Chapter 2

Rigging Information

SECTION I - DUAL ROW AIRDROP SYSTEM PLATFORM

USE

2-1. The DRAS 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 DRAS platform is used for low-velocity airdrop. The DRAS platform is 18 feet long. The assembled platform is 88 inches wide. A detailed description of this platform is in TM 10-1670-268-20&P/TO 13C7-52-22. The DRAS platform spreads the shock of ground impact. The outrigger assembly helps to prevent the platform from rolling over. Limitations for the DRAS platform are listed in Table 2-1.

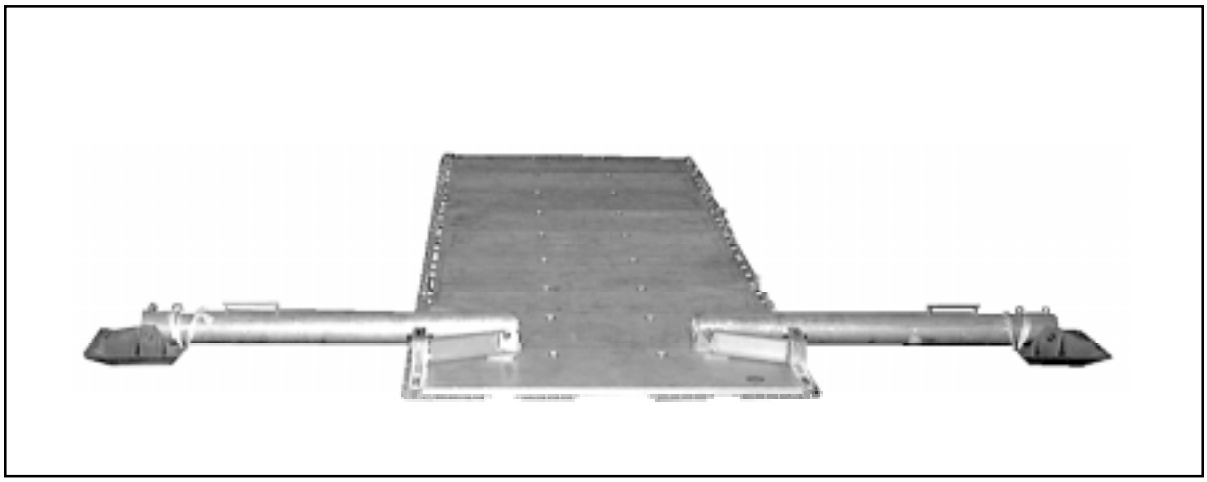


Figure 2-1. Dual Row Airdrop System Platform

Table 2-1. Limitations for DRAS Platform when Dropping from a C-17 Aircraft

Length (Feet)	**Width** (Inches)	**Weight** (Pounds)	**Platform** Surface (Square Feet)	**Minimum** Rigged Weight (Pounds)	**Maximum** Rigged Weight (Pounds)
18	88	1,590 w/o outriggers	132	7,500	14,500
18	88	1,942 w/ outriggers	132	7,500	14,500

PLATFORM LIMITATIONS

2-2. The C-17 (Globemaster) aircraft is specifically designed to deliver supplies and equipment using the DRAS during airborne operations. Platform loads are generally restricted to a height of 118 inches. Platform loads are generally restricted to a weight of 14,500 pounds. For multiple platforms, up to 116,000 pounds of airdrop load may be airdropped. The aircraft has a capability of eight DRAS platforms, six on the floor and two on the ramp.

SECTION II - AIRDROP SUPPLIES AND EQUIPMENT

COMMONLY USED ITEMS

2-3. Items commonly used for rigging DRAS platform loads are described in this section. Each rigging chapter in FM 4-20.105/TO 13C7-1-51 contains one or more tables of equipment required. These tables list the NSN, item, and quantity of each item needed to prepare and rig the load covered in that chapter. Standard DRAS hardware items are shown in Figure 2-2. Standard DRAS straps and canvas items are shown in Figure 2-3. Some textile, wood, and miscellaneous items are described below.

a. ***Textile Items.*** The most common textile items and their uses are as follows:

(1) **Type III nylon cord** is used to make safety ties and to hold items in place. It has a tensile strength of 550 pounds.

(2) **1/2-inch tubular nylon webbing** is used to secure items during airdrop. It has a tensile strength of 1,000 pounds.

(3) **5/8-inch or 9/16-inch tubular nylon webbing** may be used for 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.

(4) **3/4-inch tubular nylon webbing** is used to secure items during airdrop. It has a tensile strength of 2,300 pounds.

(5) **Type VIII nylon webbing** is used for parachute restraint and to safety tie the outrigger foot assembly. It has a tensile strength of 3,600 pounds.

(6) **Type I 1/4-inch cotton webbing** is used to make safety ties and to hold items in place. It has a tensile strength of 80 pounds.

b. ***Wood Items.*** Wood items used when DRAS loads are rigged for specific airdrop are made locally. Details for building these wood items are in the rigging chapter.

NOTE: Plywood will be grade AC or AD.

c. ***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 the specific rigging chapter for the load.

(1) **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.

(2) **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 also.

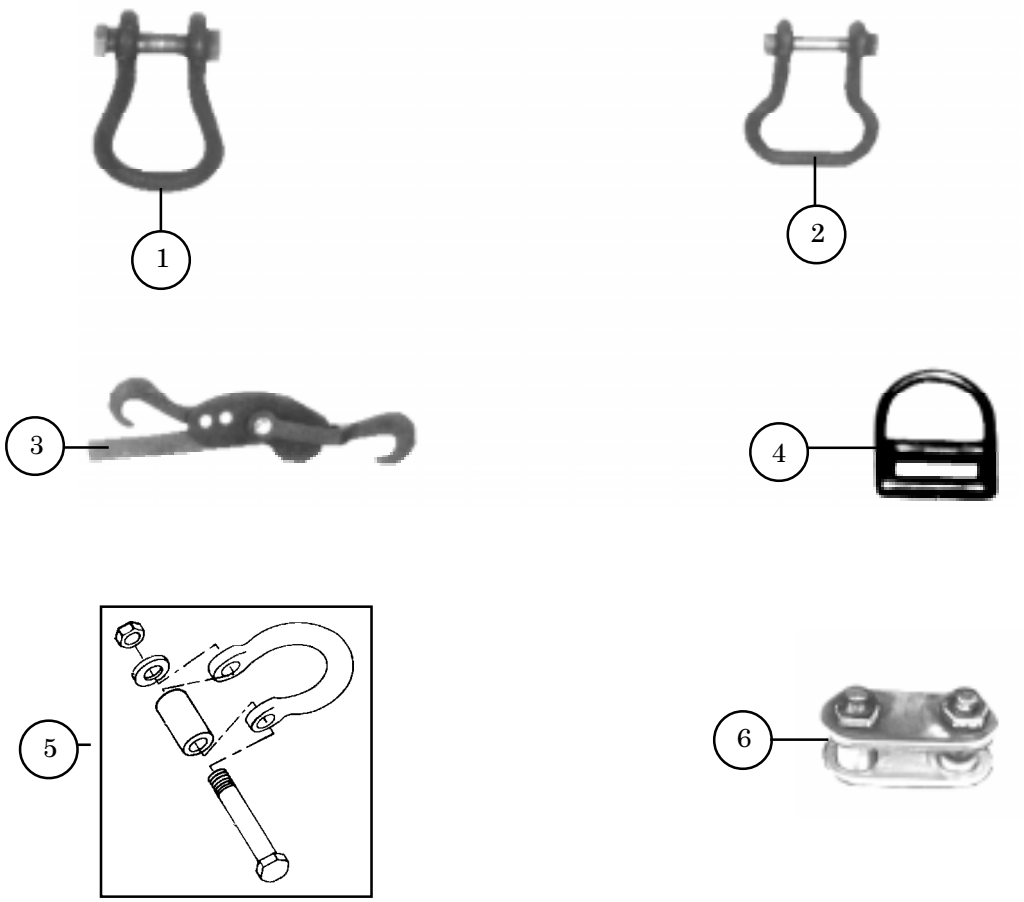
CAUTION
The type IV, cloth-backed adhesive tape, will not be used to secure folds of deployment lines.

(3) **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.

(4) **Energy-dissipating pads (honeycomb)** are used to absorb the landing shock. Honeycomb is also used to level, pad, and fill empty spaces.

INSPECTION OF ITEMS

2-4. Canvas, metal, webbing, and wood items are inspected according to TM 10-1670-296-20&P/TO 13C7-49-2.



1 The large clevis is used to group bridles and attach riser extensions to the G-11D cargo parachute. The clevis is used in other places, as indicated in the specific rigging chapter.

2 The medium clevis is used as a guide for the suspension slings on the attitude control system. Other uses are given in the specific rigging chapter.

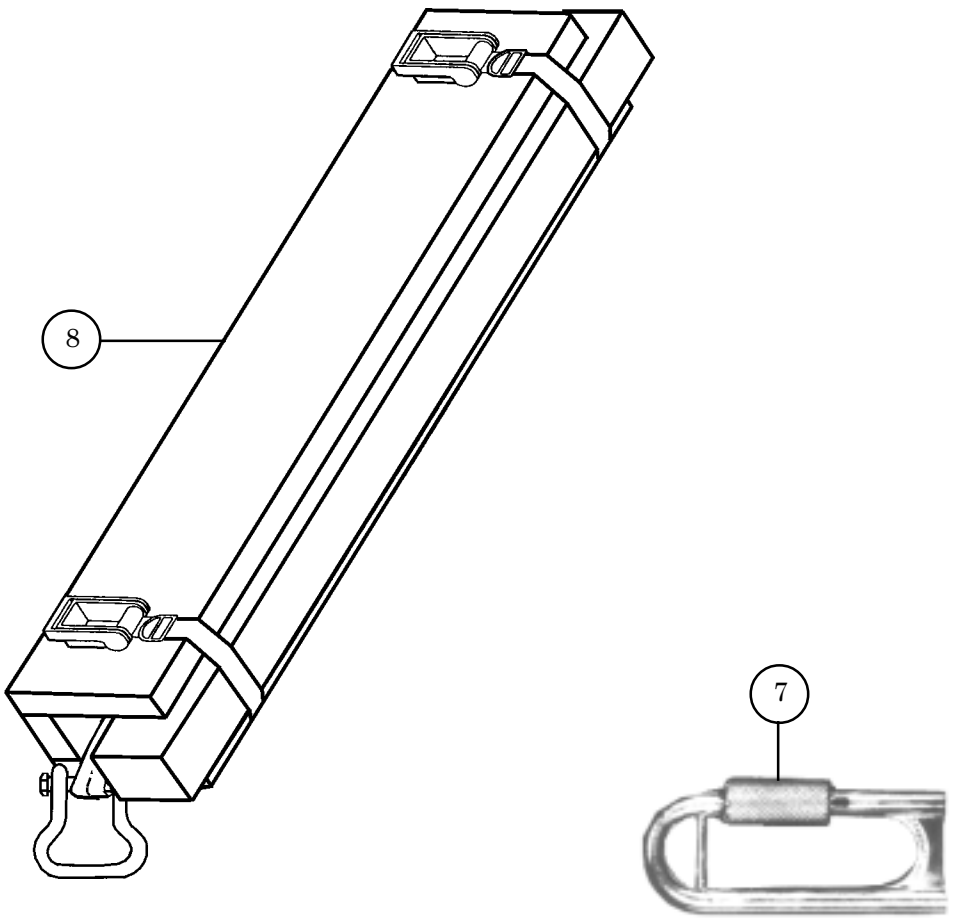
3 The 10,000-pound load binder is used to hook two D-rings together or to hook a D-ring to a platform tiedown clevis on the airdrop platform.

4 The heavy-duty D-ring is used with a 15-foot tiedown strap.

5 The platform clevis is attached to the side rails of the DRAS platform in order to secure the load.

6 The 3 3/4-inch, two-point link assembly is used to join suspension slings and to attach the deployment line to the deployment parachute adapter web.

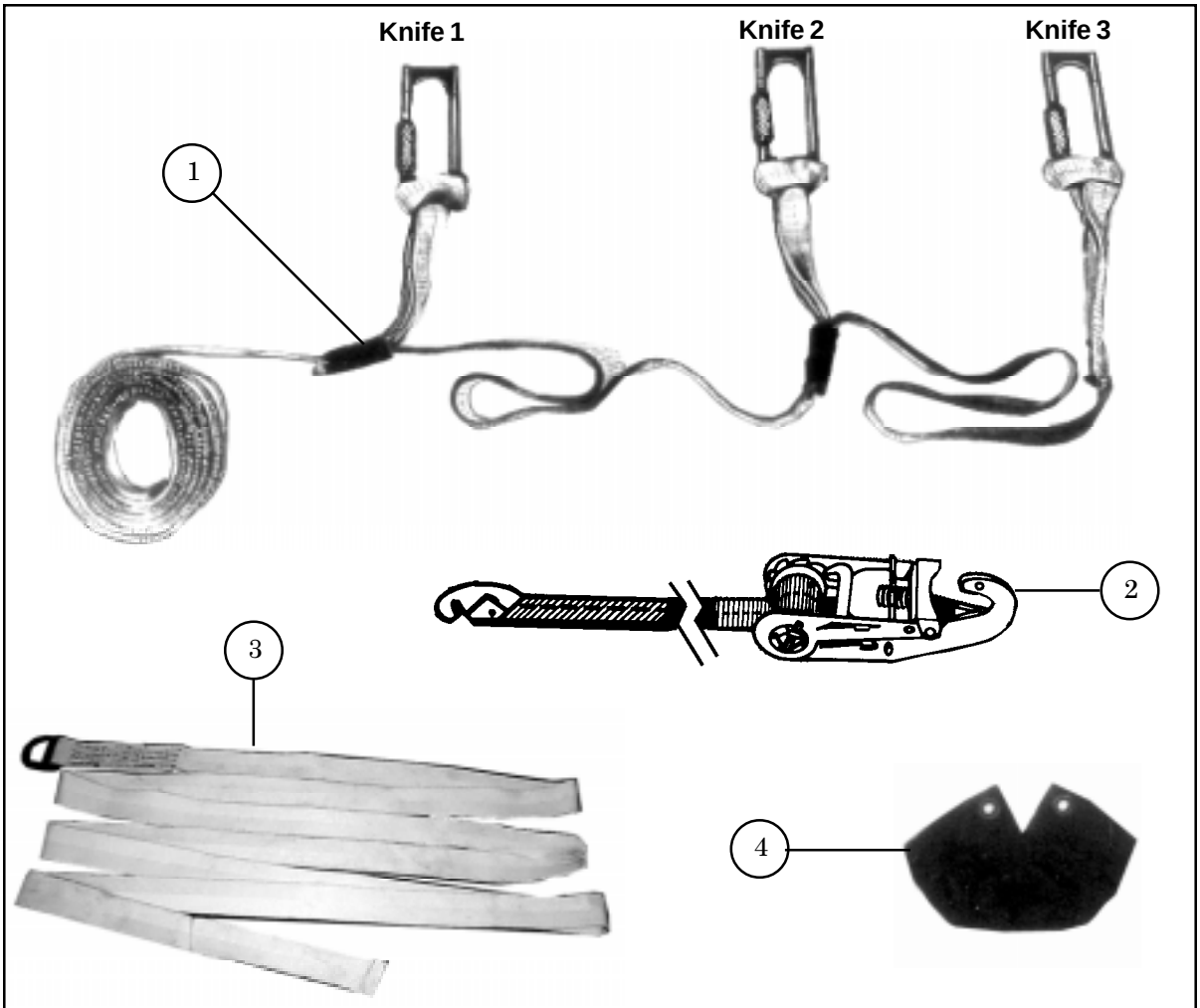
Figure 2-2. Hardware Items Used for Rigging DRAS Loads



7 The guillotine-type knife is used on parachute release straps to cut the parachute restraint straps. The guillotine knife is also used to cut the outrigger vertical restraint ties.

8 The Attitude Control System (ACS) is a locally fabricated item used as a spreader bar on all loads. The ACS also helps to control the attitude of the platform during extraction of the load. Each load requires two ACSs. The fabrication procedures are shown in Figure 3-32.

Figure 2-2. Hardware Items Used for Rigging DRAS Loads (continued)



1 The multicut parachute release strap is used to cut one to four parachute restraint straps on a DRAS load. The strap comes with three guillotine-type release knives. Knives that are not being used are removed. This release strap is always used in pairs.

2 The CGU-1/B aircraft cargo tiedown is used to safety the outriggers in the vertical position and on the ACS. **The strap is removed from the outriggers prior to airdrop.**

3 The 15-foot dacron tiedown strap is used to lash a DRAS load to the platform. Other uses of this strap are covered in the specific rigging chapter.

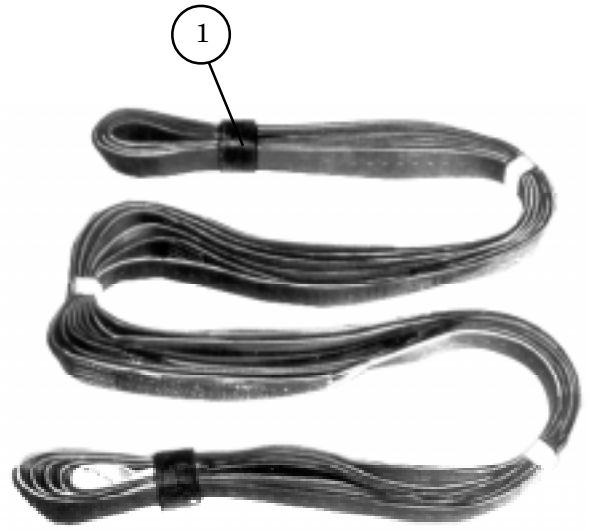
4 The large clevis cover is used on the large clevis when the clevis is used to join the risers of a cargo parachute to a riser extension.

Figure 2-3. Straps and Canvas Items Used for Rigging DRAS Loads

SECTION III - SUSPENSION SLINGS

CARGO SLINGS

2-5. Cargo slings (Figure 2-4) are used as suspension slings on DRAS loads. These slings suspend the load under the cargo parachutes during descent. Suspension slings connect the cargo parachute to the load using a parachute release assembly. Cargo slings may also be used as deployment lines and to extend the risers of cargo parachutes. Cargo slings are also used in the fabrication of the ACS.



(1) Each sling is made with continuous loops. The loops are 1 3/4-inch-wide, type XXVI nylon webbing. They are held together with keepers of 1-inch, nylon reinforced tape. Each sling has a sliding webbing keeper and a cotton or nylon buffer at each end.

NOTES: 1. The keeper at each end of the sling must be drawn snugly against the object on which the sling is fitted.

2. Suspension slings on DRAS loads will have the nylon buffers removed to fit on the lower suspension links of the M-1 parachute release assembly.

Figure 2-4. Cargo Slings

REQUIREMENTS

2-6. Loads rigged for use on the DRAS **require** 4-loop, type XXVI nylon suspension slings. The type and length of cargo slings authorized for use on a DRAS load are listed in Table 2-2.

Table 2-2. Cargo Slings for DRAS Airdrop

National Stock Number	Length (feet)	Number of Loops	Type of Nylon Webbing
1670-01-062-6306	3	4	XXVI
1670-01-062-6310	11	4	XXVI
1670-01-063-7761	16	2	XXVI
1670-01-062-6302	20	2	XXVI
1670-01-062-6313	60	3	XXVI

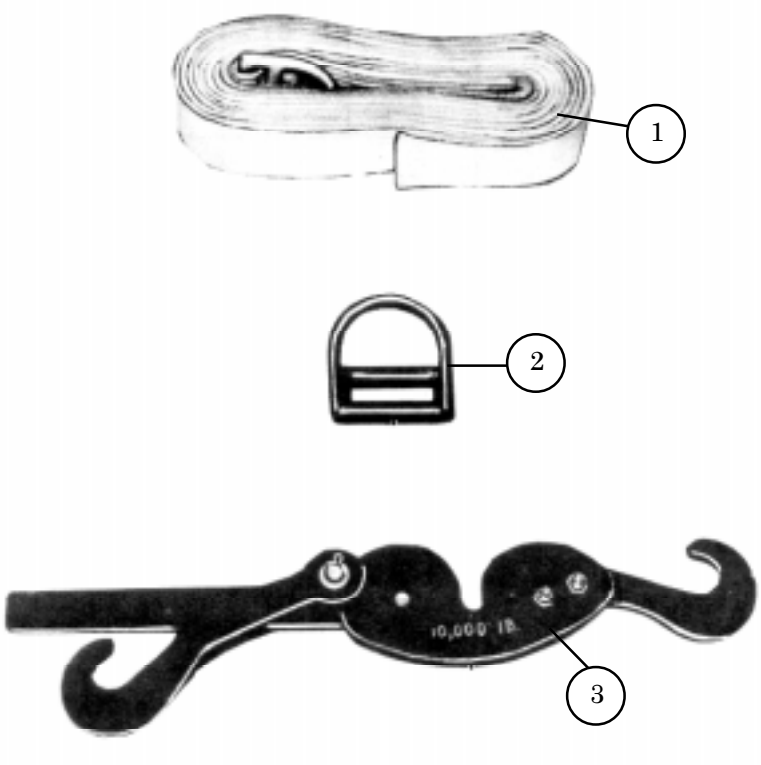
SECTION IV - LASHINGS

USE

2-7. 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

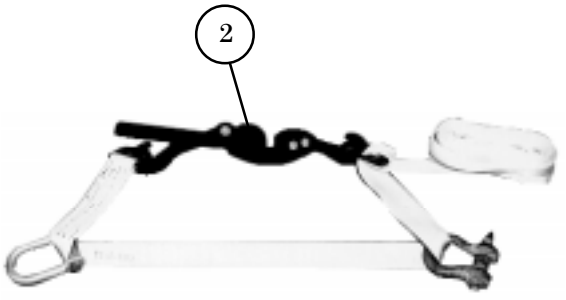
2-8. The components of the lashings used on DRAS loads are shown in Figure 2-5. The maximum strengths of the various forms of lashings are given in Figure 2-6.



1. 15-foot dacron tiedown strap.
2. Heavy-duty D-ring.
3. 10,000-pound-capacity load binder.

Figure 2-5. Components of a Tiedown Assembly

1 **Single line configuration.**
A dacron lashing routed in a single line configuration has a maximum strength of 6000 pounds when attached to a DRAS platform side rail and a tiedown clevis. It has a maximum strength of 4,000 pounds when attached to a panel tiedown ring.



2 **Double line (floating binder) configuration.**
A dacron lashing routed in a double line configuration has a maximum strength of 10,000 pounds when attached to a DRAS platform side rail and a tiedown clevis. It has a maximum strength of 4,000 pounds when attached to a panel tiedown ring.

Figure 2-6. Strengths of Dacron Lashings

SECTION V - CARGO PARACHUTES

USE

2-9. Cargo parachutes, also called recovery parachutes, are used to slow the descent of a DRAS platform load. Table 2-3 lists the weight limitations for cargo parachutes used with DRAS platform loads.

Table 2-3. General Weight Limitations for Cargo Parachutes
***Suspended Weight in Pounds**

Parachutes	Minimum	Maximum
G-11D		
2	6,950	8,499
3	8,500	12,799
4	12,750	13,400

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

TYPES

2-10. The G-11D cargo parachute is used when loads are rigged for DRAS. The parachute has a 100-foot-diameter canopy. It has 120 suspension lines (35-foot, type III nylon cord). The parachute has four 2-second cutters and four 12-foot reusable reefing lines. When packed, the assembly weighs 250 pounds.

RISER EXTENSIONS

2-11. Cargo parachutes are used 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 2-4.

Table 2-4. Riser Requirements for G-11D Cargo Parachute Clusters

Number of Parachutes in Cluster	Length of Riser Extension (feet)	Number of Extension Stows	Type XXVI Nylon Webbing Slings
2	20	2	20-foot (2-loop)
3 or 4	60	8	60-foot (3-loop)

NOTES:

1. All riser extensions must be continuous type XXVI nylon slings and have identical riser extensions and each must be of the same length.

2. For proper stowing procedures for G-11D, see Chapter 3 .

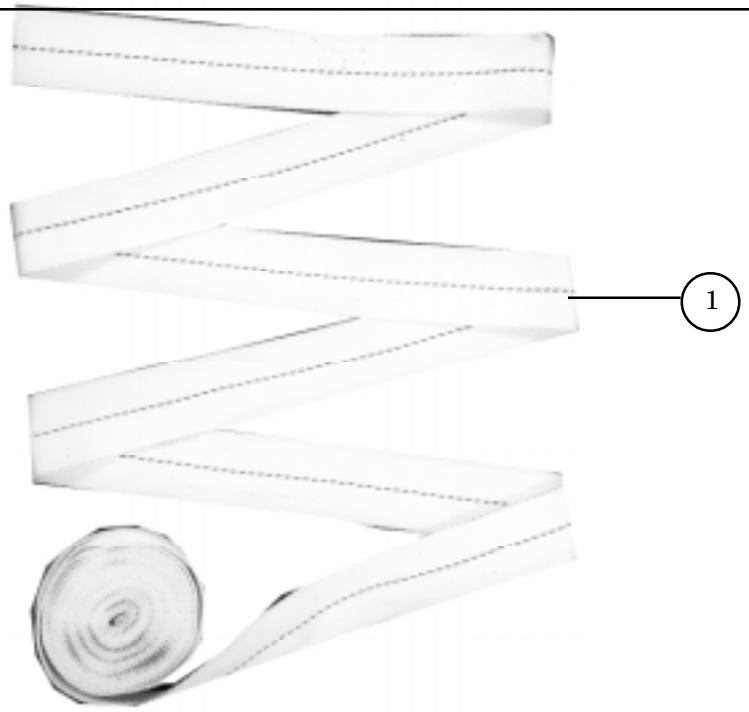
SECTION VI - PARACHUTE RESTRAINT SYSTEM

USE

2-12. A parachute restraint system, consisting of one or two restraint straps and two multicut parachute release straps, is used on all DRAS platform loads rigged with two or more cargo parachutes.

DESCRIPTION

2-13. When the force is transferred from the deployment parachute to the deployment line, it pulls on the clevis to which the release straps are secured. This pull causes the knives on the release straps to cut the restraint straps and allows the cargo parachutes to deploy. Parachute restraint straps are made from lengths of type VIII nylon webbing as shown in Figure 2-7.



(1) Restraint straps made from lengths of type VIII nylon webbing are used to restrain two to four cargo parachutes.

NOTE: The number and type of parachute restraint straps to be used on a particular load may be found in the specific rigging chapter.

Figure 2-7. Webbing Used for Parachute Restraint Straps

SECTION VII - RELEASE ASSEMBLIES

USE

2-14. The cargo parachute release assembly separates the parachutes from the load when the load touches the ground. The separation reduces the chance of the wind dragging or overturning the load.

DESCRIPTION

2-15. The M-1 release is used when a DRAS load is rigged for airdrop. This release is used with DRAS rigged loads weighing up to 13,400 pounds suspended.

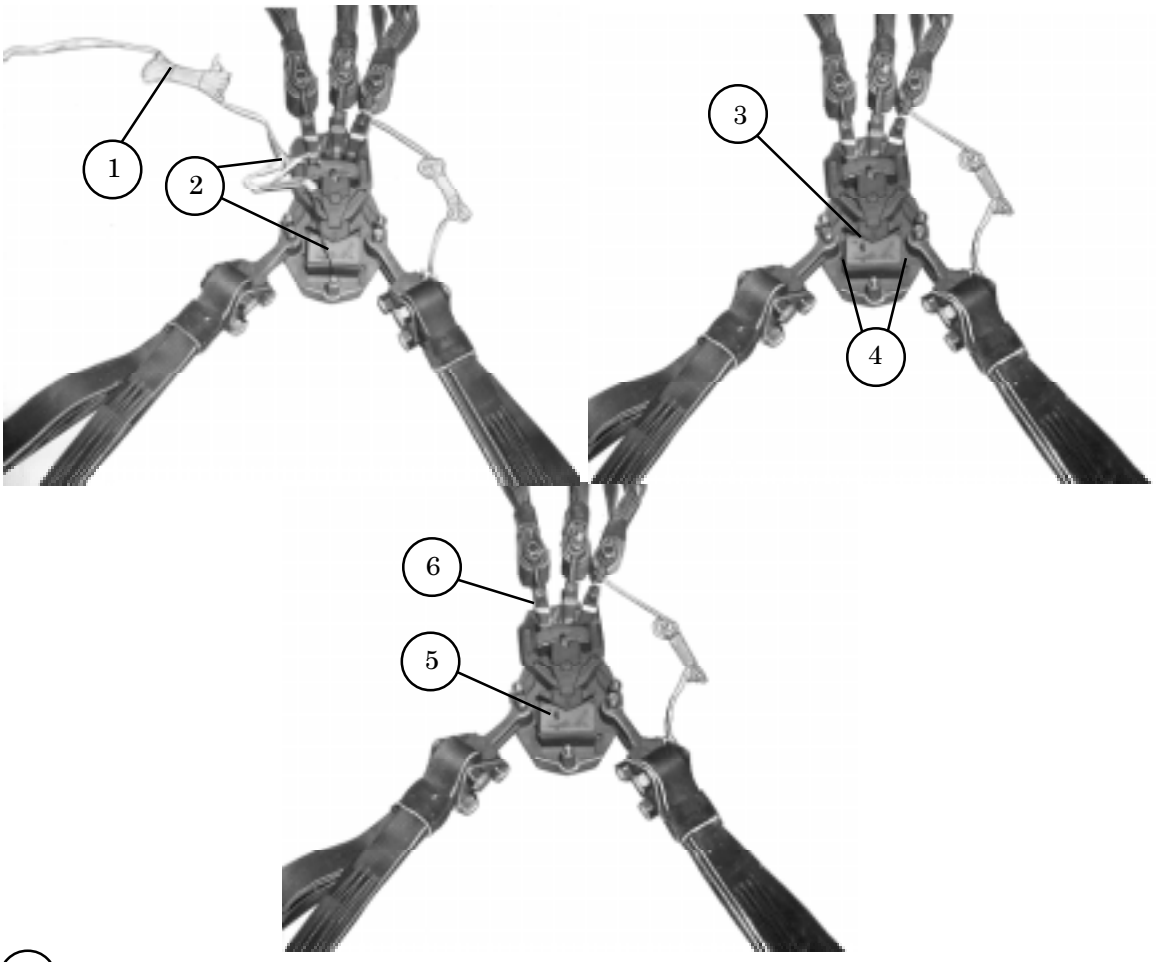
INSPECTING AND MAINTAINING

2-16. The M-1 release is 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

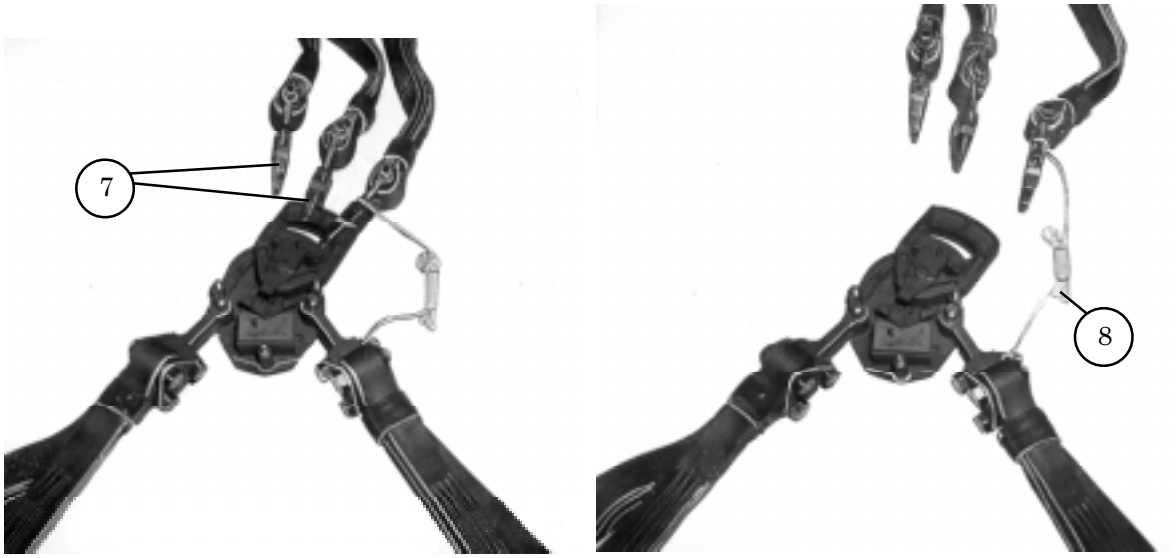
2-17. The operation of the airdrop cargo parachute release is given below. The release works when the load touches the ground and upper suspension link tilts or moves to the side. When the release tilts, the parachutes are released from the load. Figure 2-8 shows how the release operates.

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 2-8. Typical Operation of the M-1 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. Then the dragline breaks.

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

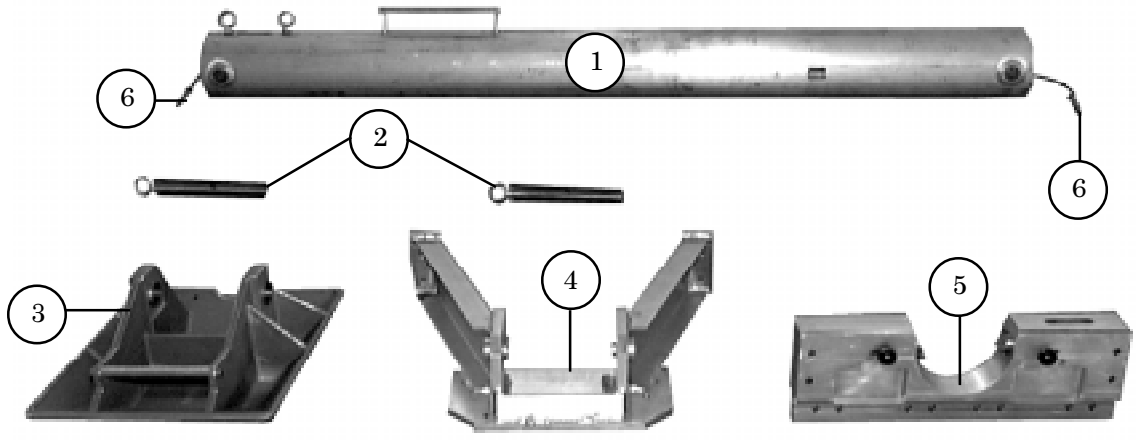
SECTION VIII - OUTRIGGER ASSEMBLY

USE

2-18. An outrigger assembly is used on every DRAS load to help prevent the load from turning over after landing on the ground. The assembly is attached to the DRAS platform and is deployed from the vertical to the horizontal positon after the load clears the ramp of the aircraft. The component parts of the outrigger assembly are shown in Figure 2-9.

INSPECTING AND MAINTAINING

2-19. Outriggers are inspected and maintained as outlined in TM 10-1670-268-20&P/TO 13C7-52-22. See the specific TM for more information on inspecting and maintaining the outrigger assembly.



1. Outrigger mast.
2. Mast pivot pin.
3. Outrigger foot.
4. Platform fitting assembly weldment.
5. Platform fitting assembly link.
6. Ball lock pin.

Figure 2-9. Deployable Outrigger Assembly

SECTION IX - DEPLOYMENT PARACHUTE AND DEPLOYMENT LINE

USE

2-20. A deployment parachute is used on every DRAS load to deploy the G-11D cargo parachutes as the load leaves the aircraft. The deployment parachute is a 28-foot extraction parachute packed in a deployment bag and rigged with a release-away static line assembly.

INSPECTING AND MAINTAINING

2-21. Deployment parachutes are inspected, maintained, and packed as outlined in TM 10-1670-277-23&P/TO 13C5-28-2. See the specific TM for more information on inspecting, maintaining, and packing these parachutes. The 28-foot extraction parachute deployment bag modification procedures are located in TM 10-1670-277-23&P. The release-away static line assembly is inspected and maintained as outlined in TM 10-1670-277-23&P/TO 13C5-28-2.

SECTION X - TRANSPORTATION OF RIGGED LOADS

RESPONSIBILITIES

2-22. 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

2-23. Some of the equipment that may be used to load and transport rigged loads is listed below.

a. 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 are not limited to the 5-ton wrecker, the 10,000- or 15,000-pound-capacity warehouse crane, or the 10,000- or 15,000-pound-capacity forklift truck.

b. Transporting Vehicle. Any standard military truck or semitrailer 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:

(1) The 6- or 10-ton cargo semitrailer can transport loads rigged on airdrop platforms.

(2) 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.

(3) 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.

(4) 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.

NOTES: 1. The DRAS platform must be loaded centerline on the 25,000- and 60,000-pound capacity loaders.

2. The 40,000-pound capacity loader requires the right side loads to be against the loader's right side rails and left side loads must be against the loader's left side rails.