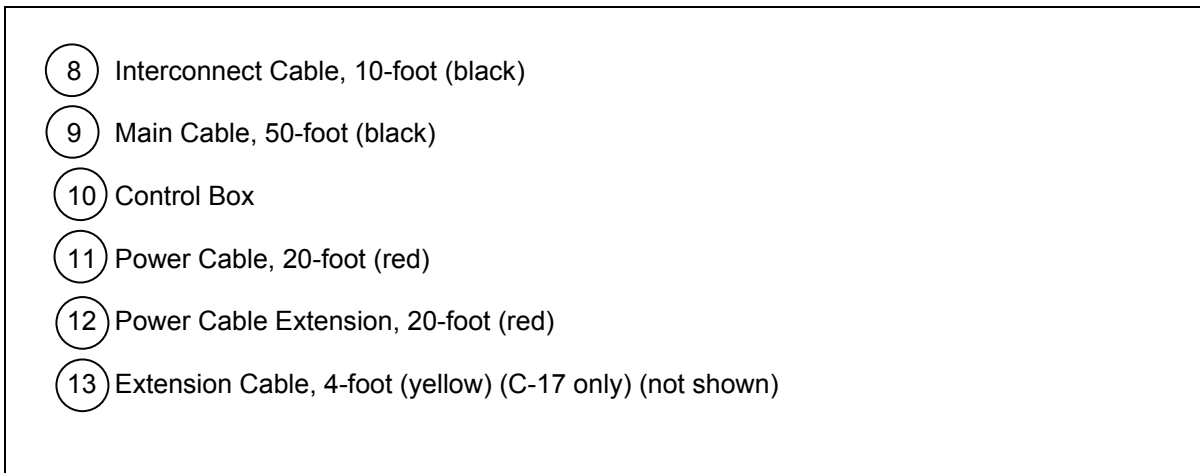


Figure 7-1. Major Components of the Extraction Parachute Jettison System (Continued)

INSPECTION AND MAINTENANCE

7-3. The EPJS components are inspected and maintained according to the procedures in TM 10-1670-296-20&P/TO 13C7-49-2. See the TM for specifics on inspection and maintenance procedures.

OPERATION

7-4. The operation of the EPJS is explained in Figure 7-2.

- **Normal Airdrop Sequence.** During a normal airdrop, there is no change to the existing sequence of extraction and deployment events. Cable disconnect events occur in the following manner. As the airdrop platform moves aft from its locked position during extraction, the forward connector of the platform cable disconnects from its respective Y-connector. During extraction transfer, the squib cable disconnects from the aft connector of the platform cable.
- **Extraction Malfunction.** When the "JETTISON" switch is activated the EPJD releases the keeper, allowing the extraction line and keeper to pull free of the load and aircraft. If multiple loads are being airdropped and the jettison switch is activated, all squibs will fire simultaneously.

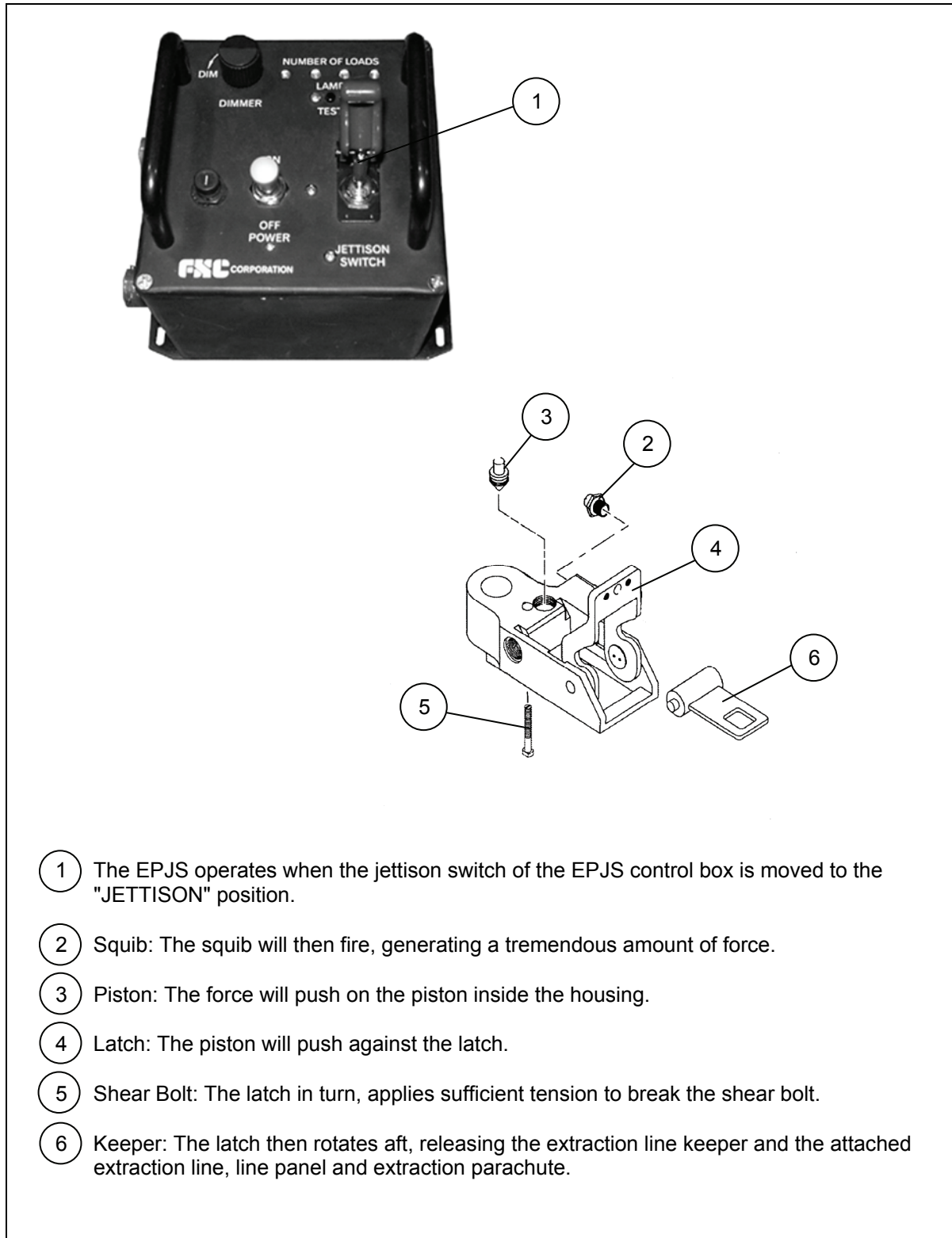


Figure 7-2. Operation of the Extraction Parachute Jettison System (EPJS)

SECTION II-RIGGING INFORMATION

PREPARING THE EPJS

7-5. Inspect, test, and prepare the components of the EPJS as shown in TM 10-1670-296-20&P/TO 13C7-49-2 and this manual.

- **Preparing the Extraction Parachute Jettison Device (EPJD).** Before each use, inspect and assemble the components of the EPJD as shown in TM 10-1670-296-20&P/ TO 13C7-49-2.
- **Attaching the Extraction Line.** Prepare and attach the extraction line to the EPJD as shown in Figure 7-3.

WARNING

The squib must not be installed in the EPJD when beginning this procedure. A squib, when improperly handled, may inadvertently activate, or fail to activate when required. Unintentional activation may result and cause injury to personnel, burns or unwanted secondary activations.

CAUTION

Ensure that the piston stop and cross hole plug is installed in the EPJD, and that the shear bolt is not loose. Do not unscrew the latch retainer nut from the latch.

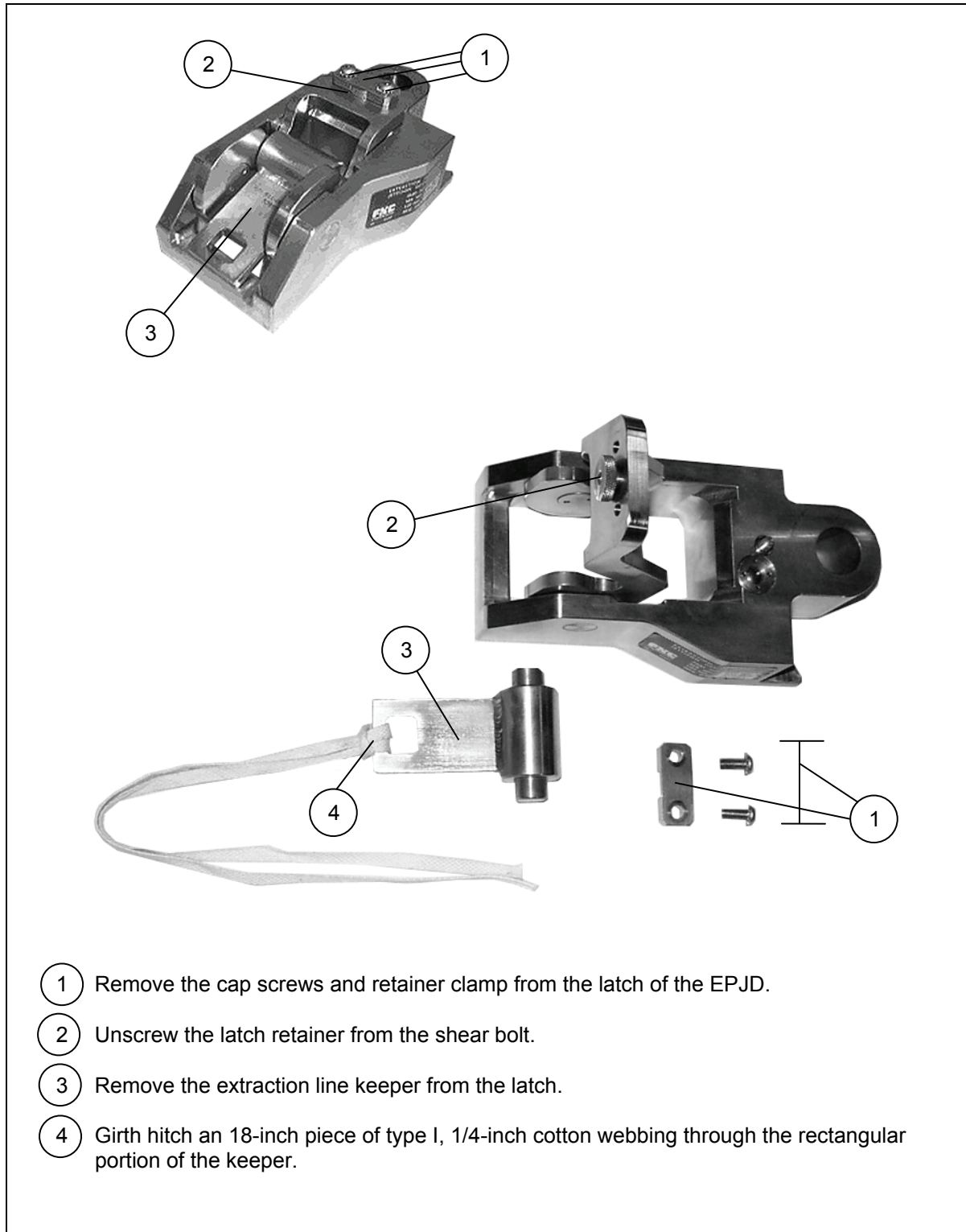


Figure 7-3. Extraction Line Attached to the EPJD

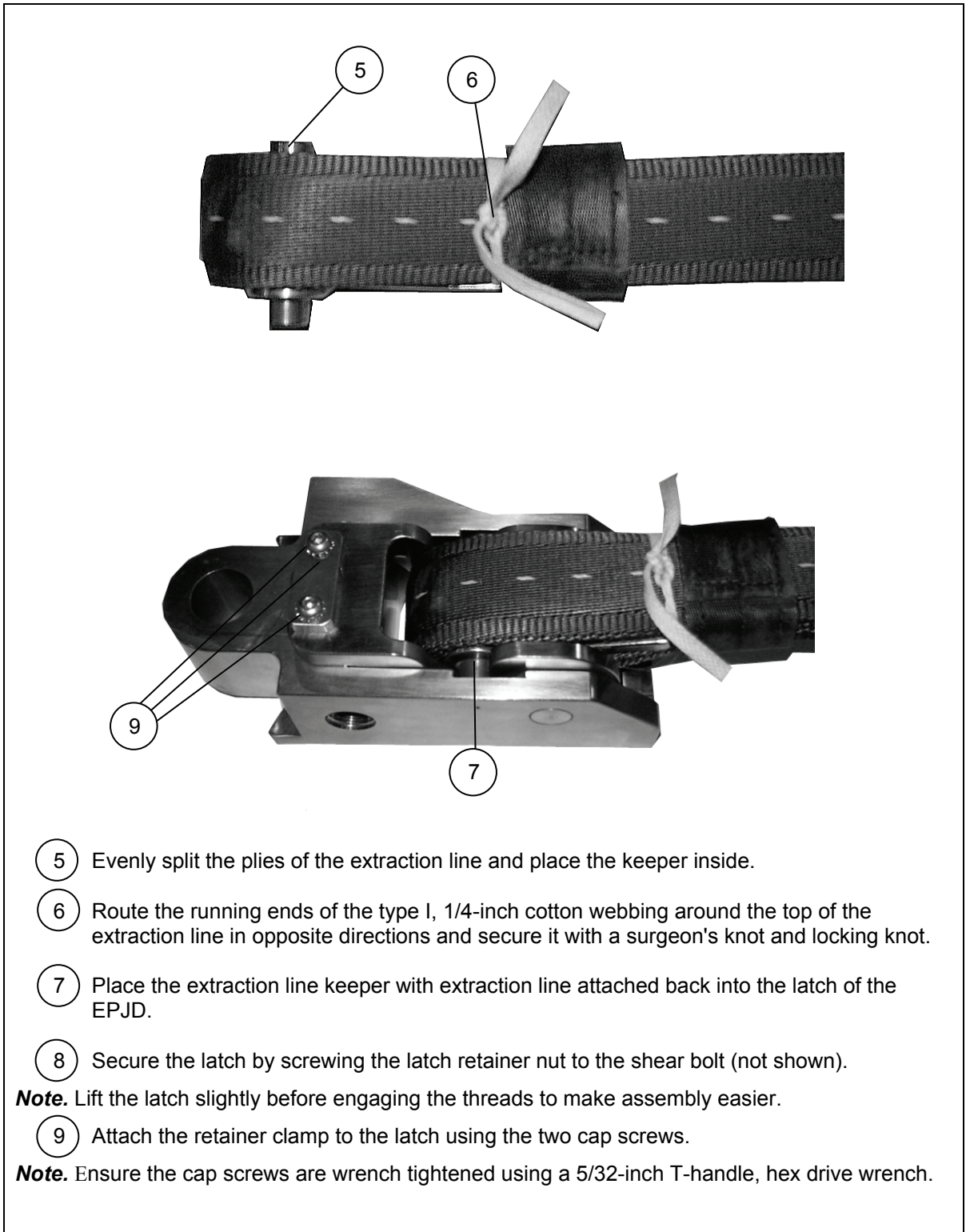


Figure 7-3. Extraction Line Attached to the EPJD (Continued)

- **Attaching the Protective Cover to the EPJD.** Attach the protective cover to the EPJD and extraction line as shown in Figure 7-4.

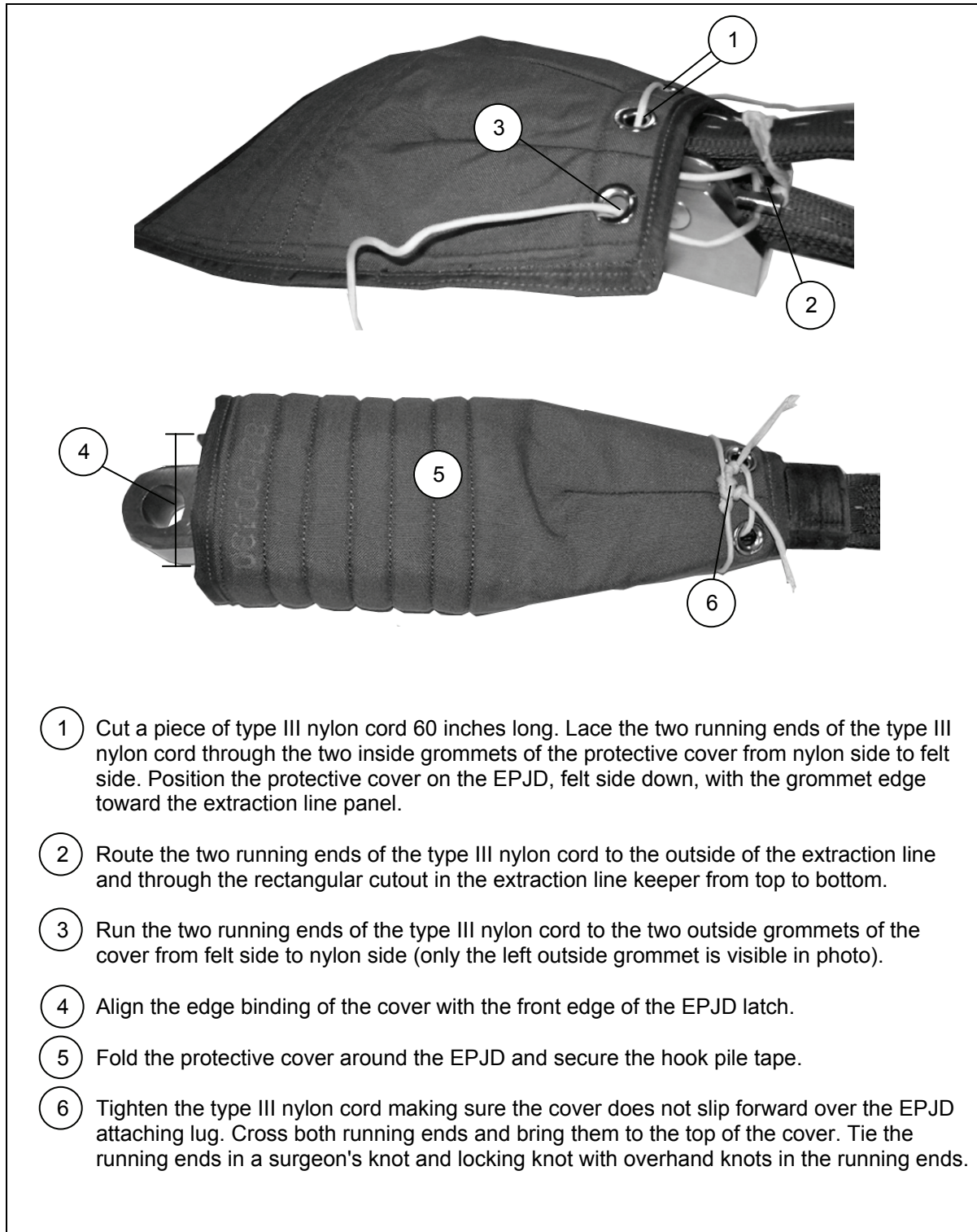


Figure 7-4. Protective Cover Attached to the EPJD

- **Attaching the Squib to the EPJD.** Attach the squib to the EPJD as shown in Figure 7-5.

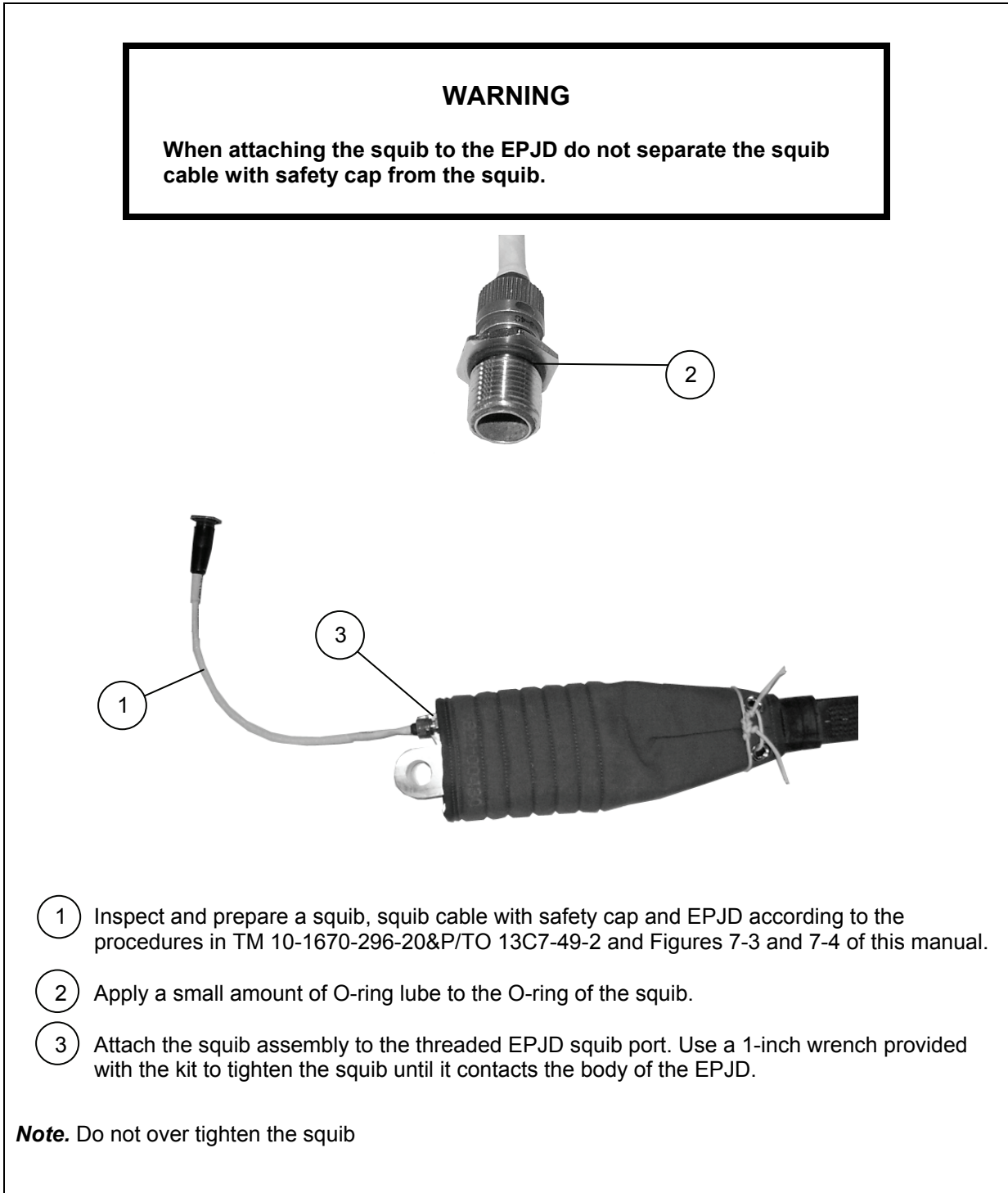


Figure 7-5. Squib and Squib Cable Attached to the EPJD



WARNING

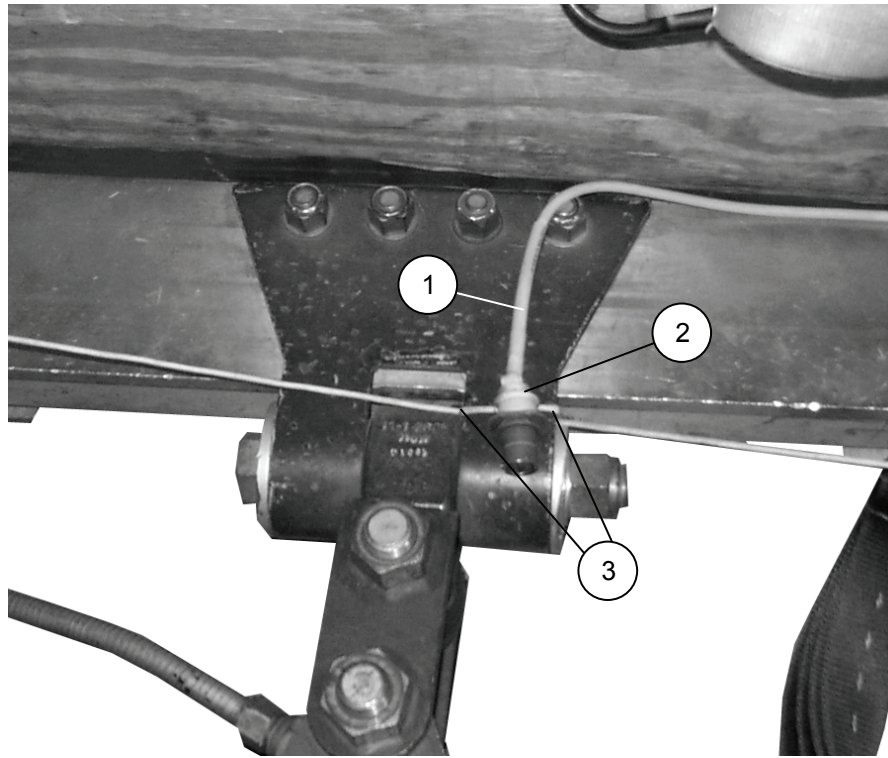
Avoid handling the EPJD by its latch after the squib has been installed in the EPJD squib port.



- 4 Open the hook pile tape and bend the squib cable back so that the connector and most of the cable is inside the protective cover and close the cover.

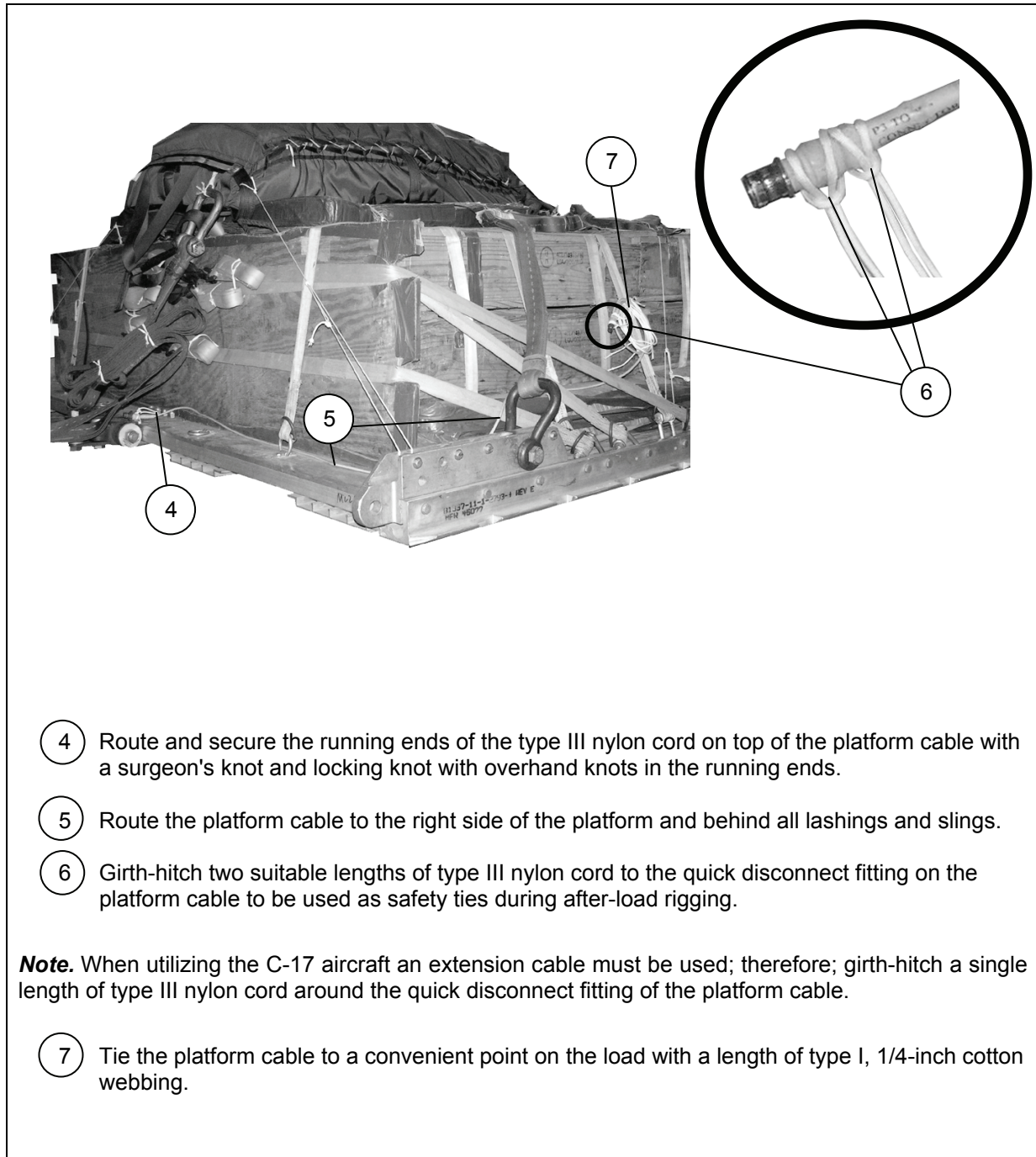
Figure 7-5. Squib and Squib Cable Attached to the EPJD (Continued)

- **Preparing the Airdrop Load.** Prepare the airdrop load by attaching a platform cable to the load as shown in Figure 7-6.



- ① Inspect a 10-foot platform cable as shown in TM 10-1670-296-20&P/TO 13C7-49-2.
- ② Girth-hitch a 32-inch length of type III nylon cord to a point just forward of the aft connector flange of the platform cable. Position the girth-hitched portion of the cable on top of the right side of the extraction bracket, aligning the tie with the rear edge of the platform.
- ③ Route both running ends of the type III nylon cord through the space between the top of the extraction bracket and the extraction lug in opposite directions.

Figure 7-6. Platform Cable Attached to the Airdrop Load



- 4 Route and secure the running ends of the type III nylon cord on top of the platform cable with a surgeon's knot and locking knot with overhand knots in the running ends.
- 5 Route the platform cable to the right side of the platform and behind all lashings and slings.
- 6 Girth-hitch two suitable lengths of type III nylon cord to the quick disconnect fitting on the platform cable to be used as safety ties during after-load rigging.

Note. When utilizing the C-17 aircraft an extension cable must be used; therefore; girth-hitch a single length of type III nylon cord around the quick disconnect fitting of the platform cable.

- 7 Tie the platform cable to a convenient point on the load with a length of type I, 1/4-inch cotton webbing.

Figure 7-6. Platform Cable Attached to the Airdrop Load (Continued)

- Preparing the EPJS Aircraft Components for Transportation (C-130, and C-17 only). Assemble, inspect, and transport the EPJS aircraft components as follows:
 - Inspect a set of EPJS aircraft components as outlined in TM 10-1670-296-20&P/TO 13C7-49-2.
 - Stow the components of the EPJS in an EPJS equipment bag. Put the control box and mounted Y-connectors in the lower level compartments. Fold the separator panel over the lower level and place the cables in the upper level.

Note. Ensure that the Y-connectors are mounted to the Y-connector mounting boxes according to the type of aircraft being utilized. For the C-130 and C-17 aircraft, mount the Y-connector to the wide portion of the mounting box.

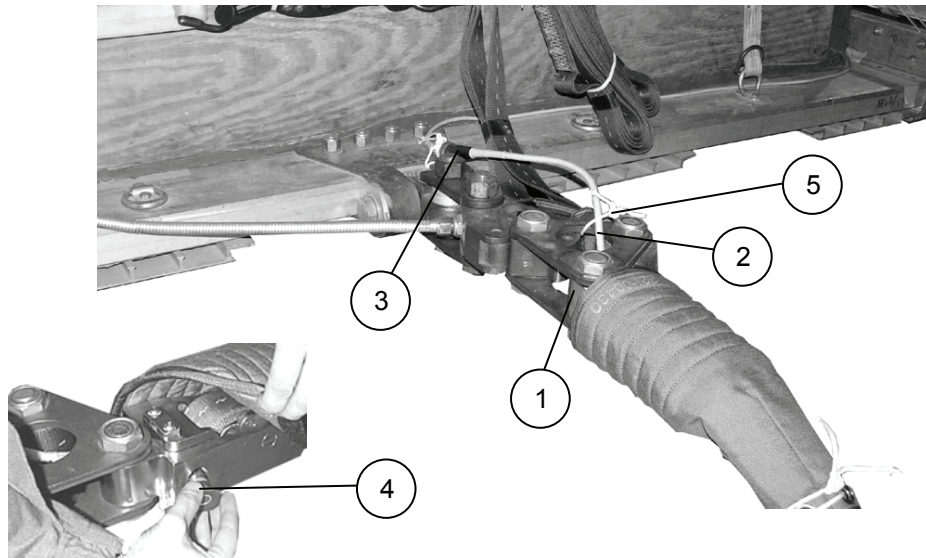
- Transport an EPJD with extraction line attached, that has been prepared as outlined in Figures 7-3 through 7-5 of this manual.
- While the airdrop loads are being weighed and manifested, transport the EPJS equipment bag and the prepared EPJD to the aircraft.
- Aircrew members will install the EPJS in the aircraft.
- **Attaching the EPJD to the Airdrop Load** During After-Load. Attach the EPJD to the load as shown in Figure 7-7.

WARNING

Failure to connect the squib cable to the platform cable as soon as practical after removing the safety cap, increases the probability of inadvertent activation.

CAUTION

Ensure the safety cap is stowed in the threaded port of the EPJD.



Note. Ensure that the spacer removed in step 1 is removed from the aircraft prior to airdrop.

- ① Remove the nut, bolt, and spacer from the extraction side of the coupling assembly. Attach an EPJD that has been inspected and prepared according to the procedures in TM 10-1670-296-20&P/TO 13C7-49-2 and Figures 7-3 through 7-5. Secure with the nut and bolt previously removed.
- ② Route the squib cable through the hole in the top plate of the coupling assembly.

WARNING

Prior to attaching the squib cable to the platform cable ensure the power and jettison switches on the control box are in the off position. This will prevent inadvertent activation of the squib.

- ③ Remove the safety cap from the squib cable and immediately plug the connector on the squib cable to the fitting on the platform cable.
- ④ Stow the safety cap in the threaded hole on the left side of the EPJD body.
- ⑤ Route a length of type III nylon cord around the squib cable and top plate of the coupling assembly on the deployment side making a loose retaining tie. Secure with a surgeon's knot and locking knot with overhand knots in the running ends.

Note. When making the retaining tie ensure that there is approximately 1 to 3 inches of slack between the top plate of the three-point link and squib cable.

Figure 7-7. EPJD Attached to the Airdrop Load

Chapter 8

Release Assemblies

SECTION I-GENERAL INFORMATION

USE

8-1. The cargo parachute release assembly allows the parachute (s) to separate from the load when the load touches the ground. The separation reduces the chance of the wind dragging or overturning the load.

DESCRIPTION

8-2. The M-1 or the M-2 is used when a platform load is rigged for low-velocity airdrop. The automatic cargo release is used on some Marine Corps, Navy and Air Force loads.

- **The M-1 Airdrop Cargo Parachute Release.** This release is used with rigged loads weighing up to 15,000 pounds suspended.
- **The M-2 Airdrop Cargo Parachute Release.** The M-2 release is similar to the M-1 release. The M-2 release is used on loads weighing up to 42,000 pounds suspended.
- **The Automatic Cargo Parachute Release (ACPR) (Not for Army Use).** The automatic cargo parachute release is a two-piece unit that operates on a load-tension activated hydraulic arming delay principal. It has no internal maintenance or repair. The automatic cargo parachute release is used on loads weighing up to 2,500 pounds suspended.

Note. Specific rigging manuals will specify which release is used.

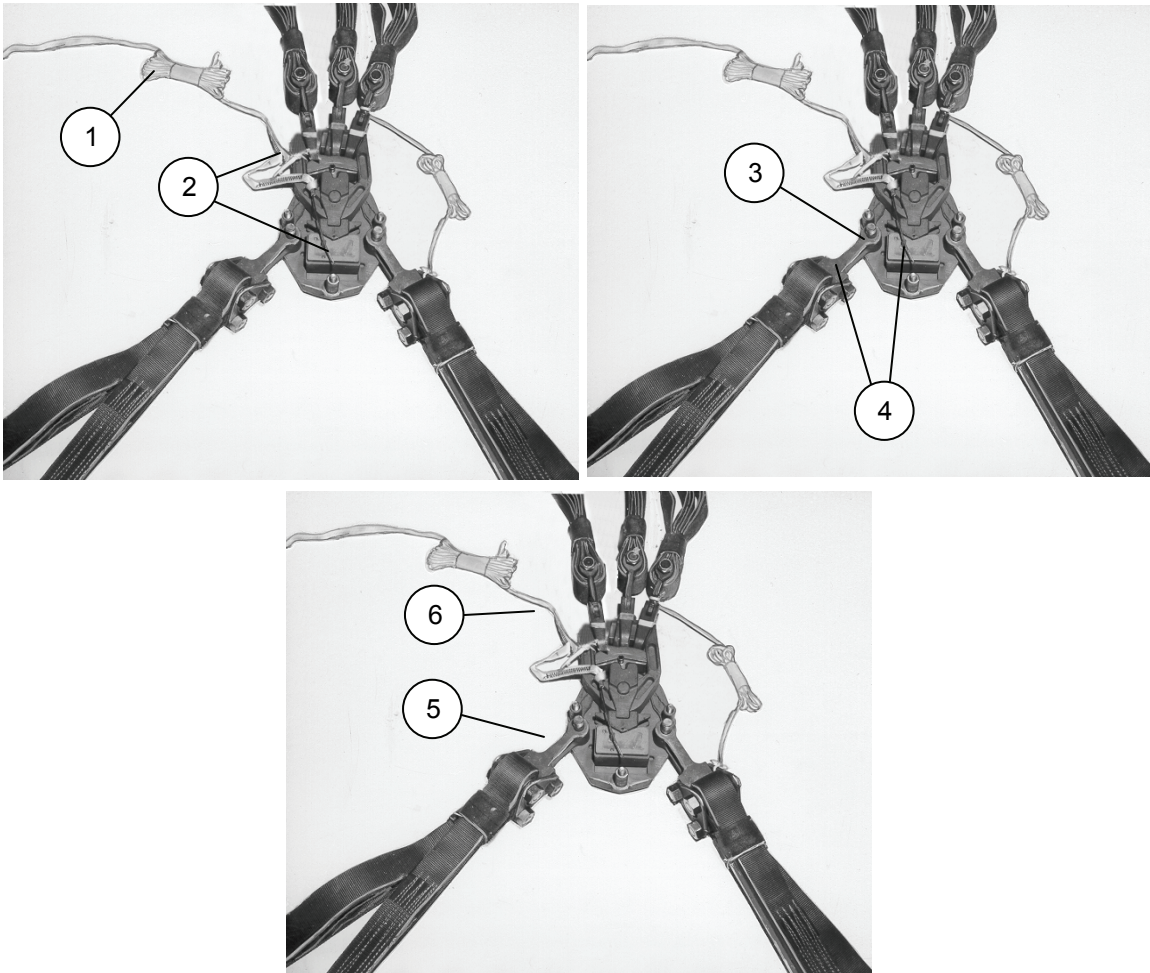
INSPECTION AND MAINTENANCE

8-3. The M-1 and M-2 releases are inspected and maintained as outlined in TM 10-1670-296-20&P/TO 13C7-49-2. See the TM for specifics on inspection and maintenance.

OPERATION

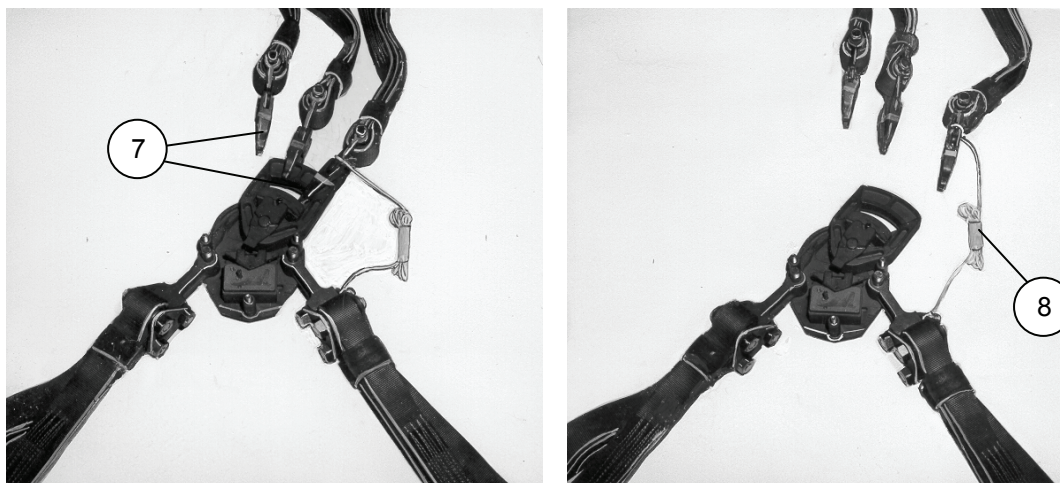
8-4. The operation of the airdrop cargo parachute release works when the load touches the ground and upper suspension link tilts or moves to the side. When the release tilts, the parachutes are released from the load. Figure 8-1 shows how the release operates.

Note. The face plate has been removed to aid in identification.



- ① As the cargo parachute deploys, the arming wire lanyard is pulled.
- ② The safety tie is broken and the arming wire is pulled from the timer.
- ③ The timer delays from 12 to 16 seconds. This delay allows the load to stabilize itself under the parachute.
- ④ When the timer winds down, it retracts its keys from the slots in the release.
- ⑤ When the keys are retracted from their slots, the timer is free to fall within the release.
- ⑥ As the timer falls, it frees the toggle and upper suspension link.

Figure 8-1. Typical Operation of the M-1 and M-2 Cargo Parachute Release



- 7 When the load descends, the normal upright position of the M-1 release keeps the parachute connectors in place. As the load touches the ground, the upper suspension link tilts and allows the parachute connectors to pull free.
- 8 The released parachute stretches the dragline until the release drags to one side of the load to prevent damage to the load. Then the dragline breaks.

Figure 8-1. Typical Operation of the M-1 and M-2 Cargo Parachute Release (Continued)

SECTION II-RIGGING INFORMATION

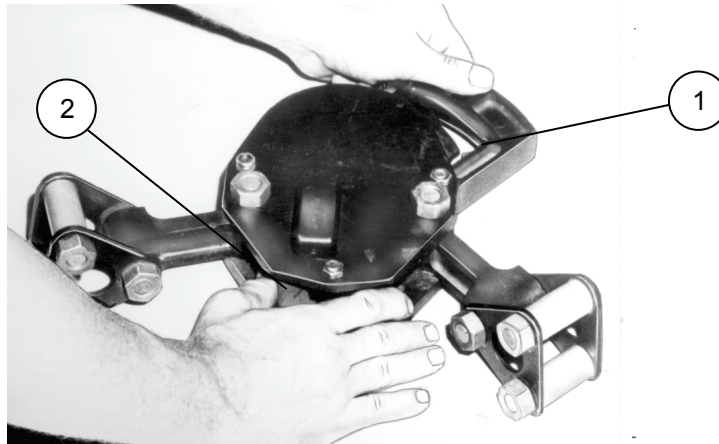
M-1 CARGO PARACHUTE RELEASE

8-5. Test, attach, and safety the M-1 cargo parachute release as follows:

CAUTION

DO NOT use the M-1 cargo parachute release with four G-11B cargo parachutes. The M-2 cargo parachute release MUST be used.

- **Testing Timer.** Before each use, seat, arm, and test the delay timer as shown in Figures 8-2 through 8-4.



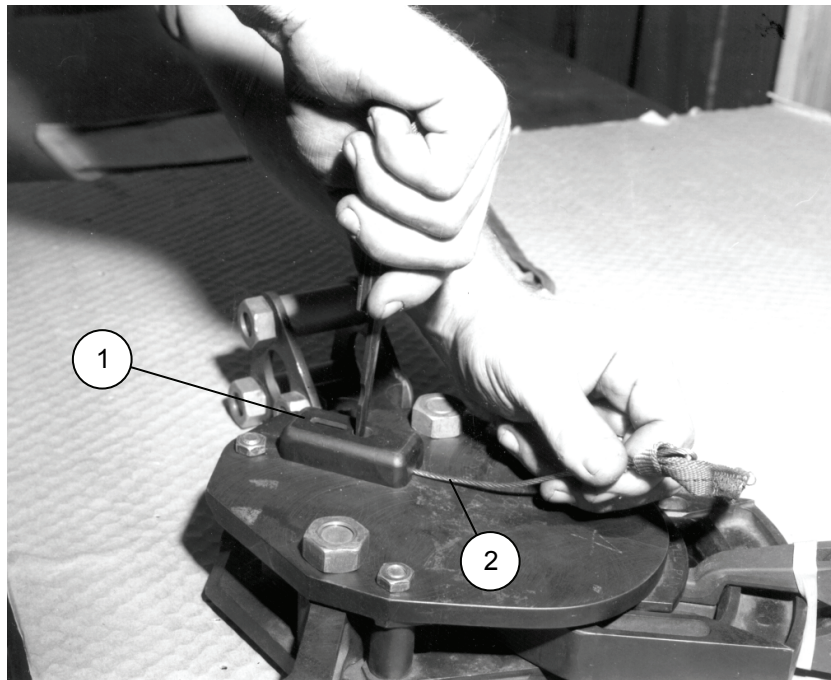
- 1 Align and center the upper suspension link with the release side plates.

CAUTION

If the timer is not correctly seated in the upper position in the release when it is armed, the keys will not fit into the slots in the back side plate and could damage the timer.

- 2 Reach between the side plates, and slide the timer up until the toggles fit in the toggle lock slides, making sure the timer slides freely. You should be able to see the winding shaft of the timer through the guide block winder access hole.

Figure 8-2. Delay Release Timer Seated



- 1 Put the tip of a flat-tip screwdriver through the guide block winder access hole and into the slot in the timer winding shaft. Gently turn the shaft one-quarter turn to the right and stop, holding the shaft with the screwdriver.

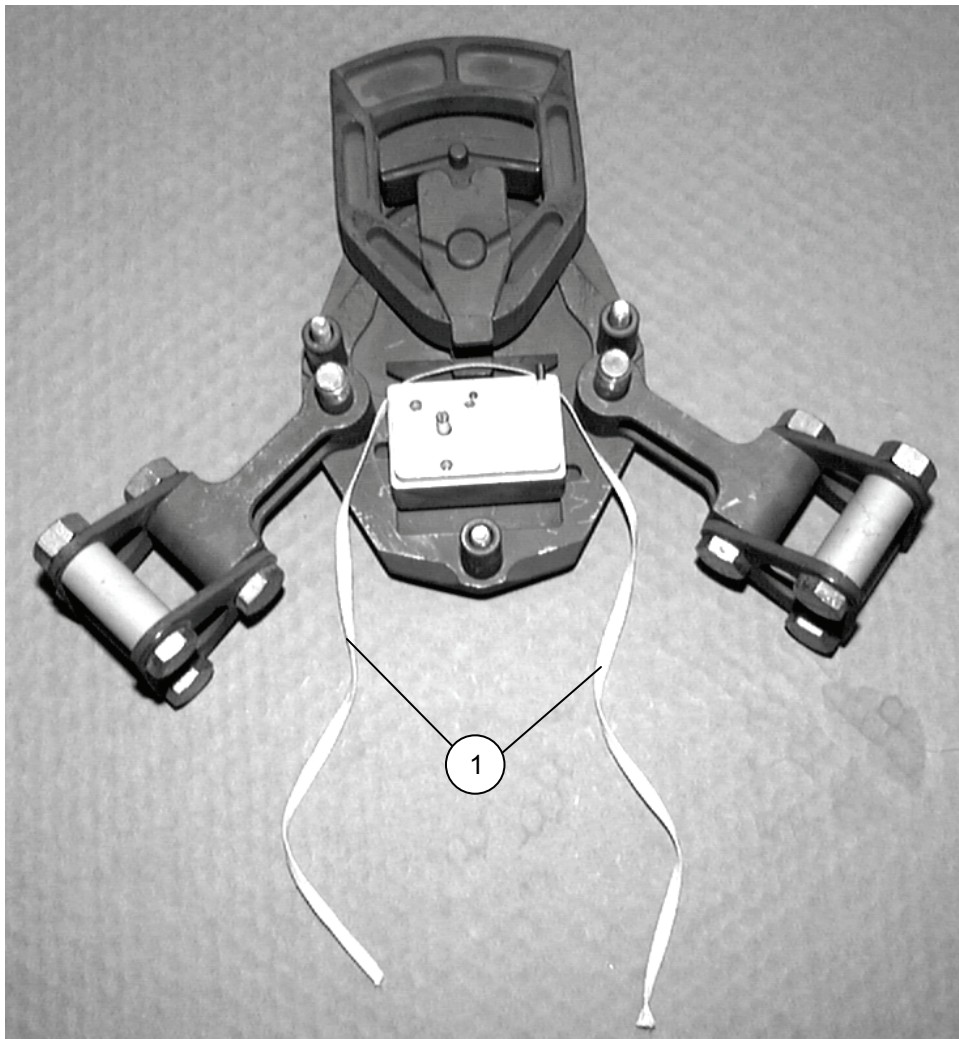
Note. If the winding shaft is hard to turn, hold the shaft with the screwdriver and move the timer around until the keys align with the slots in the back plate.

- 2 Hold the shaft, and push the arming wire down through the hole in the guide block and the hole in the winding shaft.

Note. When the timer is correctly armed, about 1/2 inch of the arming wire can be seen through the slot below the guide block winder access hole.

Figure 8-3. Timer Armed

Note. The delay release timer will be tested before each use.

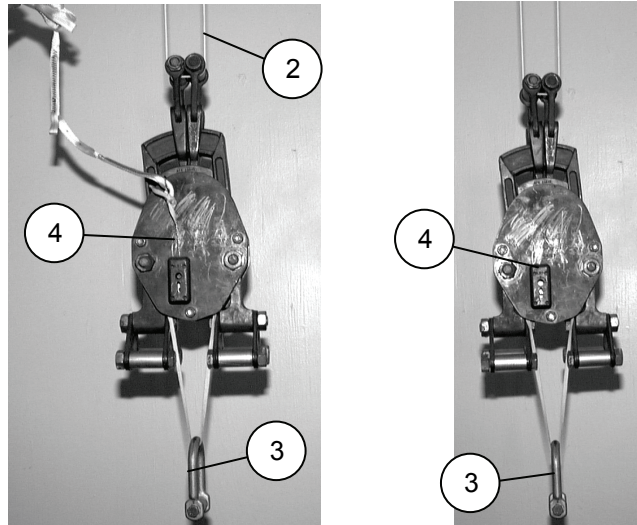


- 1 Pass a length of type I, 1/4-inch cotton webbing up between the release side plates, over and around the center of the timer, and back down between the side plates. The side plate and a toggle lock slide have been removed to show how the webbing passes around the timer. You may use a length of wire to help you pass the webbing around the timer.

Figure 8-4. Testing Timer

CAUTION

Do not over tighten the face side plate. Failure to do so could result in a malfunction of the M-1 release.



- ② Hang the release in a straight, level position.
- ③ Tie a 10-ounce weight, such as a platform clevis with bolt with no spacer or a parachute release connector, without the nut and bolt, to the type I, 1/4-inch cotton webbing.
- ④ Pull the arming wire from the timer. Count the seconds from the time the wire is pulled until the timer falls within the release.

Note. If the timer fails to fall after the allotted time (12 to 16 seconds), refer to TM 10-1670-296-20&P/TO 13C7-49-2 for proper maintenance procedures.

Figure 8-4. Testing Timer (Continued)

- **Preparing, Attaching, and Safety Tying Release.** Prepare, attach, and safety the M-1 cargo parachute release as shown in Figures 8-5 through 8-7.

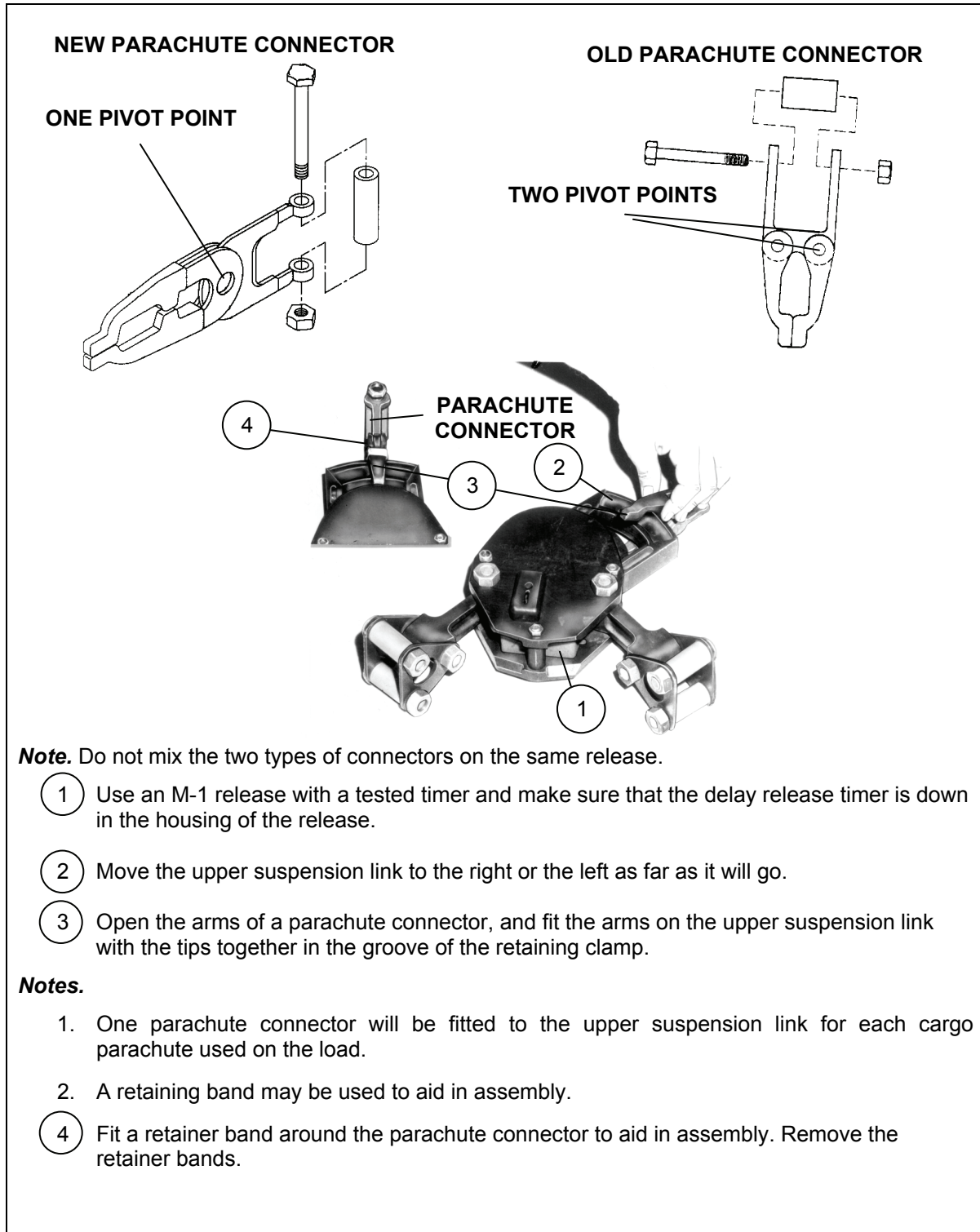
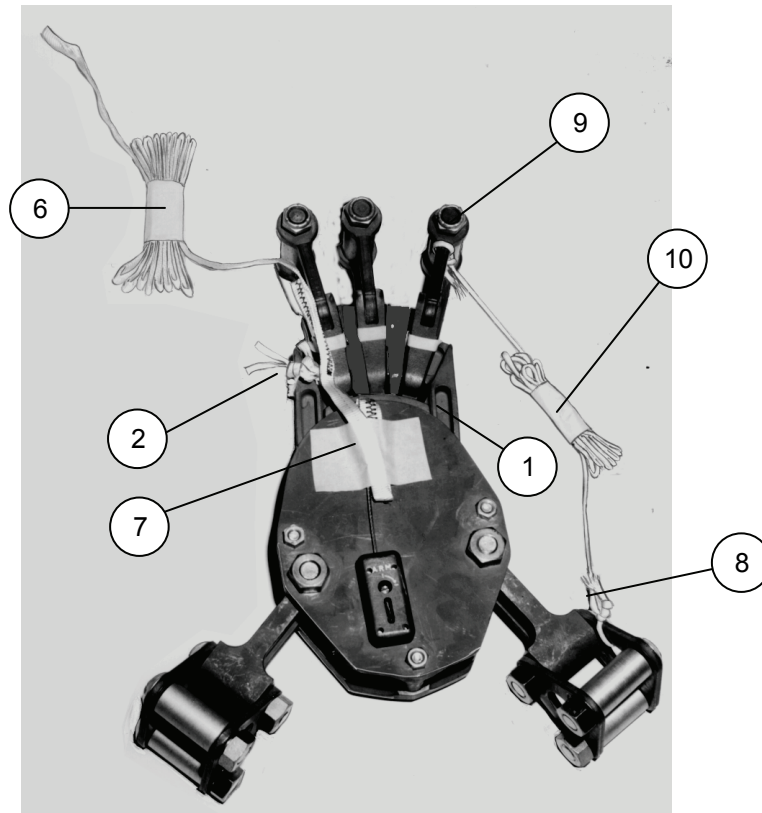


Figure 8-5. Parachute Connector Fitted to Upper Suspension Link or M-1 Release



- ① Move the upper suspension link back to the center of the release and arm the timer as indicated in Figures 8-2 and 8-3.
- ② Safety the arming wire lanyard to the upper suspension link with a double length of type I, 1/4-inch cotton webbing with a surgeon's knot and a locking knot.

CAUTION

The end loop of the arming wire may pull free from the crimping sleeve during parachute deployment. To ensure that the arming wire disengages from the timer stem, an arming wire safety tie must be installed on all arming wires prior to use on an airdrop operation.

Figure 8-6. M-1 Release Prepared

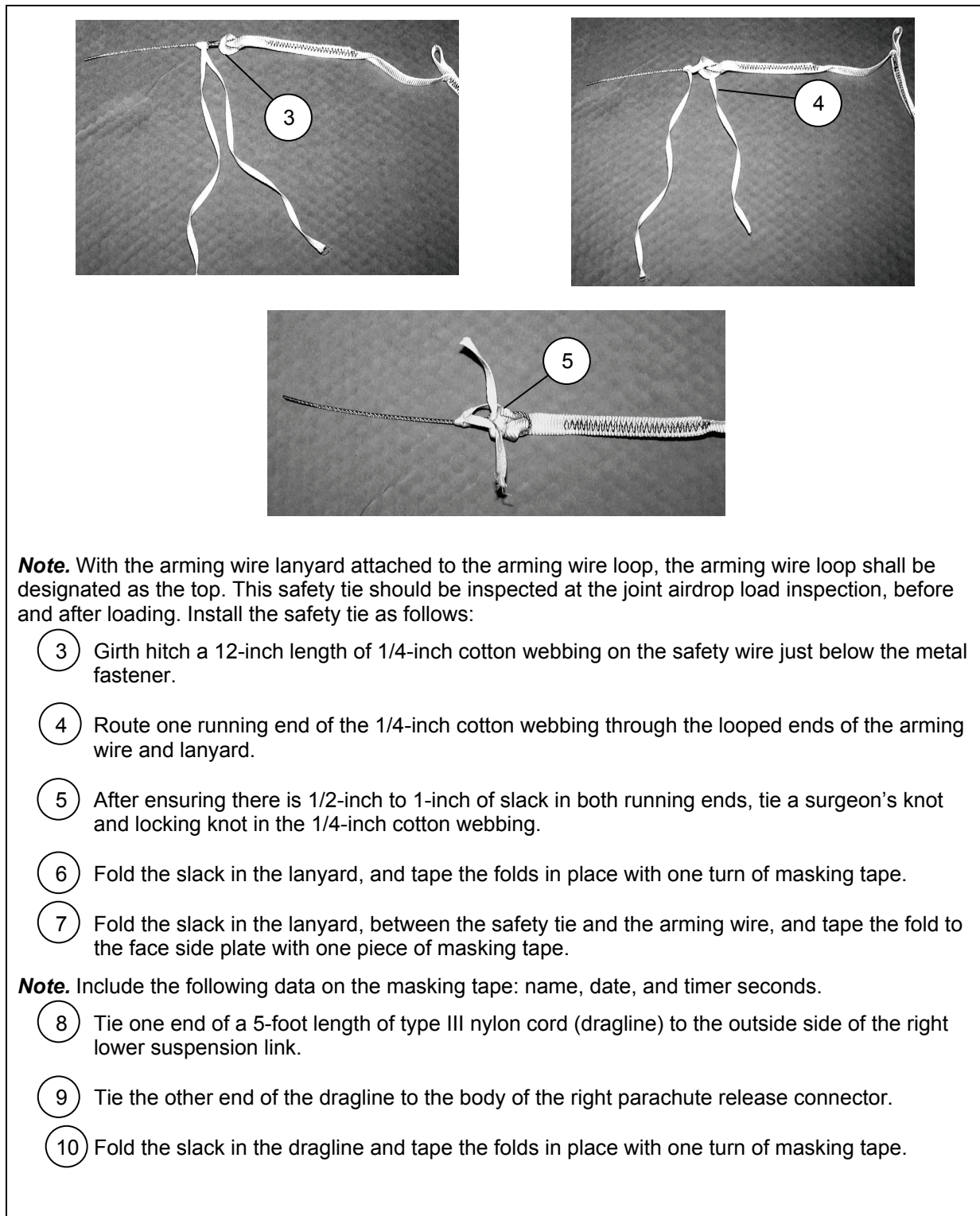
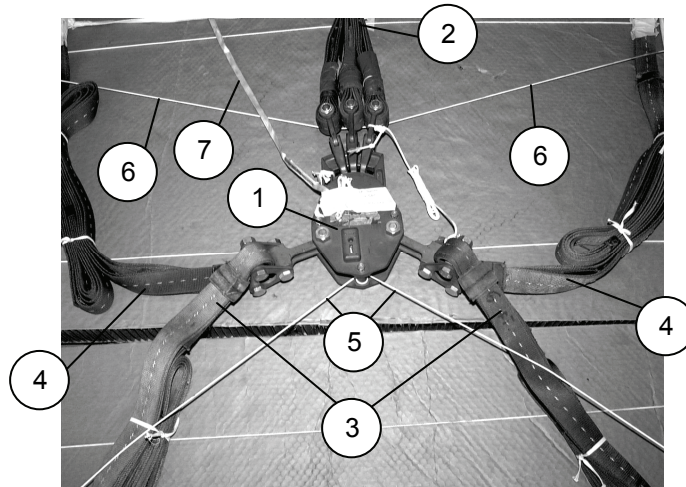


Figure 8-6. M-1 Release Prepared (Continued)

CAUTION

Make sure the arming wire lanyard is routed over all items.



- ① Put the release on the load as instructed in the specific rigging manual for the load.

Note. Bolt a 3-foot (2-loop), type XXVI nylon sling to the parachute clevis of one G-11B cargo parachute and to the parachute connector fitted to the release.

- ② Bolt the riser extensions of two G-12E, or two or three G-11B cargo parachutes to the parachute connectors already fitted to the release.
- ③ Attach the front suspension slings to the top bolts of the lower suspension link.
- ④ Attach the rear suspension slings to the lower bolts of the lower suspension link. The rear slings will have a half twist towards the parachutes.
- ⑤ Run a length of type III nylon cord to encircle the lower spacer, and tie the ends of the cord to points on the front of the load or platform.
- ⑥ Run a length of type III nylon cord over the suspension slings and through the parachute connectors, and tie the ends of the cord to points on the rear of the load or platform.
- ⑦ Tie the lanyard to a carrying handle of a parachute with three alternating half hitches and an overhand knot in the running end.
- ⑧ Fold the slack in the lanyard, and tape the folds in place with one turn of masking tape. (Not shown)

Figure 8-7. M-1 Release Attached and Safety Tied to Load

M-2 CARGO PARACHUTE RELEASE

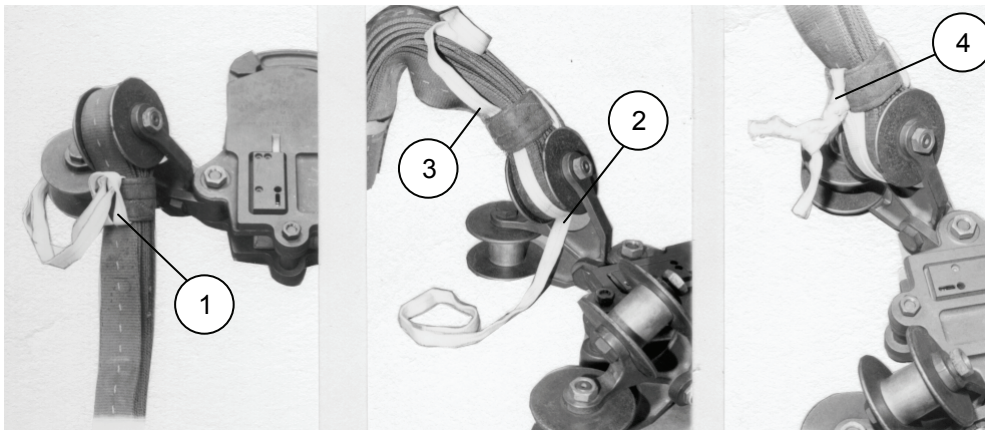
8-6. Prepare, attach, and safety the M-2 cargo parachute release as follows:

- **Preparing Release.** Test the timer and prepare an M-2 cargo parachute release the same as the M-1 release.

Note. Three to eight connectors may be fitted to an M-2 release. The M-2 release requires a 5-foot dragline made from 1/2-inch tubular nylon webbing.

- **Attaching and Safety Tying Release.** Attach and safety tie the M-2 cargo parachute release to the load as shown in Figure 8-8.

Note. When using the M-2 cargo parachute release on the 28-foot and 32-foot platforms, use a 25-foot arming wire lanyard. Make the lanyard according to TM 10-1670-296-20&P/TO 13C7-49-2.

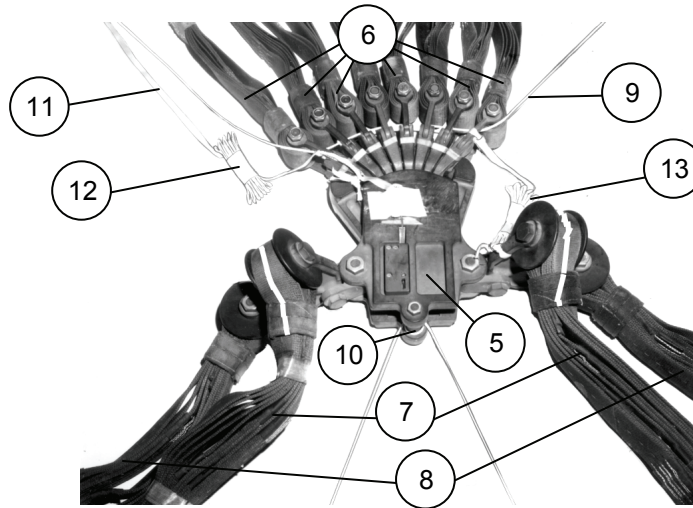


- ① Form a girth hitch around one side of a suspension sling keeper with a 5-foot length of 1/2-inch tubular nylon webbing. Make sure the running ends are equal.
- ② Route both ends around the looped end of the sling and through the lower suspension link.
- ③ Route one end of the 1/2-inch tubular nylon webbing through the suspension sling keeper.
- ④ Slide the keeper as close to the lower suspension link as possible. Tie the running ends together with a slip knot.

Figure 8-8. M-2 Release Prepared, Attached, and Safety Tied to Load

CAUTION

Make sure the arming wire lanyard is routed over all items.



- 5 Put the release on the load as instructed in the specific rigging manual for the load.
- 6 Bolt the riser extensions of three to four G-11B or five to eight G-11C cargo parachutes to the parachute connectors already fitted to the release.
- 7 Attach the front suspension slings to the top bolt of the lower suspension link.
- 8 Attach the rear suspension slings to the lower bolt of the lower suspension link. The rear slings will have a half twist towards the parachutes.
- 9 Run a length of type III nylon cord through the connectors, and tie the ends of the cord to points on the rear of the load or platform.
- 10 Run a length of type III nylon cord around the lower spacer, and tie the ends of the cord to points on the front of the load or platform.
- 11 Tie the lanyard to the carrying handle of a parachute with three alternating half hitches and an overhand knot in the running end.
- 12 Fold the slack in the lanyard, and tape the folds in place with one turn of masking tape.
- 13 Install the drag line and fold the slack. Secure with masking tape.

Figure 8-8. M-2 Release Prepared, Attached, and Safety Tied to Load (Continued)

THE AUTOMATIC CARGO PARACHUTE RELEASE (NOT FOR ARMY USE)

8-7. The automatic cargo parachute release is a two-piece unit that operates on a load tension activated hydraulic arming delay principal. It has no internal maintenance or repair.

Note. The service life of the release is 10 years from the date of manufacture.

- **Physical and Functional Characteristics.** The physical and functional characteristics of the automatic cargo release are shown in Figure 8-9.

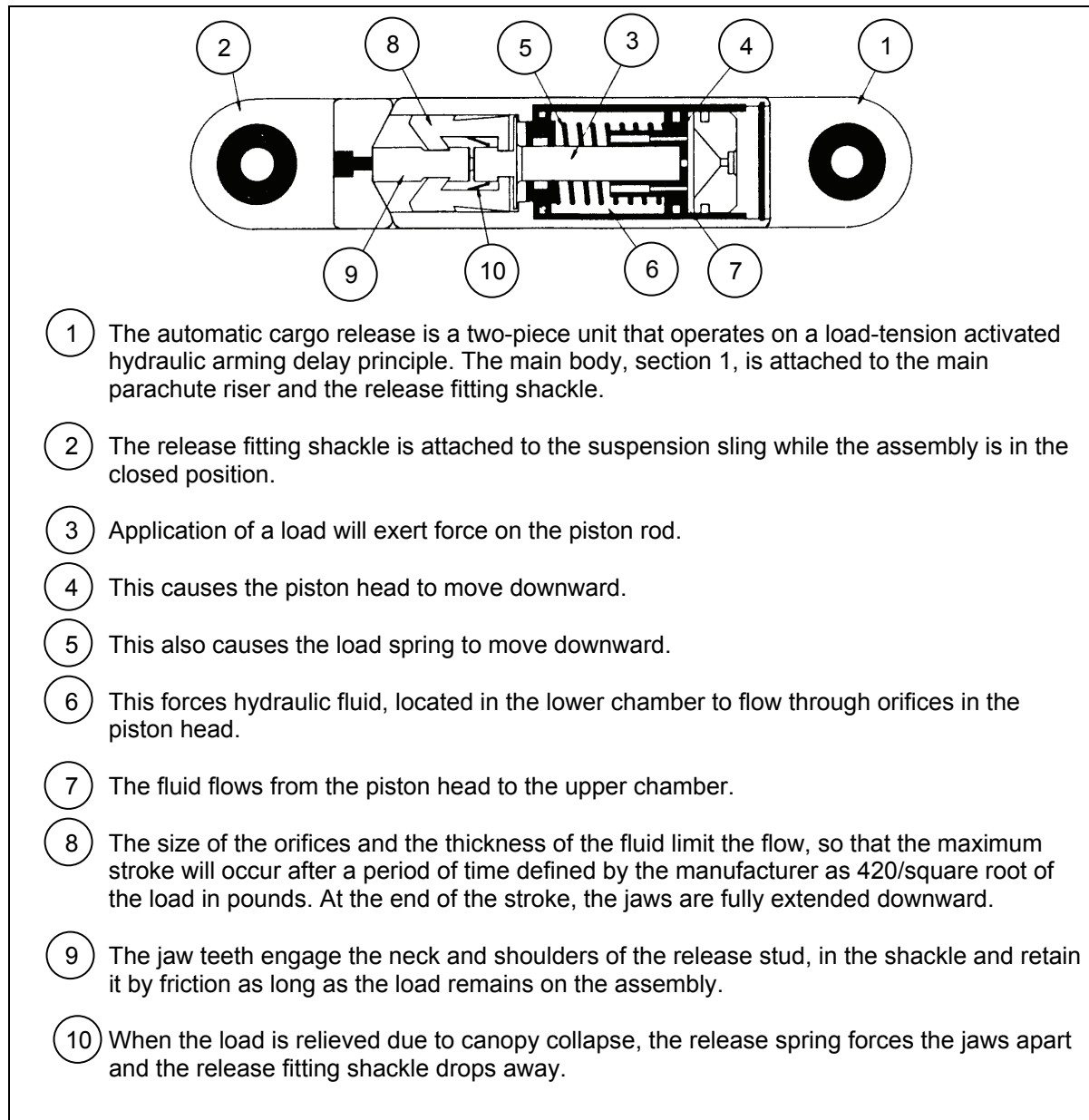


Figure 8-9. Physical and Functional Characteristics

- **Original Receipt Inspection.** After removing the unit from its packaging, visually verify that all components of Figure 8-9 are present and in acceptable condition for use (no corrosion, deformation, leakage, or other abnormalities). Perform a pre-drop activation test as shown in Figure 8-10.

Note. When testing the Automatic Cargo Parachute Release the main body must be facing up.

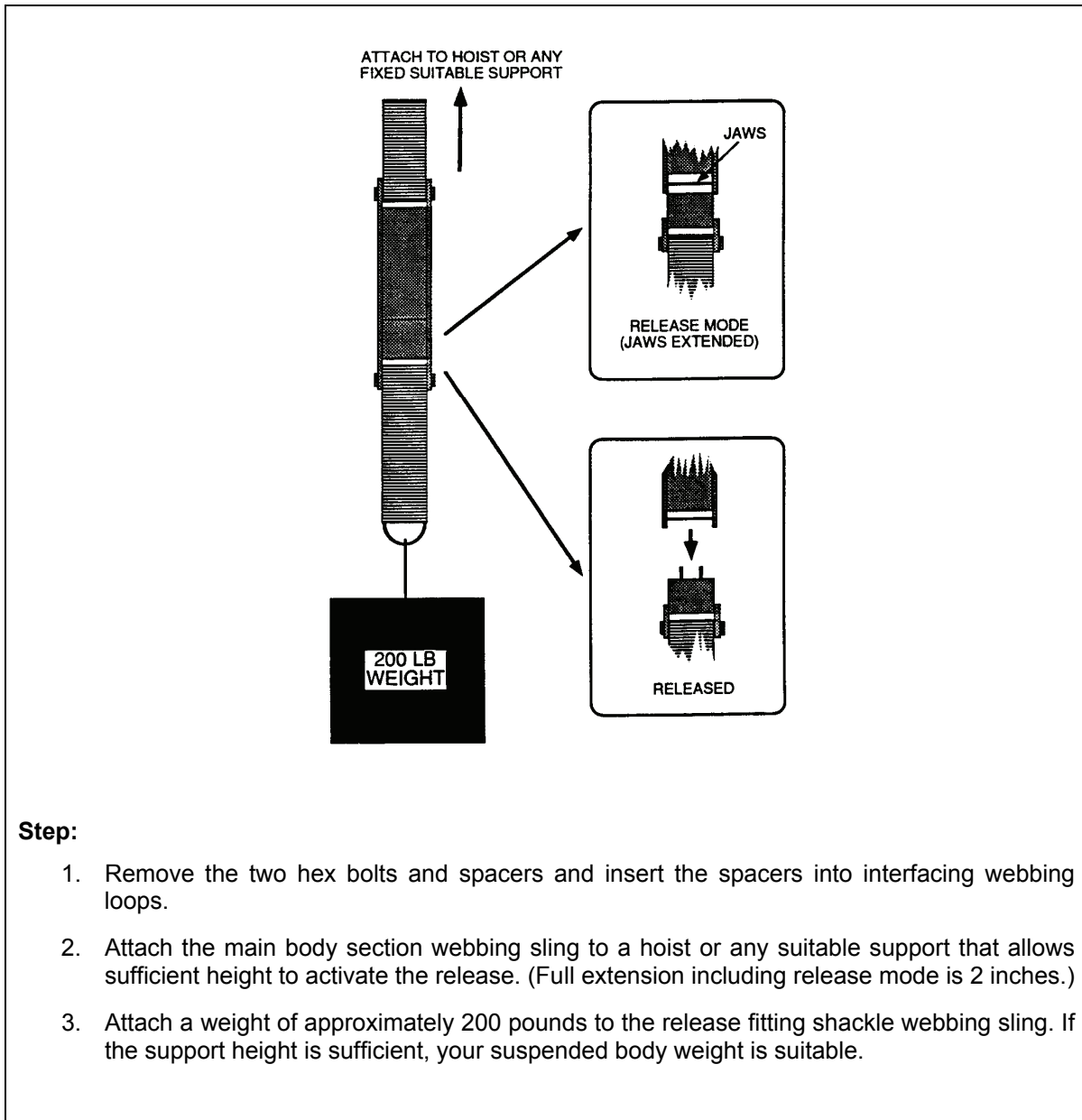
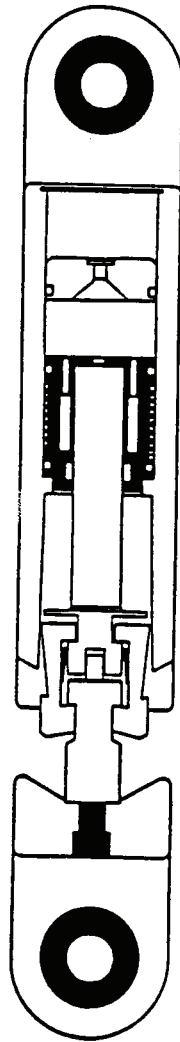


Figure 8-10. Pre-Drop Activation Test



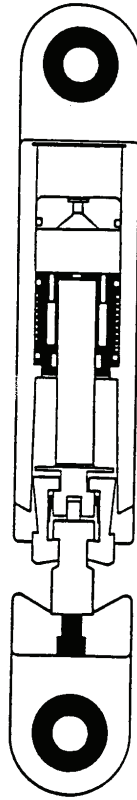
Step:

4. Time the arming delay starting from when the load is applied to when the jaws of the release extend below the cutouts in the bottom section of the main body section. Release mode should occur after 30 to 40 seconds under a 200-pound load. If the release mode and full extension is reached in less than 30 seconds under a suspended load of 200 pounds, the release is to be considered unserviceable.

Figure 8-10. Pre-Drop Activation Test (Continued)

CAUTION

Ensure the release fitting shackle is held when the weight is released to prevent it falling upon separation which could cause personal injury.

**Step:**

5. When the release mode has been achieved, simulate impact by lowering the hoist (if used) until the load is relieved; or if body weight is used, (ensure the release fitting shackle is held securely to prevent personal injury upon separation), quickly release the load. The spring loaded jaws will kick outward releasing the release fitting shackle which allows the cargo release unit to immediately separate. The outer lip on the jaws will catch on the lip of the main body section, holding the piston extracted and retaining the jaws in the open position.

Figure 8-10. Pre-Drop Activation Test (Continued)

Step:

6. Inspect the main body section for fluid leakage. The jaws and release fitting shackle should be totally dry. The silicone fluid is clear and if any evidence of leakage is apparent, it will appear as wet and glistening. If leakage is evident, the release will not be used.

Note. The automatic cargo parachute release NSN 1670-01-337-4366 part number 811-00220 incorporates a removable filter. The automatic cargo parachute release part number 811-00220-1/-2 incorporates a nonremovable solid aluminum cap.

7. Inspect the presence, condition, and security of the removable filter. The filter is a thin silver disc of porous metal located on the end of the main body section. The removable filter is held securely in the main body piston cavity by a washer and retaining ring.
8. Inspect for presence, condition, and security of the solid aluminum cap. The cap is located on the end of the main body section.
9. Preparation for reuse is accomplished by simply flushing foreign particles from the unit and air drying.

Figure 8-10. Pre-Drop Activation Test (Continued)

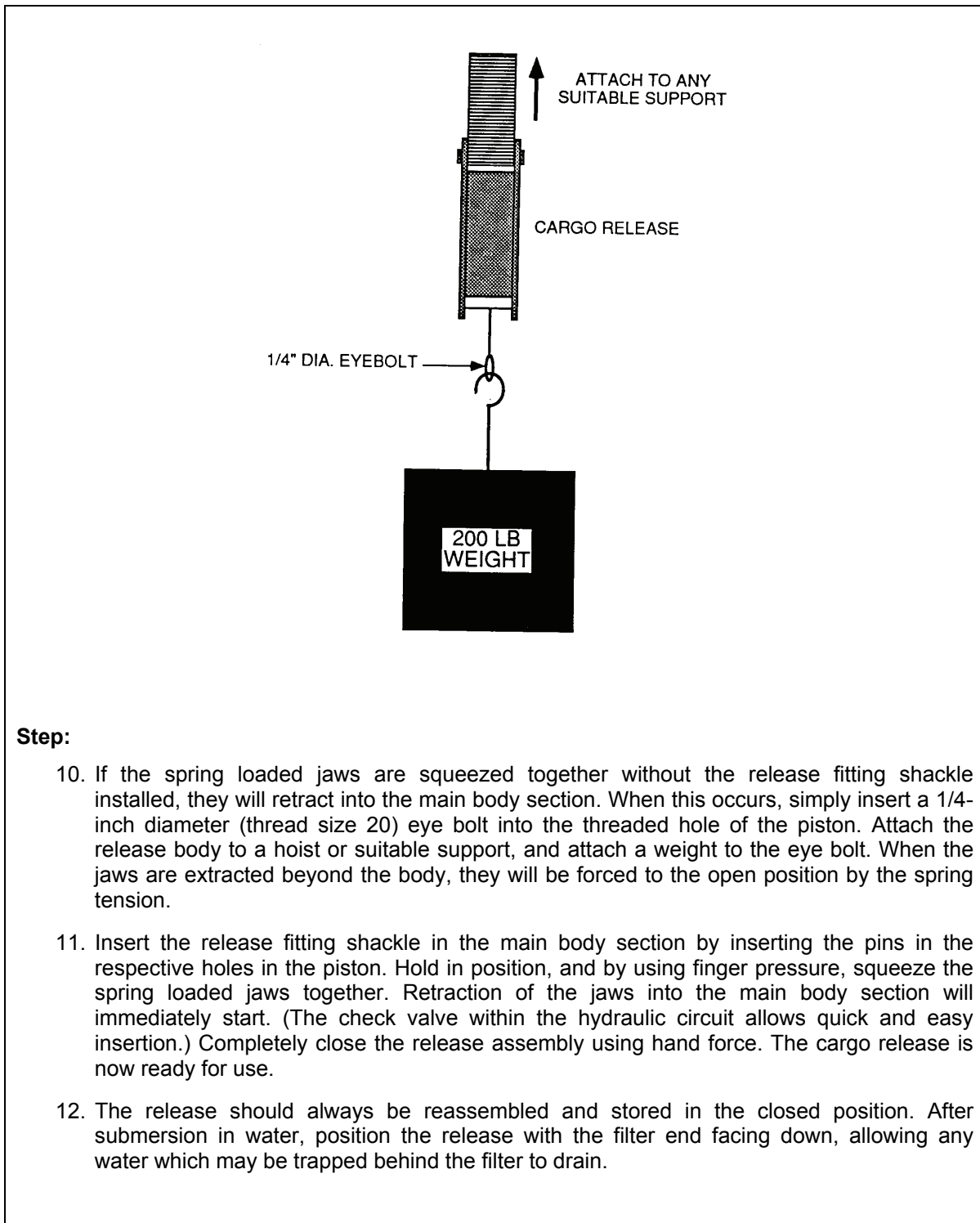
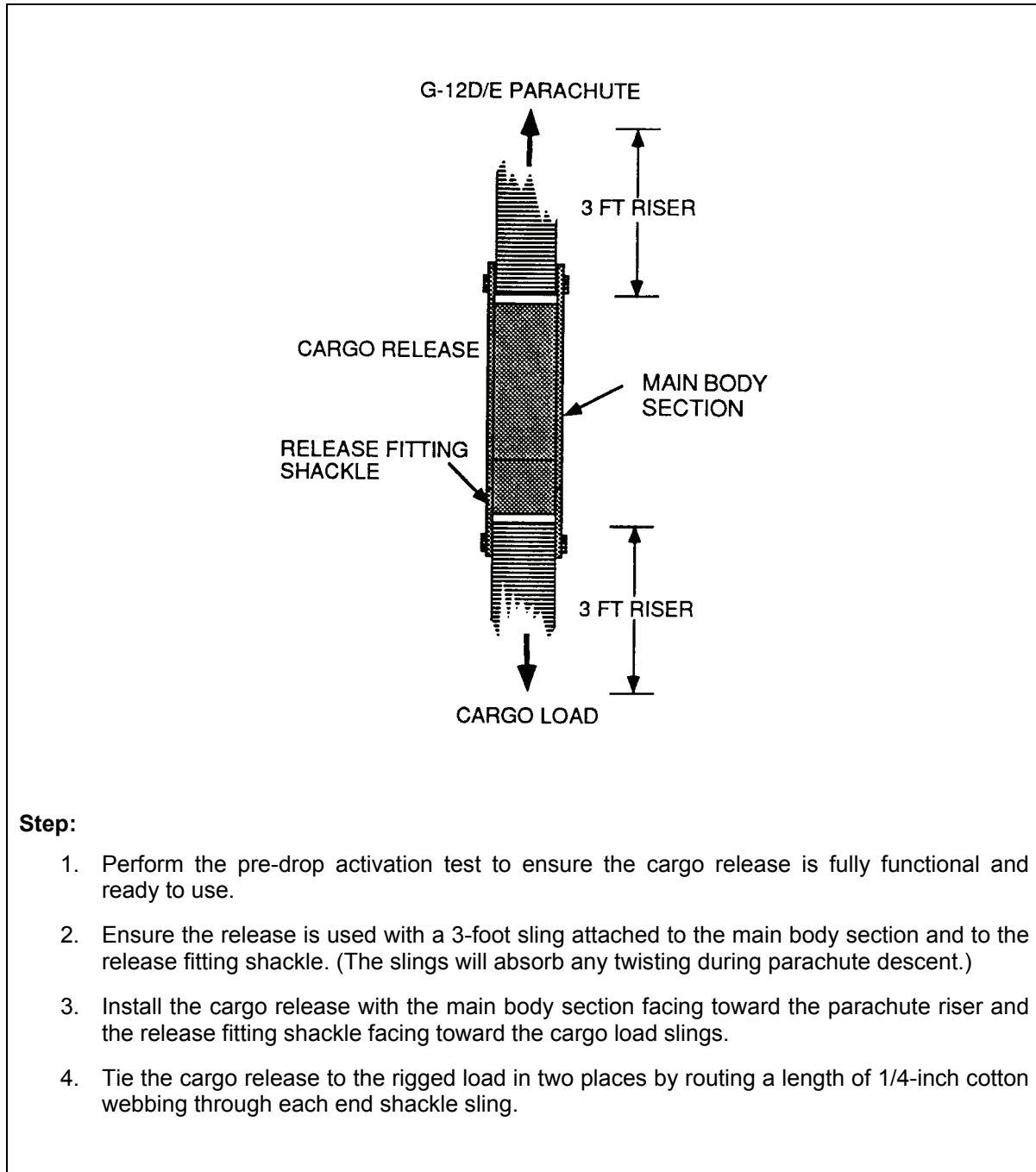


Figure 8-10. Pre-Drop Activation Test (Continued)

- **Installation for Airdrop.** Instructions for installing the cargo release are shown in Figure 8-11.



Step:

1. Perform the pre-drop activation test to ensure the cargo release is fully functional and ready to use.
2. Ensure the release is used with a 3-foot sling attached to the main body section and to the release fitting shackle. (The slings will absorb any twisting during parachute descent.)
3. Install the cargo release with the main body section facing toward the parachute riser and the release fitting shackle facing toward the cargo load slings.
4. Tie the cargo release to the rigged load in two places by routing a length of 1/4-inch cotton webbing through each end shackle sling.

Figure 8-11. Cargo Release Installed

- **Post Drop Maintenance.** Perform post drop maintenance according to the following:

Step:

1. Remove the retaining ring in the upper cargo release assembly using Truarc ring pliers. To remove the filter and washer, hold the release filter end downward. The filter and washer should fall out. Thoroughly rinse the main body section and release fitting shackle with fresh water. Direct flow using a water hose or faucet would be ideal. If the cargo release has not been maintained, the filter may adhere to the housing bore. Where severe corrosion exists, the filter may have to be replaced.
2. Thoroughly rinse the main body section and release fitting shackle with fresh water. (For non-removable solid aluminum cap)
3. Inspect the cargo release visually for obvious damage. Use low pressure air if available to dry the unit. Minor leakage of the silicone fluid will be very difficult to detect at this point.

Note. The release fitting shackle assembly, part number 811-00324-1, NSN 4030-01-353-6217, may be procured through normal supply channels.

4. Reassemble the unit by inserting the release fitting shackle into the main body section and squeezing the spring loaded jaws together. Completely close the release assembly using hand pressure. If the release does not close fully and the ball locks cannot snap in place, then the unit should be subjected to the pre-drop inspection test.
5. To completely dry, hang or stand the assembled unit with the filter end (main body section) facing down to allow drainage of any water that may have accumulated behind the filter.
6. Any discrepancies found or suspected will be cause for rejection. Return the unit with a brief description of the problem and a point of contact to: Commander, Code 461100D, Naval Air Warfare Center Weapons Division, 1 Administration Circle, China Lake, CA 93555-6001. Do not return the unit to the manufacturer.

PARACHUTE RISERS ATTACHED TO THE PARACHUTE RELEASE

8-8. Lay the parachute release on top of the load with the bolt end of the parachute connectors toward the cargo parachutes. Bolt the parachute riser extensions to the parachute connectors of the M-1 or M-2 parachute releases as shown in Figures 8-12 through 8-15.

Note. Bolt the parachute riser extensions to the parachute connectors from rigger's right to left.

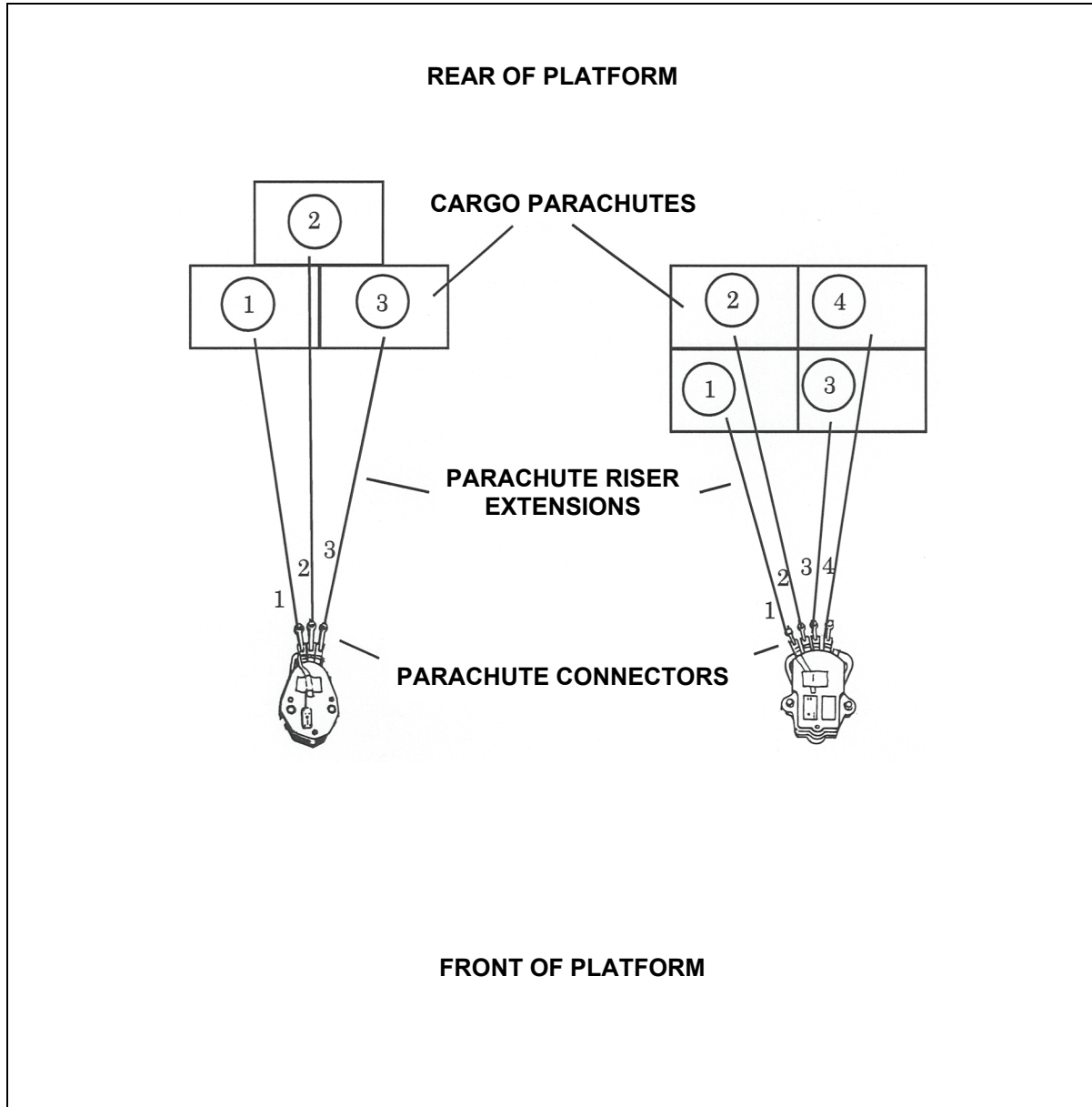


Figure 8-12. Three and Four Parachute Riser Extensions Attached to the Parachute

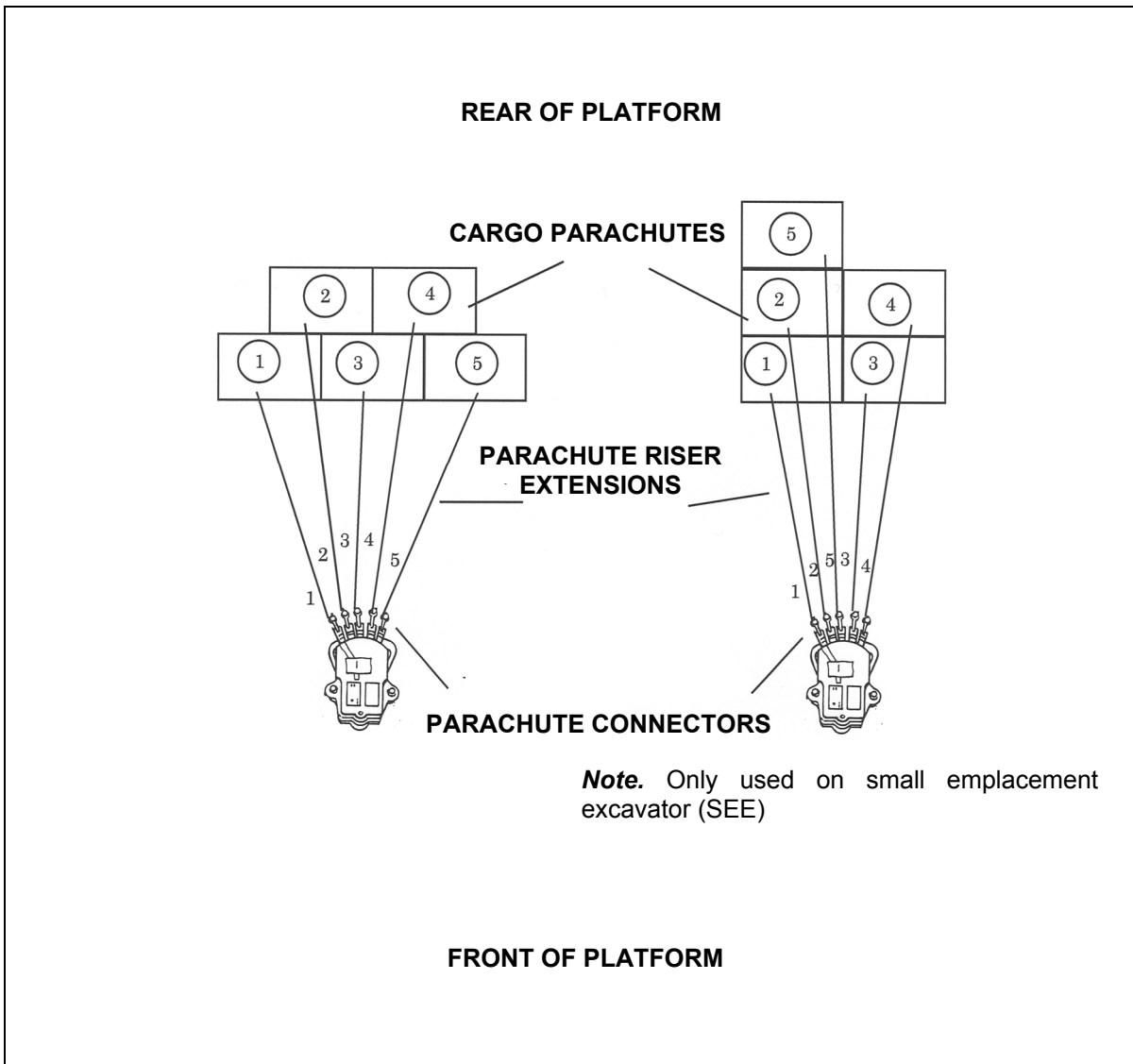


Figure 8-13. Five Parachute Riser Extensions Attached to the Parachute

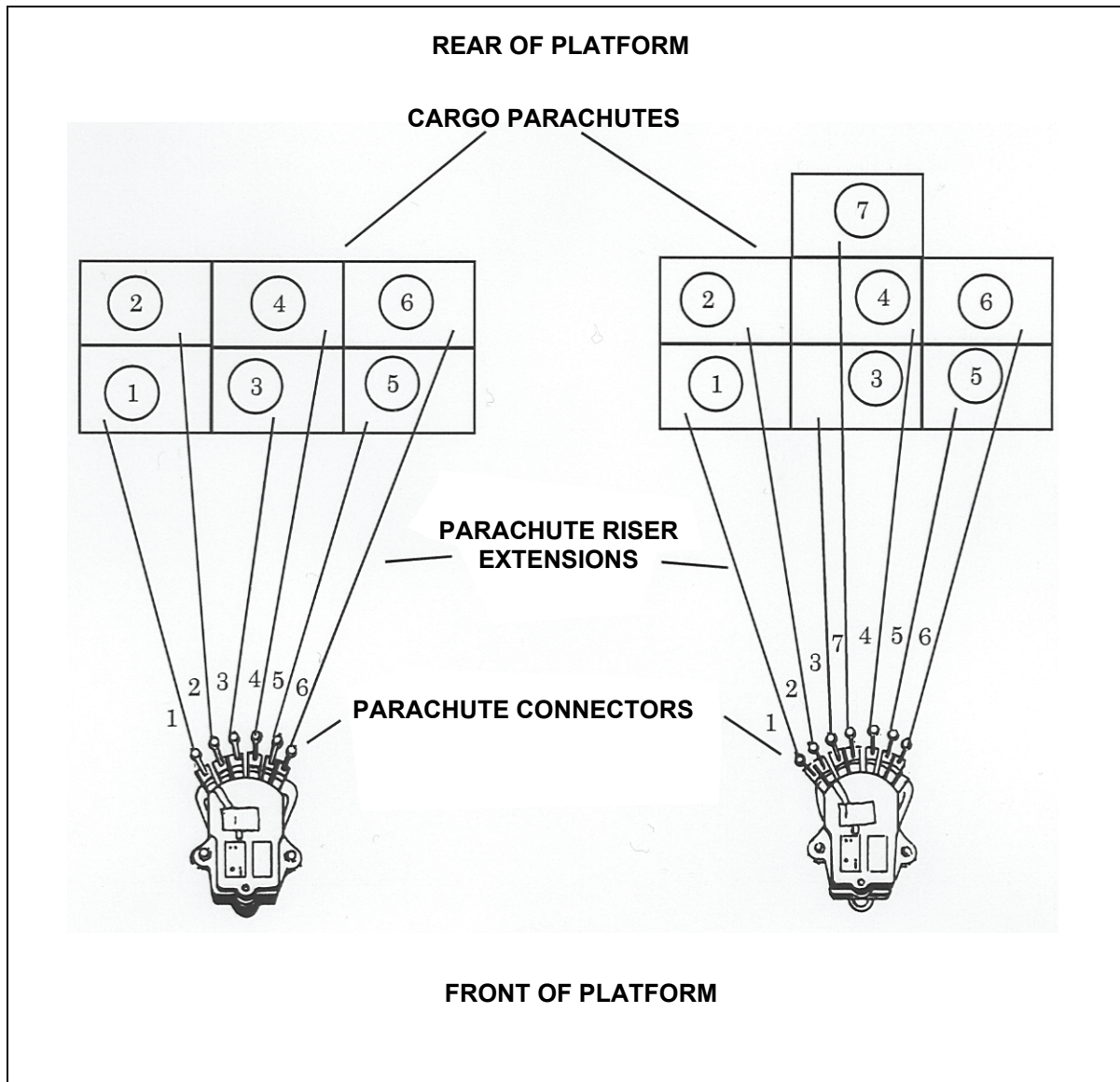


Figure 8-14. Six and Seven Parachute Riser Extensions Attached to the Parachute

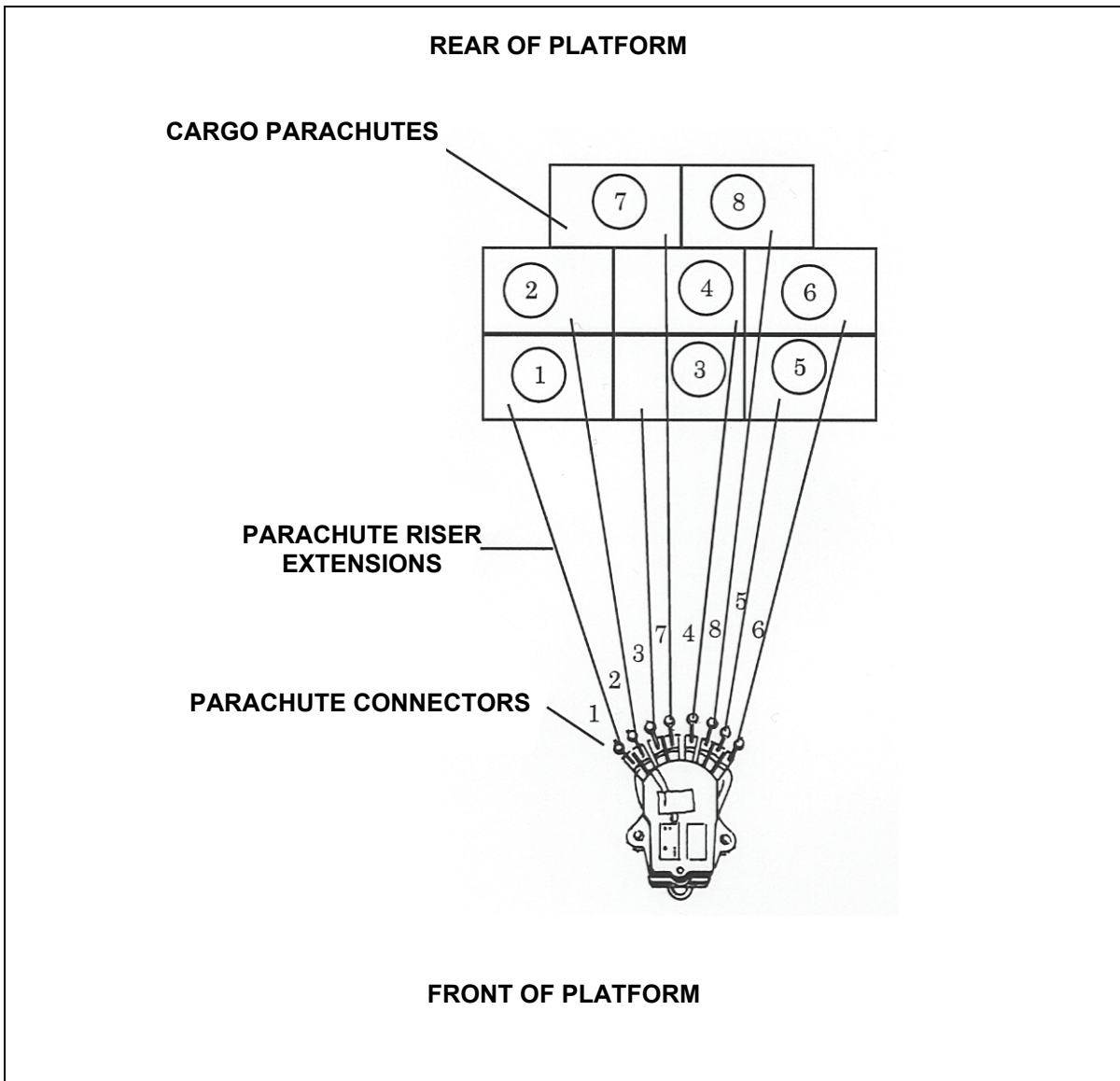


Figure 8-15. Eight Parachute Riser Extensions Attached to the Parachute

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Chapter 9

Drogue and Extraction Parachutes and Extraction Line

SECTION I-GENERAL INFORMATION

DROGUE PARACHUTES

9-1. A 15-foot cargo extraction parachute is used as a drogue parachute attached to a 1-loop, 60-foot type XXVI extraction line with a 3 3/4-inch link for the C-130J, MC-130, and the C-17 aircraft. The opposite end of the drogue line is connected to the jettison link of the extraction link assembly.

CARGO EXTRACTION PARACHUTES

9-2. A cargo extraction parachute is placed on every airdrop platform load to pull the load out of the aircraft. The extraction system is rigged up after the load is in the aircraft.

- **The 15-Foot Parachute.** This extraction parachute has a 15-foot-diameter, flat circular ring-slot nylon canopy. It is also used as a drogue parachute.
- **The 22-Foot Parachute.** This extraction parachute has a 22-foot-diameter, flat circular ring-slot nylon canopy.
- **The 28-Foot Parachute.** This extraction parachute has a 28-foot-diameter, flat circular, ring-slot nylon canopy.

INSPECTION, MAINTENANCE, AND PACKING

9-3. Cargo extraction parachutes are inspected, maintained, and packed as outlined in TM 10-1670/TO 13C5 series manuals. See the specific TM for more information on inspecting, maintaining, and packing these parachutes. The 22-foot extraction deployment bag modification procedures are located in TM 10-1670-286-20/TO 13C5-2-41.

REQUIREMENTS

9-4. Each rigging manual states the number and type of cargo extraction parachutes and the extraction line to be used on a particular load. However, when changes are made to an accompanying load or variations in rigging are made, the extraction parachute requirement must be determined. Use Table 9-1 as a guide for determining the cargo extraction parachute. Use Table 9-2 as a guide for determining extraction line requirements and the extraction parachutes link and tie requirements for the C-130 and C-17 aircraft.

Table 9-1. Extraction Parachute Requirements for C-130 Series and C-17 Aircraft

<i>Extraction Load Range</i>	<i>Cargo Extraction Parachute</i>
2,520-8,000	15-Foot
7,000-17,000	22-Foot
16,000-30,000	28-Foot
28,000-42,000	Two 28-Foot

Notes.

1. The maximum load that may be extracted over the ramp of a C-130 aircraft during airdrop is 25,000 pounds for aircraft with a serial number (tail number) of 62-1783 or lower and 42,000 pounds for aircraft with a tail number of 61-2358, 62-1784 and higher.
 2. When the extraction weight falls into the load range of two parachutes, the larger extraction parachute should be used.
 3. The minimum total rigged weight (includes the weight of the cargo parachutes) for loads to be airdropped from all aircraft is 2,520 pounds.
 4. MC-130 aircraft extracted load range shall not exceed 35,000 pounds.
-

Table 9-2. Extraction Line and Link and Tie Requirements for C-130 Series, and C-17 Aircraft

<i>Extraction Parachute</i>	<i>C-130</i>	<i>C-17</i>	<i>Link</i>	<i>Tie</i>
15-Foot	1-Loop 60-Foot	1 Loop 160 Foot	3 ¾-inch, two-point	1 turn single of type I, ¼-inch cotton webbing
22-Foot	3-Loop 60-Foot	3 Loop 140 Foot	3 ¾-inch, two-point	1 turn single of type I, ¼-inch cotton webbing
28-Foot	3-Loop 60-Foot	3 Loop 140 Foot	5 1/2-inch, two-point	1 turn double of type I, ¼-inch cotton webbing
Two 28-Foot	6-Loop 60-Foot	6 Loop 120 Foot	Four point	1 turn single of type III, nylon cord
Two 28-Foot	N/A	6 Loop 140 Foot Note 2	Four point	1 turn single of type III, nylon cord

Notes.

1. All extraction lines, (except for the C-17 drogue line) must be packed in an extraction line bag according to TM 10-1670-286-20/TO 13C5-2-41.
 2. A 120-foot extraction line may be used for loads placed no further forward than fuselage station 680 (C-17 only).
 3. All extraction lines are type XXVI nylon webbing.
-

EXTRACTION LINE PANEL

9-5. The extraction line panel, as shown in Figures 9-1 and 9-2, is used to store the extraction lines. Extraction line panels shown in Figure 9-3 are used to store the extraction lines when used in conjunction with towplate operations. Stow the different extraction lines in the extraction line bag according to TM 10-1670-286-20/TO 13C5-2-41.

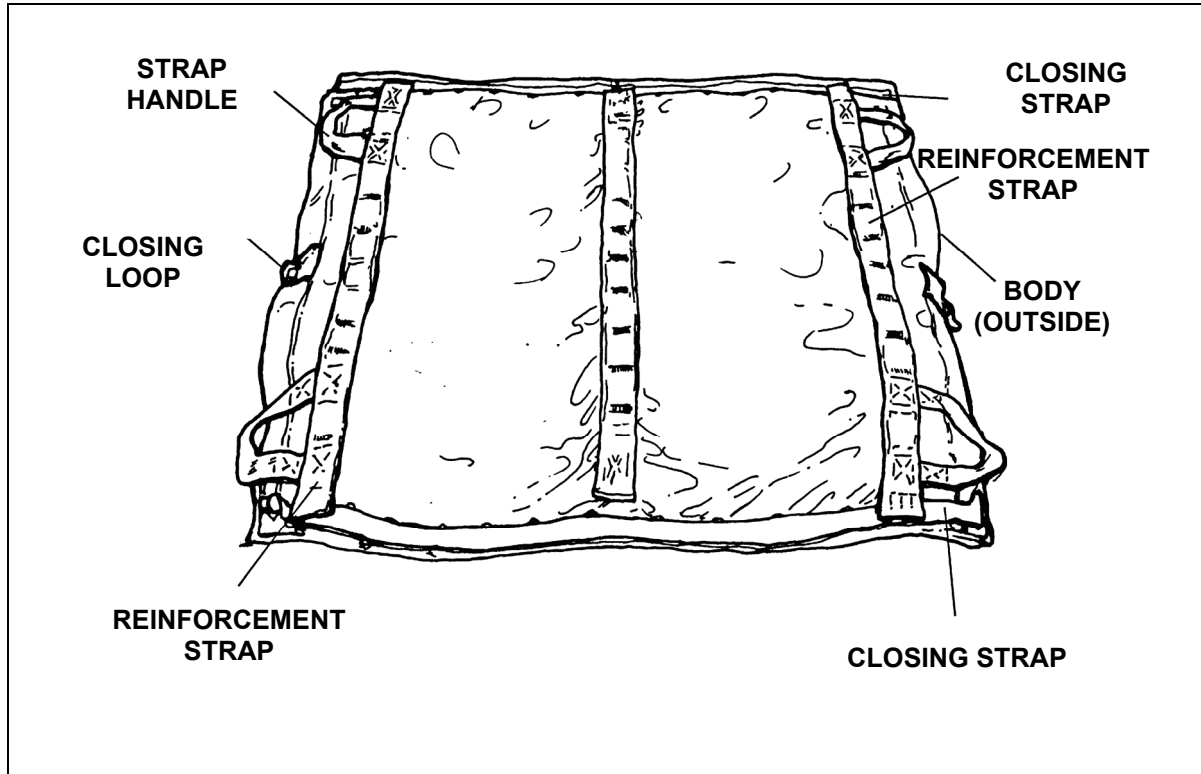


Figure 9-1. Outside View of Extraction Line Panel

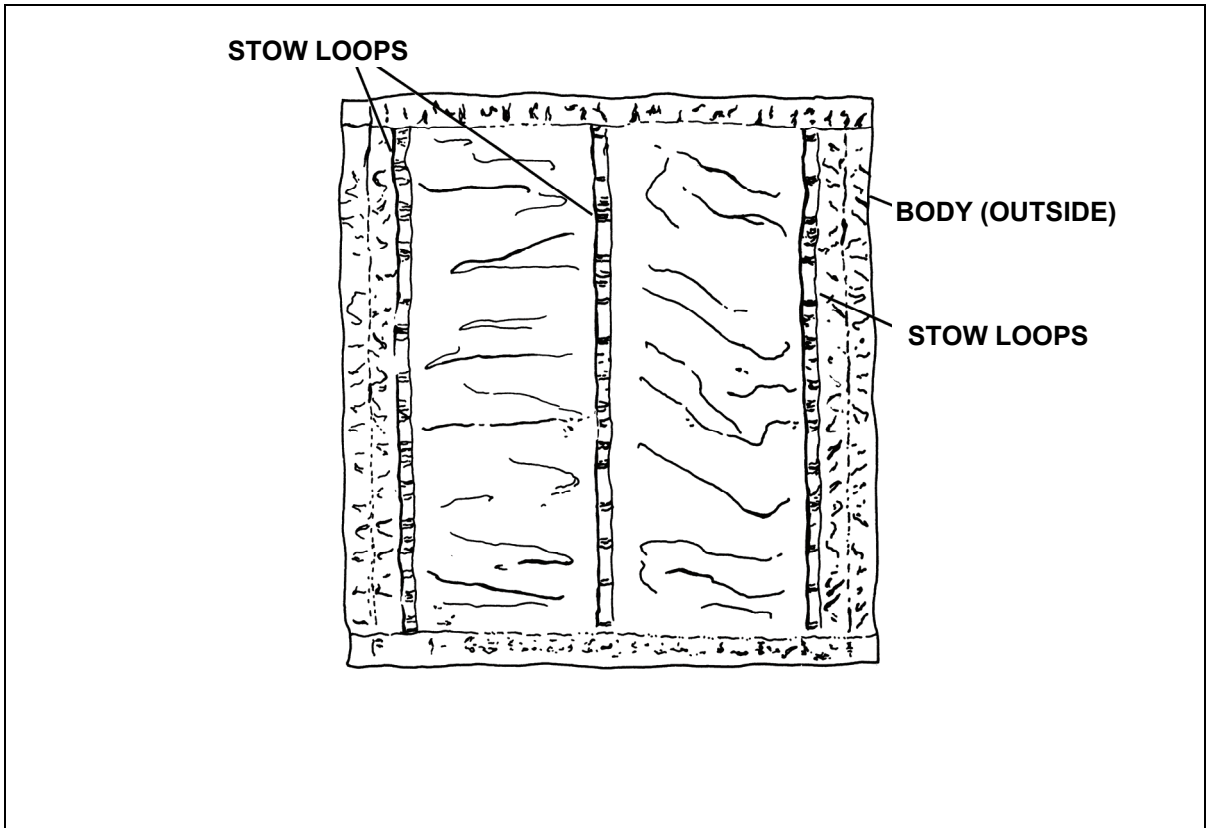


Figure 9-2. Inside View of Extraction Line Panel

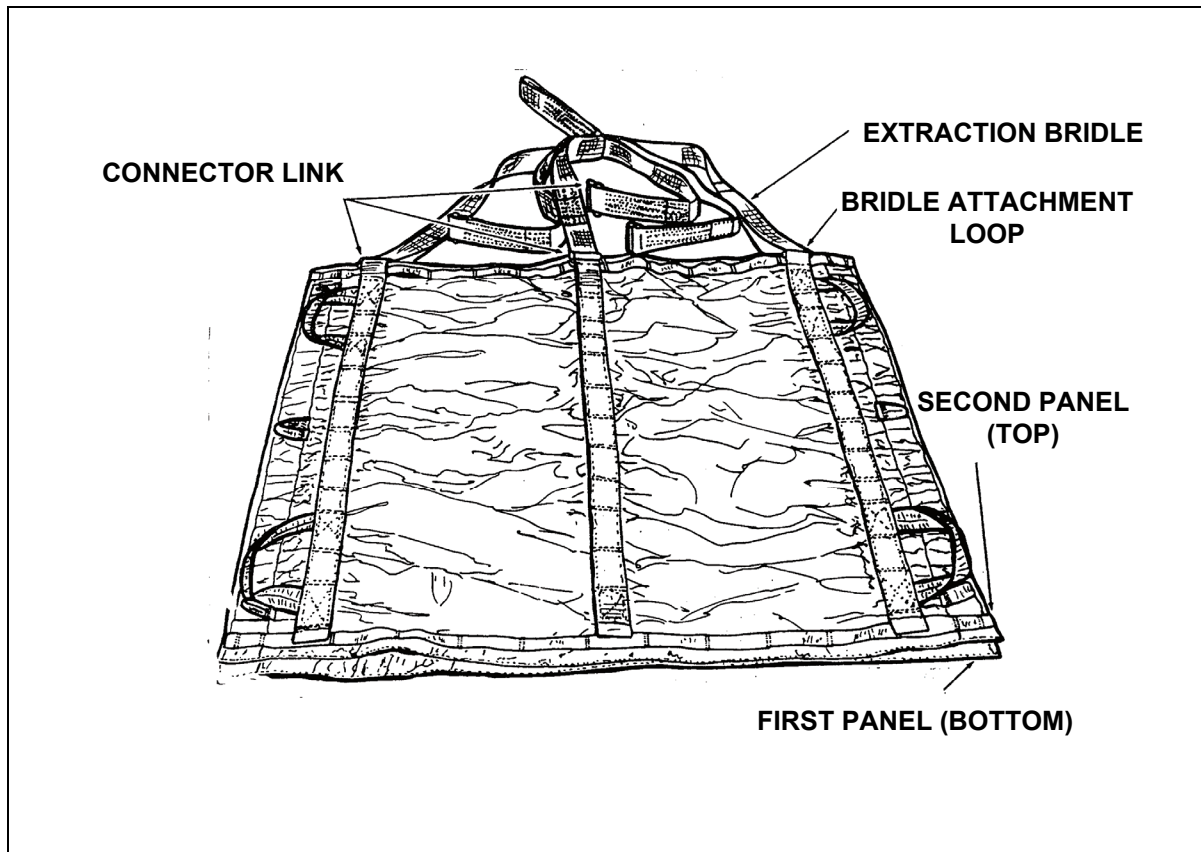


Figure 9-3. Extraction Line Panel for Tow Plate Operations

SECTION II-RIGGING INFORMATION

EXTRACTION LINES

9-6. The size and length of the extraction line used depends on the aircraft used and the size of the cargo extraction parachute rigged for the load.

CAUTION

All multi-loop lines must have 15 feet of each end of the line, taped at 1 foot intervals. The measurement should begin from the end of the line and the tape must be centered at each interval mark. Failure to comply may cause an extraction line ply to get caught under the aircraft roller and cause damage to the roller or extraction line.

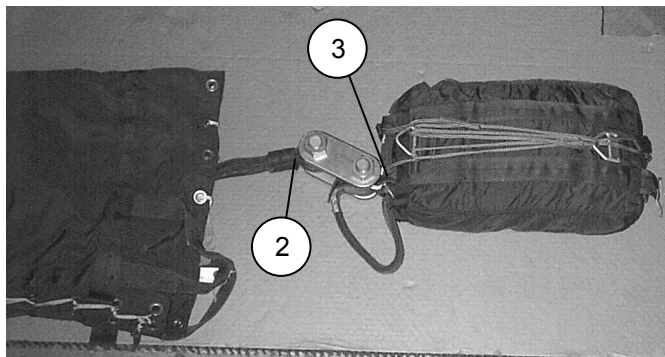
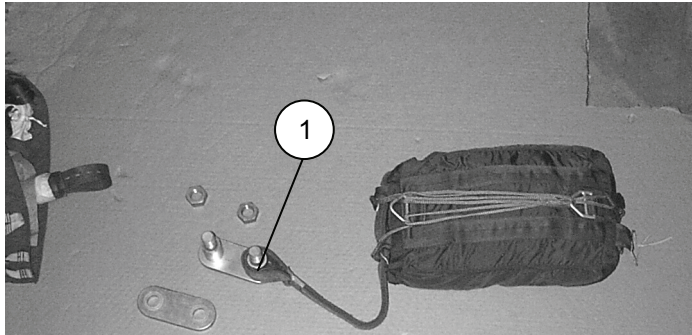
CAUTION

While attaching the extraction line to the cargo extraction parachute, ensure that the keepers on the extraction line and the adapter web are pushed tight against the link and are taped in place with cloth-backed tape. If a keeper is not present on the adapter web or extraction line, tape in place with cloth-backed tape.

C-130/MC-130 AIRCRAFT

9-7. The primary method of airdrop platform extractions uses a 60-foot extraction line attached to a cargo extraction parachute as detailed in the following paragraphs.

- **One 15-Foot Cargo Extraction Parachute.** Attach a 60-foot (1-loop), type XXVI nylon webbing extraction line as shown in Figure 9-4. Attach the adapter web of the 15-foot extraction parachute as shown in Figure 9-4.



- ① Fit the loop of the adapter web on the spacer of a 3 3/4-inch, 2-point link assembly.
- ② Fit the extraction line attaching loop to the other spacer on the link. Replace the side plate of the link assembly. Put the nuts on the bolts of the 2-point link. Use a wrench to tighten the nuts. Run a length of tape around the link and over each nut and bolt end. Tape the keeper and the adapter web in place with cloth backed tape. (Not shown)
- ③ Tie the 3 3/4-inch, 2-point link tightly against the parachute bag closing loops with one length of type I, 1/4-inch cotton webbing. Run the webbing through the top and bottom closing loops on the right side of the bag. Tie the ends of the webbing together with a surgeon's knot and a locking knot.

Figure 9-4. Extraction Line Attached to 15-foot Extraction Line

- **One 22-Foot Cargo Extraction Parachute.** The 22-foot cargo extraction parachute uses a 60-foot (3-loop), type XXVI nylon webbing extraction line. Using a 3 3/4-inch, 2-point link assembly, attach the line to the parachute by adapting the procedures shown in Figure 9-5.
- **One 28-Foot Cargo Extraction Parachute.** The 28-foot, cargo extraction parachute uses a 60-foot (3-loop), type XXVI nylon webbing extraction line. Using a 5 1/2-inch, 2-point link assembly, attach the line to the parachute by adapting the procedures shown in Figure 9-5.

Note. See Table 9-2 to determine the proper link assembly (3 3/4- or 5 1/2-inch) to use.

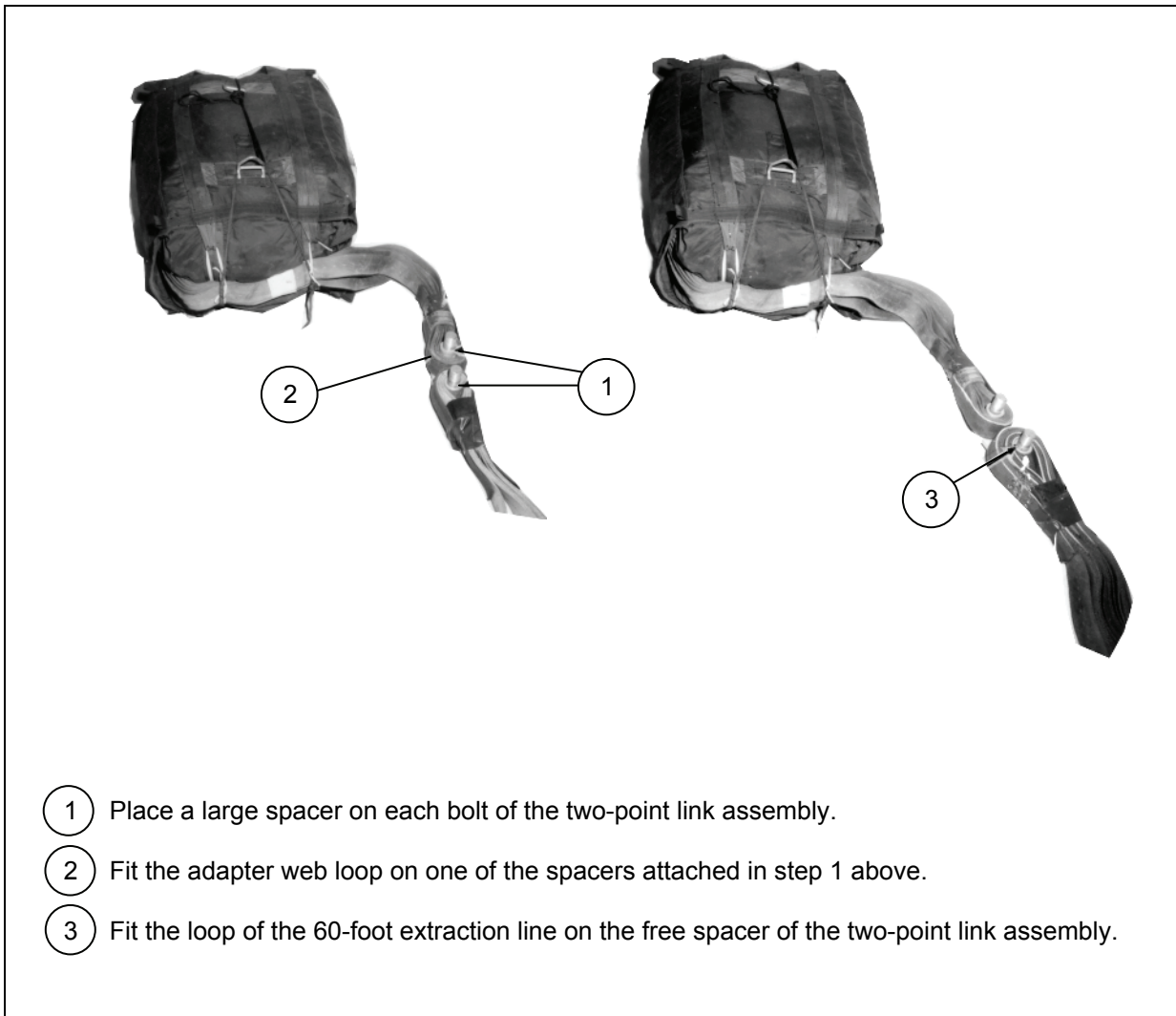
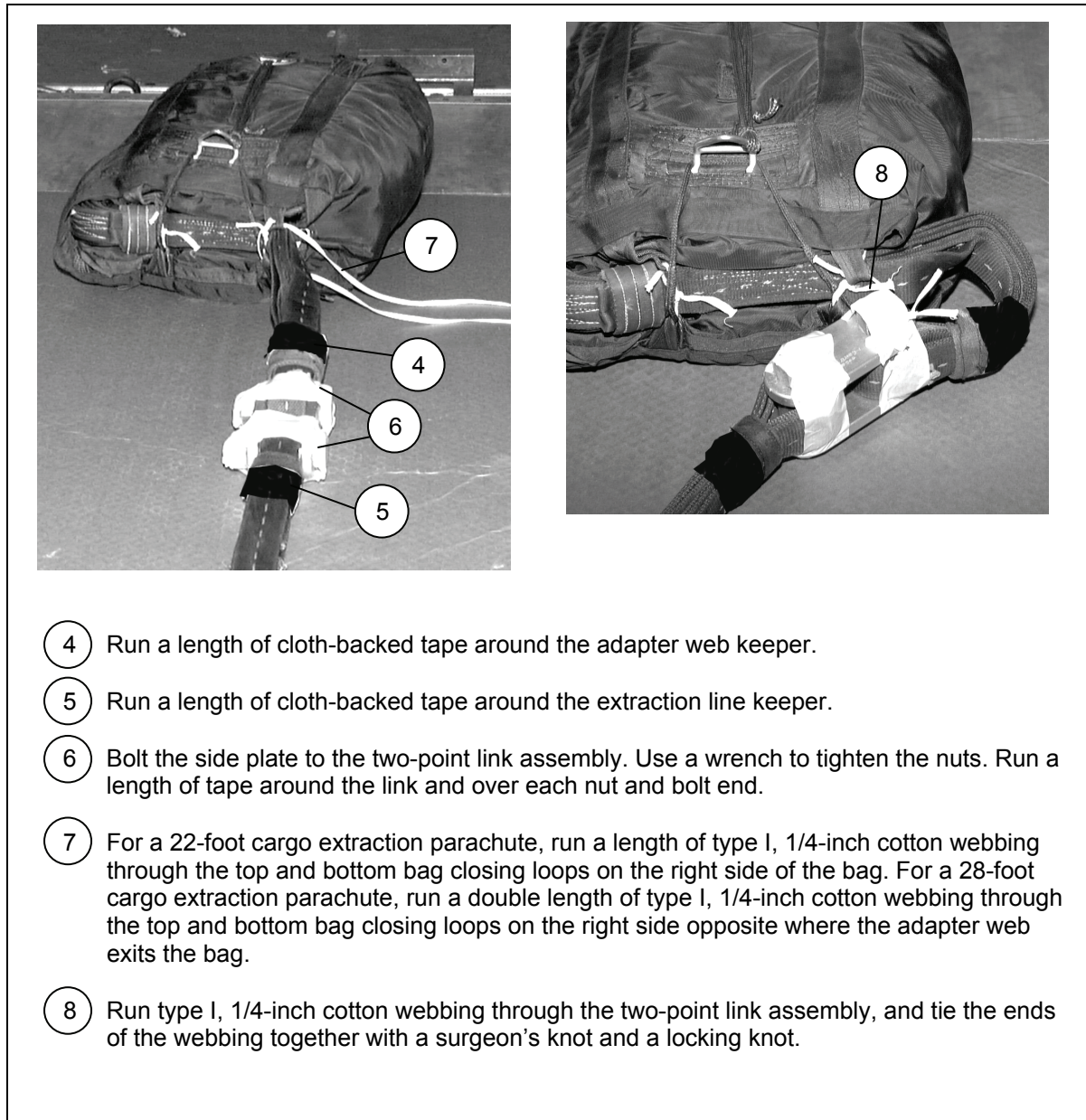


Figure 9-5. Extraction Line Attached to 22- or 28-Foot Cargo Extraction Parachute with a 3 3/4- or 5 1/2-Inch, Two-Point Link Assembly



- 4 Run a length of cloth-backed tape around the adapter web keeper.
- 5 Run a length of cloth-backed tape around the extraction line keeper.
- 6 Bolt the side plate to the two-point link assembly. Use a wrench to tighten the nuts. Run a length of tape around the link and over each nut and bolt end.
- 7 For a 22-foot cargo extraction parachute, run a length of type I, 1/4-inch cotton webbing through the top and bottom bag closing loops on the right side of the bag. For a 28-foot cargo extraction parachute, run a double length of type I, 1/4-inch cotton webbing through the top and bottom bag closing loops on the right side opposite where the adapter web exits the bag.
- 8 Run type I, 1/4-inch cotton webbing through the two-point link assembly, and tie the ends of the webbing together with a surgeon's knot and a locking knot.

Figure 9-5. Extraction Line Attached to 22- or 28-Foot Cargo Extraction Parachute with a 3 3/4- or 5 1/2-Inch, Two-Point Link Assembly (Continued)

- **Two 28-Foot Cargo Extraction Parachutes.** A cluster of two 28-foot cargo extraction parachutes as shown in Figure 9-6, is attached to one end of a 60-foot (6-loop), type XXVI nylon webbing line. The other end of the line is attached to the four-point link assembly of the parachute cluster after the cluster has been installed in the aircraft.

EXTRACTION PARACHUTE CLUSTERS

9-8. Cluster two 28-foot cargo extraction parachutes for an initial extraction as shown in Figure 9-6 and for a sequential extraction as shown in Figure 9-7.

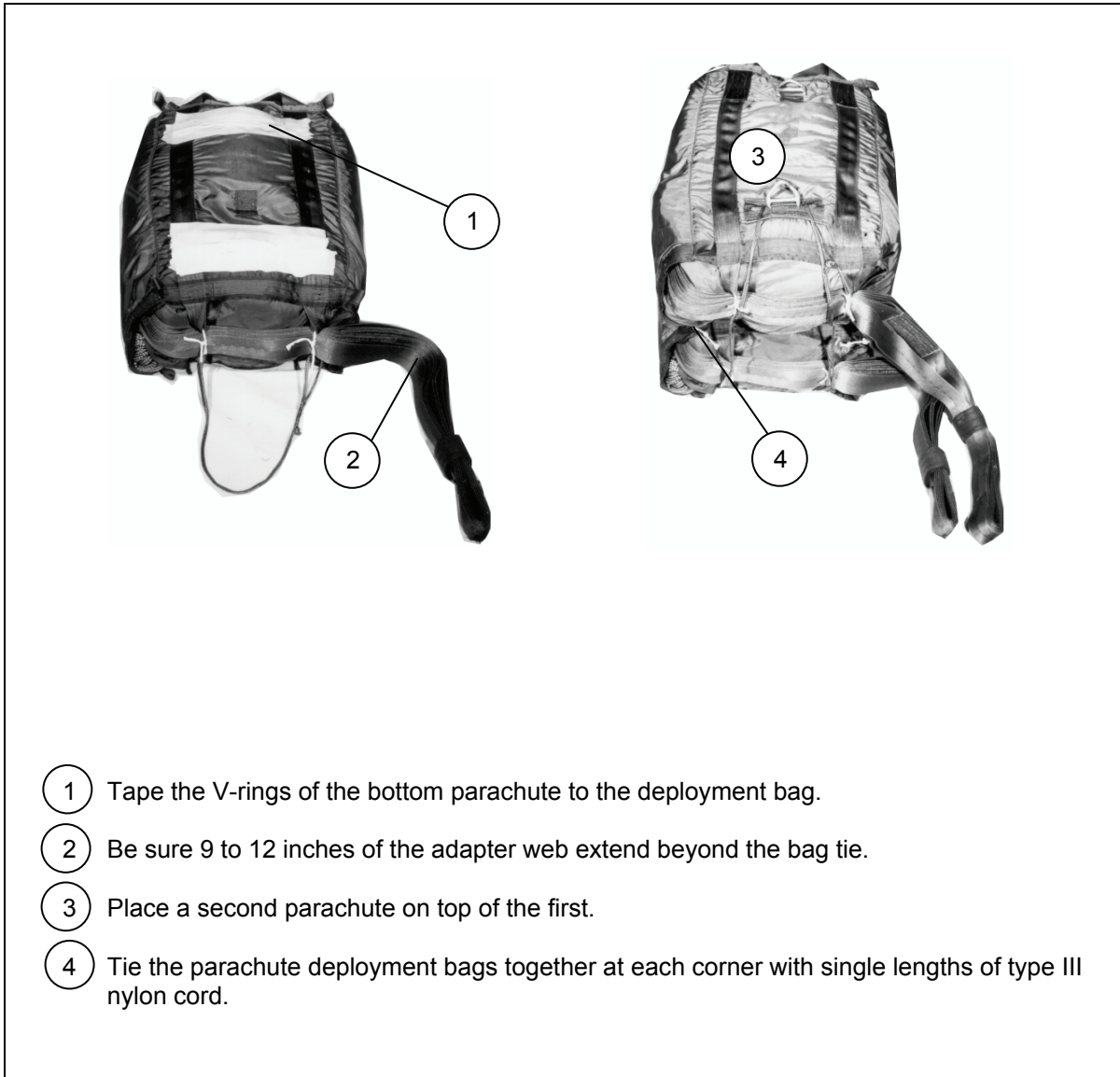


Figure 9-6. Clustering Extraction Parachutes Clustered for an Initial Extraction from C-130 Aircraft

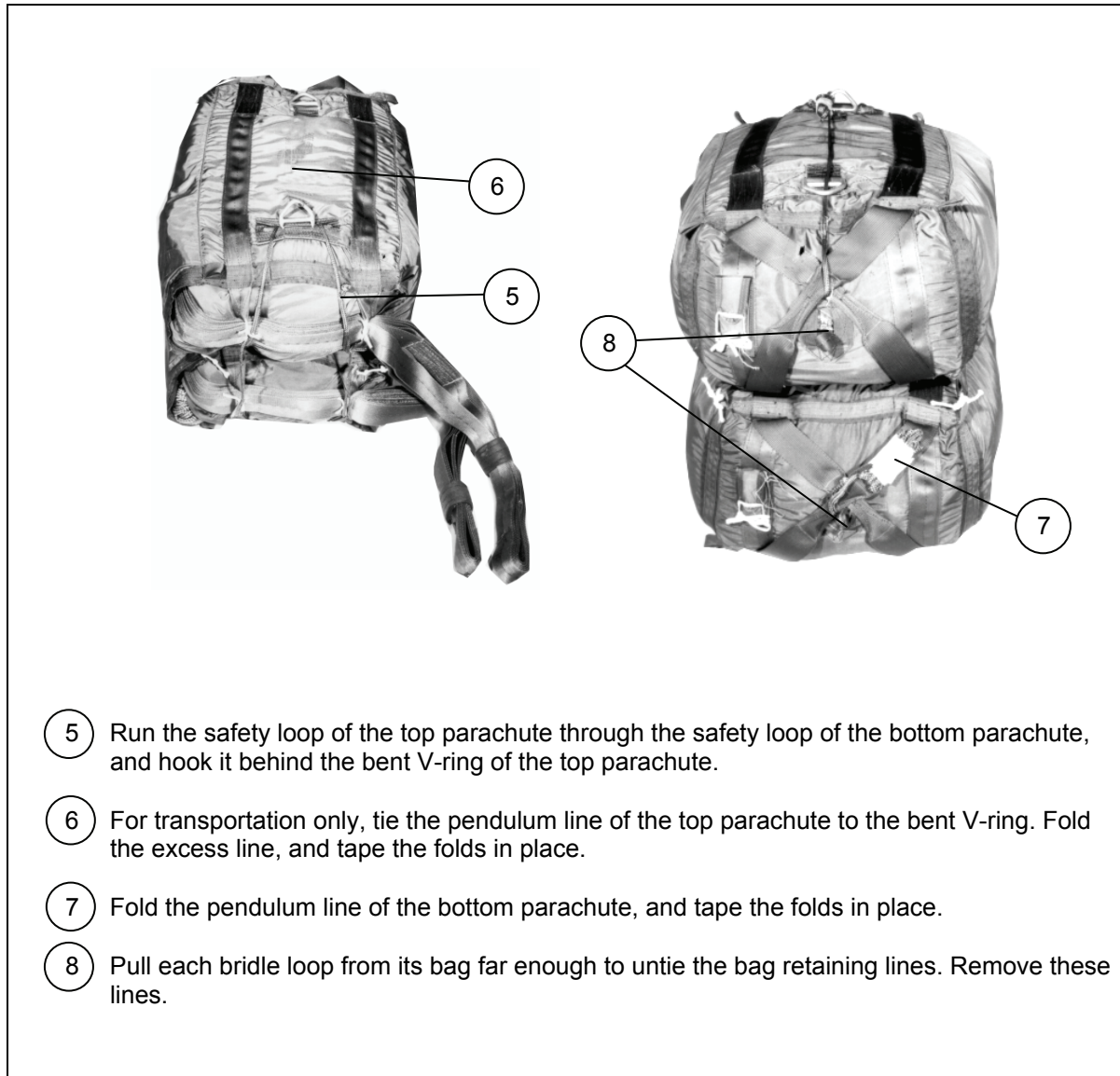
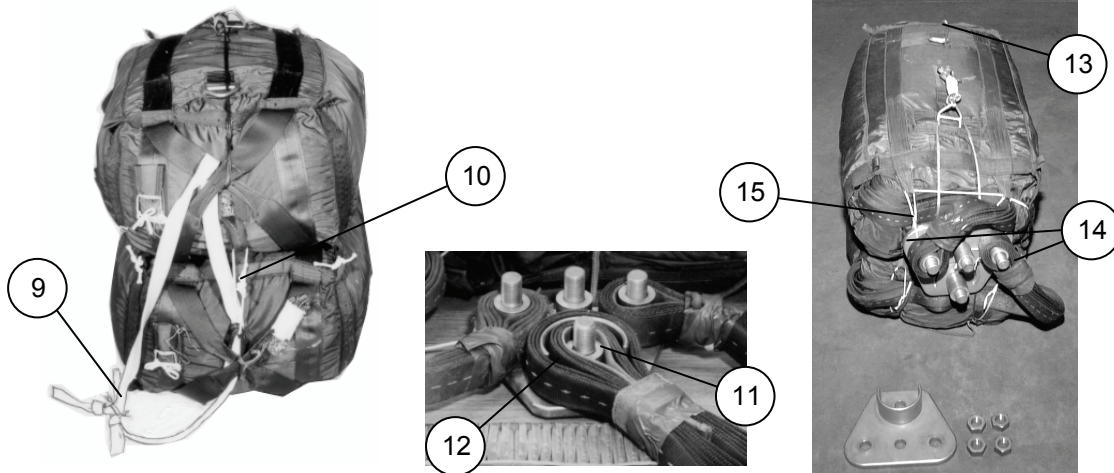


Figure 9-6. Clustering Extraction Parachutes Clustered for an Initial Extraction from C-130 Aircraft (Continued)

CAUTION

Be sure the bag retaining tie does not pass through the bridle loop of the top parachute.



- 9 Use a 103-inch length of 1-inch tubular nylon webbing for the bag retaining tie. Run the tie through the bag retaining straps of the bottom parachute, through the bridle loop, and up through the bag retaining straps of the top parachute. Tie the ends of the retaining tie together with a surgeon's knot, a locking knot, and an overhand knot in each running end.
- 10 Tie the bridle loops together with one length of type III nylon cord to form a break cord.
- 11 Place a cotton buffer on the bottom pin of the four-point link assembly.
- 12 Place the free end of the extraction line on the bottom pin and the separator. Divide the plies between the pin and the separator.
- 13 Fold the bag retaining tie, and tape the folds in place.
- 14 Place the top adapter web on the left pin. Place the adapter web of the bottom parachute on the right pin and replace the link cover. Push the keepers against the pins, and tape the keepers in place with cloth-backed tape.
- 15 Tie the link assembly to the upper bag closing loops of the top parachute with one length of type III nylon cord. Make sure the cord passes through the link assembly and under the top pins.

Figure 9-6. Clustering Extraction Parachutes Clustered for an Initial Extraction from C-130 Aircraft (Continued)



Figure 9-7. Clustering Extraction Parachutes for a Sequential Extraction

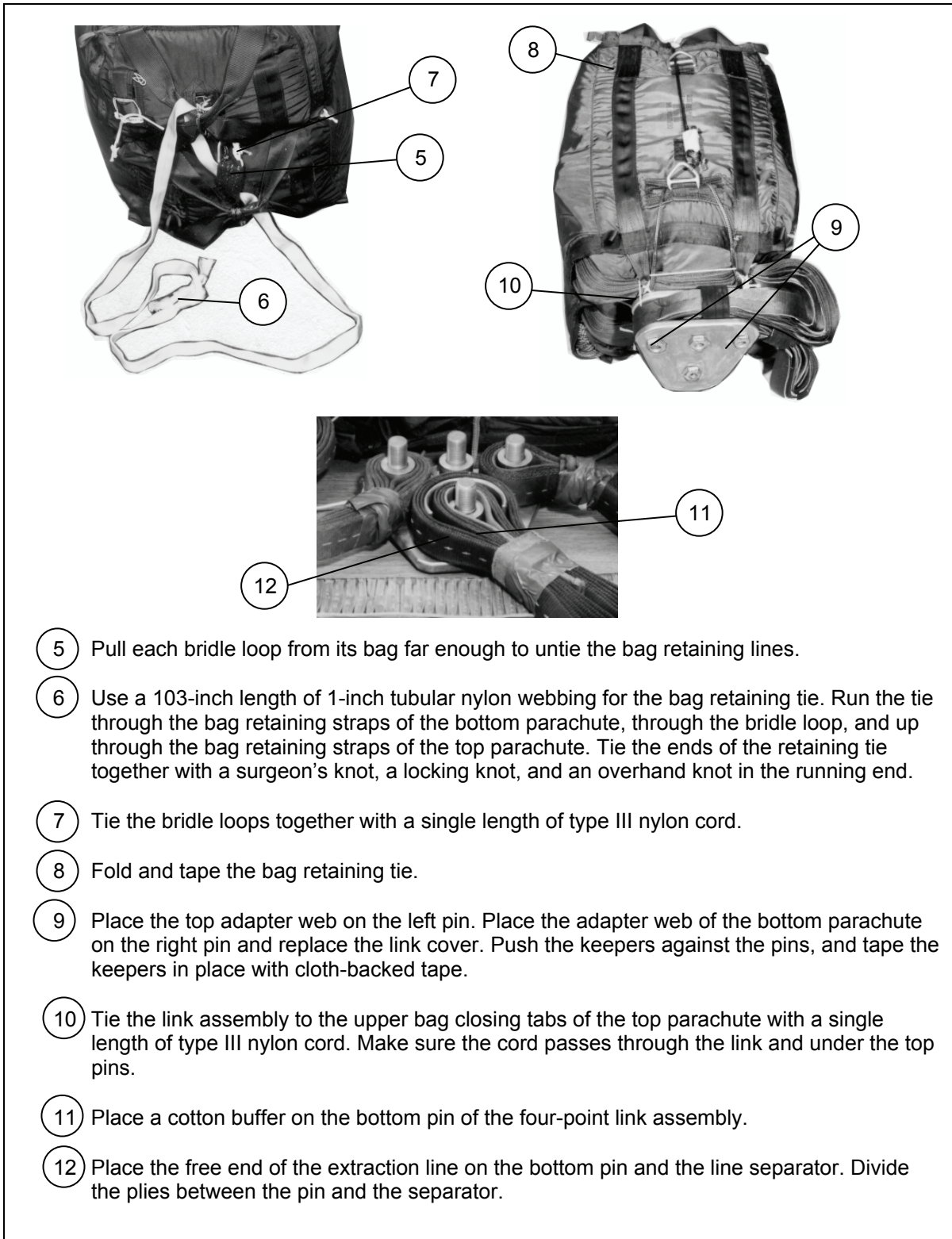


Figure 9-7. Clustering Extraction Parachutes for a Sequential Extraction (Continued)

C-17 AIRCRAFT

9-9. Low velocity loads rigged for aerial delivery from the C-17 aircraft require an extraction line based on the size of the extraction parachute. All extraction lines used on loads rigged for the C-17 aircraft must be continuous, type XXVI nylon webbing. In addition to the extraction line and extraction parachute, the C-17 requires a 15-foot drogue parachute and a 60-foot (1-loop) drogue line. The drogue line is not required to be packed in a sling/extraction line bag. The C-17 utilizes a tow release mechanism which connects the drogue line to the extraction parachute(s) and extraction line bag. All extraction lines must be packed in a sling/extraction line bag. The C-17 can accommodate a single platform weight of up to 60,000 pounds with a total airdrop load weight of 100,000 pounds. The C-17 can accommodate up to 64 feet of type V airdrop platforms.

- **One 15-Foot Cargo Extraction Parachute.** Attach a continuous 160-foot (1-loop), type XXVI nylon extraction line rigged in accordance with TM 10-1670-286-20/TO 13C5-2-41. Due to the use of the tow release mechanism, the rigging procedures are very detailed and should be followed exactly.
- **One 22-Foot Cargo Extraction Parachute.** The 22-foot cargo extraction parachute needs a continuous 140-foot (3-loop), type XXVI nylon webbing extraction line rigged in accordance with TM 10-1670-286-20/TO 13C5-2-41.
- **One 28-Foot Cargo Extraction Parachute.** The 28-foot cargo extraction parachute needs a continuous 140-foot (3-loop), type XXVI nylon webbing extraction line rigged in accordance with TM 10-1670-286-20/TO 13C5-2-41.
- **Two 28-Foot Cargo Extraction Parachutes.** For a cluster of two 28-foot cargo extraction parachutes, the extraction line requirements can change based on where the platform is located in the aircraft. Normally the 140-foot (6-loop), type XXVI nylon webbing extraction line is utilized. If the platform's aft edge is located aft of FS 680 the 120-foot (6-loop), type XXVI nylon webbing extraction line rigged in accordance with TM 10-1670-286-20/TO 13C5-2-41 may be used.

C-17 AIRCRAFT SEQUENTIAL PLATFORM EXTRACTION SYSTEM RIGGING

9-10. The typical installation of an extraction parachute and extraction line bag for sequential airdrop is shown in Figure 9-8.

Note: The aircraft loadmaster is responsible for rigging the sequential extraction system in the aircraft.

CAUTION

Failure to correctly position the extraction parachute(s) and extraction line bag could result in non-deployment of the parachutes.

Note: The following procedures are taken directly from TO 1C-17A-9. If there are any differences between the following procedures and TO 1C-17A-9, the TO 1C-17A-9 takes precedence.

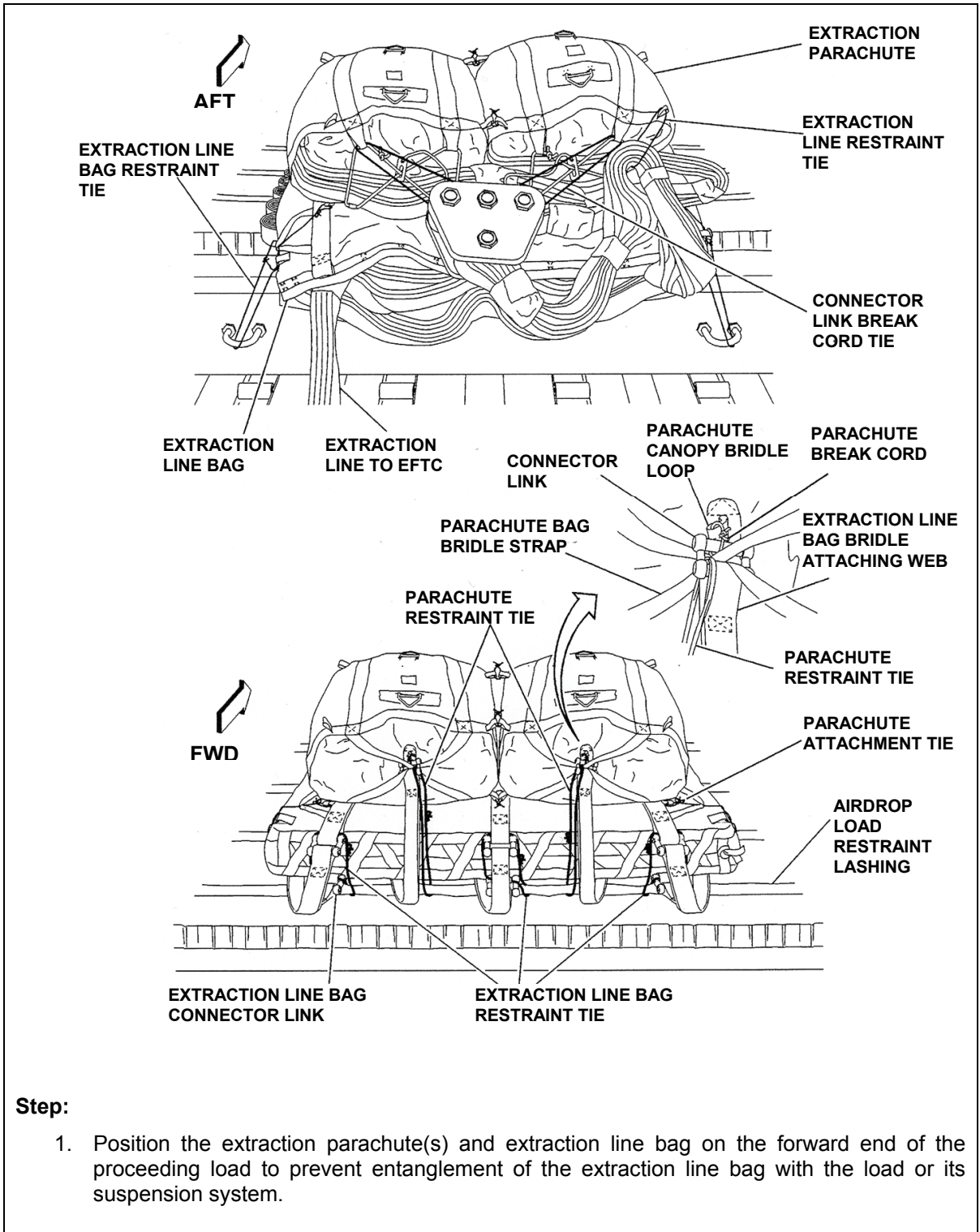


Figure 9-8. Typical Extraction Parachute and Extraction Line Bag for Sequential Airdrop Installed

CAUTION

1. Failure to correctly route ties could result in non-deployment of the parachutes.
2. If the load attaching end of the extraction line bag contacts the aircraft floor during extraction, damage to the extraction line bag may result.

Step:

2. Secure the extraction line bag to the load. Fold the extraction line bag bridle under the extraction line bag before securing. Install three one turn single 1/2-inch tubular nylon webbing restraint ties through the top and bottom extraction line bag panel connector links and to convenient points on the load. Ties are routed on the load to prevent shifting of the extraction system and secured using a trucker's hitch with three alternating half-hitches and an overhand knot in the running ends for each restraint tie.

CAUTION

The connector link(s) shall not be routed through the parachute canopy bridle loop. Failure to comply could result in non-deployment of the parachute(s).

3. Secure each extraction parachute(s) to the load. Route one turn double 1/2-inch tubular nylon webbing restraint tie through the connector link(s), around the bag bridle strap(s), and to a convenient point on the load. Secure with a trucker's hitch, three alternating half-hitches, and an overhand knot in the running ends.
4. Use the carrying handle to secure the extraction line bag to the load. Route one turn double Type I, 1/4-inch cotton webbing restraint ties through the top and bottom carrying handles on each corner of the load attaching end of the extraction line bag to a convenient point on the load.

CAUTION

Link break cord ties for sequential airdrop must be of correct size. Failure to comply could result in non-deployment of the parachute(s).

Figure 9-8. Typical Extraction Parachute and Extraction Line Bag for Sequential Airdrop Installed (Continued)

5. Ensure link break cord ties are correct.
 - For 15-foot extraction parachutes, remove 1/2-inch tubular nylon webbing link break cord ties and replace with type III nylon cord.
 - For three 28-foot extraction parachutes, remove 9/16-inch tubular nylon webbing link break cord ties and replace with 1/2-inch tubular nylon webbing.
6. Prepare extraction line by removing temporary handling and transport ties.

Note: The extraction line is stowed in the extraction line bag with Type I, 1/4-inch cotton webbing restraint ties. It may be necessary to cut a number of restraint ties to obtain a sufficient length of extraction line to reach the EFTC. For in-flight rigging, the restraint ties should be cut on the ground.

7. Pull the required length of extraction line from the load attaching end of the extraction line bag for attachment to the EFTC.
8. Repeat steps 1 through 7 for additional platforms.

Figure 9-8. Typical Extraction Parachute and Extraction Line Bag for Sequential Airdrop Installed (Continued)

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Chapter 10

Transportation of Rigged Loads

SECTION I-GENERAL INFORMATION

RESPONSIBILITIES

10-1. The using unit is responsible for coordinating transportation of the rigged load from the rigging site to the aircraft. To prevent damage, loads must be lashed to the transporting vehicle and protected during transport. The transporting force must ensure that the off-loading equipment is compatible with the aircraft to be used.

TYPICAL LOADING AND TRANSPORTING EQUIPMENT

10-2. Some of the equipment that may be used to load and transport rigged loads is listed below.

- **Materials Handling Equipment.** If a loading ramp is not available to use in loading the rigged load onto the transporting vehicle, the load is hoisted aboard the vehicle. The materials-handling equipment used to hoist the loads may include but not limited to the 5-ton wrecker, the 10,000- or 15,000-pound-capacity warehouse crane, or 5,000 pound through 15,000-pound-capacity forklift trucks.
- **Transporting Vehicle.** Any standard military truck or semi-trailer with sufficient cargo space and payload capacity can be modified to transport a rigged load from the loading area to the cargo aircraft. However, not all military trucks are compatible with the cargo-loading system of all types of cargo aircraft now in use. Rigged platform loads require straight-in loading over a horizontally positioned ramp from a truck, a forklift, a flatbed, or a cargo loader. Consequently, this may require transfer of the rigged load at the aircraft site before it is off-loaded into the cargo aircraft. The following types of materials-handling equipment can be used to transport and/or off-load platform loads:
 - The 6- or 10-ton cargo semi-trailer can transport loads rigged on airdrop platforms.
 - The 25,000-pound-capacity cargo loader can move the maximum weight of 25,000 pounds up a 3-percent incline at 15 miles per hour. It can be used for loading all aircraft.
 - The 40,000-pound-capacity cargo loader can move the maximum weight of 40,000 pounds up a 3-percent incline at 15 miles per hour.
 - The 60,000-pound-capacity cargo loader (the Tunner) can move the maximum weight of 60,000 pounds up a 3-percent incline at 15 miles per hour.
 - The model M172 (lowboy) semi-trailer can load a C-130 aircraft. Any similar vehicle can be used if its loading floor meets the cargo floor heights of the aircraft. For C-130 aircraft, this is 39 to 42 inches.

SECTION II-RIGGING INFORMATION

MARKING RIGGED LOAD

10-3. Each rigged load must have a data tag prepared for it, and some rigged loads may require a Shipper's Declaration for Dangerous Goods. The center of balance must also be clearly marked on both sides of the platform.

- **Data Tag.** A data tag is prepared and secured to each platform load near the extraction system. Entries on the tag are used in making inspections and in finding causes for malfunctions. The entries are also used to help the loadmaster determine where to place the load in the aircraft. Use a ballpoint pen or other waterproof marking device to record the following information on the tag:
 - Total rigged weight.
 - Height, including parachutes.
 - Overall length.
 - Overhang (specify front, rear, or side of load).
 - Longitudinal center of balance (measured from the front edge of the platform).
 - Type and size of extraction system.
- **Shipper's Declaration of Dangerous Goods.** This form is prepared and secured on each load that has any type of hazardous material such as fuel, ammunition, or a battery.
- **Center of Balance.** In addition to being included on the data tag, the longitudinal center of balance must also be marked on the platform. The vertical line of the symbol CB is placed at the center of balance on both sides of the platform.

TYPES OF INSPECTION

10-4. The types of inspections performed on a rigged load are the final rigger inspection, the before-loading inspection, and the after-loading inspection as required by FM 4-20.102/MCRP 4-11.3J/NAVSEA SS400-AB-MMO-010/TO 13C7-1-5 and AR 59-4/OPNAVINST 4463.24C/AFJ 13-210(I)/MCO 13480.1B. All rigged low-velocity loads must be inspected at prescribed intervals to make sure that the loads and the equipment used on the loads are assembled and installed to meet the criteria outlined in the specific rigging manual.

- **Final Rigger Inspection (Shop Final).** After the load has been completely rigged, a certified Transported Force Rigger Inspector performs the final rigger inspection. This inspection is accomplished before the rigged load leaves the rigging site to make sure it is rigged according to the specific field manual/technical order for that particular load. This inspection should be conducted by an inspector other than the rigger supervising the installation of parachutes and extraction system. It is not necessary to use the DD Form 1748 (Joint Airdrop Inspection Record [Platforms])-series inspection forms for this inspection.
- **Before-Loading Inspection.** A before-loading inspection must be performed on a rigged load before it is loaded into the aircraft. This inspection is conducted jointly by a certified Transported Force Rigger Joint Airdrop Inspector and a certified Air Force Joint Airdrop Inspector. The inspectors use the proper joint airdrop inspection record, and both sign the appropriate blocks to certify correct rigging of the load. When the rigged load is delivered to the aircraft, the aircraft loadmaster checks the inspection form for completion and necessary signatures before accepting the load.
- **After Loading Inspection.** After the loadmaster completes the loading and in-aircraft rigging, the after-loading inspection is performed. This inspection is conducted jointly by a certified Transported Force Rigger Joint Airdrop Inspector and a certified Air Force Joint Airdrop Inspector, and the aircrew loadmaster. After the inspection is completed, the three inspectors certify, by signing the form, that the load is ready to airdrop.

EMERGENCY AFT RESTRAINT REQUIREMENTS FOR PLATFORM-EXTRACTED LOADS RIGGED ON A TYPE V PLATFORM

10-5. Use Table 10-1 as a guide for determining the emergency aft restraint requirements for platform-extracted loads rigged on a type V platform.

Table 10-1. Emergency Aft Restraint Requirements for Platform-Extracted Loads Rigged on a Type V Platform for Airdrop from a C-130 Series Aircraft

<i>Cargo Extraction Parachute</i>	<i>Chains Required</i>	<i>Attachment Provision</i>
15-foot	Two 10,000-pound. One chain to each clevis	Two medium suspension clevises. One clevis is attached to the top emergency aft restraint provision hole of each tandem link.
22-foot	Four 10,000-pound. One chain to each clevis.	Four medium suspension clevises. Two clevises are attached to the top two emergency aft restraint provision holes of each tandem link.
One 28-foot	Six 10,000-pound. One chain to each clevis.	Six medium suspension clevises. Two clevises are attached to the top two emergency aft restraint provision holes of each tandem link. The third clevis is attached to the front tandem link hole.
*Two 28-foot	Two 10,000-pound. One chain to each clevis.	Two medium suspension clevises. One clevis is attached to the top emergency aft restraint provision hole of each tandem link.

WARNING

***This emergency aft restraint is used only to secure a loose platform in the aircraft if the right hand locks release prior to green light. Do not attempt to restrain two 28-foot extraction parachutes deployed outside the aircraft.**

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Glossary

ACB	attitude control bar
ACL	allowable cabin load
ACPR	automatic cargo parachute release
AD	airdrop
AFB	Air Force base
AFMAN(I)	Air Force Joint Manual
AFR	Air Force regulation
AFTO	Air Force Technical Order
AGL	above ground level
ALC	Airlift Logistics Center
AR	Army Regulation
AWADS	Adverse Weather Aerial Delivery System
CB	center of balance
DA	Department of the Army
DC	District of Columbia
DD Form	Department of Defense Form
DES	drogue extraction system
dia	diameter
EFTC	extraction force transfer coupling
EPJD	extraction parachute jettison device
EPJS	extraction parachute jettison system
fs	fuselage station
FM	field manual
ft	foot/feet
HMMWV	high mobility multipurpose wheeled vehicle
HQ	headquarters
in	inch
lb	pound
MAJCOM	Major Command
MCRP	Marine Corps Reference Publication
mm	millimeter
NAVSEA	Naval Sea Systems Command
NSN	national stock number
OVE	on-vehicular equipment
PIN	part identification number
PIP	push in, pull out
SEE	small emplacement excavator
ROWPU	Reverse Osmosis Water Purification Unit
TM	technical manual
TO	technical order
TRADOC	US Army Training and Doctrine Command
USAF	United States Air Force
US	United States
wt	weight

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FM 4-20.102
MCRP 4-11.3J
NAVSEA SS400-AB-MMO-010
TO 13C7-1-5
8 JUNE 2006

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