FM 4-191

WAR DEPARTMENT

ANTIAIRCRAFT ARTILLERY FIELD MANUAL

BARRAGE BALLOON SERVICE OF CABLE ARMAMENT, LOW ALTITUDE

29 September 1943

[redacted]

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[redacted]

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FM 4–191, Antiaircraft Artillery Field Manual, Barrage Balloon, Service of Cable Armament, Low Altitude, is published for the information and guidance of all concerned.

[A. G 300.7 (21 Aug 43).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

J. A. ULIO,
Major General,
The Adjutant General.

DISTRIBUTION:

IBn and H 44 (5); IC 44 (25).

(For explanation of symbols see FM 21–6.)

[redacted]

ANTIAIRCRAFT ARTILLERY FIELD MANUAL

BARRAGE BALLOON

SERVICE OF CABLE ARMAMENT
LOW ALTITUDE

CHANGES No. 1

WAR DEPARTMENT,
WASHINGTON 25, D. C., 23 March 1944.

FM 4-191, 29 September 1943, is changed as follows:

■ 6.1. SHIPMENT AND STORAGE OF SPARE PARTS (Added).—Spare parts for cable armament equipment are likely to become damaged through improper handling during shipment or storage. Storing the parts in bins and shipping them unwrapped are particular causes of damage. Whenever spare parts are shipped or stored they will be protected from damage by wrapping them or by packing them in such a manner that they do not contact one another.

FIGURE 12.—Parts of the DP/R Link No. U. S. 240A.

■ 15. LOADING.—To load a DP/R link, the male end is removed from the body as in disassembling and the cartridge is inserted in the breech (see par. 9*b* and *c*). This assembly is • • • by a setscrew.

FIGURE 21.—Parts of DPL.

[A. G. 300.7 (7 Mar 44).]

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ANTIAIRCRAFT ARTILLERY FIELD MANUAL

BARRAGE BALLOON, SERVICE OF CABLE ARMAMENT, LOW ALTITUDE

CHAPTER I

GENERAL

■ 1. PURPOSE OF CABLE ARMAMENT.—The flying cables supported by the balloons in a barrage are the lethal part of the barrage. An unarmed flying cable may break under impact without causing great damage to the striking aircraft. Therefore, it is necessary to make the flying cable as effective as possible by armament.

■ 2. DOUBLE PARACHUTE ARMING SCHEME.—The double parachute arming scheme requires a parachute near the balloon and another on the cable near the winch. Inertia links are used to prevent the flying cable from breaking when struck by an aircraft, and to free it from the balloon and the winch at the moment of impact. As the aircraft proceeds after impact, the freed section of the cable clings to the wing of the plane, and the parachutes on each end of the cable open. When the drag is first applied, the flying cable cuts into the leading edge of the wing, thus preventing the cable from slipping off the wing. In some cases the sawing action of the cable may sever the wing. The parachutes may cause a drag sufficient to stall and crash, or fatally damage the aircraft. Figures 1 and 2 illustrate the double parachute arming scheme.

■ 3. SERIES ARMING SCHEME.—Series arming is a scheme by which two sections of the flying cable are armed independently. (See fig. 3.) This scheme is used to permit the balloon to be flown with cable armament at a height of 800 to 1,800 feet during periods of enemy inactivity. It minimizes the danger to friendly aircraft and still provides a certain amount of protection against low altitude surprise attacks. The balloon is flown with the DP/R link and the two center DPL's attached. Upon receipt of a warning of

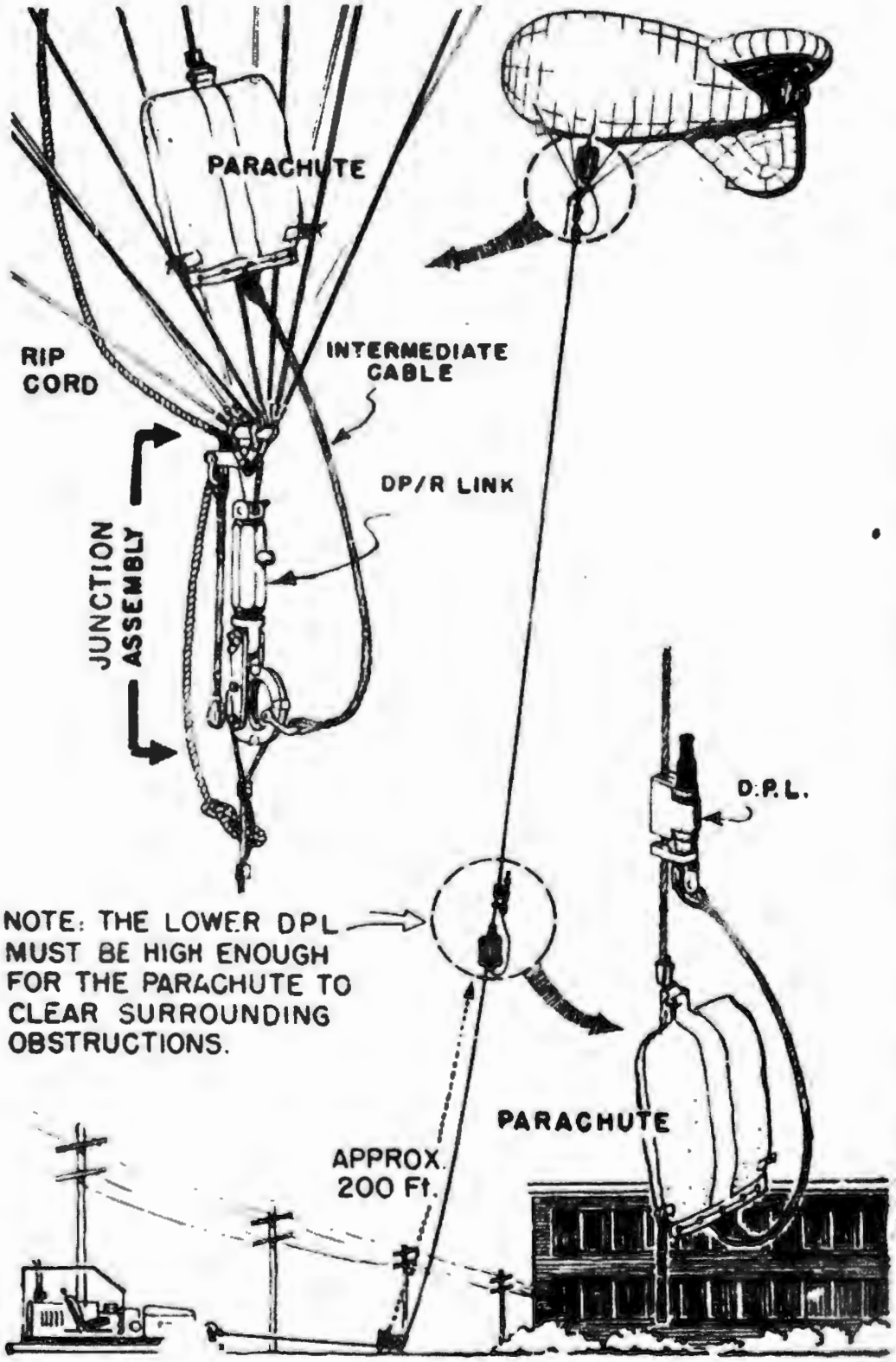


FIGURE 1.—Double parachute arming scheme.

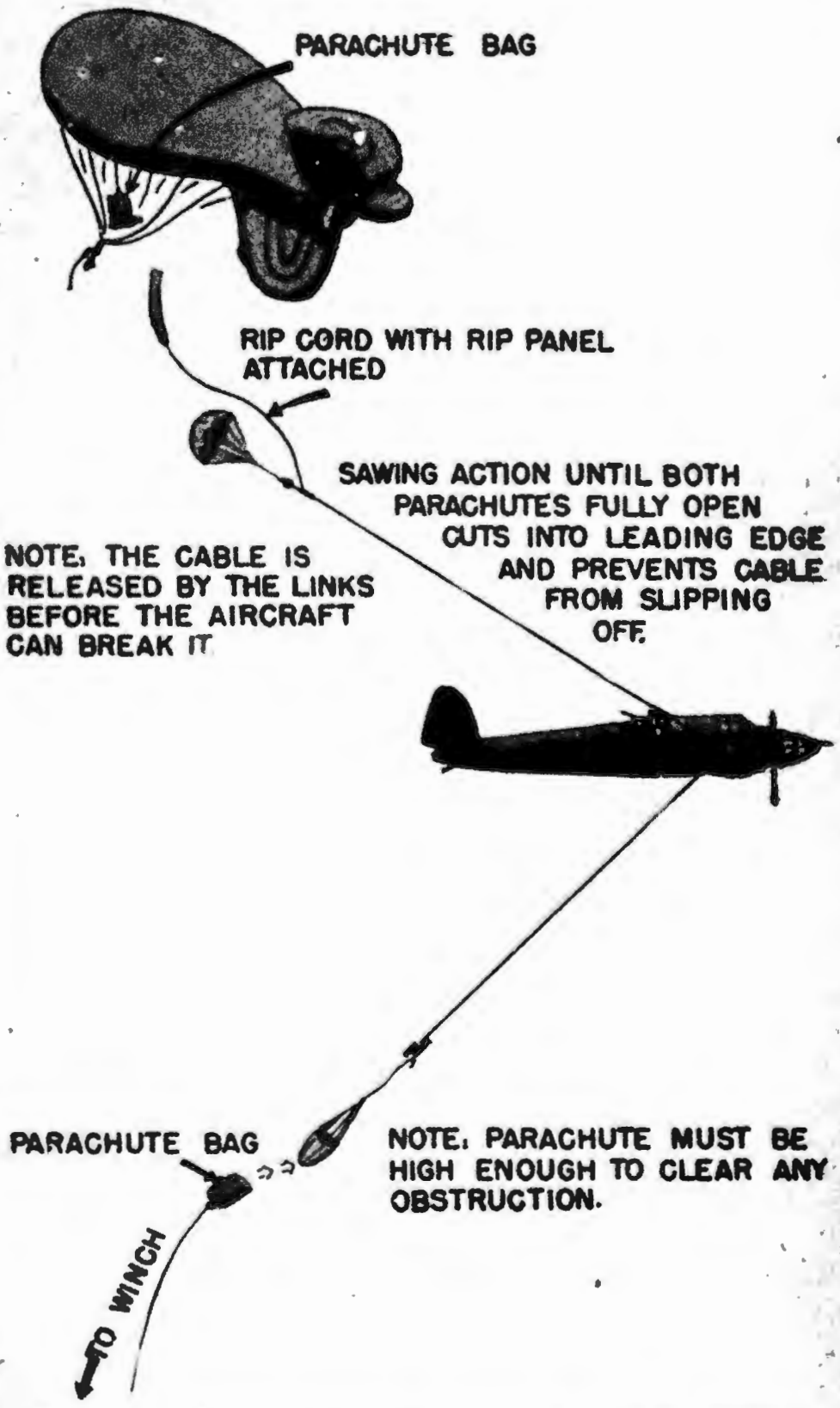


FIGURE 2.—Double parachute armed cable after impact.

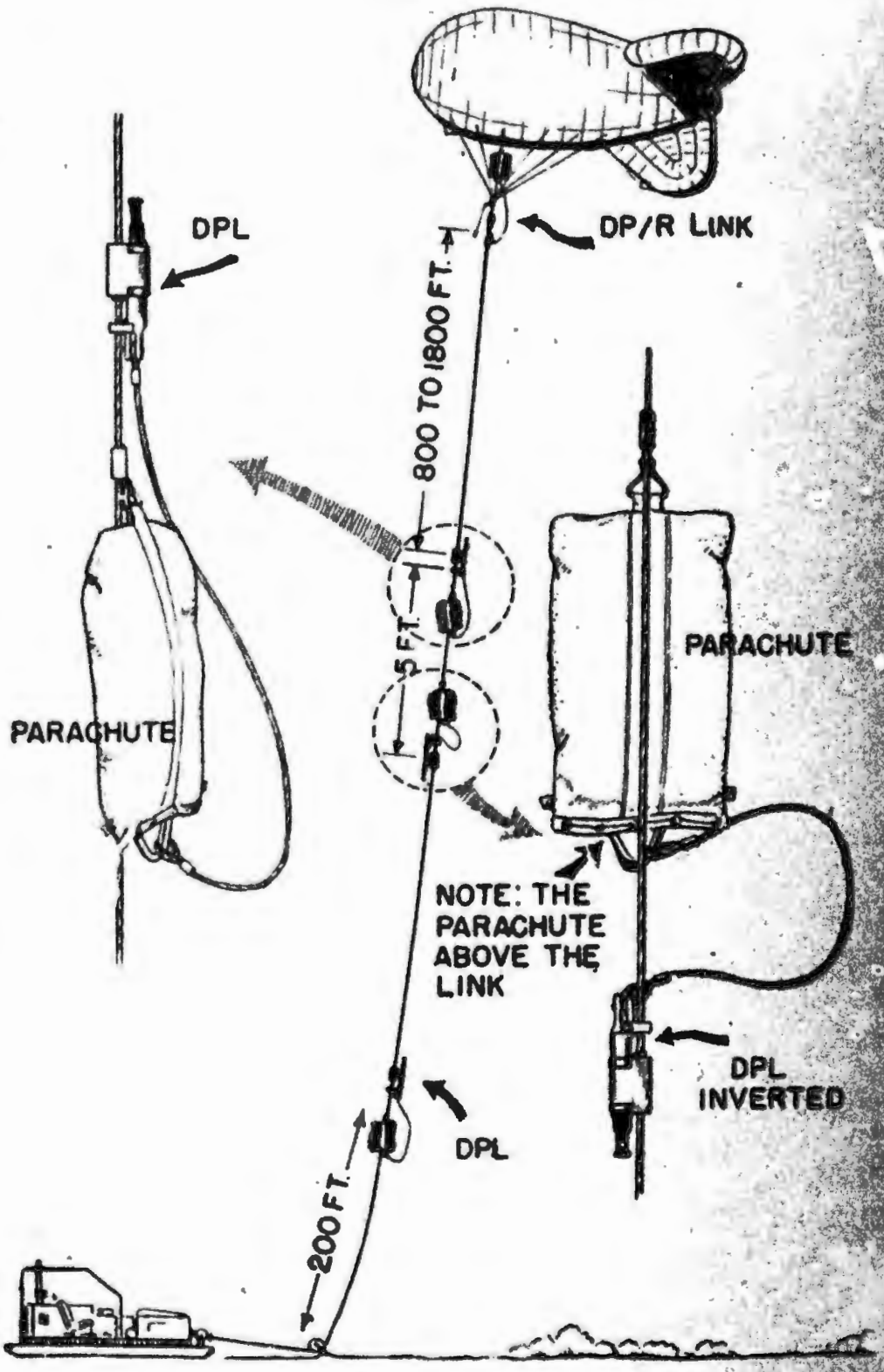


FIGURE 3.—Series arming scheme.

the approach of hostile aircraft, the balloon can be raised rapidly to its full operating height and the bottom DPL attached. If the balloon were flown at a reduced altitude with the arming scheme shown in figure 1, it would be necessary to haul down the balloon and change the position of the DPL in order to fly the balloon at its full height. The use of the series arming scheme eliminates this procedure, [illegible] during the time required to fly the balloon [illegible]

■ 4. INERTIA LINKS.—*a. General.*—The flying cable is parted by inertia links, one placed in the junction assembly and the other attached to the flying cable. The types of inertia links used are as follows:

(1) Combined double parachute link and ripping link, No. U. S. 240.

(2) Double parachute link and ripping link, No. U. S. 240A.

(3) Combined double parachute link and ripping link, Mk. II (British).

(4) Double parachute link quick release type, No. U. S. 200.

(5) Double parachute link, quick release type, No. U. S. 200A.

(6) Double parachute link, quick release type, Mark VI (British).

b. Combined double parachute and ripping links.—The inertia link installed in the junction assembly between the concentration fitting and the cable terminal assembly is the combined double parachute and ripping link, No. U. S. 240, No. U. S. 240A, or Mark II (British). (See fig. 4.) The U. S. types are commonly known as DP/R Links. The British type link is commonly known as the DP/R Link, Mark II. Threaded parts of the DP/R Link, Mark II are not interchangeable with threaded parts of the DP/R Links, since the threads of these links are different. All parts of the DP/R Links No. U. S. 240 and No. U. S. 240A are interchangeable except the body, striker weight, and parts of the safety device. (See figs. 5 and 6.)

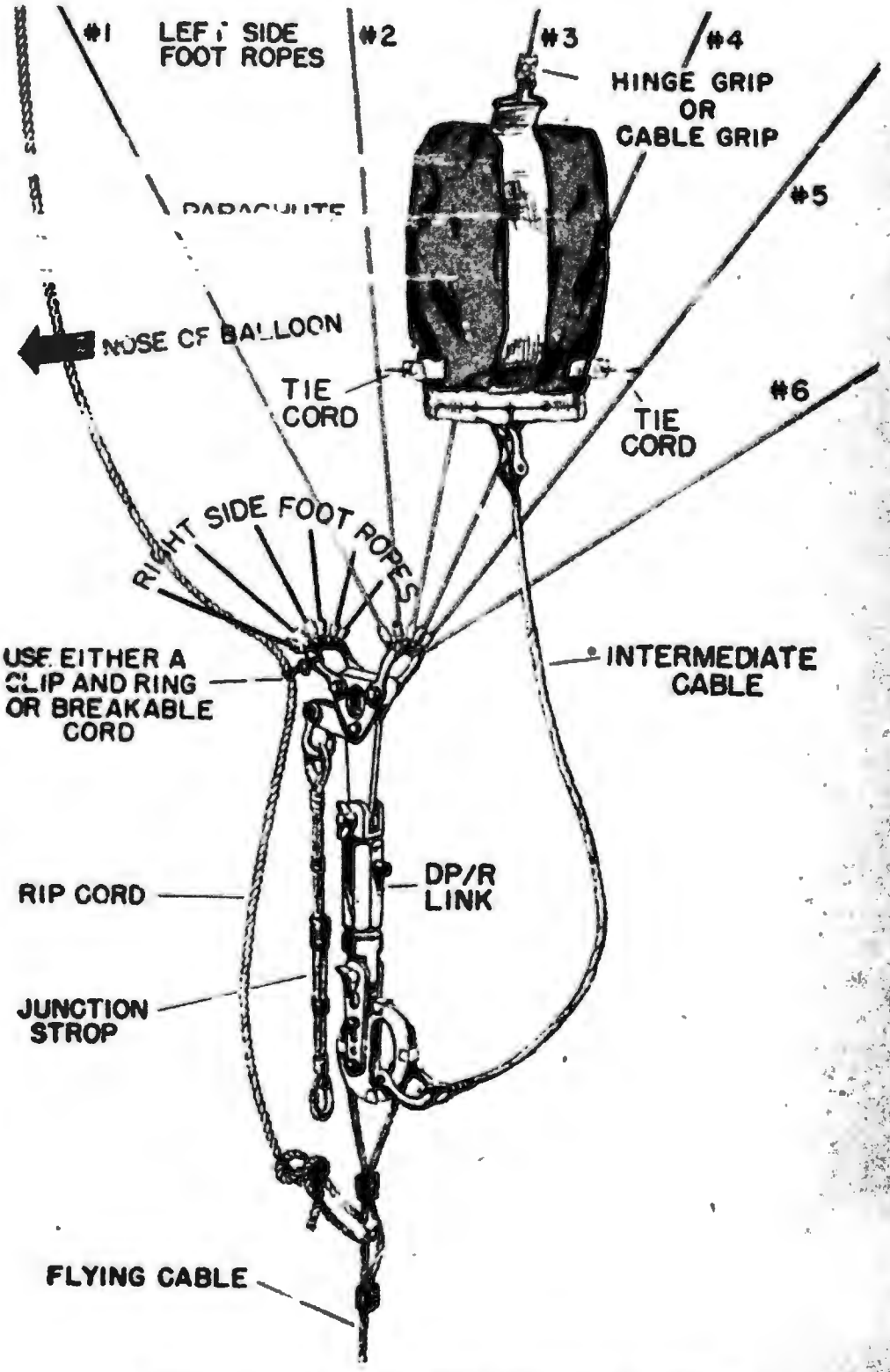


FIGURE 4.—DP/R Link and parachute installed.

FIGURE 5.—DP/R Link, No. U. S. 240A.

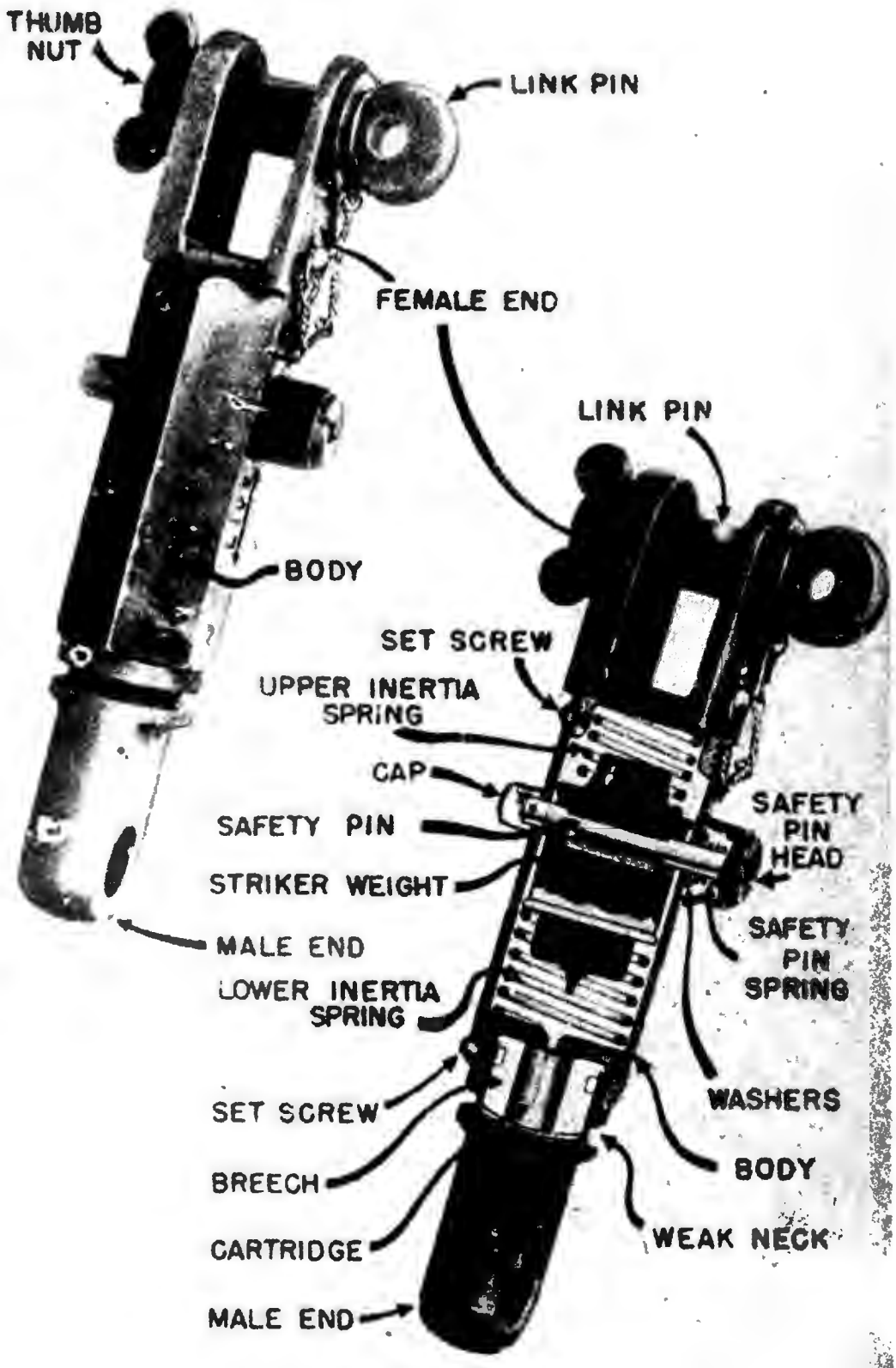


FIGURE 6.—DP, R Link, Mark II or No. U. S. 240.

c. Double parachute link.—The inertia links attached to the flying cable are the quick release type double parachute links, No. U. S. 200, No. U. S. 200A, or the Mark VI (British). The U. S. type is commonly known as a DPL. The British type is commonly known as a DPL, Mark VI. The three links are identical in operation and the parts of DPL No. U. S. 200 and 200A are interchangeable. The threads of the DPL, Mark VI, however, prevent the threaded parts from being exchanged with threaded parts of the No. U. S. 200 or the No. U. S. 200A. (See figs. 7 and 8.)

■ 5. PARACHUTES.—The parachutes used in LA cable armament are 8-foot heavy duty parachutes.

a. Upper parachute.—The upper parachute is attached to the flying cable by a 4-foot intermediate cable shackled to the cable terminal. The bag containing the parachute is fastened to the foot ropes by a hinge grip or a cable grip on the side of the balloon opposite the rip cord. (See fig. 4.)

b. Other parachutes.—The other parachutes are attached to the DPL's by 4-foot intermediate cables, and their bags are fastened to the flying cable with wedge or cable grips. (See fig. 7.)

■ 6. CABLE ARMAMENT SET.—The equipment used to arm the flying cable by the double parachute arming scheme is issued in a set called Lethal Device Equipment, BB, LA. (See fig. 9.) Figure 9 shows a wedge grip and a hinge grip included in the equipment. However, the equipment set may be issued with two cable grips, No. U. S 3318–1, instead. The cable grip is shown in figure 39.

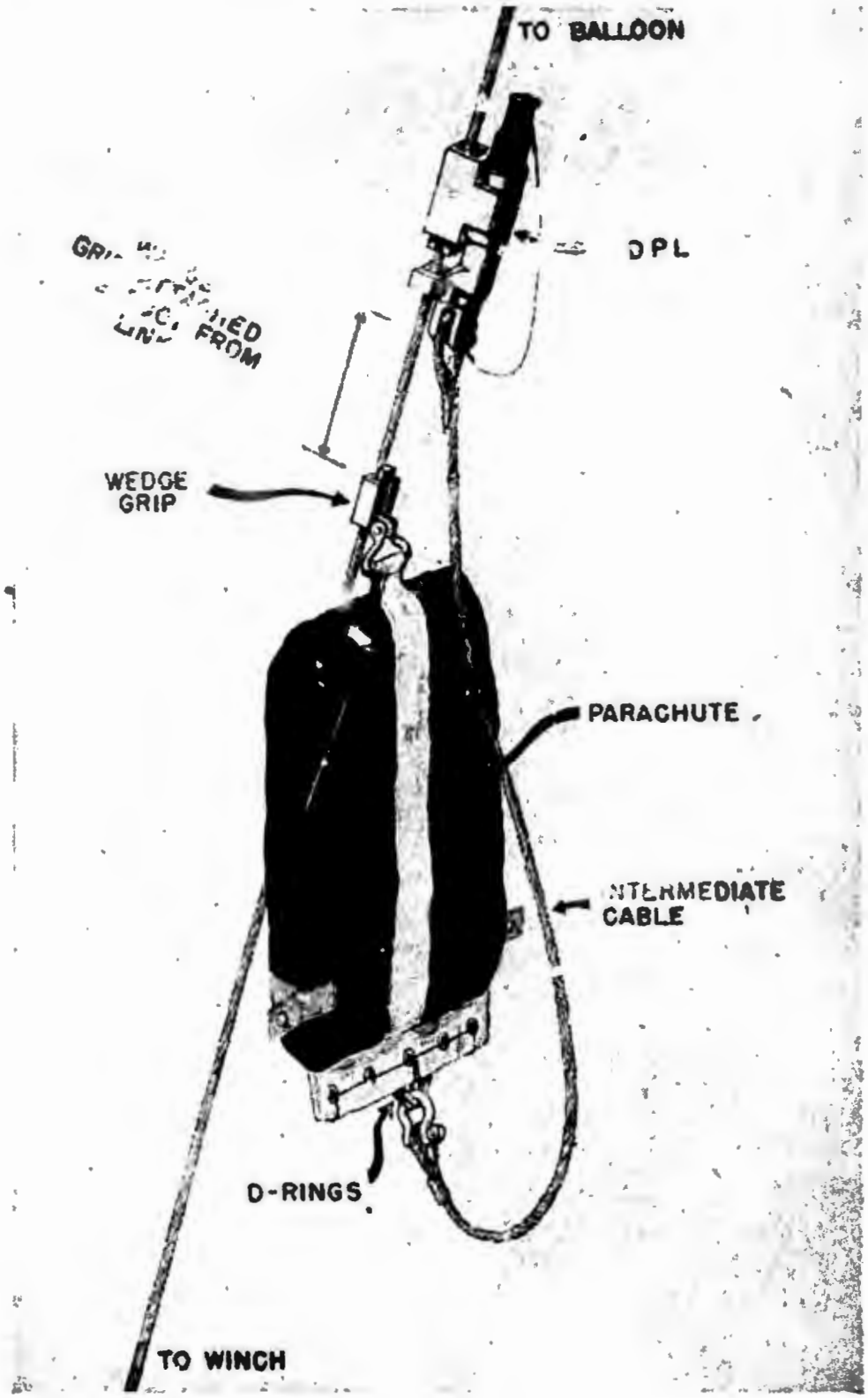


FIGURE 7 —Double parachute link and parachute installed.

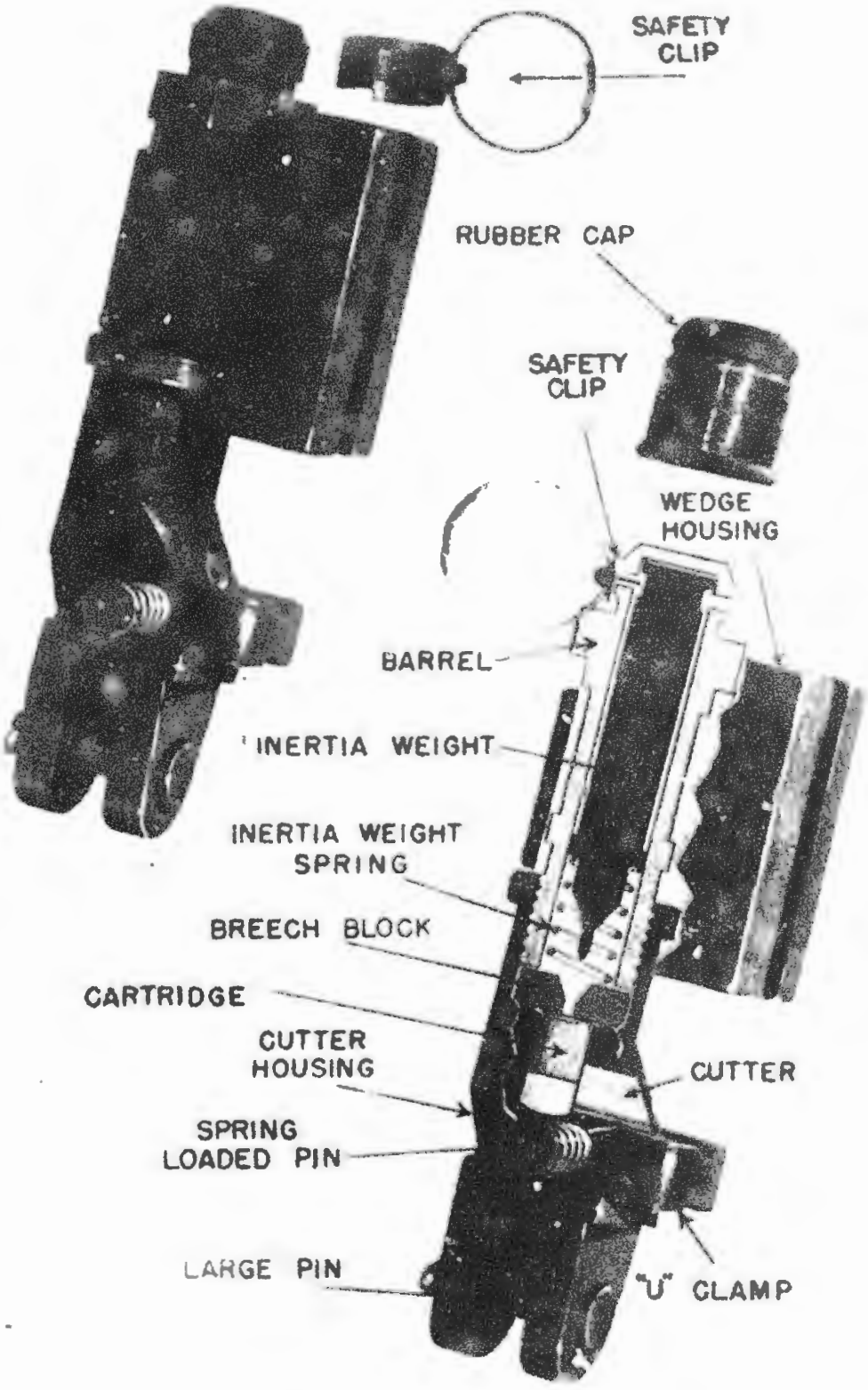


FIGURE 8.—Double parachute link

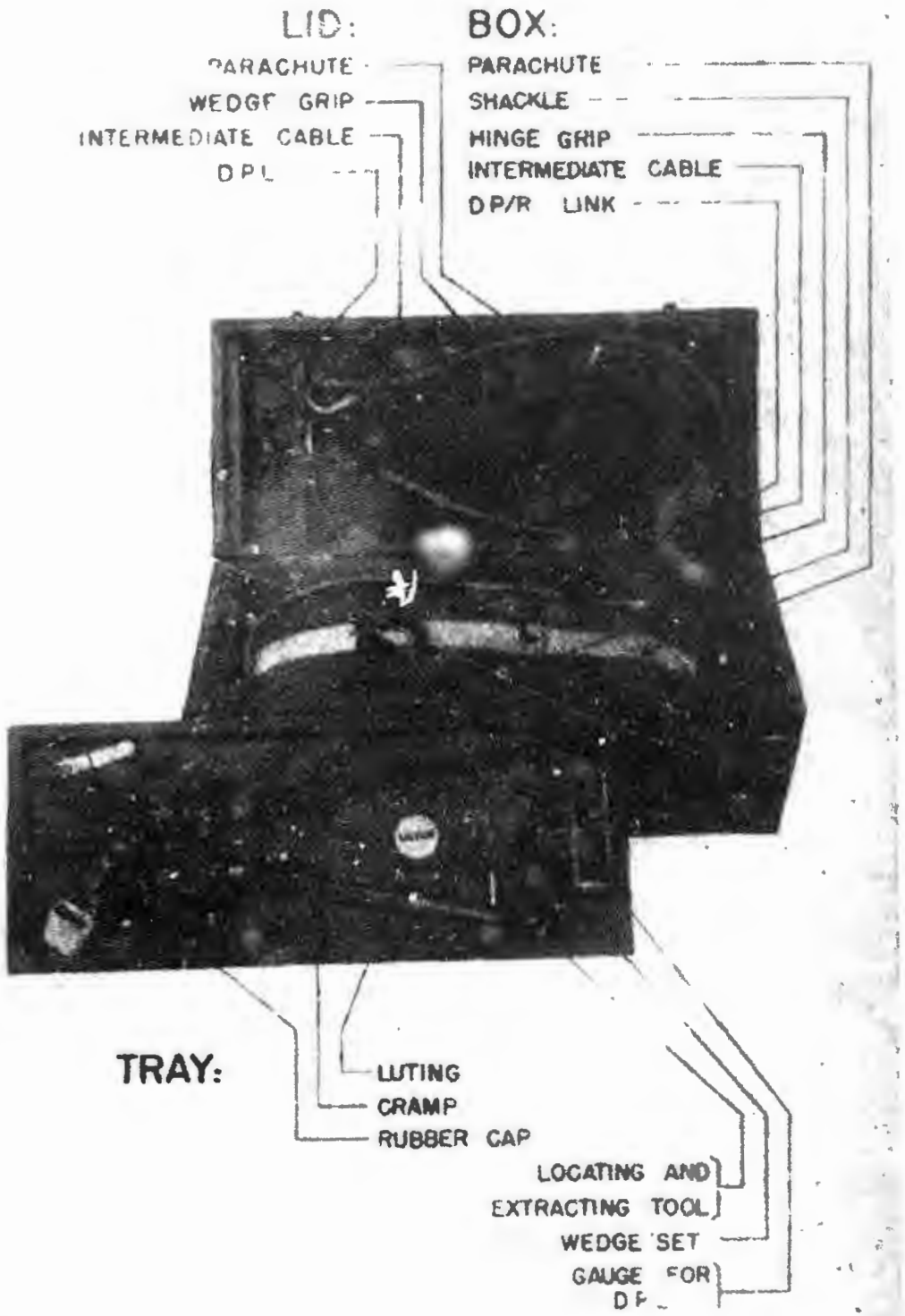


FIGURE 9.—Lethal Device Equipment BB, LA.

CHAPTER 2

ARMING EQUIPMENT FOR LA BALLCONS

SECTION I

DP/R LINKS

■ 7. PARTS.—The DP/R Links No. U. S. 240, No. U. S. 240A, and Mark II each consists of three main parts: the female end, which fits onto the bell crank of the concentration fitting; the male end, which fits into the straps of the cable terminal assembly; and the body, which contains the firing mechanism. (See fig. 10.)

■ 8. FEMALE END.—The threaded part of the female end fits into the upper end of the body. When screwed into the body, the female end is alined by matching chisel marks on it and the body. It is locked in place by a setscrew. The forked end is secured to the long arm of the bell crank by a link pin.

■ 9. MALE END.—*a. General.*—The threaded part of the male end fits into the lower end of the body; the other end is secured to the straps of the cable terminal assembly by the terminal pin. The male end houses the breech and cartridge. A groove in the male end called the weak neck is served when the cartridge is fired. When screwed into the the body, the male end is alined by matching chisel marks on the body and the male end. It is locked in place by a setscrew.

b. Cartridge.—The cartridge use in the DP/R link is about ¾ inch long and of .45 caliber. The mouth of the cartridge is sealed with a blue lacquer to keep out oil and moisture. The American type cartridge has an extracting groove around which an adapter clip is placed before the cartridge

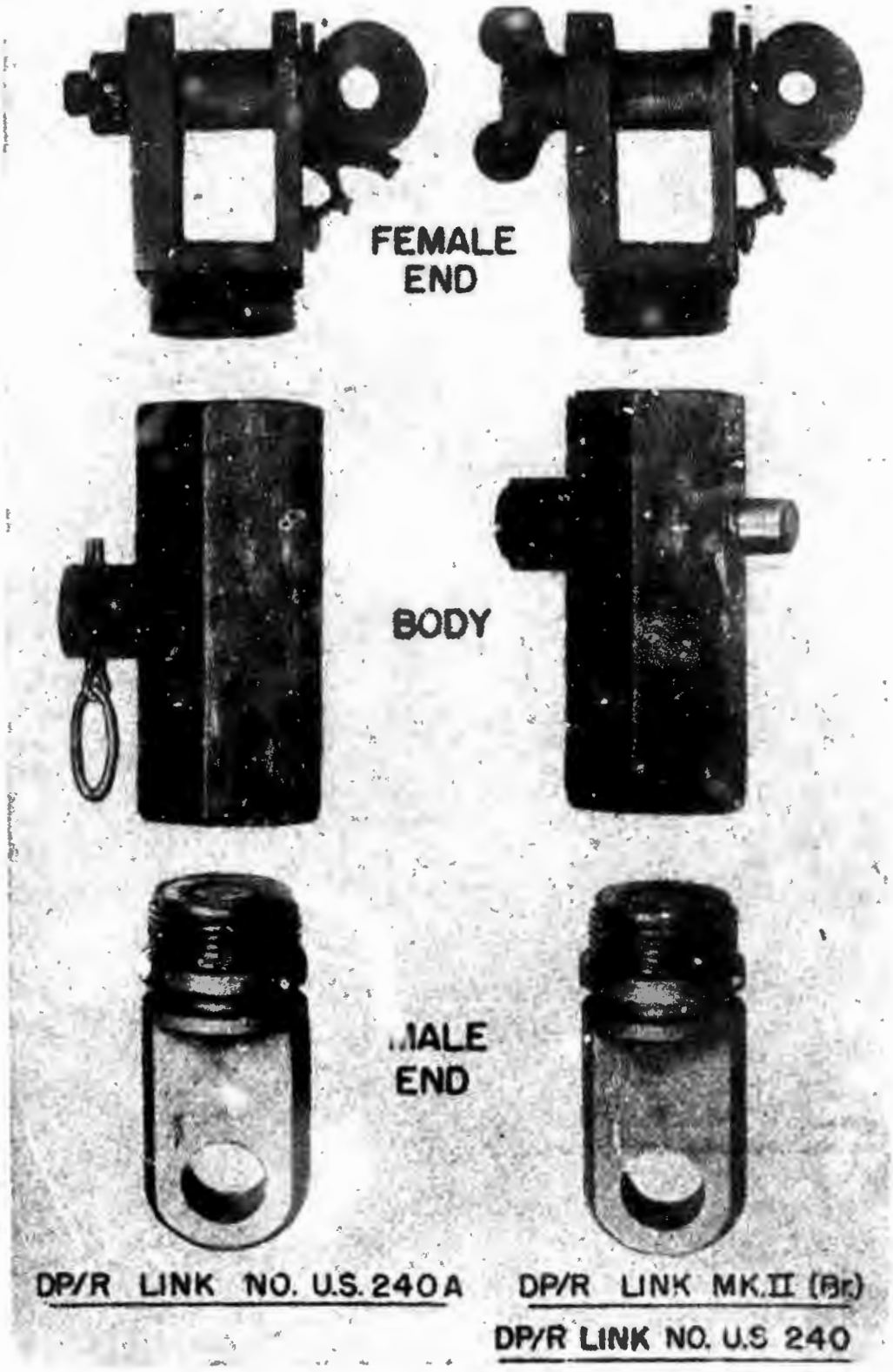


FIGURE 10. - The three main parts of the DP/R Links No. U. S. 240A, Mark II, and No. U S. 240.

is inserted in the breech. The adapter clip insures correct seating of the cartridge in the breech. The British type cartridge is made with an extracting rim, which performs the same function as the adapter clip on the American type cartridge.

c. Breech.—The breech fits into the threaded portion of the male end and receives the .45 cartridge. Since the American and British type cartridges differ as described in *b* above, the American and British type breeches are also different. The breech of the DP/R link is recessed to receive the adapter clip of the American type cartridge. Since the British type cartridge does not require an adapter clip, the breech of the DP/R Link, Mark II is not recessed. Ordinarily, a British type cartridge should not be used in an American type breech because misfires are likely to occur as a result of the loose fit of the cartridge in the breech. If the American type cartridge with the adapter clip is used in the British DP/R Link, Mark II breech, the increased thickness of the adapter clip over the extracting rim will require a new alinement of the male end to the body. It will be necessary to provide a new setscrew hole in the male end and the joint will have to be waterproofed with luting.

■ 10. BODY.—*a. General.*—The body contains a lower inertia spring, a striker weight, an upper inertia spring, and a safety device.

b. Inertia springs and striker weight.—The upper and lower inertia springs and the striker weight are housed in the body with the weight between the two springs. The weight and springs are the means by which the link is fired. The weight slides within the body and has on its lower end a firing pin which can pass through the firing pin hole in the body partition. (See figs. 5 and 6.) To prevent pneumatic cushioning, the weight is slotted.

c. Safety devices.—(1) *General.*—The safety device of the DP/R Link No. U. S. 240A is known as a stop; that of the DP/R Link, Mark II or No. U. S. 240 is called a safety pin assembly. Each device is the means of setting the link at SAFE and LIVE. When a DP/R link is set at LIVE, the striker weight is free to move within the body and, therefore, ready to function.

(2) *Stop.*—The DP/R Link No. U. S. 240A is made LIVE by the withdrawal of the cotter pin with key ring from the stop. When the cotter pin is withdrawn, the stop spring pushes the stop out of the groove in the striker weight, thereby permitting movement of the weight. To set the link at SAFE, the stop is pushed in, compressing the stop spring, and the cotter pin is inserted. (See fig. 5.)

(3) *Safety pin assembly.*—(a) The head of the safety pin of the DP/R Link, Mark II or No. U. S. 240, has a groove which indicates by its position whether the link is set at SAFE or LIVE. When the indicating groove is parallel with the arrow on the body marked SAFE, the striker weight is locked; when it is parallel with the arrow on the body marked LIVE, the link is armed. On the shank of the safety pin are two parallel flats where the safety pin passes through the striker weight. When the safety pin is set at SAFE, the flats are at right angles to the slot and prevent the striker weight from moving within the body. (See fig. 6.) When the safety pin is set at LIVE, the flats are parallel with the slot in the striker weight, and the weight is free to slide within the body. (See fig. 11.)

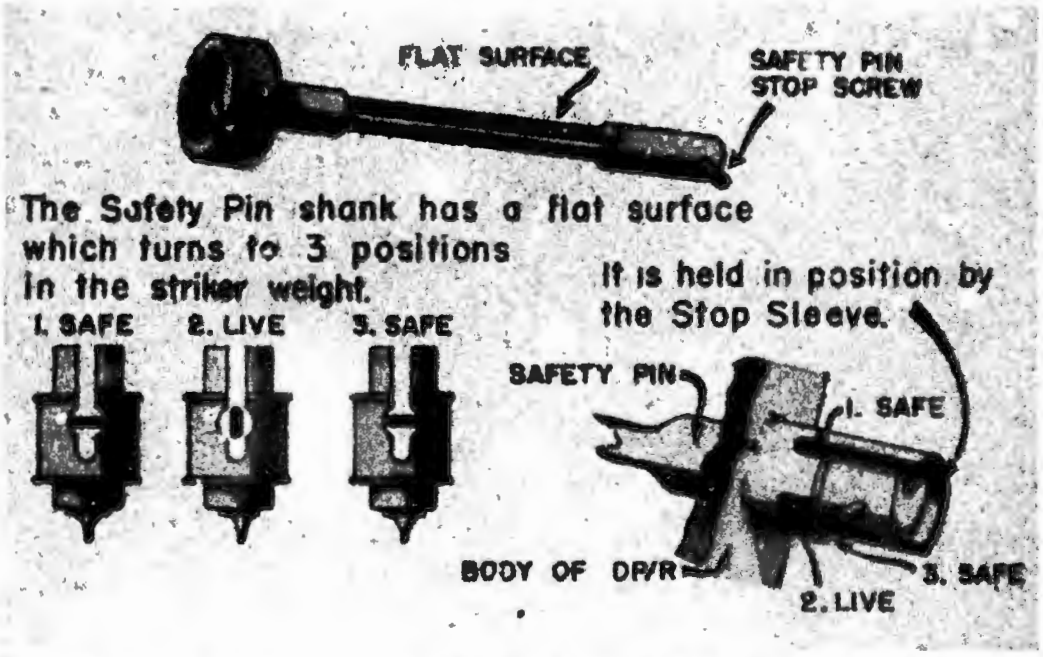


FIGURE 11.—Functioning of DP/R Link, Mark II or No. U. S. 240 stop sleeve.

(*b*) The safety pin is retained in the SAFE or LIVE position by the safety pin stop screw, which projects from the safety pin shank at the end opposite the head. The safety pin stop screw engages any one of three radial slots in the stop sleeve, the central slot being at right angles to the other two. The extended walls of the stop sleeve prevent the safety pin from turning more than one-half turn. (See fig. 11.) The stop sleeve provides two SAFE positions and one LIVE position for the safety pin. The safety pin stop screw is held in any one of these three positions by the pressure of a safety pin spring between the under side of the safety pin head and the body.

■ 11. OTHER PARTS.—For details of other parts of the DP/R Link and DP/R Link, Mark II, see figures 12 and 13.

■ 12. FUNCTIONING.—*a. Impact action* (see fig. 14).—When the cable is struck by a plane, the sudden surge on the flying cable causes a downward jerk. With the safety device in the LIVE position, this sudden downward jerk causes the striker weight to compress the upper inertia spring. The upper (stronger) inertia spring, painted red, rebounds and forces the weight downward sufficiently to compress the lower (weaker) inertia spring, painted yellow. (See fig. 37 for table of springs.) The firing pin is driven against the cartridge hard enough to detonate it. The explosion of the cartridge severs the weak neck and frees the balloon from the flying cable. Since the rip cord is tied to the flying cable below the DP/R link, it pulls off the rip panel and the balloon deflates rapidly. The falling cable will also pull the parachute from the parachute bag and cause it to open.

b. Break-away action.—(1) When the flying cable breaks while under a tension of approximately 1,100 pounds or more, the relaxation of tension subjects the DP/R link to a sudden upward jerk sufficient to compress the lower inertia spring and drive the cartridge against the firing pin. For this action to take place, the DP/R link must be set in the LIVE position. (See fig. 14.) A cable length of about 500 feet above the break is required to pull off the rip panel.

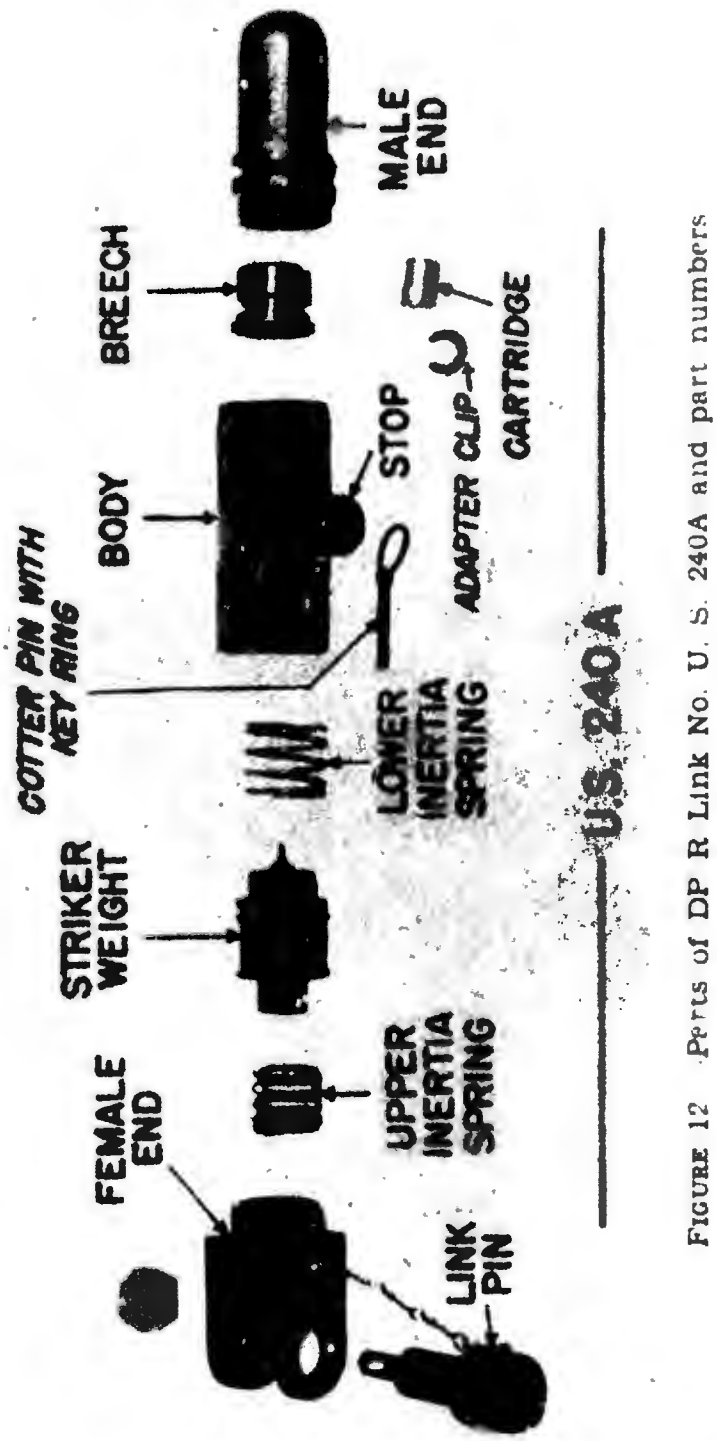


FIGURE 12.—Parts of DP R Link No. U. S. 240A and part numbers.

(2) For training purposes it may be desirable to arm the DP R link for break-away action only. Since the upper inertia spring takes no part in break away action, it may be removed and a distance piece, drawing No. A–3302–16, sub-

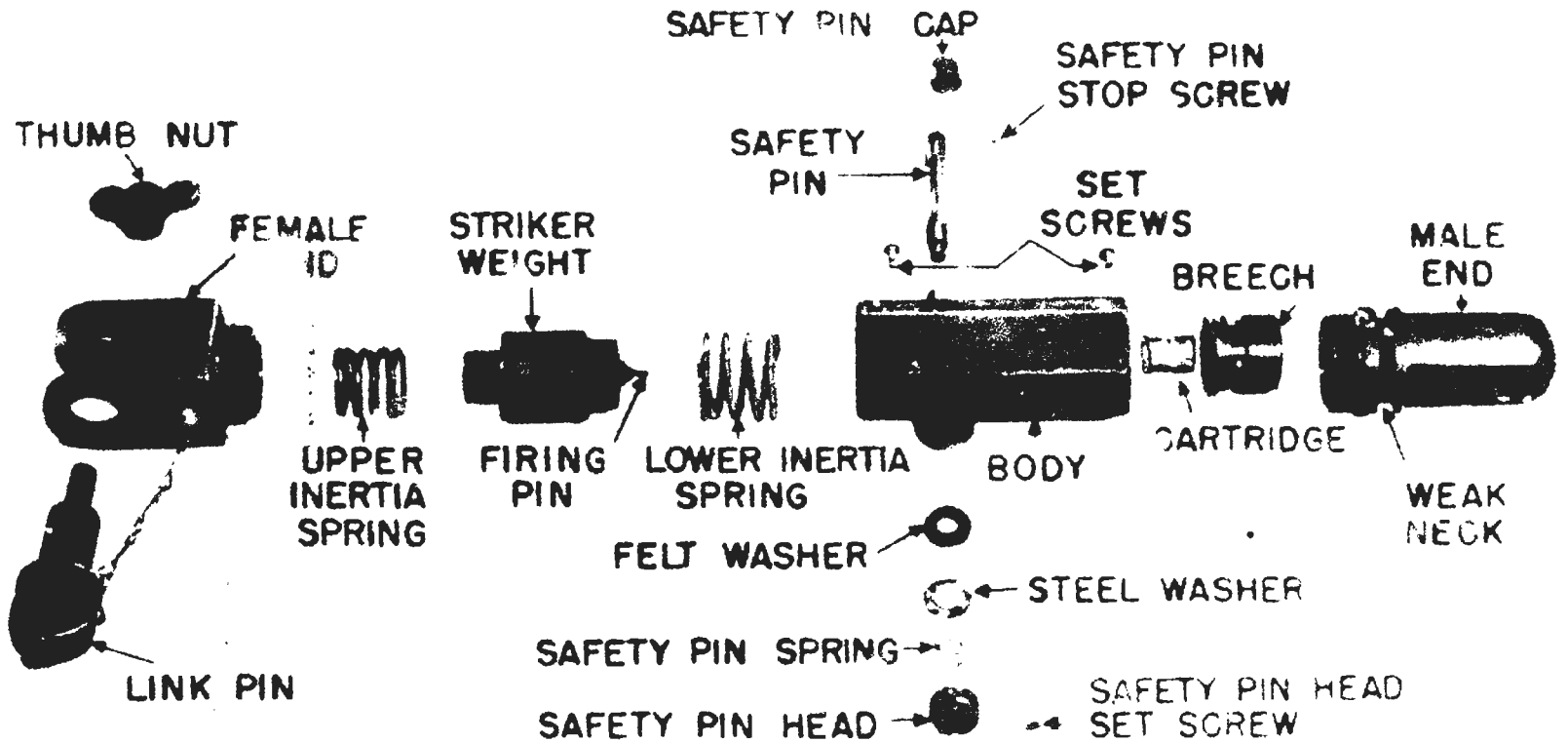


FIGURE 13.—Parts of D[illegible] R Link, Mark II, or No. [illegible] S. 240.

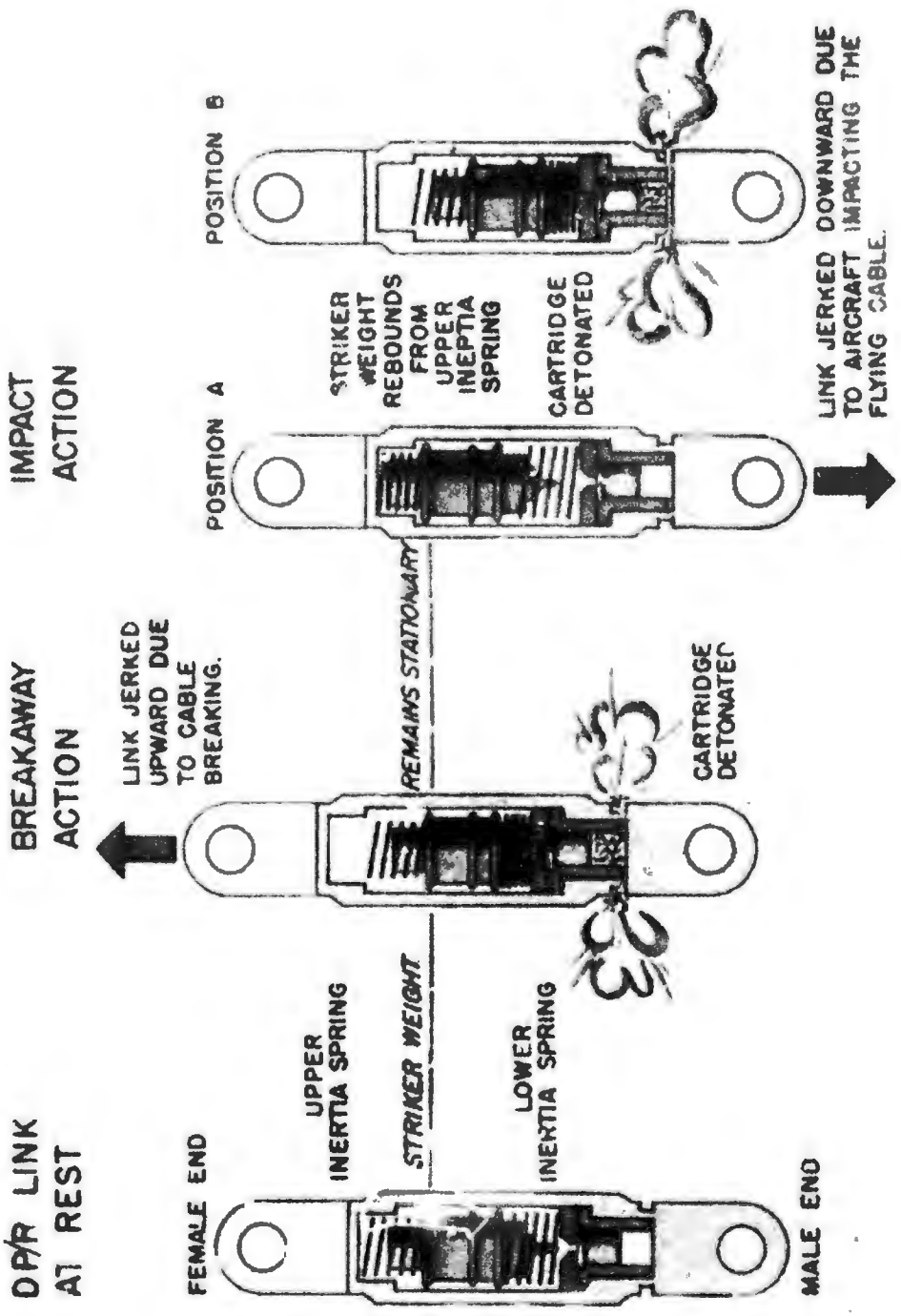


FIGURE 14.—Functioning of DP R link.

stituted. When this is done, a weaker inertia spring, white, drawing No. B–3302–7, replaces the yellow spring. (See fig. 37.) When the white spring is used, less tension in the flying cable at the time of a break-away is needed to cause the link to function.

■ 13. DISASSEMBLY.—When the DP/R link is removed from the balloon for any reason, the link is always set at SAFE. Figures 15, 16, and 17 illustrate the method of disassembling the DP/R Link, No. U. S. 240A; figures 15, 16, 18, and 19 show the steps taken in disassembling the DP/R Link, Mark II and No. U. S. 240. A hardened steel rod, $1\frac{1}{16}$ inch by 12 inches long, may be used in disassembly instead of a vise.

■ 14. ASSEMBLY.—The procedure for assembling a DP/R link is the reverse of disassembling.

■ 15. LOADING.—To load a DP/R link, the male end is removed from the body as in disassembling and the cartridge with adapter clip is inserted in the breech. This assembly is then put in the male end, which is screwed into the body and locked by a setscrew.

■ 16. UNLOADING.—To unload a DP/R link, the safety device is set at SAFE, and the male end removed as described in disassembly. The breech is then taken out of the male end and the cartridge removed and put in the cartridge case. The breech is then replaced in the male end, which is screwed into the body and locked with a setscrew.

SECTION II

DOUBLE PARACHUTE LINKS

■ 17. PARTS.—*a. General.*—The double parachute link, No. U. S. 200, No. U. S. 200A, or Mark VI (British) each consists of three main parts: the barrel, the cutter housing, and the wedge housing. (See fig. 20.) The wedge housing is mounted on the barrel and retained thereon by the cutter housing, which screws onto the end of the barrel. The link is secured to the flying cable by wedges in the wedge housing and a U-clamp on the cutter housing.

b. Barrel.—(1) The barrel is threaded externally on the open end and screws into the cutter housing. Near the closed end is a flange provided with flats to take a wrench. Beyond the flange on the end of the barrel are two

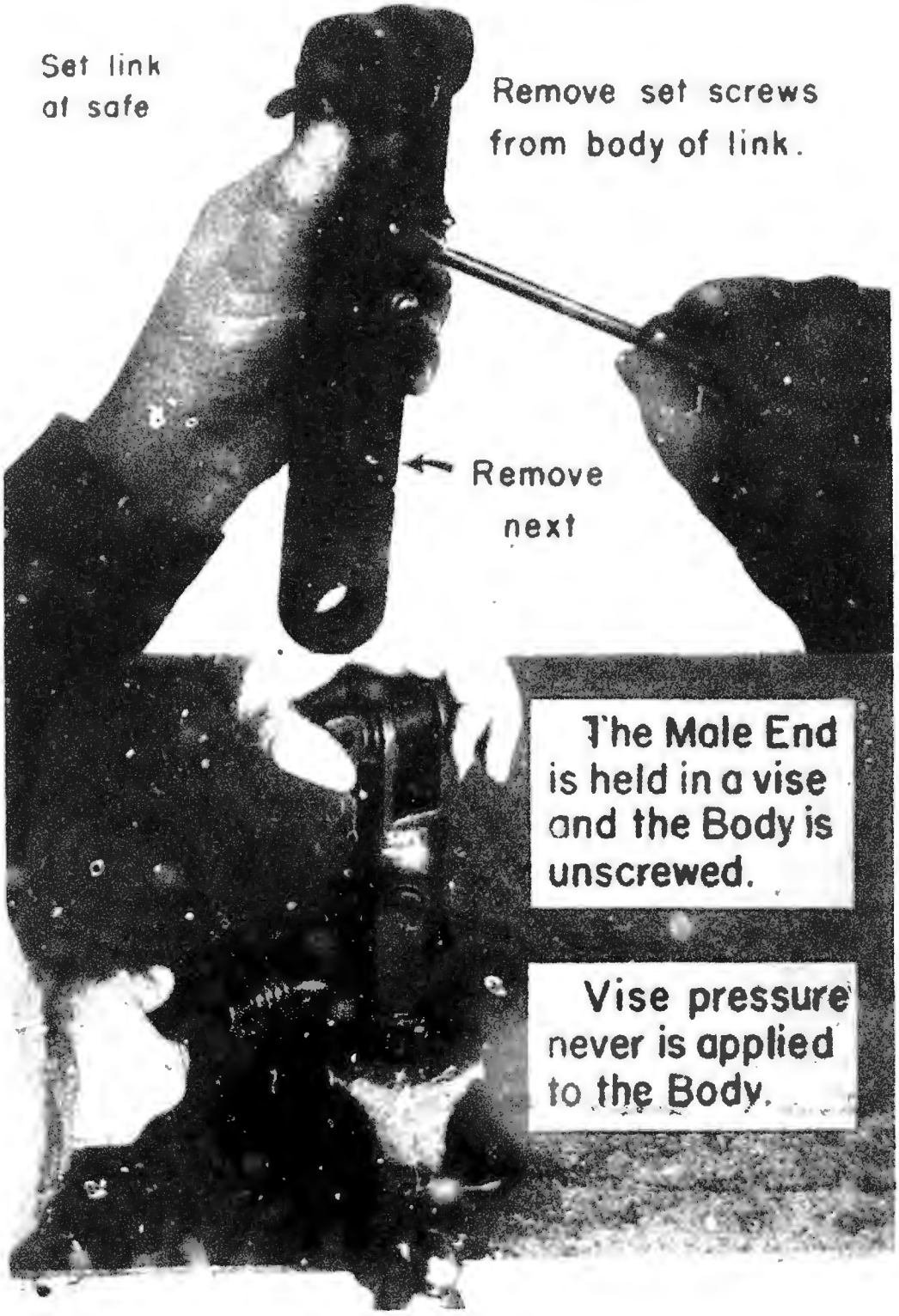
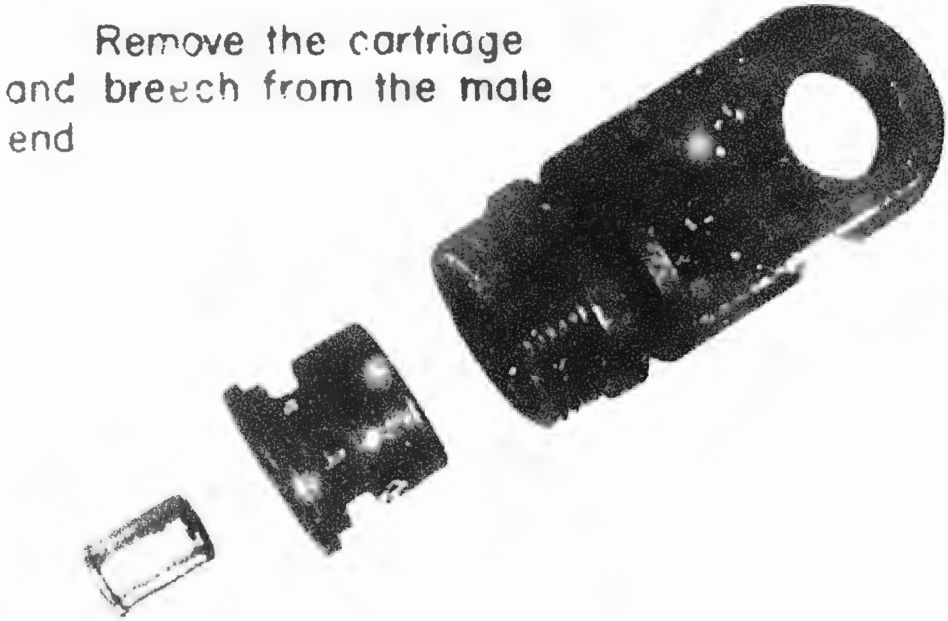


FIGURE 15 First steps in disassembly of DP R Link No U S 240A, No U S 240, or Mark 1.



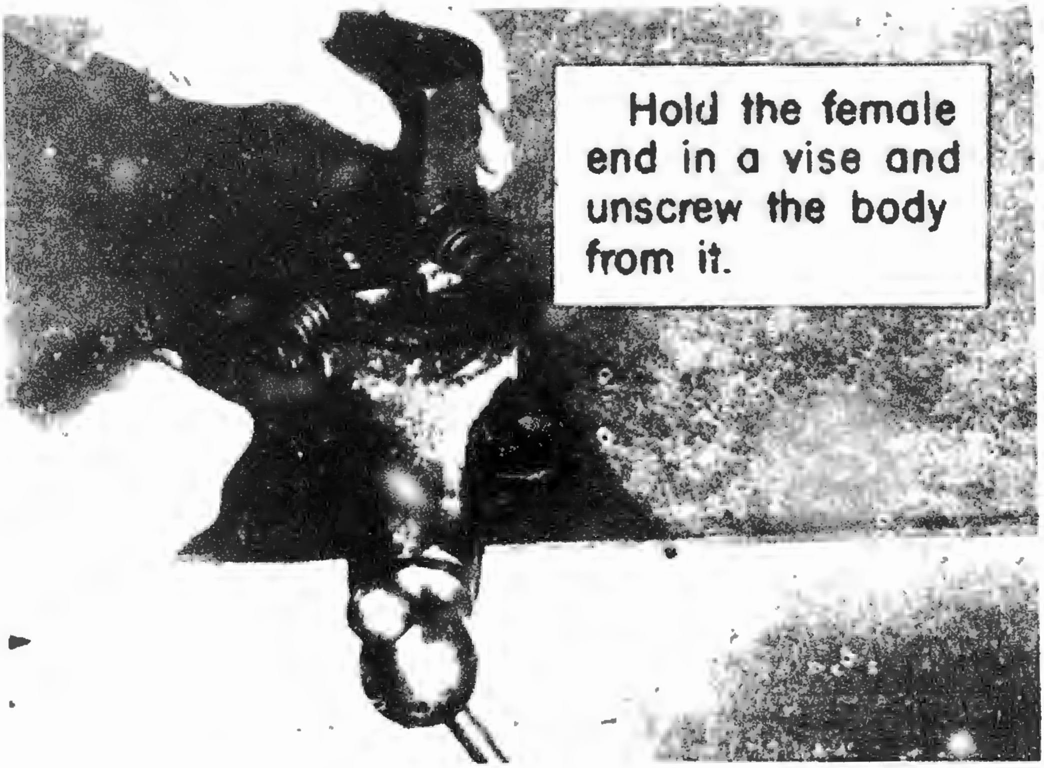


FIGURE 16 ... DF R ... No. U. S. 24 A ... M ... k II

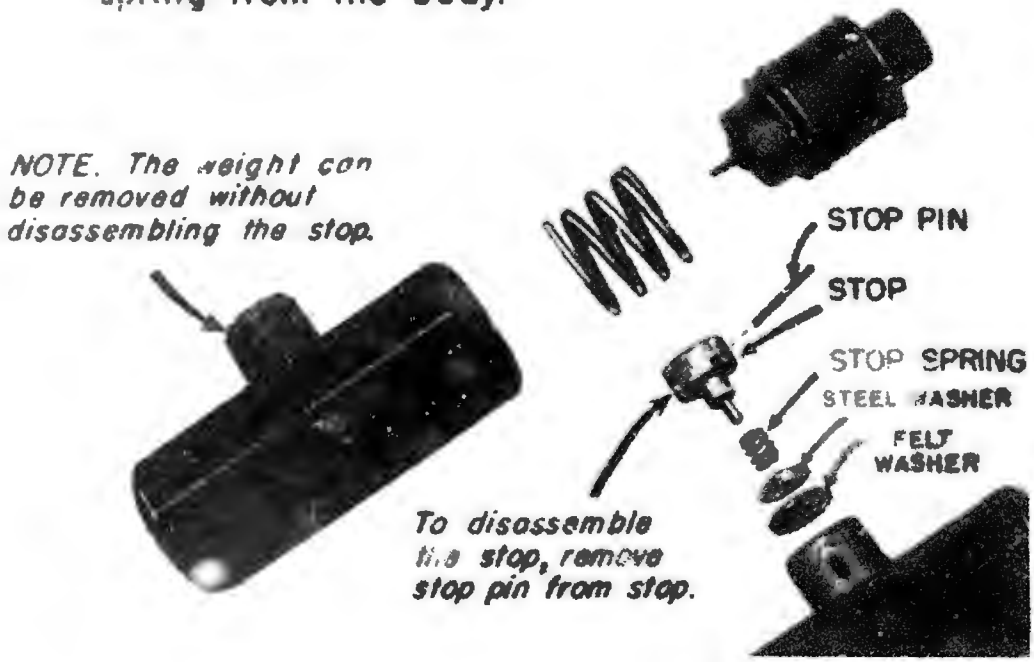


FIGURE 17. Third steps in disassembly of DP R Link, No. U. S. 240A

Remove upper inertia spring from body.

Remove set screw from head of safety pin.

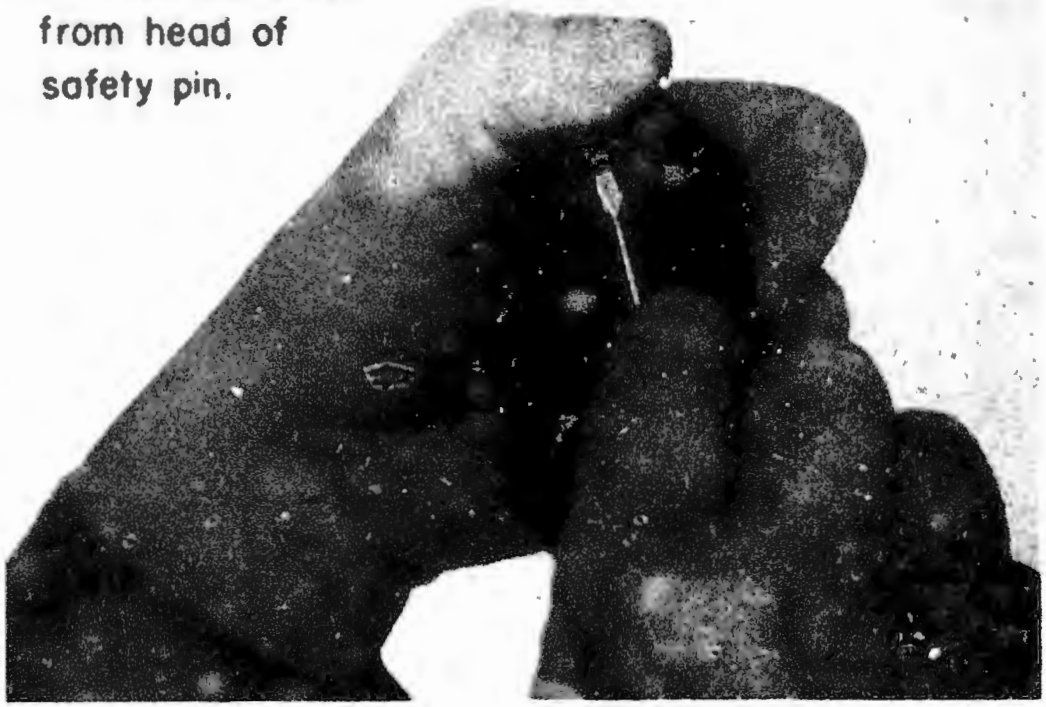


FIGURE 18.--Third steps in disassembly of DP/R Link, Mark II or No. U S. 240.

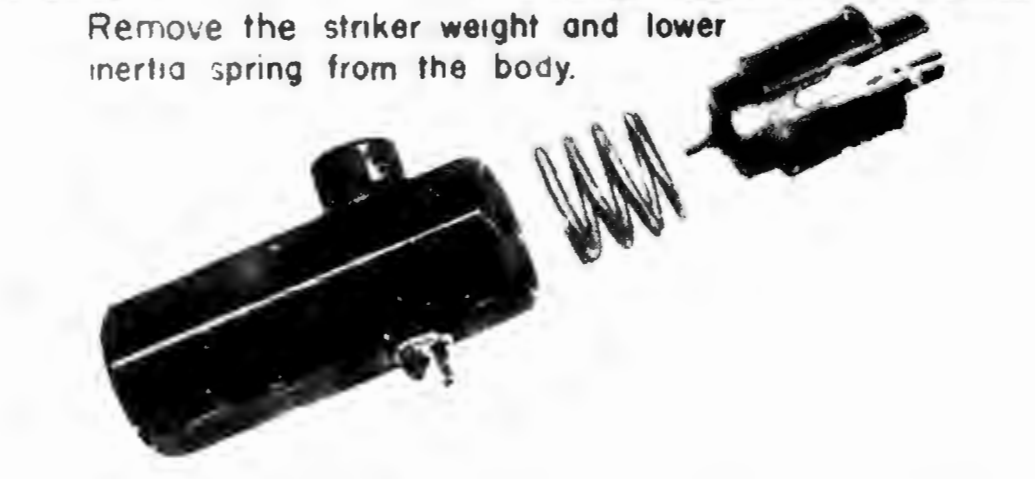


FIGURE 19.- Fourth steps in disassembly of DP R Link, Mark II or No. U S 240

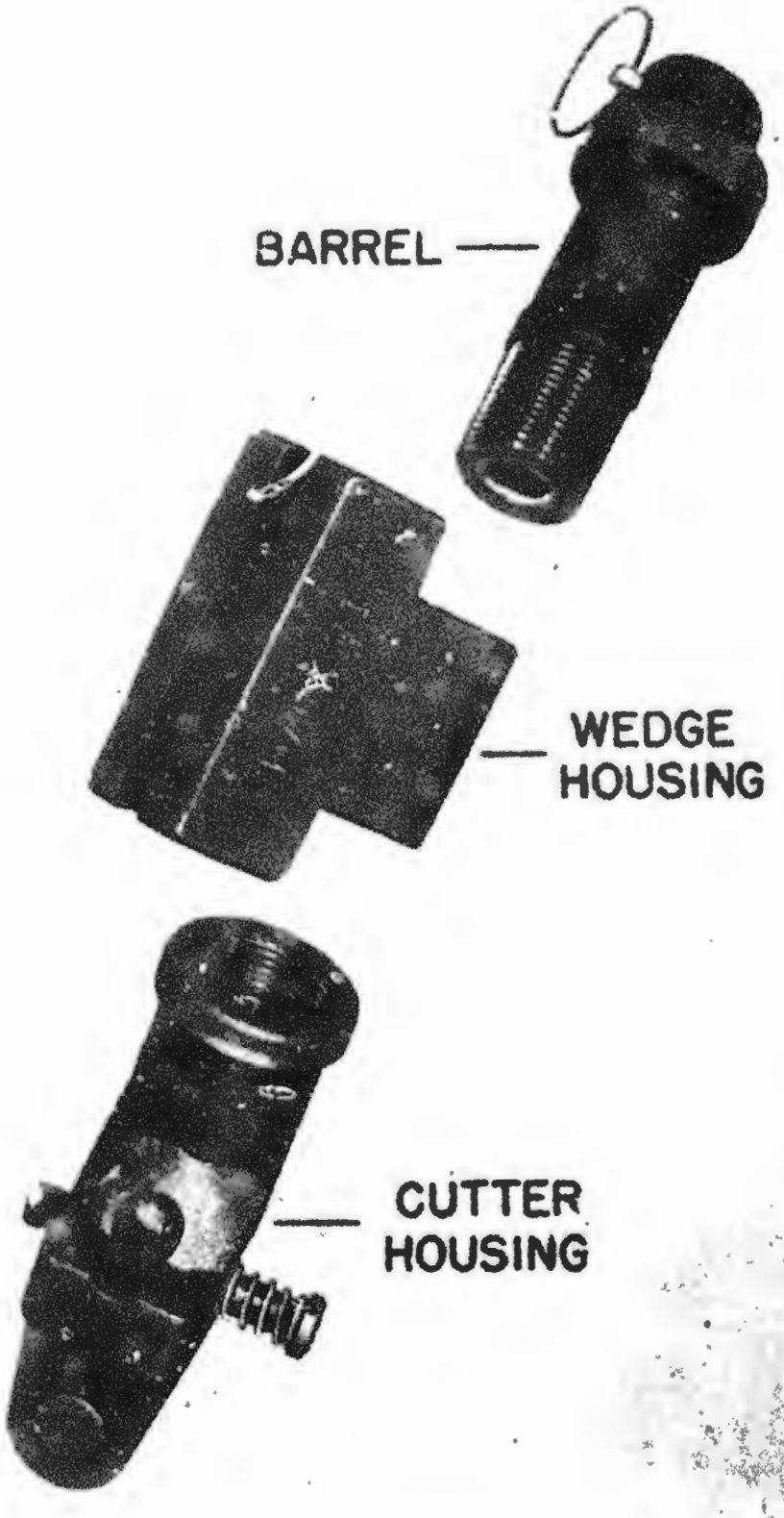


FIGURE 20.—The three main parts of the DPL.

diametrically opposite holes, either of which receives the pin on the safety clip. (See fig. 21.) When the safety clip is removed, the DPL is armed. A rubber cap is then placed over the end of the barrel to cover the two holes.

(2) *Inertia weight.*—An inertia weight is housed within the barrel. On one end of the inertia weight is a firing pin; on the other end is a locking groove for the reception of the safety clip. Two lengthwise grooves prevent pneumatic cushioning as the inertia weight slides within the barrel.

(3) *Inertia weight springs.*- An inertia weight spring is located in the barrel between the inertia weight and the breechblock. The inertia weight spring suspends the inertia weight and prevents the link from firing except on impact. The type of spring used in the DPL is determined by the manner in which the cable is being armed. With the double parachute arming scheme, inertia weight spring painted black, drawing No. A–3610–A, is used in the DPL. In series arming, inertia weight spring painted blue, drawing No. 3314–12, is used in the first and second DPL units. In the bottom DPL, spring, drawing No. A–3610–A, is used as in double parachute arming. (See fig. 37.) Spring No. A–3610–A is a weaker spring than No. U. S. 3314–12. The weaker spring is used with the bottom DPL unit of series arming to make it more sensitive. The bottom unit should be more sensitive than the upper units because of its nearness to the winch, which causes a slight dissipation of the tension wave.

(4) *Safety clip.*—The safety clip consists of a bow-shaped clip made of spring steel and fitted with a clip pin and a wire ring, which facilitate its removal from the end of the barrel.

(5) *Rubber cap.*—A rubber cap is used to prevent moisture from entering the barrel through the clip pin holes when the DPL is armed. The beaded edge of the rubber cap engages a grove on the end of the barrel and prevents the cap from slipping off. The cap is attached to the link by a loop of string.

c. Cutter housing.—(1) *General.*—The threaded end of the cutter housing receives the threaded end of the barrel. The other end is forked and carries a large pin to hold the

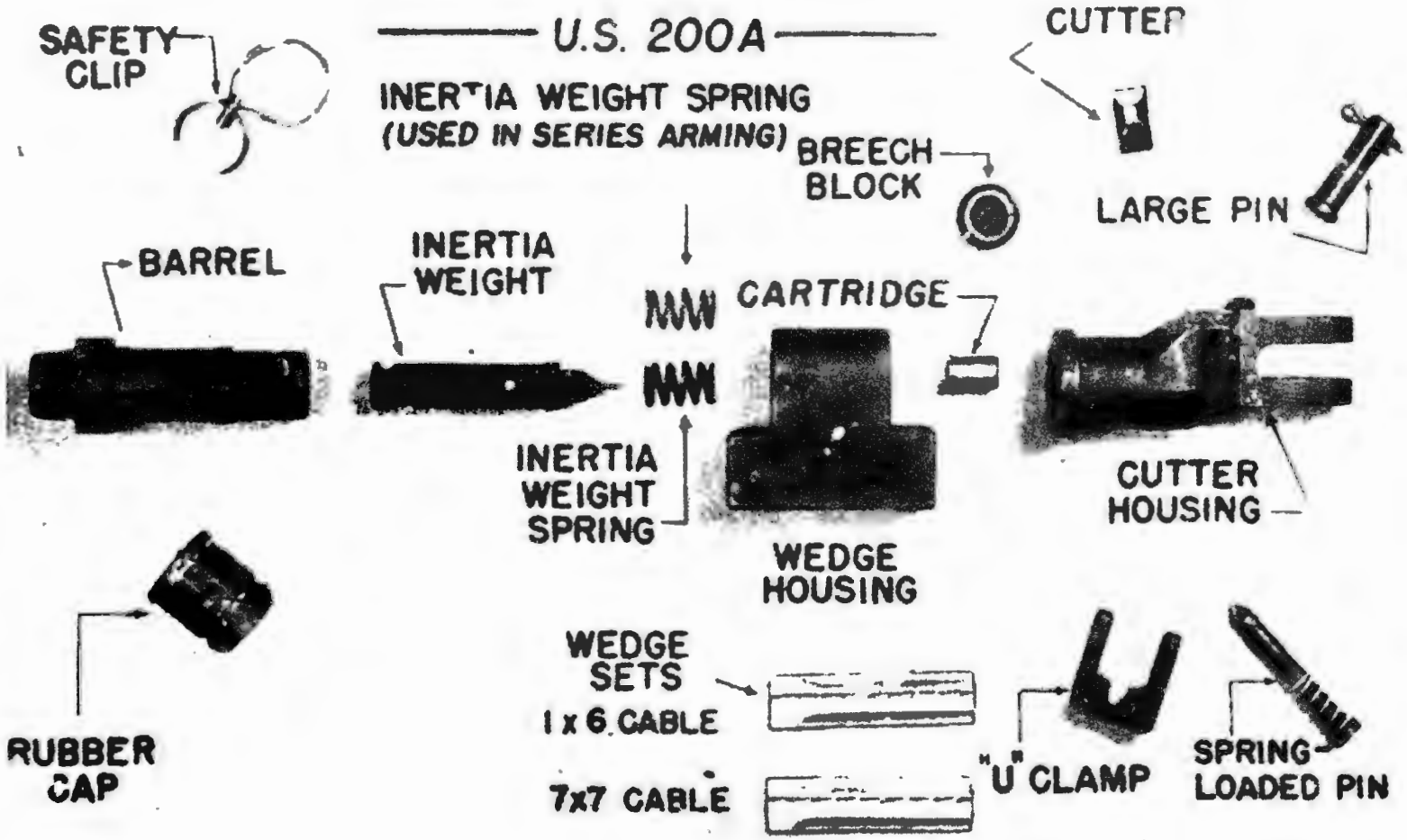


FIGURE 21.—Parts and part numbers of DPL.

thimble of the intermediate cable attached to the parachute. Grooves formed in the side of the cutter housing position the U-clamp. A cable notch aline the cutter housing with the cable.

(2) *U-clamp.*—A U-clamp is located by grooves in the cutter housing and holds the cable in the cable notch. This U-clamp is reversible. A spring-loaded pin holds it in place.

(3) *Spring-loaded pin.*—The spring-loaded pin consists of a pin, a pin spring, and a pin latch. When the pin is inserted through the U-clamp and cutter housing, the pin latch is turned to lock the pin in place.

(4) *Breechblock.*—The breechblock which is used in the DPL No. U. S. 200 and the earlier type DPL, Mark VI is chamfered around the edge and recessed on one face. This breechblock fits into the hollow end of the cutter housing with its chamfered and recessed face toward the cartridge. The breechblock for use with DPL No. U. S. 200A and later type DPL, Mark VI is reversible. Either side of this breechblock can be placed against the cartridge. (See fig. 22.)

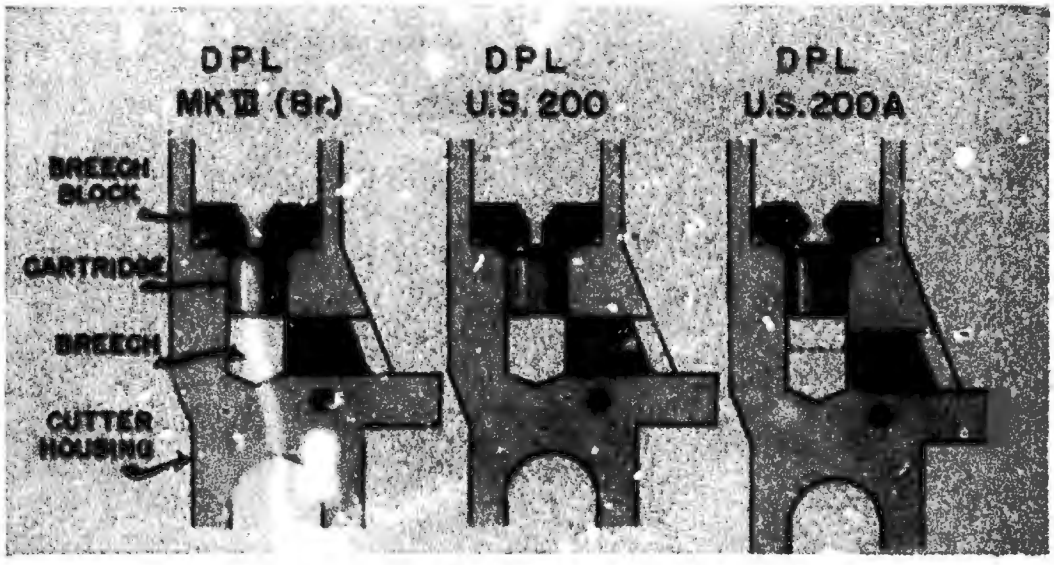


FIGURE 22.—Breechblocks for DPL and DPL, Mark VI.

(5) *Breech.*—Inside the hollow end of the cutter housing is a small cavity called the breech. The breech receives the cartridge. (See fig. 22.)

(6) *Cartridge.*—The DPL breech takes a .45 caliber cartridge. (See fig. 22.) It is about ½ inch long, and the mouth

is sealed with red lacquer. The British type cartridge has an extracting rim; the American type has an extracting groove. An adapter clip must be used with the American type cartridge.

NOTE.—*The cartridges for the DPL and DP/R link must not be interchanged. In an emergency, however, the ¾-inch cartridge of the DP/R link can be used in the breech of the DPL No. U. S. 200A.*

(7) *Cutter bore.*—The cutter bore extends radially into the cutter housing and connects with the bottom end of the breech. The cutter bore contains the cable cutter.

(8) *Cutter.*—The cutter is placed in the cutter bore and is sealed and held in position with luting (a puttylike material). The outer edge of the cutter is ground on a bevel to provide a cutting edge, and the inner edge is recessed to engage the cartridge, the engagement insuring the correct location of the cutter. The beveled or cutting edge should be down for the cutter to function properly.

d. Wedge housing.—(1) *General.*—The wedge housing, which receives the cable and a wedge set, consists of a slotted rectangular portion backed by a rounded hollow lug. (See fig. 20.) A recess in the back of the rectangular portion accommodates the rim of the cutter housing. The recess and rim arrangement insures that the wedge housing is assembled in the right way and also prevents the barrel from unscrewing from the cutter housing.

(2) *Wedge set.*—The wedge housing receives the wedge set used with the DPL, and holds the link to the flying cable. Grooves cut along the edges and back faces of the wedges reduce the surface area bearing on the wedge housing. The inside faces of the wedges have grooves of semicircular cross section which are machined to fit the cable strands on which they grip. It is especially important that wedge sets be used on the type of cable for which they are designed. The size cable with which a wedge set is to be used is marked on the back of each wedge. For cable constructed of strands of single wire, a set of wedges No. U. S. 209 is supplied with the thick end of one of the pair notched and the thick end of the other chamfered. This marking is for identification. There is a difference in the angle of the grooves on each

wedge of a set to prevent the wedges from slipping on a 1 by 6 cable. (See fig. 23.) For 7 by 7 cable, a set of wedges No. U. S. 221 is used. These wedges are both alike and are chamfered at their thick ends.

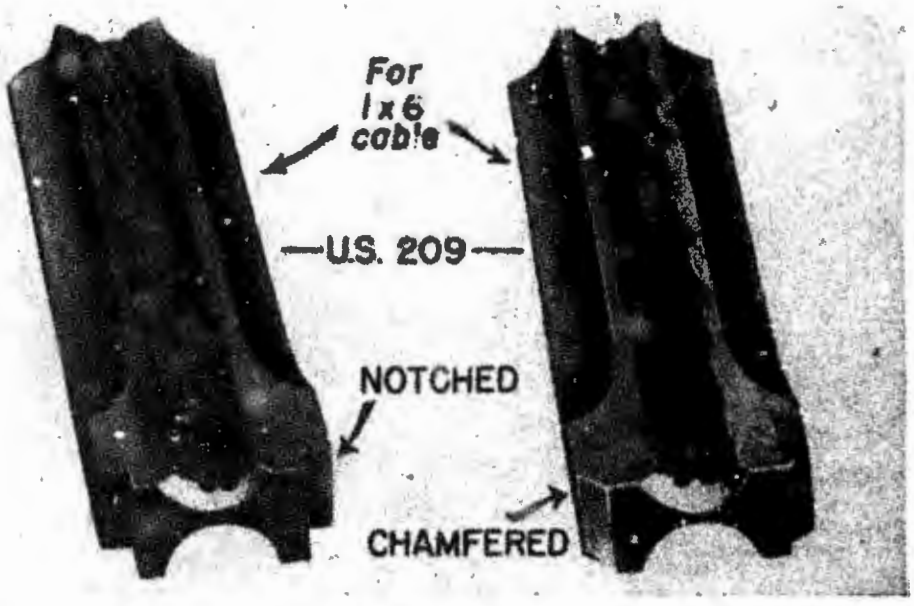


FIGURE 23.—Wedge set, No. U. S. 209, for 1 by 6 cable.

■ 18. FUNCTIONING OF DPL.—*a.* The DPL is single acting and is activated only by an upward surge of the flying cable. (See fig. 24.) When the flying cable is struck by a plane, a surge is imparted and the inertia weight, because of its inertia, remains stationary while the link moves sharply upward. The inertia weight spring is compressed and the cartridge is detonated by the firing pin. The explosion of the cartridge blows the cutter out of the cutter housing, severing the flying cable. The parachute, fastened below the cut in the flying cable, is pulled out of the parachute bag by the intermediate cable end is opened, creating a drag on the wing of the plane.

b. The upper DPL unit of the lower cable section in series arming is inverted. (See fig. 3.) Therefore, this DPL unit is activated by a downward surge of the cable.

■ 19. TOOLS FOR USE WITH DPL.—*a. Locating and extracting tool.*—The locating and extracting tool is used for ejecting the cutter, extracting empty cartridges, and positioning the

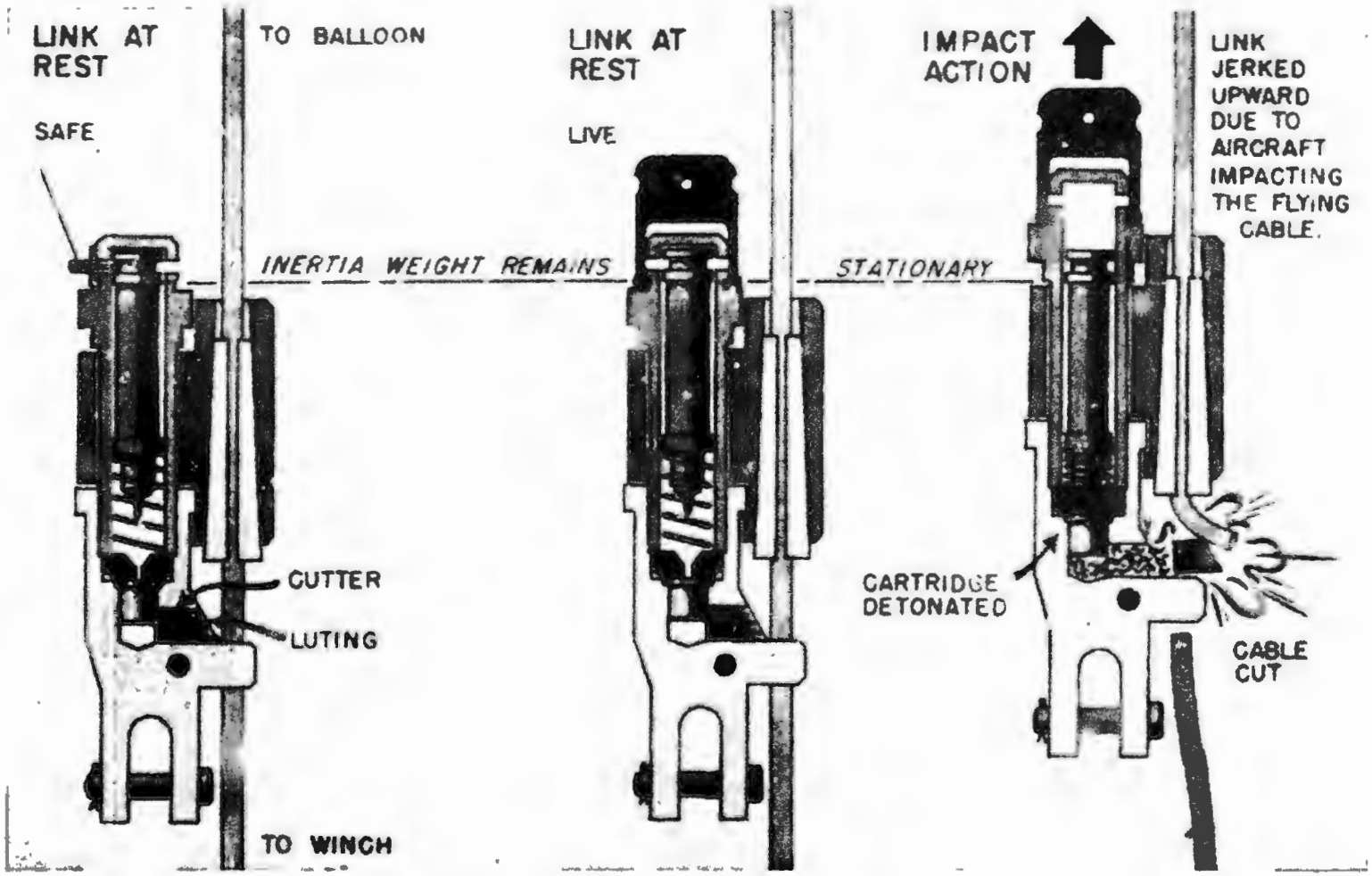


FIGURE 24.—Functioning of the DPL.

cutter during assembling. (See fig. 25.) On one end of the locating and extracting tool there is a thin bar with a curved end for ejecting the cutter. This end is also used for extracting the empty cartridge after it has been fired. On the other end there is a round rod the same diameter as a .45 cartridge. This round rod, which is part of the tool handle, is used to position the cutter during assembling.

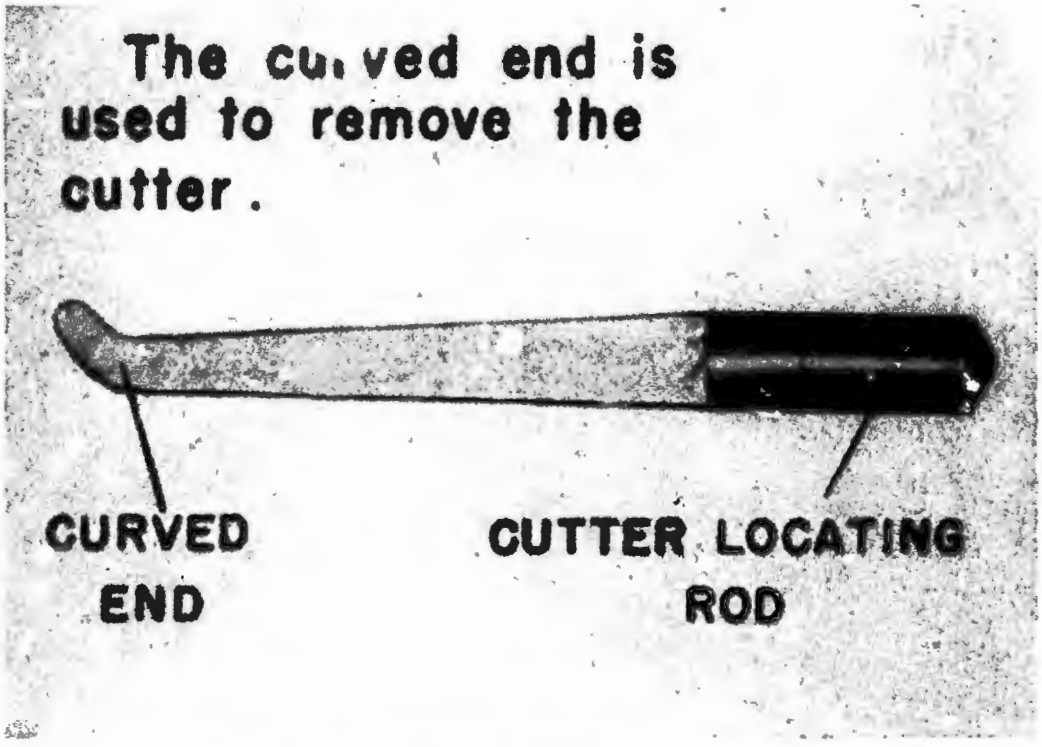


FIGURE 25.—Locating and extracting tool.

b. Cramp.—The cramp, used for attaching and removing the DPL, is similar to a commercial bolt cutter but with special jaws. (See fig. 26.) On the right-hand jaw there is a reversible jaw which can be swung inside the jaws to reduce the distance between them, or swung outside when not needed. On the left-hand jaw there is a wedge extractor jaw which can be swung to the inside of the jaws and used for ejecting the wedges. Adjusting screws are provided on the handles for setting the distance between the jaws. With both the reversible jaw and the wedge extractor jaw swung outwards, the jaws should have a spread of 4 inches with the handles closed and a minimum of 5 inches with the handles open.

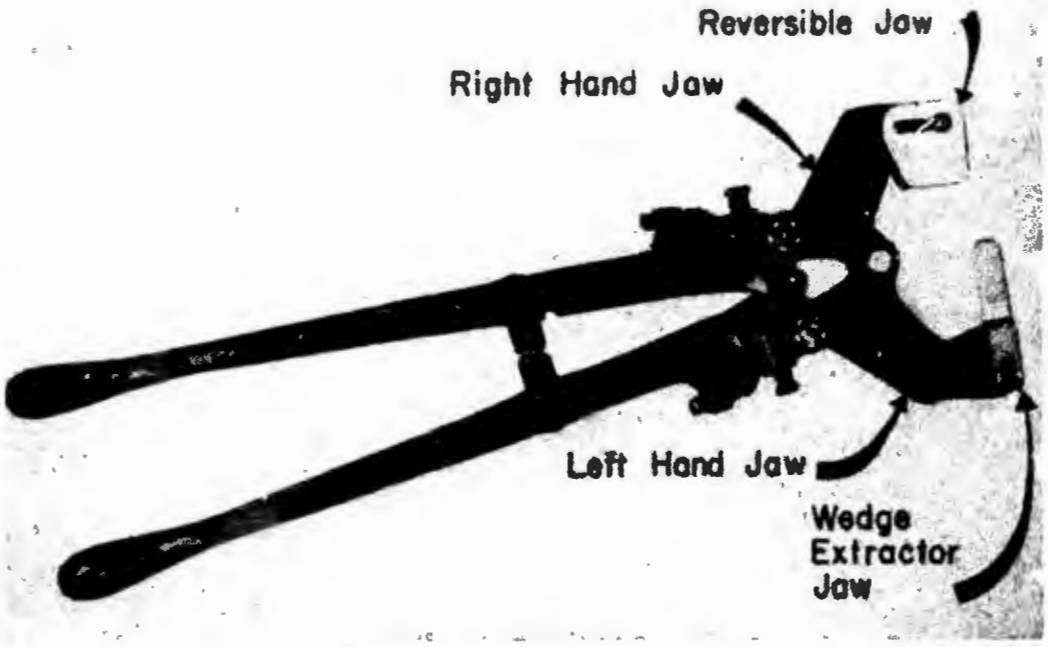


FIGURE 26.—The cramp.

■ 20. INSTALLING AND REMOVING THE DPL.—*a*. For installing and removing the DPL, the cramp is used as follows (see figs. 27 to 31 incl.):

(1) *Tightening wedges.*—Right-hand jaw above, left-hand jaw below.

(*a*) *First step.*—Jaws with both reversible and extractor jaws swung out.

(*b*) *Second step.*—Right-hand jaw with reversible jaw swung in to reduce the gap, and left-hand jaw with extractor jaw swung out.

(2) *Extracting wedges.*—Right-hand jaw below, left-hand jaw above.

(*a*) *First step.*—Right-hand jaw with reversible jaw swung out, and left-hand jaw with wedge extractor jaw swung in.

(*b*) *Second step.*—Both jaws swung in, if this step is necessary.

b. The drill for attaching and removing the link is given in detail in FM 4–187.

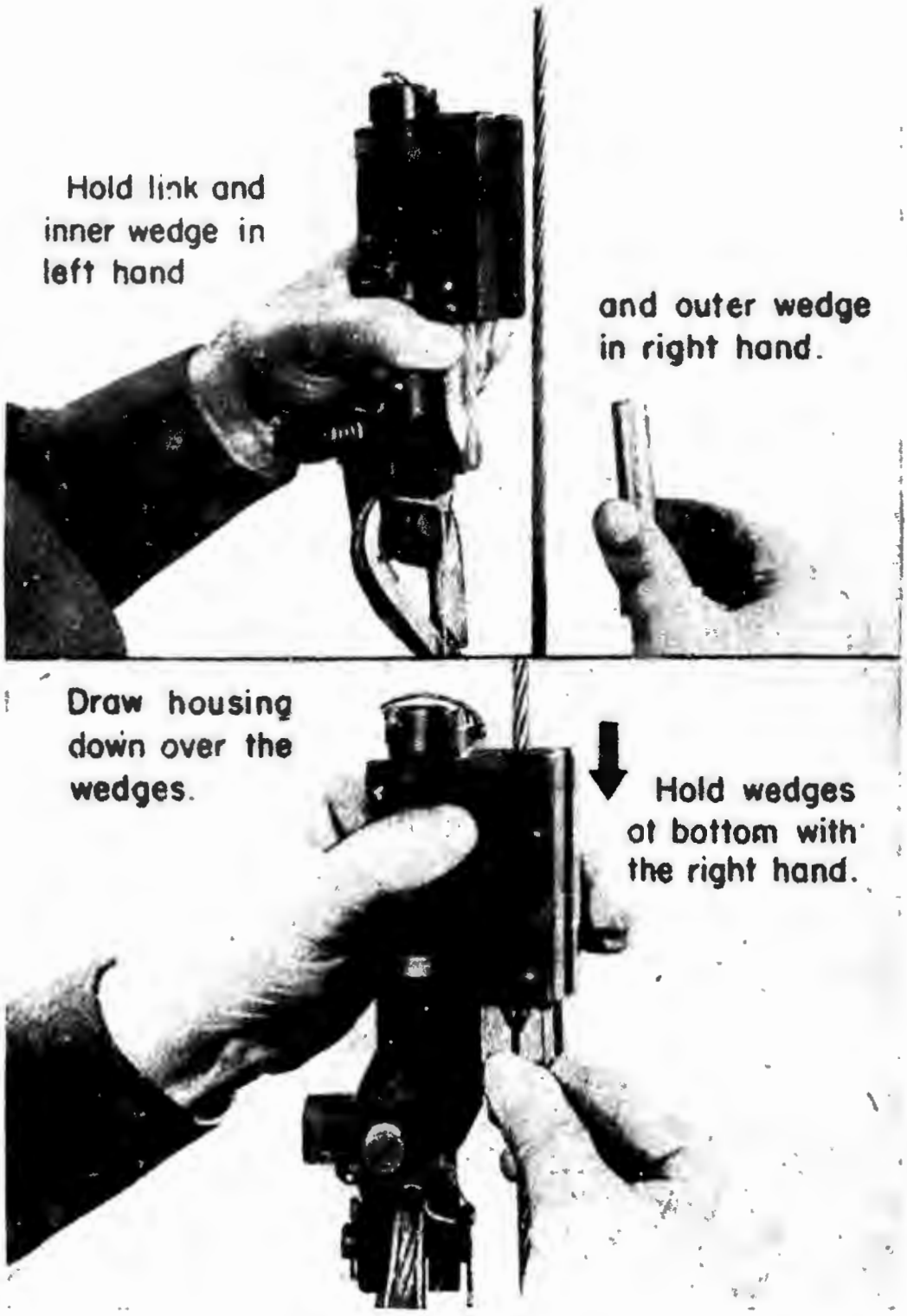


FIGURE 27.—First step in attaching DPL.

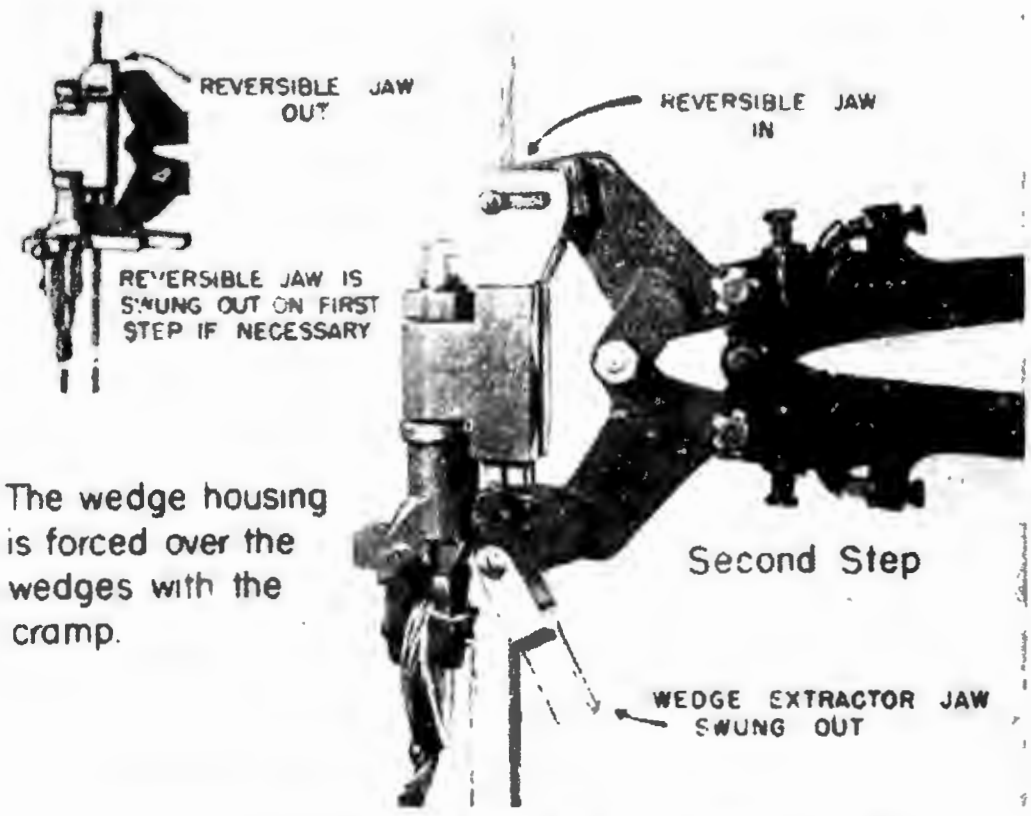


FIGURE 28.—Use of cramp in attaching DPL to cable.

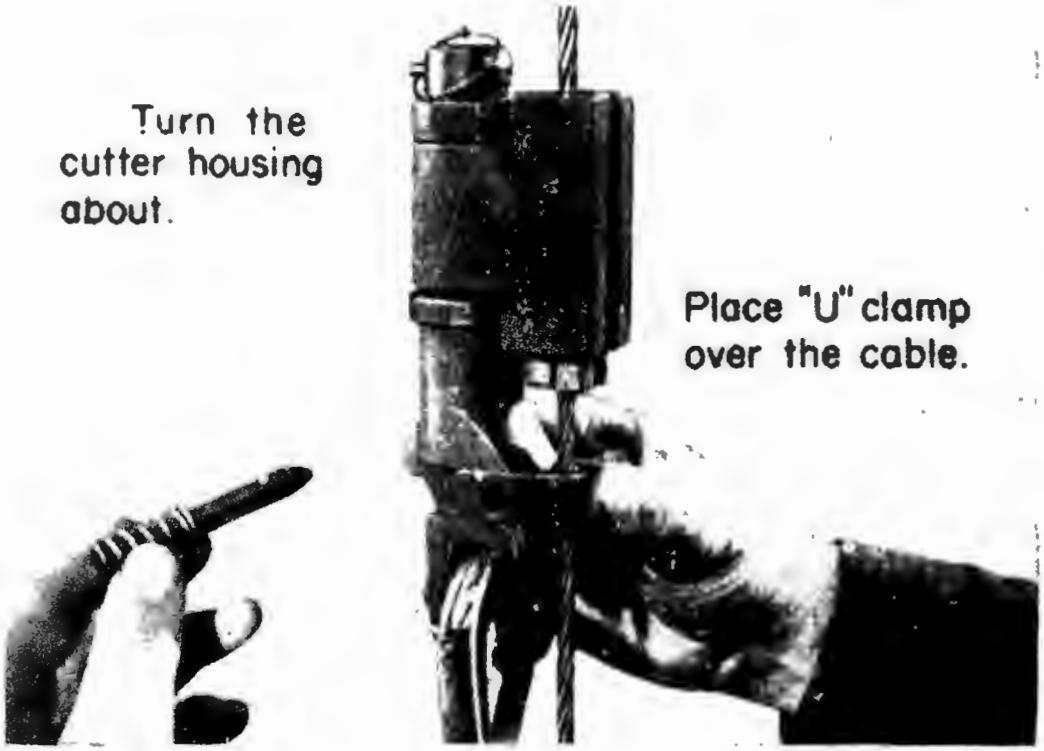


FIGURE 29.—Attaching U-clamp of DPL to cable.

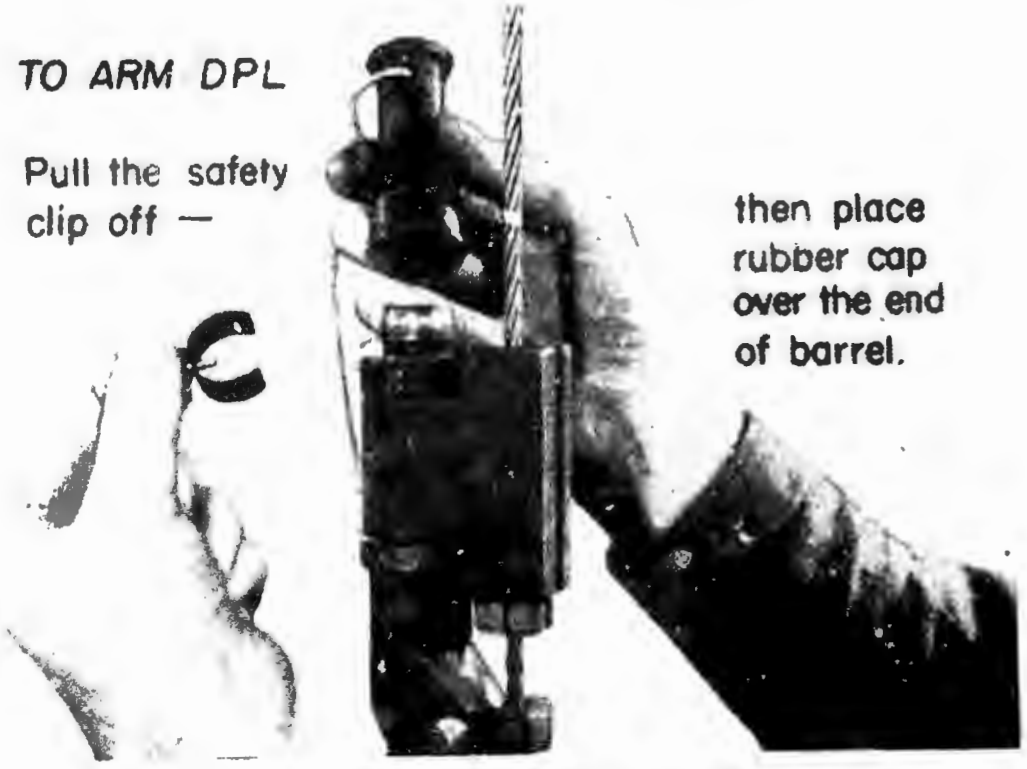


FIGURE 30 —Setting DPL to LIVE.

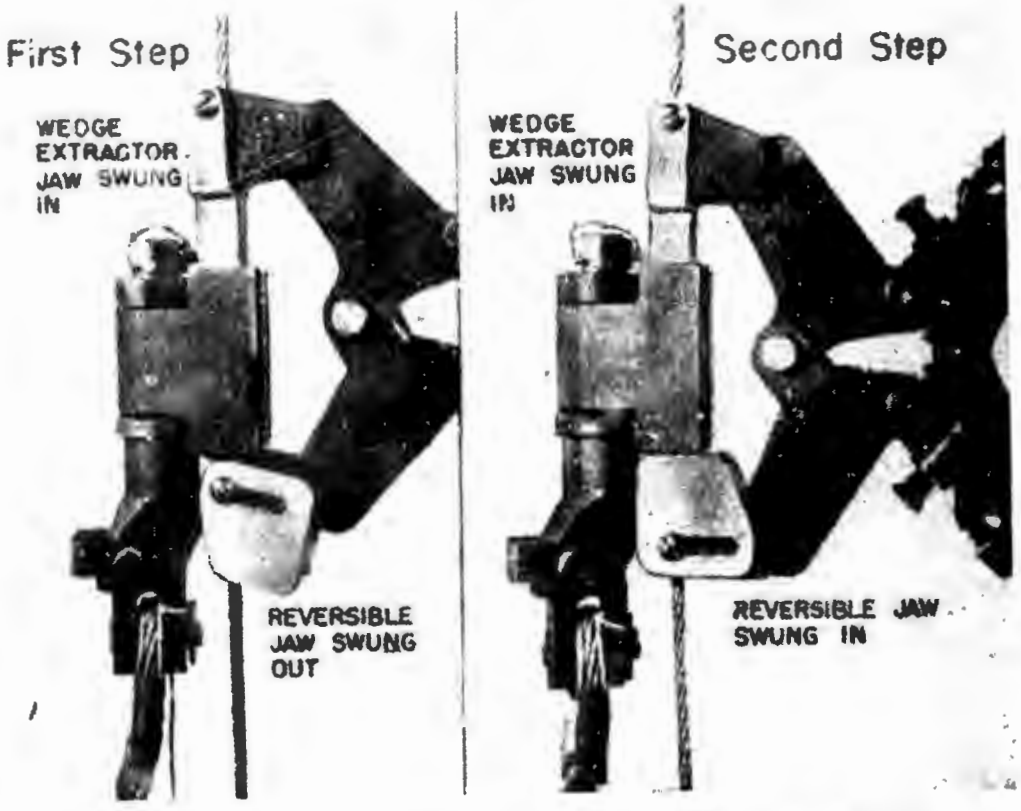


FIGURE 31 —Use of cramp in removing DPL from cable.

■ 21. DISASSEMBLY OF DP[illegible] (See fig. 32 to 35, incl.).—These figures explain in detail the steps taken in the disassembly of the DPL and DPL, Mark VI.

■ 22. ASSEMBLY OF DPL.—To assemble the DPL, the procedure for disassembling is reversed. The cutter is inserted as shown in figure 36. The following precautions are to be observed:

a. The breechblock must lie flat on the bottom of the hollow end of the cutter housing. The breechblock is likely to lodge crosswise on its edge in the housing, particularly if the housing is not held upright. In the crosswise position the breechblock may detonate the cartridge when the barrel is tightened.

b. When using the breechblock for the earlier type Mark VI or the No. U. S. 200, care must be taken that the recessed face of the breechblock be toward the cartridge. If this is not done the cartridge will fail to fire.

c. When tightening the barrel into the cutter housing, the cutter should always be directed away from personnel so that no one will be injured if the unit should fire accidentally.

■ 23. UNLOADING.—To unload the link the disassembly procedure as described in paragraph 21 is followed and the cartridge is removed. If the cartridge sticks, it may be removed by bumping the cutter housing rim against a piece of wood.

■ 24. LOADING.—To load the DPL, it is first disassembled. When the breechblock is removed from the cutter housing, the breech is checked to make certain that it is clean and free from all foreign material. The cartridge is put in the breech by hand. The link with the cartridge is then assembled as described in paragraph 22.

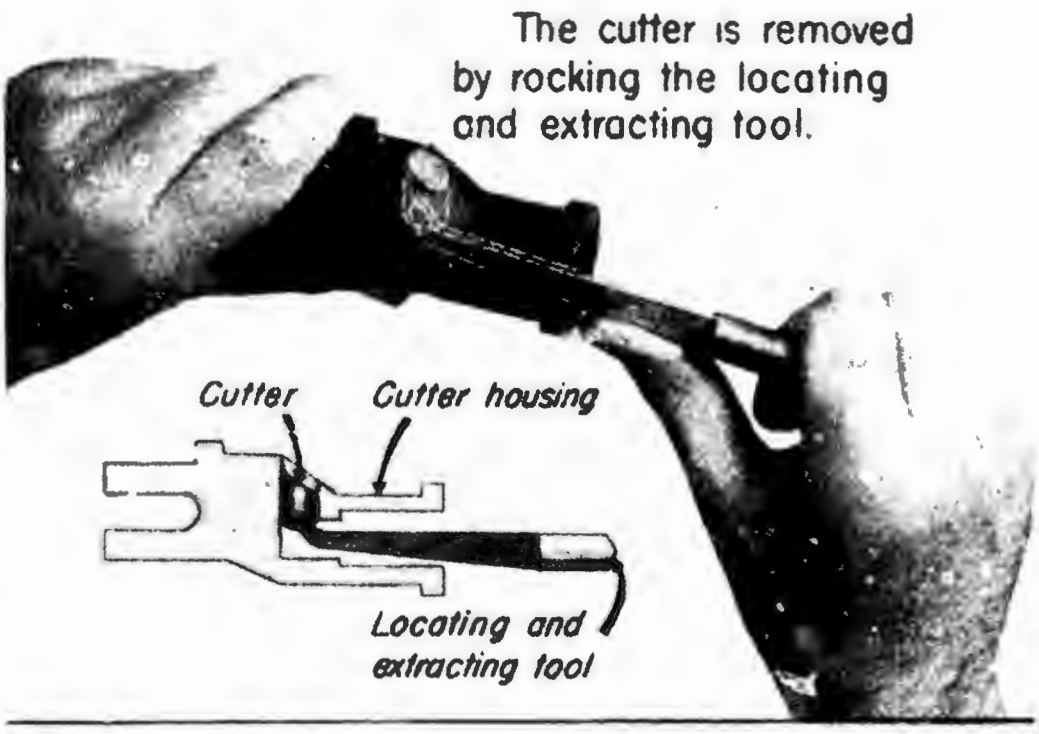
SECTION III

SPRINGS

■ 25. TABLE OF SPRINGS FOR LA BALLOON ARMAMENT.—The various springs used in DP/R links and DPL's are shown in figure 37.

FIGURE 12 First steps in disassembly of DPL.

FIGURE 33.—Second steps in disassembly of DPL.



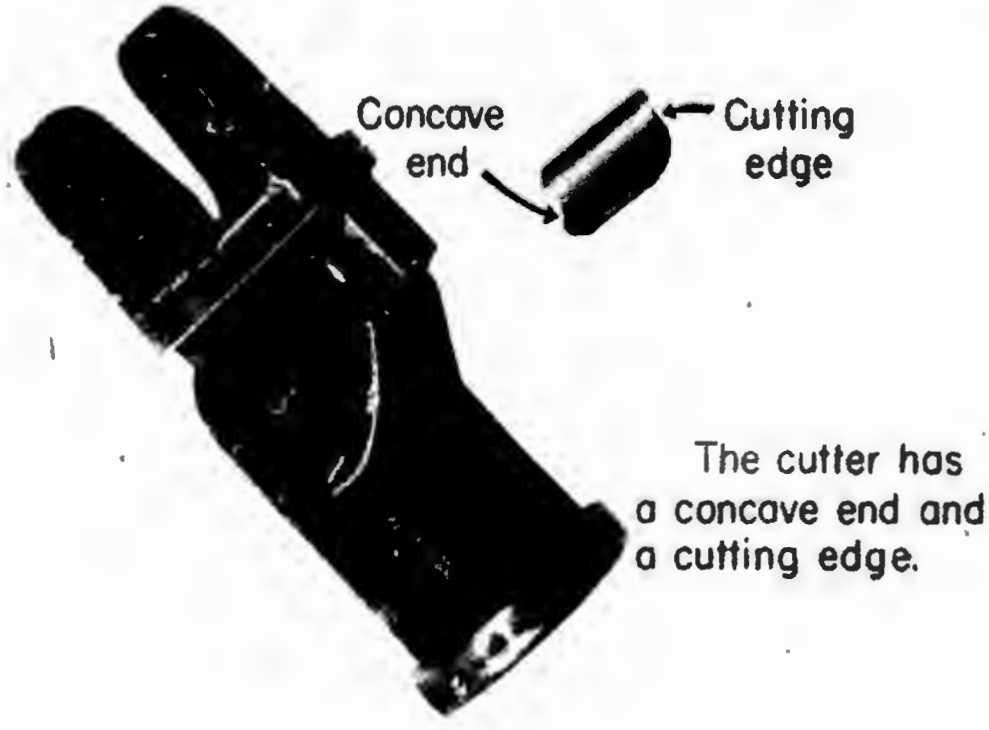


FIGURE 34.—Third steps in disassembly of DPL.

FIGURE 35.—Fourth steps in disassembly of DPL.

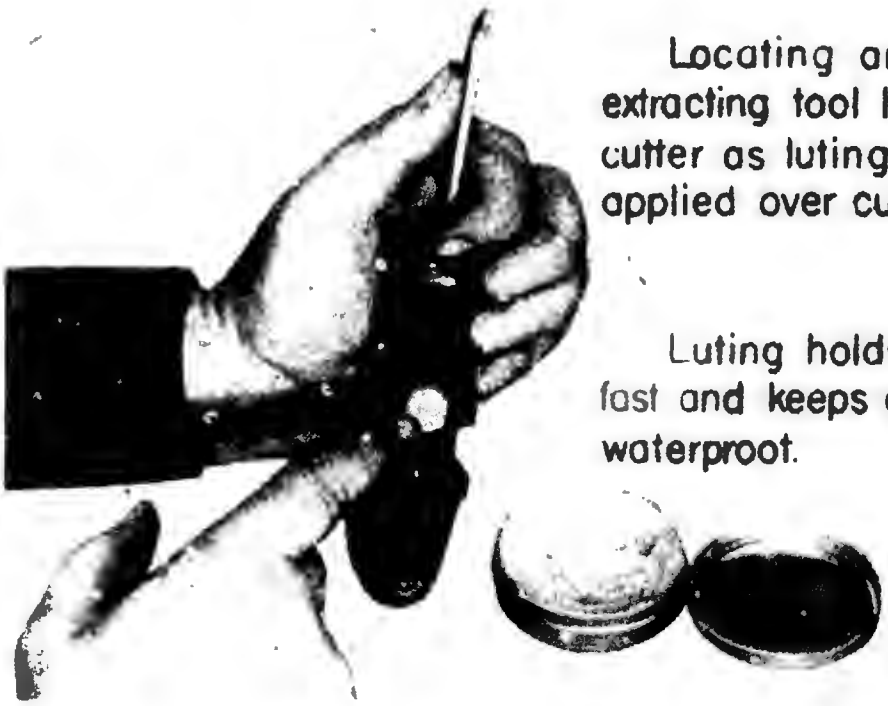


FIGURE 36.—Inserting DPL cutter.

TABLE OF SPRINGS

	USE	COLOR
DP/R Link, U.S.		
	Single Acting	No Upper Spring WHITE, B-3302-7
	Double Acting	RED, B-3302-5 YELLOW, A-3302-6
DP/R Link, Mk IV		
	Single Acting	No Upper Spring WHITE, B-3302-7
	Double Acting	RED, B-3302-5 YELLOW, A-3302-6
DPL, U.S.		
	Double Parachute Arming (also lower series arming DPL)	BLACK, A-3610-A
	Series Arming (two upper DPL's)	BLUE, A-3314-12
DPL, Mk VI		
	Double Parachute Arming (also lower series arming DPL)	BLACK, A-3610-A
	Series Arming (two upper DPL's)	BLUE, A-3314-12

FIGURE 37.—Springs for LA armament.

SECTION IV

PARACHUTE

■ **26. GENERAL.**—*a. 8-foot heavy duty parachute.*—Each parachute used with the DP/R link and the DPL is 8 feet in diameter when the canopy is fully opened. Attached to this canopy are 24 shroud lines formed by 12 continuous lines that pass over the canopy from one side to the other and are sewed into the canopy seams. (See fig. 38.)

b. Material.—The American parachute canopy is made of rayon with nylon shroud lines; the British type canopy is made of cotton or linen with artificial silk or flax shroud lines.

c. Parachute bag.—A waterproof canvas bag is provided for holding the parachute. The parachute is carefully folded and packed into the bag. The open end of the parachute bag is laced with breakable cotton cord through the grommets on the mouth of the bag. This lacing retains the parachute in the bag. On each side of the open end of the parachute bag is a tab with an eyelet through which a cord is passed and tied to the Nos. 2 and 5 foot ropes. These attachments steady the bag when it is installed with a DP/R link.

■ **27. CABLE GRIP, NO. U. S. 3318–1.**—The cable grip, No. U. S. 3318–1, is constructed so that it can be used with the parachute which is located in the foot ropes or with the parachutes that are attached to the flying cable with DPL's. (See fig. 39.) The clamps on this type grip are machined to form two separate grooves throughout the longitudinal section of the grip. The smaller groove is to accommodate the No. 3 foot rope when the parachute is used with a DP/R link. The larger groove is used to grip the flying cable when the grip is used with a DPL. The link of the cable grip should be wrapped with friction or adhesive tape to prevent excessive wear to the webbing loop that attaches the parachute bag to the grip.

■ **28. HINGE GRIP** (see fig. 40).—The hinge grip may be used instead of the cable grip to attach the parachute bag to the No. 3 foot rope on the side of the balloon opposite the rip

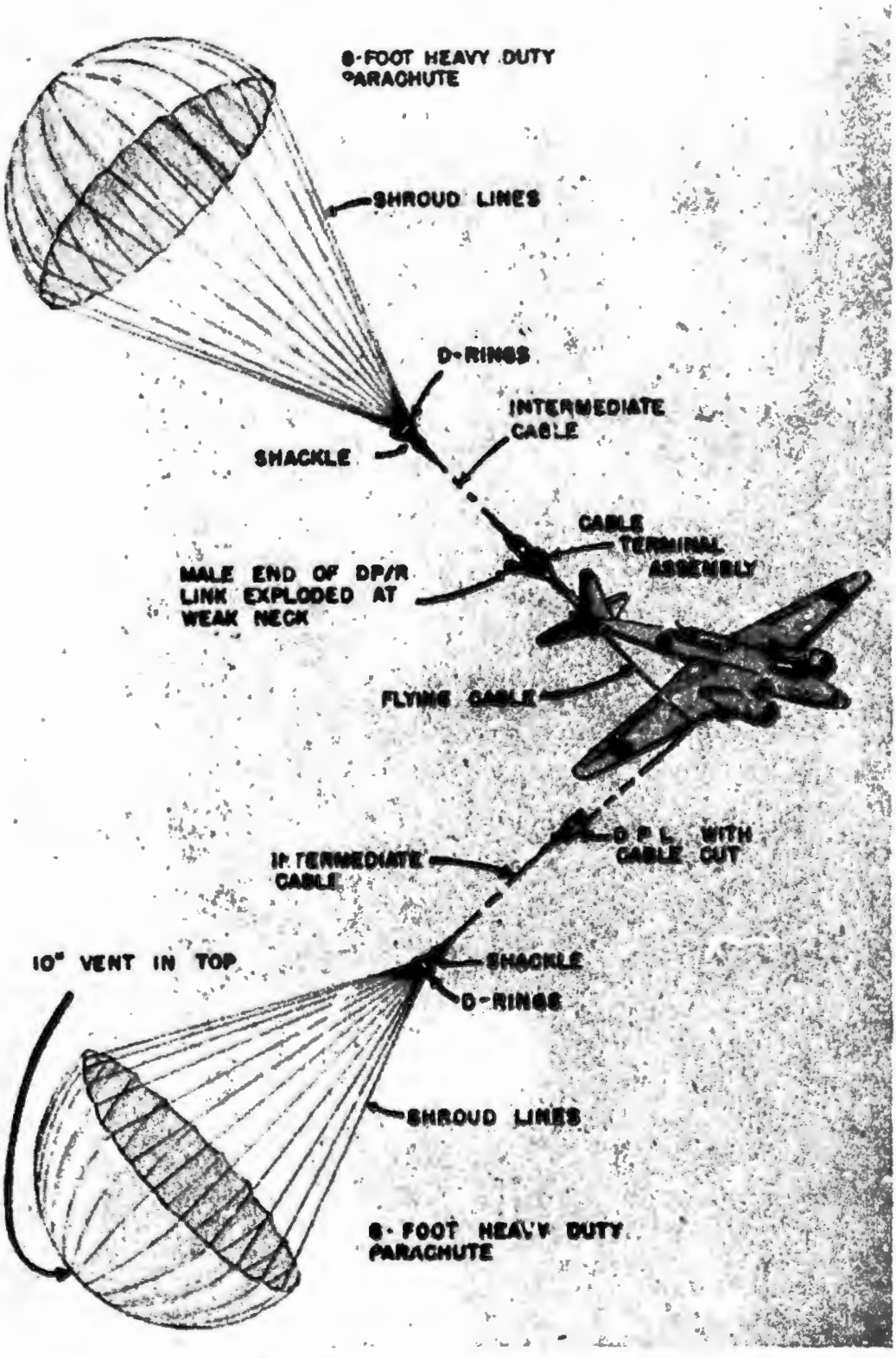


FIGURE 38.—8-foot heavy duty parachutes.

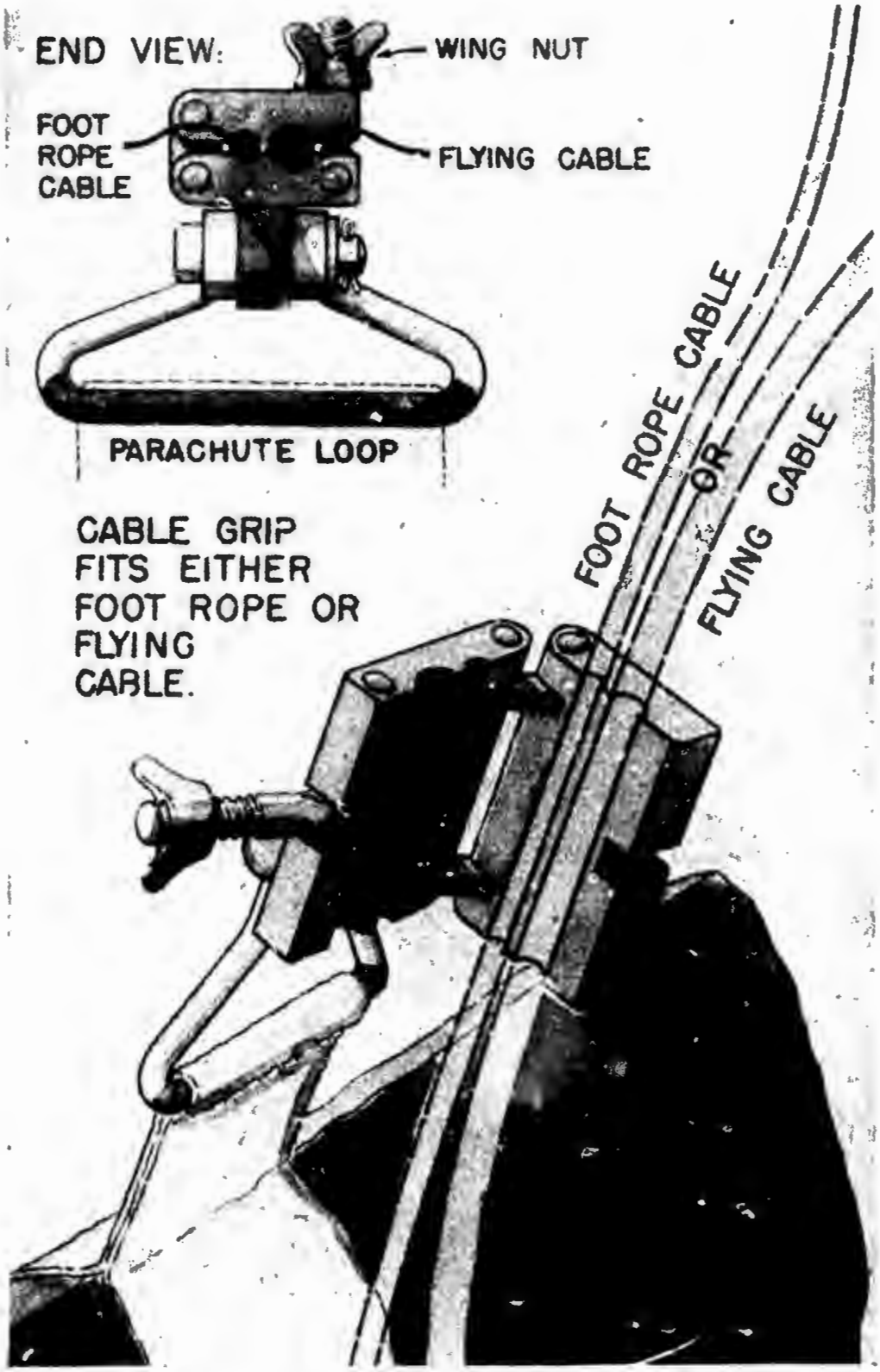


FIGURE 39.—Cable grip, No. U. S. 3318–1.

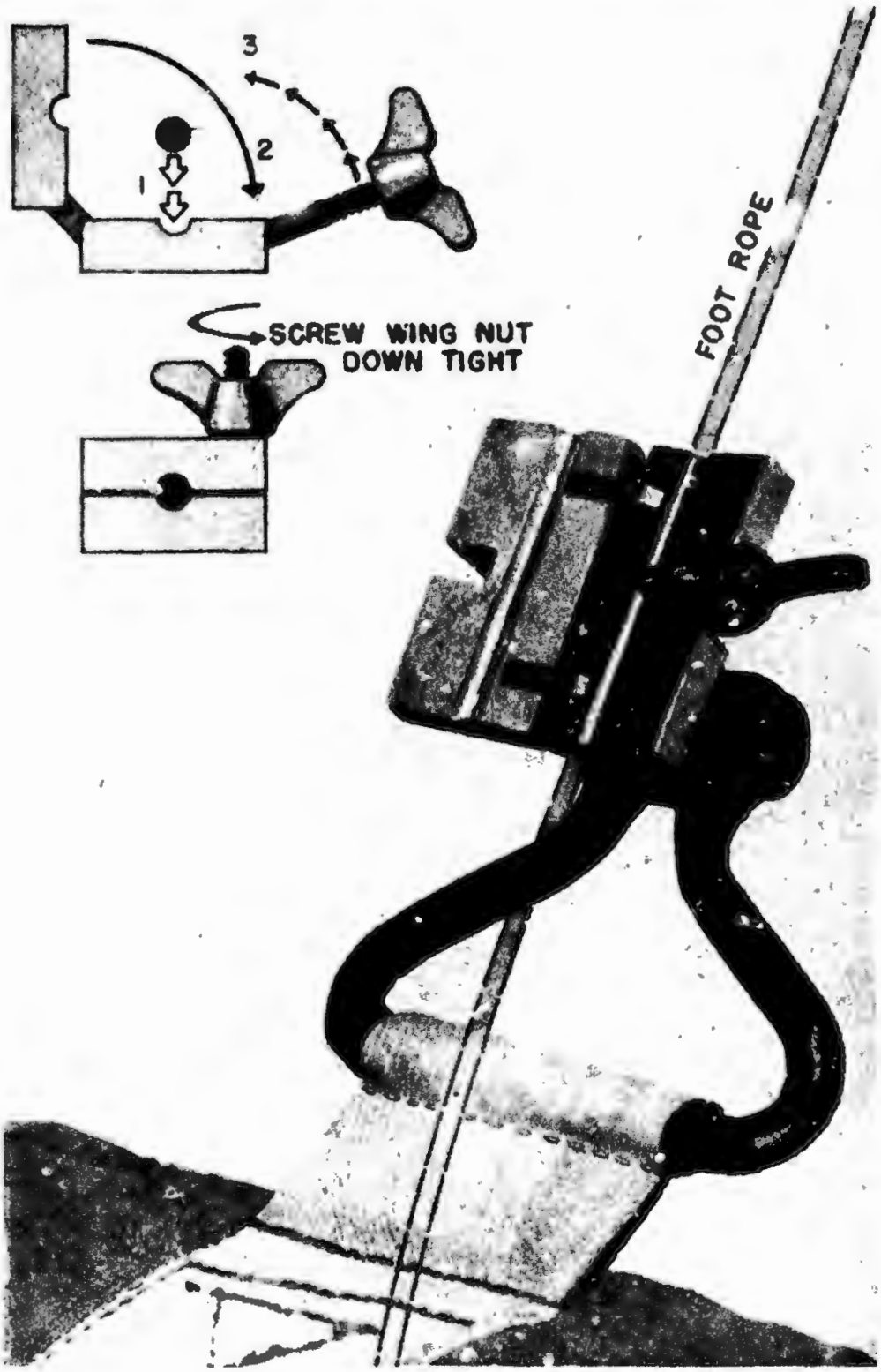


FIGURE 40.—Hinge grip.

cord. This grip consists of two plates hinged together at one side and provided with a swivel bolt and wing nut on the other side. Both plates are grooved to receive the foot rope.

■ 29. WEDGE GRIP.—The wedge grip may be used instead of the cable grip to attach the parachute bag to the flying cable at the DPL. The wedge grip body is rectangular in shape and has a longitudinal hole of square cross section through its center. (See fig. 41.) A slot is cut through one side for placing the flying cable in the body. A tapered wedge inserted between the flying cable and the shoulders of the grip holds the grip firmly on the flying cable. The wide edge of the wedge and the wide part of the grooves in the wedge body are always up when the grip is installed on the cable.

■ 30. INTERMEDIATE CABLE.—An intermediate cable 4 feet long, made of ⅜-inch cable, is provided for connecting the parachute to the flying cable. The intermediate cable has a thimbled eye on both ends. One end is attached to the parachute D-rings by means of a shackle. (See fig. 42.)

SECTION V

ASSEMBLING PARACHUTE

■ 31. GENERAL.—The parachute as shipped may not have the shroud lines attached to the D-rings, or may be improperly packed. The matériel repair section in headquarters battery is responsible for attaching the shroud lines and packing the parachute. This section is also responsible for repairs on the parachute and bag and the training and supervising of personnel at the site in parachute packing and bag lacing.

■ 32. CONNECTING SHROUD LINES.—The parachute shroud lines must be attached to the D-rings. In order to avoid excessive wear to the shroud lines, the D-rings are wrapped with friction or adhesive tape. The shroud lines are marked 12 feet from the parachute canopy, leaving an excess of about 9 inches in each line. Then the lines are passed through the D-rings and tied with a clove hitch around the standing part of the line. The hitch is pushed down close to the

FIGURE 41.—Wedge grip.

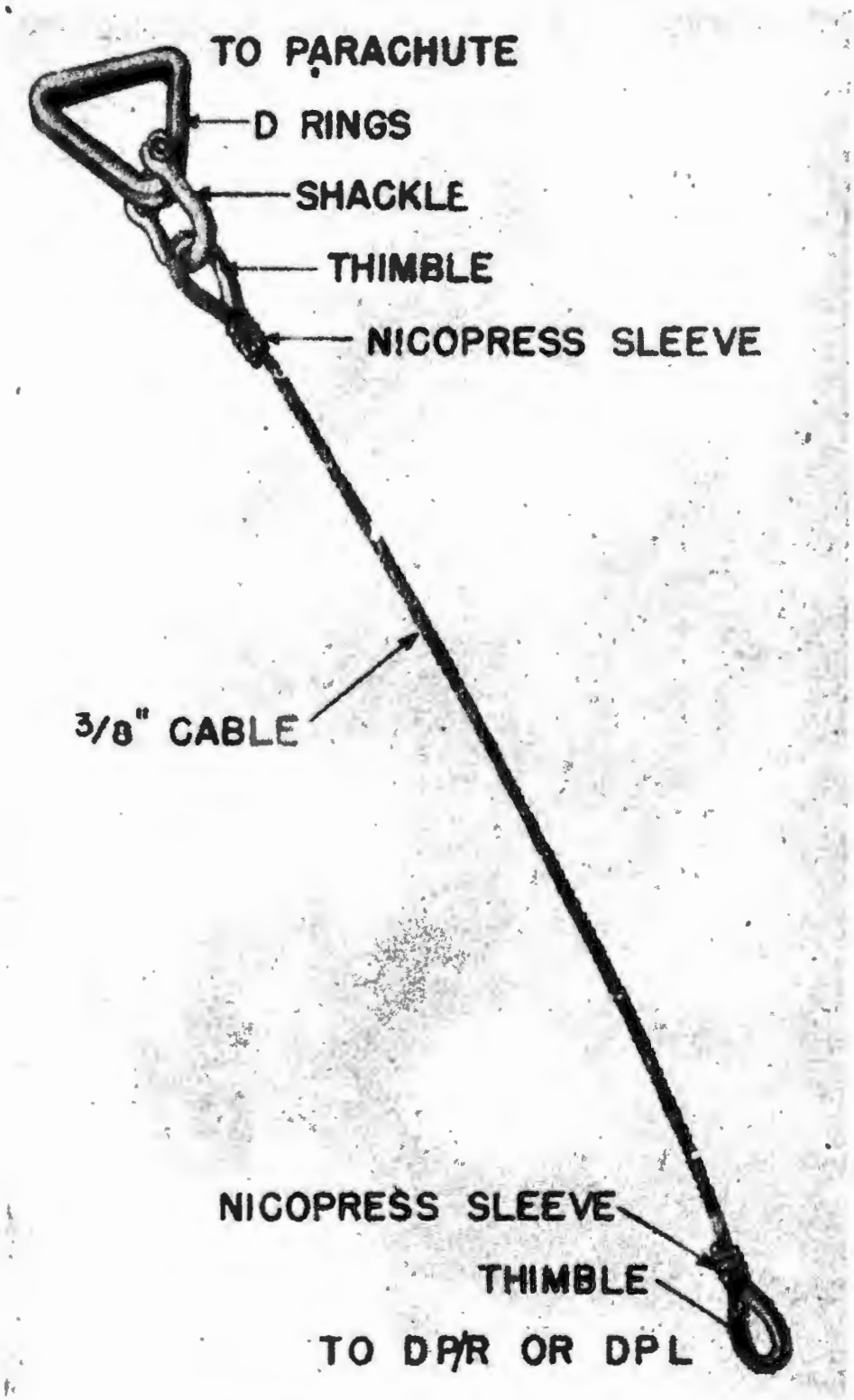


FIGURE 42.—Intermediate cable.

D-ring. The loose ends are seized to the standing part of the line with No. 9 serving cord, and any excess shroud line is cut off. (See fig. 43.) The shroud lines are now 12 feet long from the parachute canopy to the D-ring. Twelve shroud lines are connected to each D-ring. The lines must not be crossed or entangled. The shroud lines on each D-ring are pushed up close against each other and bound together with serving cord so as to occupy only the long side of the D-ring.

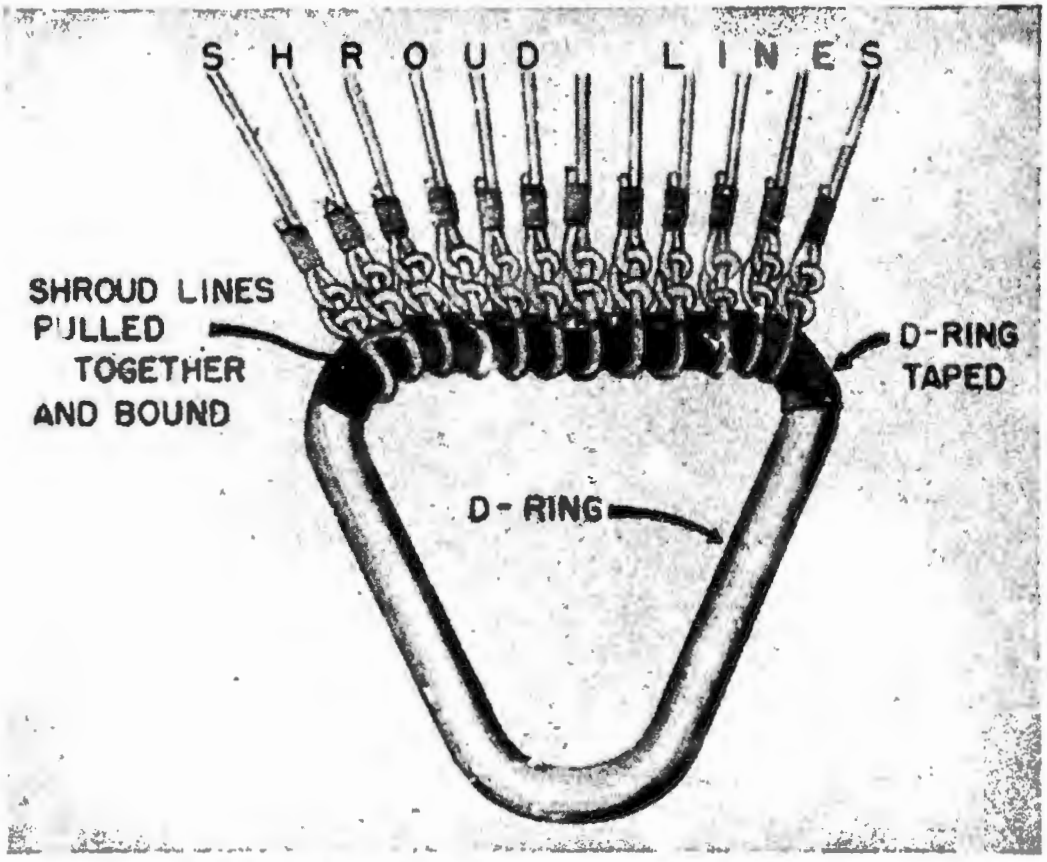


FIGURE 43.—Tying parachute shroud lines.

■ 33. FOLDING THE PARACHUTE (see fig. 44).—To fold the parachute, follow the procedure outlined below.

a. Lay the parachute out carefully and select the second shroud line on the top D-ring. Run the fingers along the selected shroud line to find the canopy seam belonging to it.

b. Fold the canopy at this seam and smooth out the upper and lower layers of the canopy from the fold as far as the second seam from the fold.

c. Pick up the canopy along the second seam from the fold and draw it over the fold to form the second fold. Then smooth out the fold.

d. Repeat this procedure for four more folds to complete a total of six folds, and then place a weight on the folds.

e. (1) Gather the remaining unfolded portion of the canopy and pull it over the completed folds.

(2) Select the first two gores extending from underneat the folded portion and fold the two gores at their joining seam to form the first fold of the second group.

(3) Pick up the unfolded portion of the canopy along the second seam from the fold just previously formed and place it over the fold to form the second fold.

f. Repeat until six folds are completed in the second group.

g. Remove the weight and smooth out the two groups of x folds.

h. Fold the last group of six folds over the first group.

■ 34. PACKING THE PARACHUTE. (see fig. 45).—To pack the parachute, follow the procedure outlined below:

a. Turn the parachute bag hali inside out and attach the shroud lines at the vent of the parachute to the inside tab of the bag, using a single cotton co.d of about 20- to 25-pound strength.

b. (1) Turn the bag right side out to inclose the apex of the canopy. Make one fold of the parachute by placing one hand on the canopy near the mouth of the bag and the other hand under the canopy about 18 inches from the bag.

(2) Push the first fold into the bag, being careful not to disturb the flatness of the fold.

c. (1) Make a second fold of the parachute in the same manner that the first fold was made.

(2) Push the second fold into the bag.

d. (1) Stand the bag up and work the canopy down into the bottom, being careful not to rumple the folds.

(2) Coil the shroud lines in figures-of-eight into the mouth of the bag.

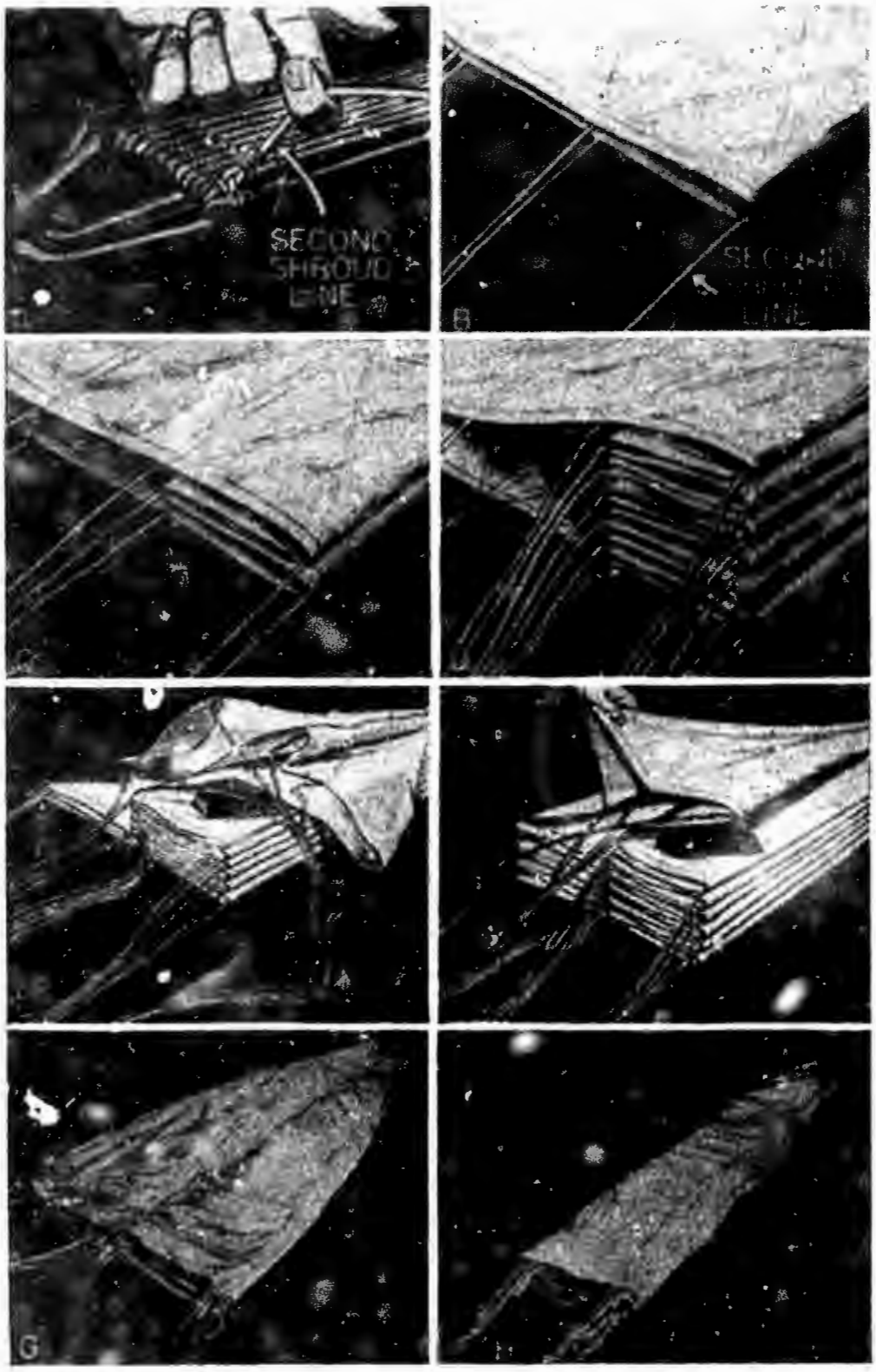


FIGURE 44—Folding the parachute.

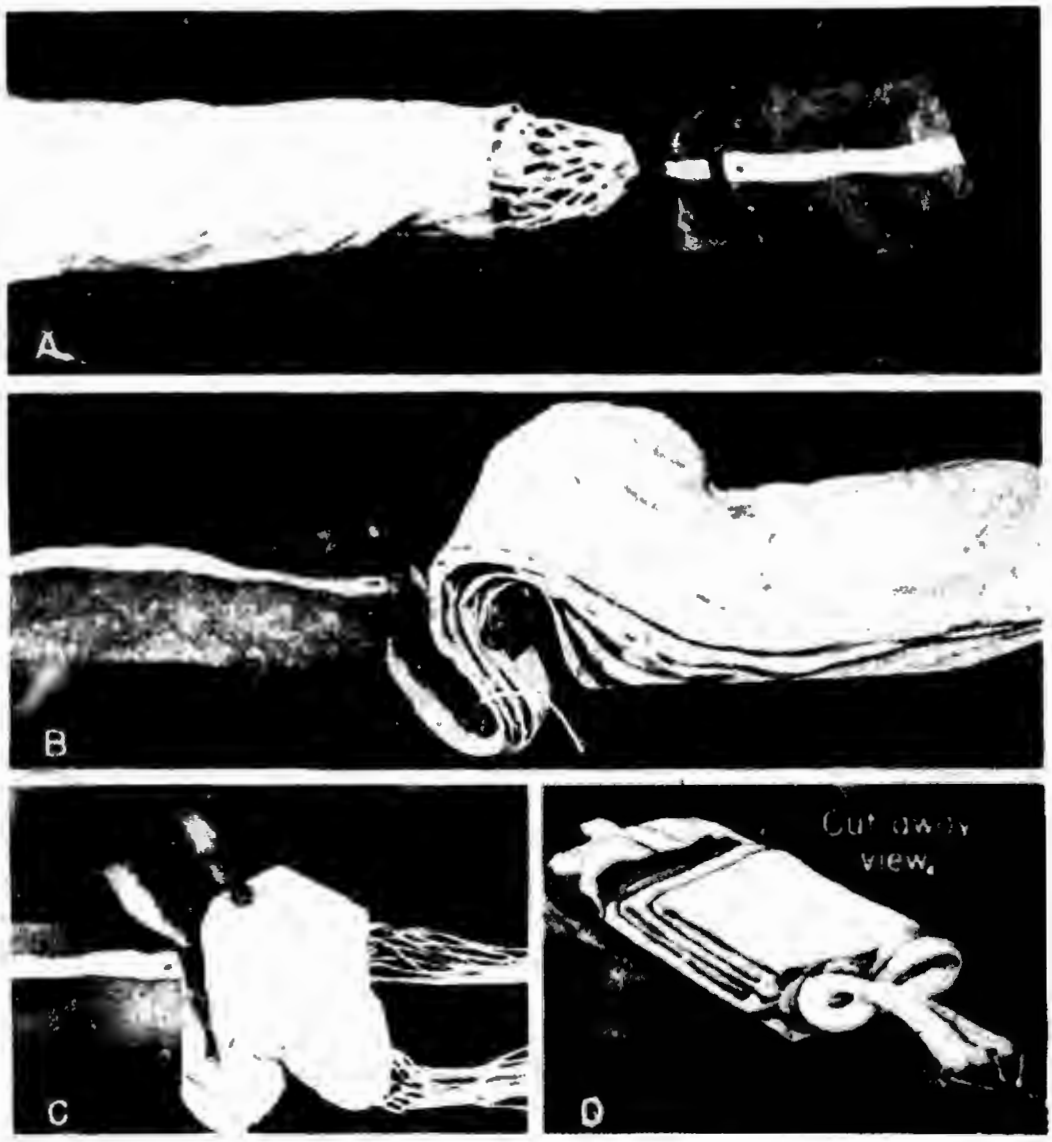


FIGURE 45.—Packing the parachute.

■ 35. LACING PARACHUTE BAG. (see fig. 46).—To lace the parachute bag, follow the procedure outlined below:

a. Place the D-rings in the center of the bag with the long side inside and the curved end and intermediate cable projecting outside.

b. Use two cords of 20- to 25-pound strength using one of the cords for each end of the parachute bag opening.

c. Pass both ends of one cord through an outside pair of grommets, in opposite directions.

d. Reeve one end of the cord through the next pair of grommets.

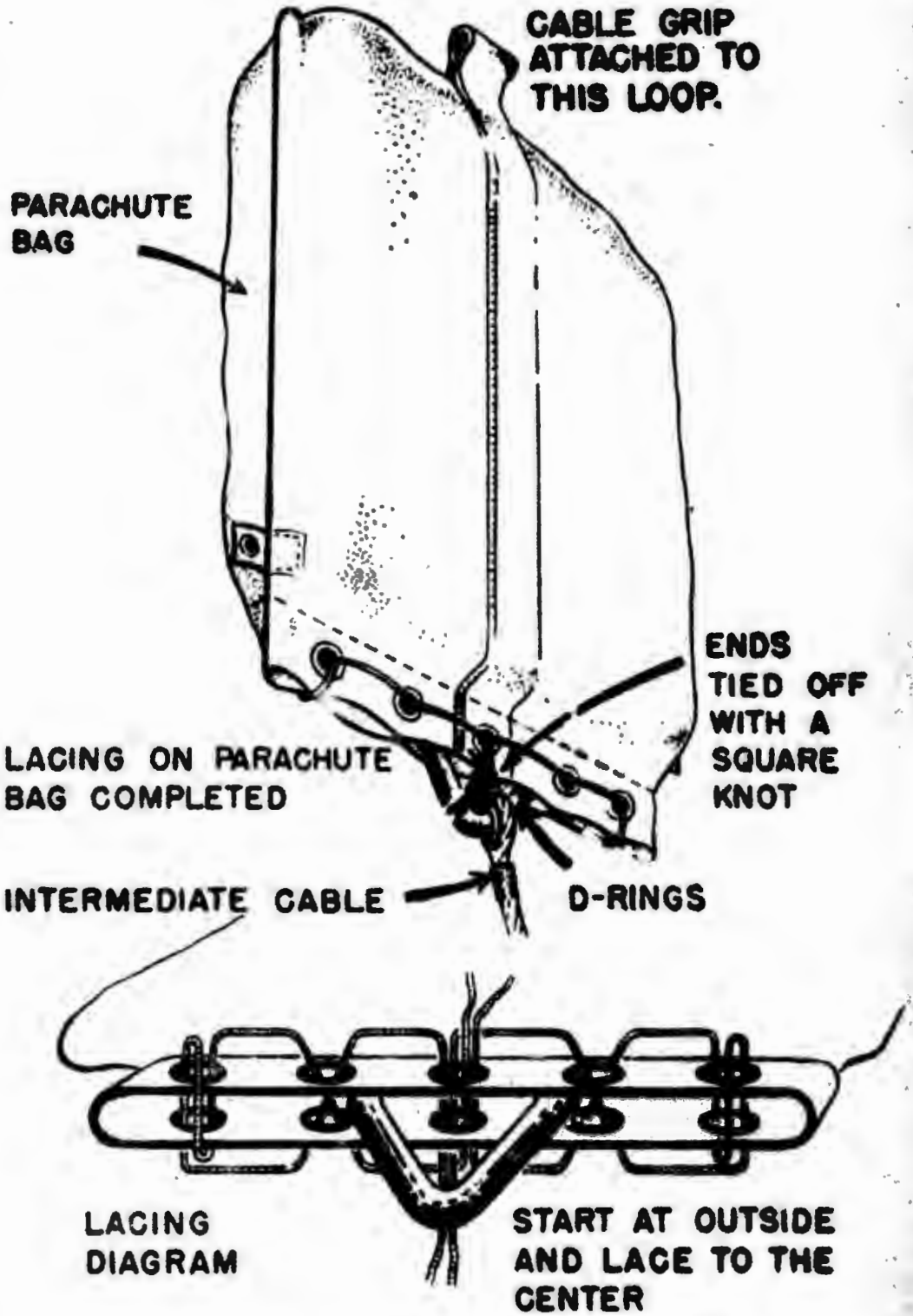


FIGURE 46.—Lacing the parachute bag.

e. Pass this end through the center pair of grommets and the D-rings.

f. Do the same with the other end of this cord, going through the same grommets in the opposite direction.

g. Repeat the procedure with the other cord, beginning at the opposite end of the bag.

h. Tie the one pair of cords through the center grommets and D-rings to the other pair with a square knot.

■ **36. STORING RESERVE PARACHUTES.**—Reserve parachutes must be carefully stored. The battalion armorer is responsible for the maintenance of the stored parachutes. All parachutes must be stored in a dry and ratproof place. A frequent check should be made on the condition of the stored parachutes and harmful conditions corrected.

CHAPTER 3

SERVICE AND REPAIR OF CABLE ARMAMENT FOR LA BALLOONS

SECTION I

SERVICE

■ 37. GENERAL.—Service of cable armament equipment will be performed at the site. (See fig. 47.) One member of the crew, usually the assistant winch operator, will be made responsible for this servicing, although all personnel should be familiar with his duties. All parts should be thoroughly cleaned, lubricated, and inspected periodically. If the parts do not conform to standard, they should be sent to the battalion armorer for repairs or replacement.

FIGURE 47.—Servicing armament at the site.

■ 38. CLASSES OF SERVICE.—There are three classes of service required for cable armament: class I, daily; class II, weekly; and class III, semimonthly. A record must be kept of this work in order to insure that it is being done as scheduled. (See table I.)

■ 39. CLASS I, DAILY SERVICE.—*a. DP/R Link and DP/R Link, Mark II.*—(1) Wipe moisture and dirt from outside surfaces of link with a clean rag; wipe lightly with an oily rag.

(2) Inspect spring on safety pin of DP/R Link, Mark II. Push in safety pin head to see that the spring has sufficient tension to hold pin in SAFE and LIVE positions.

(3) Check cable grip and parachute bag loop for wear or damage.

(4) Check parachute bag lacing for wear and see that the bag is properly laced.

(5) Check eye splices or nicopress sleeves on intermediate cable.

(6) Check tie cords attaching parachute bag to foot rope for wear, damage, and correct tying.

(7) Check male and female ends to see that they are tightly secured to the body.

(8) Check link connections to bell crank and cable terminal straps.

LETHAL DEVICE LOG

Date installed ..... Site No. .....

Type .....

Serial No. .....

Class of service	Date month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
I																																
II																																
III																																
Inspections.																																

Date	Description of repair	Repaired by	Initials	Name and rank

b. DPL and DPL, Mark VI.—(1) Wipe moisture and dirt from outside surface of link with a clean rag; wipe lightly with an oily rag.

(2) Check the luting of the cutter and insure that it is properly placed and is intact.

(3) Inspect U-clamp and be sure that an undamaged face is toward the cutter.

(4) Insure that the cotter pin is secured on the large pin.

(5) Insure that the spring-loaded pin is satisfactorily locked in place and that the pin latch is undamaged.

(6) Check wedges for proper installation and for wear or damage.

(7) Inspect cable grip and parachute bag loop for wear or damage.

(8) See that the cable grip is securely attached to the cable.

(9) Check parachute bag lacing for wear and see that the bag is properly laced.

(10) Check eye splices or nicopress sleeves on intermediate cable.

■ 40. CLASS II, WEEKLY SERVICE.—*a. DP/R Link and DP/R Link, Mark II.*—

(1) Remove the link from the junction assembly and disassemble it.

(2) Clean and dry all parts and oil them with a clean rag slightly soaked with thin oil.

(3) Clean the cartridge and inspect for moisture or oil. See that mouth of cartridge is properly sealed with blue lacquer. Check for any indentation or chipping of the cap.

(4) Check the upper and lower inertia springs, and see that they have not become set or depressed.

(5) Insure that the striker weight slides freely in the body and that the firing pin is neither bent nor sharp pointed.

(6) Inspect breech for damage and see that it slips into the male end freely.

(7) Inspect the threads on the male and female ends for damage.

(8) Check the link pin for damage. See that the pin fits into the female end correctly and that the threads are undamaged.

(9) On the DP/R Link, Mark II see that the safety pin is not damaged or bent and that it fits freely into the body.

(10) Apply a very thin, even film of antifreeze oil to the interior of the body and to the weight. Avoid using an excess of oil.

(11) On the DP/R Link, Mark II or No. U. S. 240, apply a thin film of antifreeze oil to the safety pin and replace it. Replace the felt washer, which should be saturated with antifreeze oil. Replace the steel washer and safety pin spring, and insert a small amount of low temperature grease into the sleeve to form a seal. Avoid excess grease. Replace safety pin head, and lock it securely to the safety pin with the safety pin head setscrew. The stop on the DP/R Link, No. U. S. 240A, can be lubricated by merely dropping oil into the slot of the stop pin.

(12) Partially fill the stop cap of the DP/R Link, Mark II or No. U. S. 240, with low temperature grease and place the cap over the end of the pin and stop sleeve. Apply luting around the base of the cap to seal it and crimp the base slightly to hold it in place

(13) Apply a light film of low temperature grease to the threads of the female end. Insert the upper (red) inertia spring and attach the female end to the body. Apply luting to the underside of the head of the setscrew and tighten it in place.

(14) Apply a light film of low temperature grease to the threads of the male end, insert the cartridge, and replace the male end. Then apply luting to the underside of the head of the setscrew and tighten it in place.

(15) Replace the DP/R link in the junction assembly.

b. DPL and DPL, Mark VI.—(1) Remove DPL unit from cable and disassemble the link.

(2) Clean and dry all parts and oil them with a clean rag slightly soaked with thin oil.

(3) Examine the cutter and see that—

(*a*) The cutter slides easily in the cutter bore.

(*b*) The curved cutting edge is undamaged.

(4) Examine the breechblock and make sure that the axial hole and recess are undamaged and free from obstructions.

(5) Inspect the inertia weight spring to see that it is undamaged and that it fits easily in the barrel.

(6) Examine the inertia weight and make certain that—

(*a*) The locating rings are undamaged.

(*b*) The air grooves are unobstructed.

(*c*) The firing pin is rounded at the tip, and not sharp.

(*d*) The firing pin is not bent.

(7) Examine the cartridge and make certain that—

(*a*) The coating of red lacquer at the mouth is intact.

(*b*) There is no oil on the case.

(*c*) There is no indentation or chipping of the cap.

(8) Examine the barrel and make certain that—

(*a*) The threads are undamaged.

(*b*) The safety clip pin holes are free from obstruction.

(*c*) The bore is smooth.

(*d*) The wrench flats on the wide flange are undamaged.

(9) Examine the wedge housing for damage. Make certain that the tolerance on the wedge housing is not exceeded. Check this by inserting the DPL wedge housing gage into the housing with its taper corresponding to the housing taper. When the gage is pressed in tightly by hand, it must enter at least as far as the first mark but not farther than the second. (See fig. 48.)

(10) Examine the cutter housing and make certain that—

(*a*) The threads are undamaged.

(*b*) The cutter bore is smooth and free from obstruction.

(*c*) The rim is undamaged.

(*d*) The U-clamp grooves are undamaged and free from obstruction.

(11) Inspect the spring-loaded pin. Make certain that the pin latch can be rotated and that it is securely attached to the pin. Place the U-clamp in position on the cutter housing and check to see that the spring-loaded pin passes easily through the holes in the U-clamp and cutter housing.

(12) Examine the large pin for any damage.

(13) Check the locating and extracting tool for any damage to it.

(14) Make certain that the wedges are not bent or broken and that the bearing surfaces are undamaged and not burred or badly chipped.

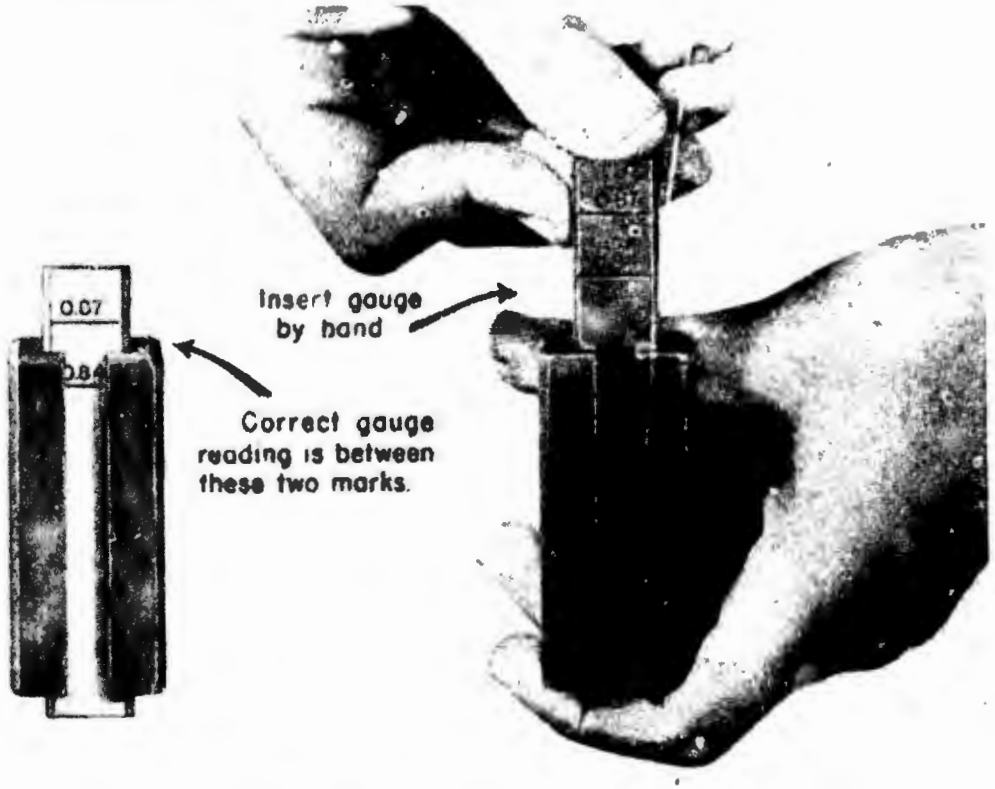


FIGURE 48 —Gage for DPL.

(15) Inspect the rubber cap and its string for damage and see that the cap fits tightly on the end of barrel.

(16) Lightly lubricate the inertia weight, inertia weight spring, cutter, spring-loaded pin, and U-clamp grooves in the cutter housing with antifreeze oil. Do not lubricate the cartridge or breechblock.

(17) Drop the inertia weight, flat end first, into the barrel and spring the safety clip on.

(18) Locate the cutter in the cutter housing with the locating and extracting tool, and fill the remainder of the cutter bore with luting to waterproof and position the cutter.

(19) Slide the U-clamp into position and lock with the spring-loaded pin. Make sure an undamaged side is toward the cutter.

(20) Hold the cutter housing with the forked end downward. Remove the locating and extracting tool and insert the cartridge into the breech. Be sure the breechblock lies flat against the cartridge.

(21) Maintaining the cutter housing upright, engage the recess in back of the wedge housing with the cutter housing. Slide the barrel through the wedge housing and turn it into the cutter housing.

(22) Tighten the barrel into the cutter housing and lubricate the wedge housing and backs of the wedges with a mixture of one part of antifreeze oil and two parts of powdered graphite.

(23) Replace the DPL unit on the flying cable.

■ 41. CLASS III, SEMIMONTHLY SERVICE.—Class III service deals only with the parachute. Twice each month proceed as follows:

a. Remove the parachutes from the cable.

b. Unlace each parachute bag and inspect the parachutes for dampness, mold, mildew, damage, or entangled shroud lines. Unpack and allow to dry or return to the battalion armorer for cleaning, repairing, drying, and repacking.

c. Inspect the D-rings for damage and for wear to the protective tape covering, and make certain that all shroud lines are properly attached.

d. Inspect the webbing loop at the closed end of the bag for wear and damage. Replace the parachute bag if any signs of wear to the webbing loop are apparent.

e. Lace the parachute bag with new cord.

■ 42. REPLACEMENT OF CARTRIDGES.—Replace each cartridge every 60 days.

SECTION II

REPAIR

■ 43. GENERAL.—All repairs such as filing, replacement of parts, or repairing of exploded links are done by the battalion armorer. An armorer's set of repair equipment is furnished to each battalion with the necessary tools for making the repairs.

■ 44. DP/R LINK AND DP/R LINK MARK II.—*a. Female end.*—If the threads on the female end are damaged, they must

be trued. A bent or damaged link pin should be straightened or replaced.

b. Male end.—Damaged threads of the male end must be trued.

c. Breech.—Loosely fitting or damaged breeches should be replaced. Any burred edge or tight fit may be remedied by using a file or emery paper.

d. Body.—If the partition in the body or walls of the body is distorted because of several firings of the link, the body must be replaced.

e. Striker weight.—Roughness on the surface of the striker weight must be removed with a file or emery paper. The firing pin will be straightened if necessary. The pin should be rounded slightly at the end; under no circumstances should it be sharp. When passed through the body partition with the lower inertia spring in place, the firing pin should project through about 3/32 inch. Replace any striker weight that cannot be repaired properly.

f. Upper and lower inertia springs.—Inertia springs that have become set and have lost some of their strength must be replaced.

g. Safety pin.—Worn or damaged safety pins should be replaced. If the striker weight does not slide freely over the shank when the pin is in the SAFE position, the shank should be filed until the weight works freely. Weak safety pin springs should be replaced.

■ 45. DPL AND DPL, MARK VI.—*a. Wedge housing.*—All burs must be removed with a fine file. The tapered inner surfaces must be filed with care.

b. Wedge sets.—All burs made by the cramp must be removed from wedge sets. Bent, badly chipped, or worn wedges must be replaced.

c. Inertia weight.—Any roughness of the surface will be removed from the inertia weight with a fine file or emery paper. The firing pin is straightened if necessary and trimmed with a fine file. The pin should be rounded at the end and under no circumstances should it be sharp. When passed through the breechblock as far as it will go,

the firing pin should project about 3/32 inch. Replace any inertia weight that cannot be repaired properly.

d. Barrel.—After the link has been fired, the barrel may be distorted slightly. If so, it will be replaced. The alinement of the inertia weight and breechblock will then be checked by assembling the cutter housing, breechblock, inertia weight, and barrel. If the threads have been damaged, they must be trued.

e. Breechblock.—Any burs on the breechblock are removed by filing.

f. U-clamp.—The U-clamp is reversible. Thus, if one face becomes damaged when the link is fired, the U-clamp must be assembled with the undamaged face towards the cutter. When both faces are damaged, the U-clamp is replaced.

g. Spring-loaded pin.—If the pin latch becomes loose, the 1/8-inch pin holding it to the pin must be riveted over and filed flush, taking care not to jam the pin latch.

h. Large pin.—Any burs will be removed. When the pin becomes unserviceable it must be replaced.

i. Miscellaneous parts.—If any other part, such as the safety clip, the cutter housing, the inertia weight spring, or the cutter, is damaged, it will be replaced.

SECTION III

REPAIR AFTER FIRING

■ 46. DP/R LINKS.—The DP R Link or DP/R Link, Mark II must be returned to the battalion armorer for replacement of the blown-out male end. The procedure for replacement is as follows:

a. The section of the male end remaining in the body must be removed. First the set screw is removed. Two parallel flats are filed on the portion of the male end remaining in the body. These flats are placed in a vise and the body unscrewed.

b. Screw a new unloaded male end into the body firmly. Drill and tap a hole in the male end through the existing set screw hole in the body. Put a chisel mark on the male end opposite the chisel mark on the body.

c. Remove the male end and clear both this end and the body of steel chips. Give the link class II service and assemble it for use.

■ 47. DPL.—*a.* The DPL or DPL, Mark VI cutter will be lost in firing. The cutter must be replaced and class II service applied to the link. If all parts conform to standard, the link is again ready for action.

b. In case damage has resulted from firing or if the empty cartridge cannot be removed, the link is sent to the battalion armorer for repair. If difficulty is encountered in removing the cartridge, the locating and extracting tool is inserted into the cutter bore and the cartridge case pressed out of the bore. If this procedure fails to extract the case, a ¼-inch drill is turned down the cutter housing and a hole drilled in the cap of the cartridge. A corkscrew action will result which will withdraw the cartridge.

SECTION IV

REPAIR OF PARACHUTE

■ 48. GENERAL.—When inspection at the site indicates that the parachute will require major repairs, it is sent to the matériel repair section where the work will be done by the battalion armorer.

■ 49. D-RINGS AND INTERMEDIATE CABLES.—Damaged D-rings or intermediate cables should be replaced. Any frayed serving should be renewed.

■ 50. SHROUD LINES.—*a. Broken lines* (see fig. 49).—If a shroud line is broken or frayed, the part must be removed and a new line attached.

(1) The end of the shroud line is removed from the D-ring.

(2) A new piece of line is tied to the original shroud line running through the canopy seam. A fisherman's knot is used. The half hitches of this knot are spaced 1¼ inches apart.

(3) The space between the two half hitches is seized. The two free ends of the line are seized to the shroud lines for a distance of ½ inch from each hitch.

(4) The free end of the shroud line is attached to the D-ring as described in paragraph 32.

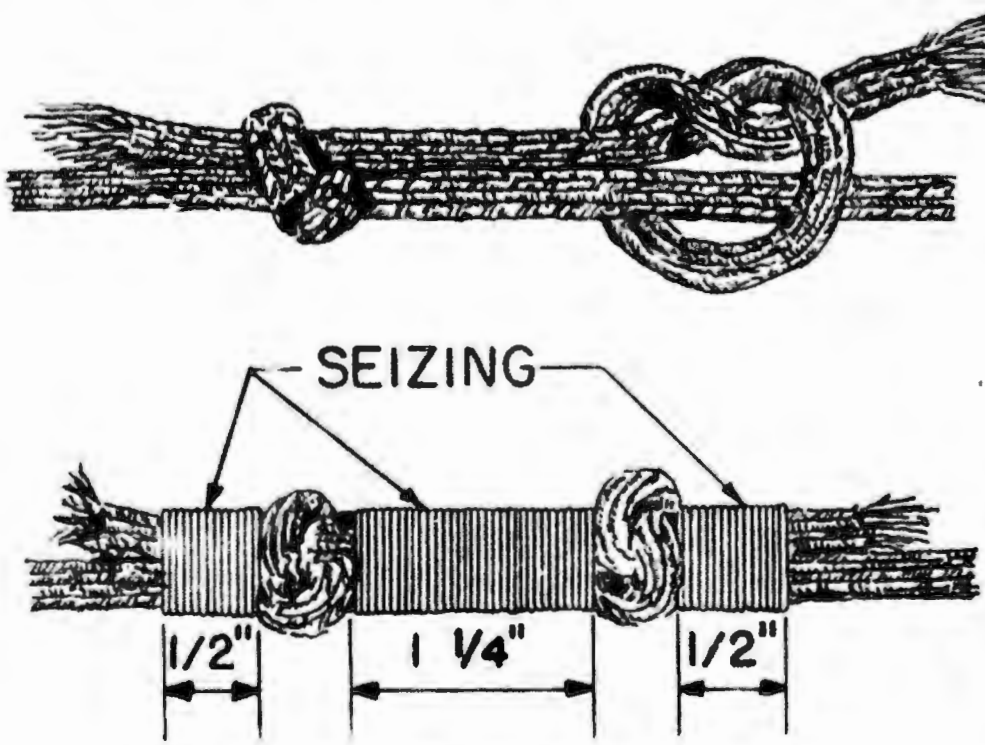


FIGURE 49.—Repair of broken shroud lines.

b. Broken shroud line in canopy seam (see fig. 50).—If a broken shroud line is found in a canopy seam, it will be repaired as follows:

(1) Remove the piece of line attached to the D-ring.

(2) Cut the line attached to the canopy at a point 3 inches nearer the perimeter than halfway between two crossing seams, choosing the crossing seams nearer the break.

(3) Rip the stitching holding the line to the canopy from the break to the canopy perimeter and remove the shroud line.

(4) Rip the hem adjacent to the break, to facilitate making a splice.

(5) Thread a new piece of line into the canopy seam, cut back 3 inches the ends of the new piece of line and the standing part by cutting the locking thread.

(6) Wax the strands together making four groups with the same number of strands in each group.

(7) Splice the ends of the lines together 2 inches, using every third tuck. Serve for ½ inch on each side of splice.

(8) Sew the line to the canopy seams at the same positions as before. Sew up the hem adjacent to the break.

(9) Attach the line to the D-ring as in paragraph 32.

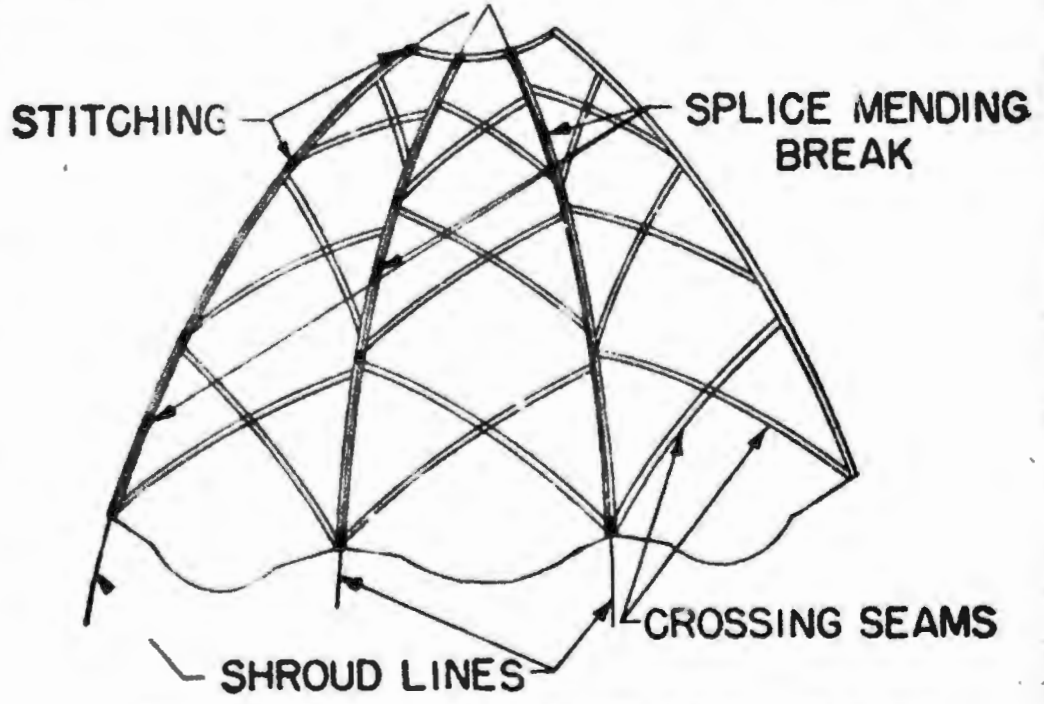


FIGURE 50.—Repair to shroud lines in a canopy s m.

■ 51. BAG.—If the webbing loop on the closed end of the bag is damaged, it should be removed and a new one se. n in its place.

■ 52. CANOPY (see fig. 51).—If a hole or tear is found in the parachute canopy, repair it as follows:

a. Cut a patch (use sound fabric from an unserviceable parachute) which will overlap the edges of the tear 1¼ inches on all sides.

b. Make a ¼-inch hem at the edges of the patch in such a way that the machine sewing of the hem also secures the patch to the canopy.

c. Machine sew the tear, beginning slightly beyond the end of the tear and going about ¾ inch on each side of the tear before turning. The rows of stitches should not be more than ¼ inch apart. Continue stitching in this manner until the entire tear has been reinforced.

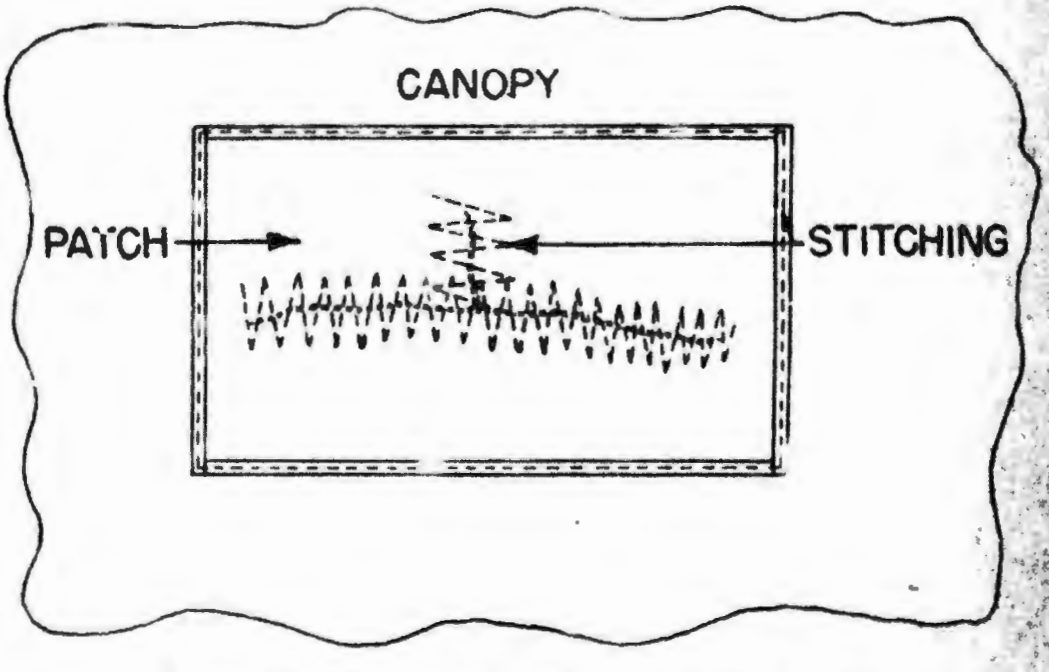


FIGURE 51.—Repair to tear in parachute canopy.

CHAPTER 4

DESTRUCTION OF MATÉRIEL

■ **53. General.**—For situations requiring destruction see FM 4–187.

■ **54. Method of Destruction.**—Cartridges will be removed from all inertia links and the links will be smashed. Parachutes will be soaked in gasoline, and the parachutes and smashed inertia links will be piled with all other available inflammable material and ignited.

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