

**TECHNICAL MANUAL**

**ORGANIZATIONAL AND DS**

**MAINTENANCE MANUAL**

**FOR**

**GENERAL MAINTENANCE**

**OF PARACHUTES**

**AND OTHER AIRDROP EQUIPMENT**

**This copy is a reprint which includes current pages from Changes 1 through 7.**

This manual supersedes TM 10-1670-201-25 /TO 13C-1-41, 3 December 1965, including all changes.

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**HEADQUARTERS, DEPARTMENT OF THE ARMY**

**30 OCTOBER 1973**

CHANGE }  
NO. 7 }

HEADQUARTERS  
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WASHINGTON, D.C., 17 May 1990

**Organizational and DS Maintenance Manual  
for  
GENERAL MAINTENANCE OF PARACHUTES  
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HEADQUARTERS  
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No. 3 }

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No. 2 }

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**Organizational and DS Maintenance Manual  
FOR  
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## WARNING PAGE

Personnel performing operations, procedures, and practices which are included or implied in this technical manual shall adhere to the following instructions. Disregard of these warnings can cause serious or fatal injury to personnel.

**TESTING THE PERSONNEL PARACHUTE HARNESS AND QUICK RELEASE** (paragraph 2-18). Failure to rotate the release operating button to the unlock position prior to placing the quick release into a vise for testing may allow damage to be incurred upon the center post camway. As a result, the operating button could then be manually depressed while in the locked position.

**CLEANING AND DRYING** (paragraph 2-24). Due to flammable properties and nylon-damaging substances, cleaning solvents other than tetrachloroethylene will not be used in the spot-cleaning of airdrop equipment. Tetrachloroethylene will only be used in areas where substantial ventilation is available. Repeated or prolonged inhalation of the solvent vapors can be detrimental to human health. In addition, avoid prolonged or repeated contact of the solvent fluid with areas of the skin. Tetrachloroethylene must not be taken internally.

**PARACHUTE CANOPY PATCHING LIMITATIONS** (paragraph 3-12). The limitations prescribed for parachute canopy patching will be stringently adhered to under all circumstances and without any deviations.

**PARACHUTE CONNECTOR LINK ASSEMBLIES** (paragraph 3-30). Use of any type connector link assembly other than the L-bar connector link assembly on US Army troop-type personnel parachutes and ejection seat parachutes is prohibited.

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## CHAPTER 1

### INTRODUCTION

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#### Section I. GENERAL

##### 1-1. Scope.

These instructions are for use by organizational and direct support maintenance activities performing maintenance on parachutes (cargo and personnel) and other airdrop equipment. Information is furnished to clarify and detail maintenance requirements which generally affect all airdrop items. Maintenance procedures which are common and usually applicable to two or more airdrop equipment items are contained within this publication. Other information or procedures which are not considered common are contained in individual airdrop equipment publications as listed in DA Pam 310-4.

##### NOTE

**Information and instructions contained in individual airdrop equipment publications will have precedence over the data in this manual should any conflict of the published contents exist.**

##### 1-2. Reporting of Errors.

The reporting of errors, omissions, and recommendations for improving this publication by the individual

user is encouraged. Preparation and submission of reports will be as follows:

a. Reports by US Army personnel should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to: US Army Troop Support and Aviation Materiel Readiness Command, ATTN DRSTS-MPSD, 4300 Goodfellow Blvd., St. Louis, MO 63120. A reply will be furnished to you.

b. Reports by US Air Force units should be submitted on AFTO Form 22 (Technical Order Publication Improvement Report) and forwarded to the address prescribed in *a.* above. An information copy of the prepared AFTO Form 22 shall be furnished to SA-ALC/MMEDTR, Kelly AFB, TX 78241.

c. Reports by US Navy personnel shall be submitted in accordance with instructions contained in publication OPNAVINST 4790.2.

##### 1-3. Destruction to Prevent Enemy Use.

For instructions applicable to the destruction of airdrop items, related parts, material, machines, and tools which are in danger of imminent capture by an enemy, refer to TM 43-0002-1/TO 13C3-1-10.

#### Section II. MAINTENANCE FORMS AND RECORDS

##### 1-4. General

Maintenance forms, records, and reports that are to be used by US Army organizational and direct support maintenance personnel are prescribed throughout this publication, and also in TB 750-126 and TB 43-0002-4. Additional recording and reporting documentation that may be required for work orders. Modification Work Orders (MWOs), Equipment Improvement Reports (EIRs), and Quality Deficiency Reports (QDRs) will be accomplished in accordance with TM 38-750. The use

of Air Force maintenance forms by maintenance personnel will be in accordance with TO 00-25-241.

The accomplishment of US Navy maintenance forms by maintenance personnel will be in accordance with NAVAIR 13-1-6.2 and OPNAVINST 4790.2.

##### 1-5. Army Parachute Log Record

a. *General.* The Army Parachute Log Record (DA Form 10-42 or 3912) is a history-type maintenance document which accompanies most parachute canopy assemblies and some personnel

parachute harness assemblies through the period of service of the individual assembly. The log record provides a means of recording maintenance actions performed on a parachute canopy assembly or, if applicable, a personnel parachute harness. Normally, a log record is initiated and attached to a parachute or harness, as applicable, upon receipt by a using unit. However, if the item is subjected to alteration or modification by a maintenance activity during the interim of time from date of manufacture to receipt by a using unit, the log record will be prepared by the activity performing the maintenance function. Once initiated, a log record will be attached to and contained in an affixed parachute log record / inspection data pocket until such time as the applicable parachute canopy assembly or harness assembly is destroyed or rendered unfit for further use or repair. Additionally, should an item that requires a log record be transferred from one unit to another, the log record for that applicable assembly will accompany the item in the transfer action. A prepared log record will not be removed or separated from a parachute or applicable type harness, and especially a packed parachute, except as directed by the local airdrop equipment maintenance activity officer. A log record which is illegible, lost, damaged, soiled, or precludes further entries due to lack of space will be replaced upon the next repack or inspection, as applicable, with a serviceable item from stock. Completion of the replacement log record will be performed as outlined in paragraph d below.

**NOTE**

**Each personnel parachute harness used with the 28-foot-diameter chest personnel parachute or the MK - J5 ejection seat personnel parachute will be equipped with an individual log record. Data applicable to the harness used with troop-type back personnel parachutes will not be entered into a parachute log record. For procedures pertinent to the handling and accomplishment of a parachute log record (AF Form 46 or AFTO 3911 used with US Air Force parachutes, refer to 00-25-241.**

b. *Attaching a Log Record.* Attach a log record to a parachute log record / inspection data pocket as follows:

**NOTE**

**On troop-type personnel parachutes, the pocket containing a log record is designated as a "log record pocket". On emergency-type personnel parachutes and applicable emergency - type parachute harnesses, the pocket which contains a log record is classified as a "log record and survival manual pocket". However, for simplification purposes in this manual, a pocket associated with a personnel parachute or harness will be referred to as a "log record pocket". On cargo parachutes, the proper nomenclature for the pocket containing a log record is "parachute inspection data pocket".**

(1) Cut a 30-inch length of ticket No. 5 waxed cotton thread and double the thread length.

(2) Pass the looped end of the doubled thread length around the centerfold of the log record and form a slip loop on the outside at the log record top (A, fig. 1-1).

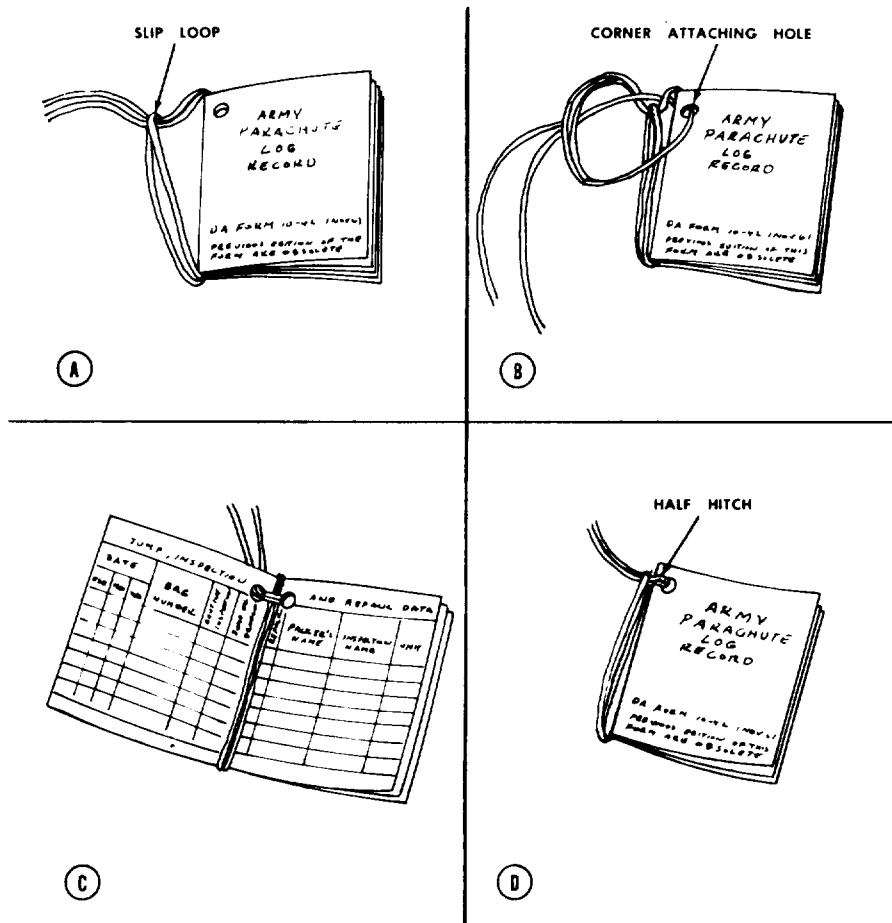
(3) Pass the thread length running ends through the corner attaching hole from the front cover of the log record (B) and insure the running ends are routed over that part of the thread length located along the log record centerfold (C).

(4) Complete the attachment tie by making a half hitch on top of the slip loop made in (2) above.

(5) Thread one running end of the log record attachment tie in a tacking needle and pass the tacking needle with attached thread end through the edge binding of the applicable parachute log record / inspection data pocket.

(6) Remove the thread end from the tacking needle and make a finished 10-inch-long log record attaching loop by securing the two thread ends together with an overhand knot.

(7) Insert the log record into the pocket and secure the record within the pocket using the pocket flap and applicable type flap fastener.



- A. Forming slip loop on log record outside.
- B. Thread length loose ends passed through corner attaching hole.
- C. Thread loose end routing at log record centerfold.
- D. Log record attachment tie completed.

**Figure 1-1. Installing attachment tie on a parachute log record, typical.**

c. *Accomplishing a Log Record.* Upon completion of the first technical/rigger-type inspection, the individual performing the inspection will initially prepare a log record for an individual parachute or applicable type parachute harness and accomplish subsequent record entries using the following procedures, as applicable:

**NOTE**

**Log record book entries will be made with a suitable type blue or black marking device that cannot be erased.**

(1) *Parachute log record.*

(a) *Inside front cover.* Using the information provided on the parachute canopy data block, make the following entries on the inside front cover of the log record (A, fig. 1-2). Entries may be

continued on the inside of the black cover (B), if necessary.

1. *Serial number.* Enter the parachute canopy assembly serial number.

**NOTE**

**A parachute canopy serial number is recorded in a log record as a method of establishing control for maintenance, EIR (Equipment Improvement Report) and QDR (Quality Deficiency Report) documentation, and to insure the correct original record is reattached should the record become detached. A canopy serial number will not be used for property accountability, except in test projects or other special instances.**

SERIAL NO. DA 65-38110

TYPE TROOP-Back, T-10

PART NO. 49J 7141-2

DATE OF MFG. (Month & Year) JAN 67

MANUFACTURER MILLS

CANOPY CONTRACT NO. DA-73-204-AMC-036081

STATION & UNIT 504 QM CO  
FT. CAMPBELL, KY.

(Continued on inside back cover)

A

STATION & UNIT (Continued)

600<sup>th</sup> QM Co.  
FT. BRAGG, N.C.

B

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- A. Inside front cover.
- B. Inside back cover.

Figure 1-2. Parachute log record entries for the inside front and back covers, typical

2. *Type.* Enter the parachute type.
3. *Part number.* Enter the part number of the parachute canopy.
4. *Date of manufacture.* Enter the month and year the parachute canopy was manufactured.
5. *Manufacturer.* Enter the name of the parachute canopy manufacturer.
6. *Canopy contract number.* Enter the entire contract number specified for the parachute canopy.
7. *Station and unit.* Enter the name of the station and unit to which the parachute canopy is currently assigned. When a parachute is transferred permanently to another station and / or unit, the original entry will be lined out and the name of the receiving station and / or unit will be entered.
8. At top of notes page located in back of book enter: Placed in service: (enter month and year that the item was placed into service).

**NOTE**

Record only the 30 day routine inspection for emergency type parachutes. Other routine inspections according to paragraph 2-15 need not be recorded.

(b) *Jump, inspection, and repack data page.* Beginning with the initial packing of a parachute and each time a parachute is repacked or administered a routine inspection, make the applicable entries on the "JUMP, INSPECTION, AND REPACK DATA" page of the log record (fig. 1-31 as follows:

JUMP, INSPECTION,						AND REPACK DATA			
DATE			BAG NUMBER	INSPECTION	REPACKED	REPACK	PACKER'S NAME	INSPECTOR'S NAME	UNIT
DAY	MO.	YR.		ROUTINE	EMERGENCY				
11	4	72	41167		0		IN	Evans	504 QM CO
17	11	72		✓	0			Burton	504 QM CO

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1. Entry for initial packing of a parachute.
2. Entry of emergency-type personnel parachute routine inspection.

Figure 1-3. Log record entries for the jump, inspection. And repack data page. typical

1. *Date.* Enter the date (day, month, and year) of each inspection and packing action applied to the parachute. These actions include the initial pack (1), after-use repack, 120-day inspection and repack, and routine inspection (2), as applicable.

2. *Bag number.* If the parachute is of troop-type design, enter the deployment bag number which is marked on the bag suspension line protector flap.

3. *Routine inspection.* Enter a checkmark when an emergency-type personnel parachute is administered a routine inspection.

4. *Jumped or dropped.* No entry required.

5. *Repack.* For initial packing, enter "in.", thereafter enter a checkmark in the column each time the parachute is repacked.

6. *Packer's name.* The packer performing the initial pack, repack, or routine inspection, as applicable will sign this entry.

7. *Inspector's name.* The inspector who has performed the pack-in-process inspection or routine inspection, as applicable, will sign this entry.

8. *MWO number.* Enter the publication number and date of the modification work order (MWO) which prescribes the modification work (1, fig. 1-4).

9. *MWO title.* Enter a short, abbreviated title extracted from the modification work order (MWO) prescribing the work.

10. *Modified by.* Enter the last name of the individual who has performed the modification. If the original log record for the parachute has been lost and it has been ascertained through inspection that a particular modification has been accomplished, the entry for this column will be "C / W" (2, fig. 1-4) which signifies the applicable modification work order (MWO) has been complied with.

11. *Inspected by.* The individual who accomplished the inspection required after modification will sign this entry with his last name only.

12. *Unit.* Enter the unit designation responsible for performing the modification work or, in the event of a lost log record, the unit to which the inspector is assigned.

13. *Date.* Enter the date (day, month, and year) the modification work was completed.

14. *Unit.* Enter the unit designation to which the packer and/ or inspector are assigned,

(c) Modification work order compliance record page. When a modification is performed on a parachute canopy, the following entries will be made on

the "MODIFICATION WORK ORDER COMPLIANCE RECORD" page of the log record (fig. 1-4).

MODIFICATION WORK ORDER		COMPLIANCE RECORD					
MWO NUMBER	MWO TITLE	MODIFIED BY (Name)	INSP BY	UNIT	DATE		
					DAY	MO.	YR.
10-1670-213-201 8 JUN 72	ENLARGE ORIFICE	C/W	Evans	1st	25	7	71
10-1670-213-201 8 JUN 72	ENLARGE ORIFICE	C/W	Mc	1st	25	10	72

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1. Modification work order compliance completed.
2. Modification completed by unknown due to lost original log record.

**Figure 1-4. Log record entries for the modification work order compliance page. typical**

(d) *Organizational, field, and depot repair and inspection data page.* When a parachute canopy assembly is initially received from a supply source and a technical/ rigger-type inspection is performed, the inspection accomplishment will be documented on the "ORGANIZATIONAL, FIELD, AND DEPOT REPAIR AND INSPECTION DATA" page of the individual parachute log record (1, fig. 1-5). Additional entries will also be made on this page each time the canopy assembly is repaired (2, fig. 1-5) or is administered an inspection in compliance with a one-time inspection technical bulletin (TB) (3, fig. 1-5). The page completion criteria is as follows:

ORGANIZATIONAL, FIELD & DEPOT		REPAIR & INSPECTION DATA				
TYPE OF REPAIR		INSP BY	UNIT	DATE		
				DAY	MO.	YR.
INITIAL INSPECTION		Off	1st	2	72	
2 SEC and 4 LINES REPAIRED		Evans	1st	3	72	
TB 10-1670-213-201/5		Mc	1st	4	72	

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1. Completion of initial inspection.
2. Repair accomplishment.
3. Technical bulletin inspection compliance.

**Figure 1-5. Log record entries for the organizational, field, and depot repair and inspection data page. typical**

1. *Type of repair.* As applicable, enter the term "INITIAL INSPECTION". the type of repair or the number of the technical bulletin (TB) which prescribes a one-time inspection.

2. *Inspected by.* The individual who performed the initial inspection, inspection after repair, or one-time inspection, as applicable, will sign this entry with his last name only.

3. *Unit.* Enter the designation of the unit which performed an inspection or the repair.

4. *Date.* Enter the date (day, month, and year) the applicable type inspection was completed.

(e) *Note page.* A page is provided at the back of a parachute log record to accommodate recording of additional data pertinent to the serviceability of a parachute canopy assembly (fig. 16).

SERIAL NO.	NONE
TYPE	HARNESSES, 28 FT. CHEST
PART NO.	59 J 6709
DATE OF MFG. (Month & Year)	OCT 64
MANUFACTURER	M. STEINTHAL & CO.
CANOPY CONTRACT NO.	AF 36 (600) 19273
STATION & UNIT	TSARCOM
	ST. LOUIS, MO
(Continued on inside back cover)	

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Figure 1-7. Inside front cover entries for a parachute harness log record, typical

1. *Serial number.* Enter the word "NONE" for all harnesses except the harness used with the MK-J5 ejection seat personnel parachute system. In an MK-J5 harness log record, enter the harness serial number obtained from the harness vest.

2. *Type.* Enter the type of parachute the harness is used with.

3. *Part number.* Enter the part number of the harness.

4. *Date of manufacture.* Enter the month and year the harness was manufactured.

5. *Manufacturer.* Enter the name of the harness manufacturer.

6. *Contract number.* Delete the word "CANOPY" in the entry block title and enter contract number under which the harness was manufactured.

7. *Station and unit.* Enter the name of the station and the unit to which the parachute harness is currently assigned. Should the harness be

NOTES
RISER MFG. DATE JAN 61 IMMERSED IN SALT WATER 24/72 RINSED 27/10/72
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Figure 1-6. Data entries for a log record note page, typical

(2) *Parachute harness log record.*

(a) *Inside front cover.* Using the information furnished on the identification label of the harness, make the following entries on the inside of the front cover of the log record (fig. 1-7). Entries may be continued on the inside of the back cover, if required. Should the identification label be missing, the date of manufacture will be obtained from the harness hardware.

transferred permanently to another station and / or unit. the original entry will be lined out and the name of the receiving station and / or unit will be entered.

(b) *Jump, inspection, and repack data page.* When a parachute that is associated with a harness which requires a log record is repacked or routinely inspected. the harness also will be administered an inspection. For recording purposes, the harness inspection will be treated in the same manner as a repack or routine inspection of a parachute. As a result, the "JUMP, INSPECTION, AND REPACK DATA" page of the harness (fig. 1-8) will be completed as follows:

JUMP, INSPECTION,					AND REPACK DATA			
DATE			BAG NUMBER	ROUTINE INSPECTION	REPACK	PACKER'S NAME	INSPECTOR'S NAME	UNIT
DAY	MO.	YR.						
21	6	72						
21	7	72		✓	IN	Evans		
22	8	72		✓		Moller	TSM	
22	9	72		✓		Offt	COM	
19	10	72			✓	Jord		
						Cook		

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1. Entry for harness inspection upon initial pack of the parachute.
2. Routine inspection entry.
3. Second routine inspection entry.
4. Third routine inspection entry.
5. Entry for harness inspection upon 120-day (200-day for MK-J5 ejection seat harness) parachute repack.

**Figure 1-8. Entries for harness log record jump, inspection, and repack data page, typical**

1. *Date.* Enter the date (day, month, and year) of each inspection action applied to the parachute harness. These inspections are performed upon initial pack of the associated parachute (1, fig. 1-8) on a 30-day routine basis between the parachute repack cycle (2, 3, and 4, fig. 1-8) and upon the 120-day (200 day for MK-J5 ejection seat) repack of the parachute (5, fig. 1-8).

2. *Bag number.* This column is not applicable to an individual parachute harness and will be left blank.

3. *Routine inspection.* Enter a checkmark when the harness is administered a routine inspection.

4. *Jumped or dropped.* No entry required.

5. *Repack.* For initial inspection, enter "in.", thereafter enter a checkmark in the column

each time the harness is inspected during packing of the associated parachute.

6. *Packer's name.* This column is not applicable to an individual parachute harness and will be left blank.

7. *Inspector's name.* The individual who performed the inspection will sign this entry with his last name only.

8. *Unit.* Enter the unit designation to which the inspector is assigned.

(c) *Modification work order compliance record page.* To complete entries on the "MODIFICATION WORK ORDER COMPLIANCE RECORD" page which are applicable to modification work performed on an applicable type parachute harness, refer to paragraph c (1)(c) above.

(d) *Organizational, field, and depot repair and inspection data page.* The accomplishment of the "ORGANIZATIONAL, FIELD, AND DEPOT REPAIR AND INSPECTION DATA" page as applies to the log record of an applicable type parachute harness will be as prescribed in paragraph c (1) (d) above.

(e) *Note page.* Additional data which may be pertinent to the serviceability of an applicable type parachute harness will be recorded on the "NOTE" page located at the back of a log record.

d. *Log Record Replacement.* A parachute or harness log record, which is completely filled out, lost, illegible, or in an otherwise unserviceable condition, will be replaced with a serviceable log record. Accomplish the log record according to the following procedures, as applicable.

(1) *Replacing a filled out or unserviceable log record.*

(a) Using a suitable blue or black marking device, enter "NEW BOOK" on the outside front cover of the replacement log record.

(b) Transcribe the information from the inside front cover of the original log record to the inside front cover of the replacement log record. If the original data is illegible or missing, accomplish the page entries as prescribed in paragraphs c (1) (a) or c (2) (a) above.

(c) In the replacement log record, transcribe the initial and last entry made on the "JUMP, INSPECTION, AND REPACK DATA" page of the original log record.

(d) Transcribe all data from the remaining pages of the original log record to the

appropriate pages of the replacement log record.

(e) After insuring that all original data has been transcribed to the replacement log record as prescribed in (b) through (d) above, destroy the original log record.

(2) Replacing a lost log record.

**NOTE**

**Any time a log record is discovered missing from a parachute or an applicable type harness, a replacement log record will be initiated upon completion of repack or inspection, as applicable.**

(a) Using a suitable blue or black marking device, enter "NEW BOOK" at the top of the inside front cover of the replacement log record.

(b) Accomplish the log record inside front, cover as prescribed in paragraphs c (1) (a) or c (2) (a) above.

(c) If the item for which a replacement log record is being prepared is a personnel parachute, the age life of the canopy will be obtained from the date of manufacture or, if available the date the canopy was placed into service as indicated on the canopy information data block. Enter the date placed in service (initial) and other applicable data on the "JUMP, INSPECTION, AND REPACK DATA" page of the log

record (fig. 1-9) as detailed in paragraph c(1) (b) above, enter "in." if date placed in service is known. If not known, enter "unk."

JUMP, INSPECTION,					AND REPACK DATA			
DATE			BAG NUMBER	ROUTINE INSPECTION	REPACK	PACKER'S NAME	INSPECTOR'S NAME	UNIT
DAY	MO.	YR.						
26	10	77	38795		IN	Wagner	J. and	130000

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**Figure 1-9. Parachute initial pack entry for replacement log record, typical**

(d) If it can be ascertained by inspection that a previous modification work order (MWO) or technical bulletin (TB) has been complied with, applicable entries will be made on the appropriate page of the replacement log record using the procedures in paragraph c (1) and (2) above.

(e) Attach the replacement log record to the applicable parachute log record / inspection data pocket using the procedures in paragraph a above.



## CHAPTER 2

### MAINTENANCE REQUIREMENTS

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#### Section I. SERVICE UPON RECEIPT OF MATERIAL

##### 2-1. Initial Receipt

###### *a. General Procedures for Airdrop Equipment.*

When airdrop equipment is initially procured from a supply source and issued to a using unit, the item(s) will be unpacked from the shipping container(s) and inspected by a qualified parachute rigger (MOS 43E). The inspection performed will be a technical/rigger-type which will be conducted as outlined in paragraph 2-13. Upon completion of the inspection, the item(s) will be tagged as prescribed in TB 750-126. Serviceable equipment may then be entered either into storage or into use in airdrop operations, as applicable. An unserviceable item will be held and reported in accordance with paragraph 2-10d.

###### **NOTE**

**Personnel other than parachute rigger personnel may assist in the unpacking process of initially received airdrop equipment as directed by the local airdrop equipment maintenance officer. However, maintenance officer will insure that the entire unpacking effort is conducted under the direct supervision of a qualified parachute rigger (MOS 43E).**

###### **NOTE**

**Acceptance of new airdrop equipment from manufacturers is based upon inspections made of sample lots which have been randomly selected in accordance with military standards. It is incumbent upon using activity personnel to bear this in mind whenever equipment is first placed in service. Changes will sometimes evolve from the original equipment**

**design and some times contractors are authorized deviations in material and construction techniques. Airdrop equipment that has been in the field cannot be expected to meet exacting manufacturing specifications; however, the equipment should closely reflect desired design characteristics. Since repairs, modifications and/or changes can alter or detract from the configuration originally desired; such equipment shall be air worthy, safe and of the desired configuration and adequate for intended use.**

*b. Additional Requirements for Personnel Parachutes.* Prior to being placed into service, personnel parachutes that have had no previous use will be marked to reflect the date of entry into service. The marking will be made on the canopy information data block by stenciling the lettering in 1/2-inch characters using the procedures in paragraph 3-5. Other applicable parachute components will be marked adjacent to existing data. The stenciled data will appear on "IN-SVC" followed by the date which will indicate the month and calendar year such as "Jan 75". Insure the added marking does not infringe upon or obliterate any original data on the information data block.

##### 2-2. After-Use Receipt

Used airdrop equipment which has been rehabilitated and is received from a supply source by an airdrop equipment maintenance activity will be processed as prescribed in paragraph 2-1. Airdrop equipment which is received after being used for airdrop will be administered a shakeout and, if required, aired in accordance with paragraph 2-23.

## Section II. GENERAL MAINTENANCE SPECIFICS

### 2-3. Maintenance Responsibilities and Backlog Policies

a. *Responsibilities.* The maintenance of parachutes and other airdrop equipment will be accomplished by the various levels of maintenance as prescribed by the applicable equipment maintenance publications. Responsibilities of each maintenance level and the concepts of equipment maintenance are defined in AR 750-1.

b. *Parachute Maintenance Back/log.* A backlog of parachute maintenance work at a direct support maintenance level within CONUS will not exceed 60 workdays. The 60-workday criteria, however, does not apply to modification work being performed at the direct support level or a parachute maintenance backlog which has occurred as a result of scheduled maneuvers. To alleviate a parachute maintenance backlog at the direct support level within CONUS which exceeds 60 workdays, prepare and forward a request for disposition through command channels to Commander, US Army Development and Readiness Command. A backlog at an overseas installation will be regulated by the division or area commander, as required.

### 2-4. Repair Limitations.

The amount and types of repair which may be performed on a parachute or other airdrop item will be as authorized by the applicable technical publication pertinent to the individual item. In some instances, certain repair procedures may be prohibited entirely. Regardless of the situation or the item type, any and all repair limitations specified for an airdrop item will be strictly adhered to as prescribed in TB 43-0002-4 and AR 750-1.

### 2-5 Shelf and Service Life Criteria.

Shelf life is defined as a specified time an item remains in storage in the original container. Service life begins when an item is placed in use and is a specific time period. Shelf and service life limitations for airdrop equipment are as follows:

a. *Personnel Parachutes.* Shelf and service life for personnel parachute shall be as stipulated in TB 43-0002-4.

b. *Other Airdrop Items.* There are no shelf or service life limitations prescribed for cargo parachutes, pilot parachutes used with cargo parachutes, extraction parachutes, drone-recovery parachutes, or other airdrop equipment. However, it is essential that all airdrop equipment be carefully monitored for evidence of deterioration resulting from age or use.

c. *Emergency Parachute Assemblies (Aircraft Installed).* Components which have more than ninety (90) days service life remaining, may be repacked and issued for service. It is the responsibility of the parachute packer to enter the next repack due (NRD) date in the parachute log record, DA Form 10-42 or 3912. The next due date will be entered on the line below the date repacked entry and will contain the acronym "NRD" and the packer's "initials" in the bag number column. The date entered on this line will reflect either the normal repack cycle date or the emergency parachute assembly, whichever occurs first. It is the responsibility of the using organization to insure that parachute assemblies are removed from aircraft and returned to the parachute repack facility by the next repack due (NRD) date.

**Table 2-1. Parachute Repack Interval Schedule.**

<b>Parachute Type</b>	<b>Repack interval (days)</b>
Troop-Back Static Line	120
Troop-Back Free Fall	120
Troop Chest Reserve (except climatic categories 7 & 8)	365 (see note)
Troop Chest Reserve (Climatic categories 7 & 8)	120 (see note)
Ejection-seat, when plastic suspension line stowage tray is used	100
Ejection-seat, when fabric suspension line stowage tray is used	200
Emergency-type free back and chest	120
Cargo and Cargo Extraction	365
Drone-recovery	365

**NOTE**

The repack interval for troop chest reserve parachutes is 365 days except in climatic categories (CC) 7 and 8 (cold/extreme cold per AR 70-38) where the repack interval is 120 days. When packed, the following provisions for repack will apply:

- a. When entering and remaining in CC 7 and 8 repack on next due date or within 120 days from date of entry whichever comes first.
- b. When leaving CC 7 and 8 and remaining in CC 1 through 6 repack at next due date (120 days from last pack) and thereafter annually.
- c. When reserve parachutes from CC 1 through 6 are used in CC 7 and 8 for less than 120 days, they will remain on the 365 repack interval.

**2-6. Parachute Repack Intervals.**

All parachutes will be repacked at scheduled intervals to insure airworthiness. The criteria for scheduling of parachute repack are as follows:

a. *Normal Parachute Stock.* Parachutes packed for airdrop, except those cargo and cargo extraction parachutes specifically identified as "Packed for Contingency" and stored separately as contingency stock will be repacked at the intervals specified in Table 2-1. When necessitated by climate/storage/use condition, more frequent repack intervals may be required by the local airdrop equipment maintenance officer. In this regard, of major concern would be rapid fluctuations of temperature, fluctuations around the 32 °F freezing point, sustained high or low temperature or humidity and heavily polluted atmosphere.

b. *Contingency Parachute Stock.* Cargo and cargo extraction parachutes specifically identified as "Packed for Contingency" and stored as contingency parachute stock separate from normal parachute stock will be repacked as follows: The G-11 A/B will be repacked at a 36 month interval. All other cargo parachutes will be repacked at a 72 month interval, provided the storage conditions are in accordance with the following criteria:

- (1) Temperature is between 50 °F and 95 °F, with only occasional extremes from 40° F to 120 °F.
- (2) Relative humidity is between 25 to 80 percent.
- (3) There are no rapid changes of temperature which would cause moisture condensation.
- (4) Equipment is stored at least 6 inches off the floor, 1 foot away from external walls and 4 feet below the roof or ceiling, with ventilation alleys between stacks on all sides.
- (5) Stock is protected by covers from exposure to bright sunlight (doors, windows, skylight) and from fluorescent lighting if within 6 feet distance.

(6) Measurements, inspection and records are maintained to show that the criteria are met.

(7) Cargo and cargo extraction parachutes packed for contingency operations will be identified by an entry made on the "JUMP, INSPECTION, AND REPACK DATA" page of each applicable parachute log record. The statement "PACKED FOR CONTINGENCY" and the location of the contingency stock (fig. 2-1) will be stamped in the log record using red ink.

c. *Parachute Log Record* Using activities receiving cargo and cargo extraction parachutes from contingency stock will enter the date of receipt in each applicable parachute log record as shown in fig. 2-1. Subsequent repack intervals for these parachutes will be scheduled as specified in paragraph a. above. However, under no circumstances will the repack interval exceed 36 months.

JUMP, INSPECTION,					AND REPACK DATA				
DATE			BAG NUMBER	ROUTINE INSPECTION	JUMPED OR DROPPED	REPACK	PACKER'S NAME	INSPECTOR'S NAME	UNIT
10	1	74					L. Smith	Sheppard	82 QM
PACKED FOR CONTINGENCY-					NEW CUMBERLAND ARMY DEPOT				
DATE RECEIVED					30 JAN 74				

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**Figure 2-1. Log record entries for contingency stock parachutes, typical**

d. *Personnel Parachute in POMCUS Storage.* Troop-back static line and troop-back free fall parachutes stored as POMCUS stock, separate from normal parachute stock, will be repacked at intervals not exceeding 180 days.

## 2-7. Shop Layout Details.

a. *General.* Because of the serious consequences that could result if unserviceable airdrop equipment is placed into use, it is imperative that shop facilities be laid out and operated in a manner which will insure that airdrop equipment is afforded systematic care and handling at all times. Layout of a shop will be accomplished in accordance with FM 10-8. To produce a controlled environment within a shop will require the use of air conditioning, evaporative cooling, and a mechanical ventilation system which will be installed in accordance with AR 420-54.

b. *Maintenance Activity Separation.* To preclude the mixing of serviceable and unserviceable airdrop equipment, the packing activity will be physically separated from the repair activity. If the two activities cannot be housed within separate buildings, a separation will be effected by use of mesh wire or other suitable type partitioning material. Packed parachutes ready for issue will be physically stored separately. Within each activity, storage and work areas will be designated to insure that the segregation of serviceable equipment and equipment to be inspected is maintained at all times. When an airdrop item is considered unserviceable, the item will be tagged in accordance with TB 750-126 and removed to an area which has been designated for unserviceable equipment. The unserviceable equipment area will contain a physical barrier to prevent serviceable equipment from being contaminated.

## 2-8. Operating Procedures.

Procedures which are used in the limited storage of air delivery equipment also apply to air delivery items located in a packing or repair activity. In addition, the following procedures "will be exercised and strictly adhered to.

### CAUTION

**Jewelry items such as watches, rings, and identification bracelets may damage canopy cloth if worn during the packing or maintenance of a parachute canopy. Nylon**

**material is subject to ultraviolet degradation by sunlight and some types of artificial lighting. Efforts will be made to avoid exposing airdrop items made of nylon, especially parachutes, to sunlight in the open or near windows, doors, and skylights. Additional efforts will be made to avoid prolonged exposure of the cited airdrop equipment over inspection lights or under fluorescent lights. It is recommended that parachutes be covered during periods of inactivity.**

a. A shop will be well lighted, with special attention directed to the adequacy of overhead lights. The lighting in shadow tables will be maintained in an operable condition at all times.

b. Maintenance tables (inspection, packing, and repair) and packing tools will be cleaned before use. In addition, tables and tools will be maintained free of sharp edges and splinters.

c. Insure shop floors are kept free of oil, grease, and dirt.

d. Smoking, eating, and refreshment drinking will be permitted in designated areas other than work areas.

## 2-9. Tools and Equipment.

The maintenance of airdrop equipment requires the use of certain tools and devices which, in some cases, will be available through supply channels and in other instances, necessitate local fabrication. Except for unique situations, the following tool and equipment criteria will generally apply to the maintenance of airdrop items.

a. *Special Tools and Equipment.* Any special tools or devices which may be required to perform maintenance will be specified in the Repair Parts and Special Tools List (RPSTL) of the technical manual pertinent to the particular airdrop equipment.

b. *Common Tools and Equipment.* Common tools and equipment required to perform maintenance on airdrop equipment will be listed and authorized in the applicable TOE or TA of the using unit or maintenance installation.

c. *Field Expedients.*

(1) *Vent hook.* A vent hook is a fabricated device used during the packing of small cargo parachutes and personnel parachutes to secure the applicable parachute canopy sent to the packing table. A suitable type webbing length and snap will be used in the construction of a vent hook.

(2) *Stationary post.* A stationary post is a fabricated item used as a stable attaching point for the bridle loop of a large cargo parachute when applying tension to the parachute canopy. To construct a stationary post will require a suitable length of metal pipe or wooden stake to be firmly anchored in the surface of the packing area.

(3) *Tension device.* A tension device used to apply tension during the packing of a large cargo parachute canopy may be improvised through the use of a suitable type motor vehicle or a pulley system employing rope or webbing straps.

(4) *Shakeout tower.* A shakeout tower may be erected locally by placing long poles vertically in the ground and assembling pulleys, ropes, and suitable type attaching devices for use in the raising and lowering of parachute canopies. Other similar type improvisation may be used to achieve a suitable means of accomplishing parachute canopy shakeout.

**NOTE**

**When poles are used, each pole will be wrapped with a suitable type material to prevent snagging of canopies**

(5) *Searing device.* A searing device used to sear the raw ends of nylon cord, tape, or webbing may be devised by improvising with any suitable type heat-emitting item.

**2-10. Equipment Disposition.**

Airdrop equipment may be rendered unserviceable by either normal fair wear or by aging and will subsequently be repaired, modified, or condemned, as appropriate.

Equipment that is uneconomically repairable (outdated) will be condemned. Disposition of airdrop equipment that is condemned, unserviceable, or for which the serviceability is questionable, will be accomplished using the following procedures, as applicable.

a. *Item Requiring Repair or Modification.* An airdrop item which requires repair or modification will be tagged in accordance with TB 750-126. Subsequent work on the item will be performed at the maintenance level specified for the maintenance function in the applicable supporting technical publication.

b. *Personnel Parachutes and Air Delivery Equipment with Exhausted Age or Service Life.* Any parachute component or air delivery equipment whose age or service life has expired as specified in TB 43-0002-4 will be removed from service, condemned and tagged as prescribed by TB 750-126.

c. *Disposition of Fatality Parachutes and Condemned Air Delivery Equipment.* Personnel parachutes that have been involved in a parachute jump fatality will be condemned and tagged as prescribed by TB 750-126. Parachutes and equipment involved in a fatality will be retained until engineering studies and investigations have been completed. When a fatality parachute is no longer needed, it will be destroyed by burning or mutilation with appropriate destruction certification completed for documentation of supply records. Condemned equipment, other than fatality parachutes, will be removed from service and disposed of in accordance with current directives listed in Appendix A of this manual.

d. *Rejected Equipment.* Equipment which, prior to use, is deemed unserviceable for use will be reported in an Equipment Improvement Recommendation (EIR) in accordance with TM 38-750, as authorized by AR 750-1. Each applicable item which is defective will be held and safeguarded pending receipt of disposition instructions from the National Maintenance Point (NMP). In all instances, EIR exhibit material will be handled as prescribed in TM 38-750. If the quality or the serviceability of an item is questionable, clarification and assistance may be obtained by contacting Commander, US Army Troop Support and Aviation Materiel Readiness Command, ATTN: DRSTS-MT, 4300 Goodfellow Blvd., St. Louis, Missouri 63120.

e. *Equipment of Doubtful Serviceability*

Equipment which has had previous use and has not exceeded normal fair wear or aging criteria, but of which further serviceability is doubtful, will be tagged as prescribed in TB 750-126. In addition, the equipment will be reported in an Equipment Improvement Recommendation (EIR) in accordance with TM 38-750 and AR 7501. The items in question will be held as EIR exhibit material as outlined in TM 38-750 pending receipt of disposition instructions from the National Maintenance Point (NMP). A maintenance activity holding EIR exhibit material will not tamper with the applicable item(s) or make any attempt to ascertain cause factors. Unnecessary handling of EIR exhibit material may disturb or alter peculiar aspects of the affected item(s) which might affect the judgement of engineering personnel who have the responsibility for final evaluation of EIR actions.

*f. Equipment Immersed in Salt Water.* Any airdrop item constructed from cotton material that has been immersed in salt water will be condemned. Cotton thread used for tacking and sewing on nylon parachute packs which have been immersed in salt water will only be replaced when there is visible evidence of deterioration such as extreme discoloration or indications of broken thread. Any airdrop equipment constructed of nylon or rayon material that has been immersed in salt water in excess of 24 hours will be condemned. Additionally, any nylon or rayon airdrop item that has been immersed in salt water for a period less than 24 hours, but which cannot be rinsed within 48 hours after recovery will also be condemned. However, if the cited time limitations can be met, then immediately upon recovery, suspend or elevate the recovered equipment in a shaded area and allow the item(s) to drain for at least 5 minutes. Do not attempt to wring the equipment fabric or, if applicable, the suspension lines. Within 48 hours after recovery, under the supervision of a qualified parachute rigger (43E), rinse the recovered equipment as follows:

(1) Place the equipment in a large water-tight container filled with a suitable amount of fresh, clean water to cover the item(s).

**NOTE**

**If salt water-soaked equipment is too large to be placed into a rinsing container, then the rinsing process will be effected by applying fresh, clean water to the item using a hose.**

(2) Agitate the container contents by hand for 5 minutes.

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Remove the item (s) from the container and suspend or elevate the equipment in a shaded area, allowing a 5-minute drainage period. Do not attempt to wring the equipment fabric or, if applicable, the suspension lines.

(4) Repeat the procedures in (1) through (3) above twice, using fresh, clean water for each rinse.

(5) After the third rinse, allow the equipment to drain thoroughly. Upon completion of draining, dry the equipment in accordance with procedures in paragraph 2-24.

(6) When dried, perform a technical / rigger-type inspection of the item(s). Corroded metal components, or corrosion-stained fabrics or suspension lines will be either repaired or replaced as prescribed by the applicable equipment Maintenance Allocation Chart (MAC).

(7) If the recovered equipment is a parachute, record the immersion, rinsing, and any repairs in the individual parachute log record as outlined in paragraph 1-5c(1).

*g. Equipment Immersed in Fresh Water.* Any airdrop equipment that has been immersed in a fresh water lake, river, or stream will not require rinsing unless it has been ascertained that the water is dirty, oily, or otherwise contaminated. Procedures for handling a fresh water immersed item are as follows:

(1) *Contaminated fresh water.* If airdrop equipment has been immersed in contaminated fresh water, rinse, dry, and, if applicable, repair the item(s) using the procedures in paragraph f above.

(2) *Uncontaminated fresh water.* If airdrop equipment has been immersed in uncontaminated fresh water, the item(s) will be cleaned and dried as outlined in paragraph 2-24. Minor discoloration of fabric items resulting from immersion in uncontaminated fresh water may occur. No attempt should be made to eliminate a minor discoloration as a slight discoloring is preferable to employing vigorous techniques that may damage the fabric. Small stains caused by petroleum products or blood will be removed using spot-cleaning procedures in paragraph 2-24.

**2-11. Procedural Requirements for Personnel Parachuting Mishaps/Malfunctions and Activity Reporting.**

Appropriate reports will be submitted in accordance with AR 59-4.

ALL DATA DELETED.

### Section III. INSPECTION PROCEDURES

#### 2-12. General.

Airdrop equipment will be inspected at prescribed intervals to ascertain individual item serviceability. The types of inspection that are normally performed on airdrop equipment are technical / rigger-type, pack-in-process, routine, and in-storage. In some instances, other technical inspections may be accomplished on an "as required" basis.

a. During any inspection or at any time that an item is found to be overage (shelf/service life has expired) as specified in TB 43-0002-4, the item will be removed from service, condemned, and tagged IAW TB 750-126.

b. To conserve time and labor and avoid evacuation to a direct support maintenance activity, unit/detachment commanders may designate in writing rigger personnel to accomplish classification inspection of overaged air delivery equipment.

#### 2-13. Technical/Rigger-type Inspection.

A technical / rigger-type inspection is a complete and thorough inspection of an individual airdrop item, including associated parts and components. The following criteria cites the specifics applicable to accomplishing a technical / rigger-type inspection which will be performed by a qualified parachute rigger in accordance with AR 750-32.

a. Inspection Intervals.

(1) Upon initial receipt of procured equipment issued to a using unit by a supply source.

(2) Immediately before equipment is packed - or rigged for use in airdrop operations.

(3) Before and after repairs or modifications are made.

(4) At any other time as deemed necessary by the airdrop equipment maintenance officer.

b. *Inspection Function Requirement.* Normally, a technical/rigger-type inspection will be performed by airdrop equipment maintenance personnel at a packing, rigging, or repair activity. The inspection of initial receipt items will be performed as a separate function from packing or rigging operations. When the inspection is conducted at a packing or rigging activity, the item to be inspected will be placed in proper layout on packing table or suitable sized floor area. Should defect or damage be discovered at any point during the inspection, the inspection will be terminated and the applicable item will be processed and forwarded to a repair activity. The repair activity in turn, will conduct a technical / riggertype inspection that will be performed by only those parachute rigger personnel cited in AR 750-32. The repair activity inspection of personnel parachutes will be made on a shadow table. Any defect discovered during an organizational level repair activity inspection which exceeds the capability of that activity will require the affected item to be evacuated to a direct support maintenance function for further determination of economic repair and repair accomplishment,



if applicable.

**NOTE**

**Personnel, drone-recovery, and small cargo parachutes which are deemed unserviceable by a packing or rigging activity will be rigger-rolled prior to being sent to a repair activity.**

c. *Technical/ Rigger-type Inspection Procedures.*

(1) *Overall inspection.* An overall inspection will be made of individual parachutes and other airdrop equipment items to ascertain the following:

(a) *Log record/parachute inspection data pocket and form.* As applicable, inspect the assembly log record / parachute inspection data pocket to insure the Army Parachute Log Record IDA Form 10-42 or 3912) is inclosed and properly attached as prescribed in paragraph 1-5 b. Further, remove the log record from the pocket and evaluate the recorded entries to insure compliance with paragraph 1-5c.

**NOTE**

**On emergency-type personnel parachutes, the log record pocket will be checked to insure the pocket also contains a copy of TM 10-1670-1/AFM 64-15 which is wrapped in a sealed clear polyethylene bag.**

(b) *Assembly completeness.* Insure that the applicable assembly is complete and no components or parts are missing.

(c) *Operational adequacy.* Check the item components and parts to insure proper assembly which includes attachment and alinement, and that the assembled product functions in the prescribed manner. Further insure that no stitch formation or sewn seam has been omitted, with particular attention directed to static lines, harnesses, risers, slings, extraction lines, adapter webs, and parachute canopies.

(d) *Markings and paint.* Inspect each assembly and associated components for faded, illegible, obliterated, or missing informational data, identification numbers, and warning marks. Also check for chipped, worn, or peeled paint, as applicable.

(e) *Foreign material and stains.* Inspect each assembly and related components for the presence of dirt or similar type foreign material. Also check for evidence of mildew, moisture, oil, grease, pitch, resin, or contamination by salt water.

(2) *Detailed inspection.* In addition to the overall inspection performed in (1) above, a detailed inspection will be performed on the materials which constitute the assembly or component construction using the following criteria, as applicable:

(a) *Metal.* Inspect for rust, corrosion, dents, bends, breaks, burrs, rough spots, sharp edges, wear, deterioration; damaged, loose, or missing nuts, bolts, screws, safety pins, or rivets; improper swaging or welding; loss of spring tension.

(b) *Plastic and wood.* Inspect for bends, breaks, dents, holes, rough spots, sharp edges, and wear.

(c) *Cloth.* Inspect for breaks, burns, cuts, frays, holes, rips, snags, tears; loose, missing, or broken stitching or tacking; weak spots, wear, or deterioration.

(d) *Fabric tape, webbing, and cordage.* Inspect for breaks, burns, cuts, frays, holes, snags, tears, incorrect weaving, and sharp edges formed from searing; loose, missing, or broken stitching, tacking, whipping, and weaving; weak spots, wear, and deterioration.

(e) *Pressure-sensitive (adhesive) tape.* Inspect for burns, holes, cuts, tears, weak spots; looseness and deterioration.

(f) *Rubber and elastic.* Inspect for burns, cuts, holes, tears, weak spots; loss of elasticity and deterioration.

(g) *Felt.* Inspect for cuts, tears, burns, breaks, holes, and thin spots.

(h) *Leather.* Inspect for burns, cuts, holes, tears, loose missing or broken stitching; thin spots and deterioration.

**2-14. Pack-in-process Inspection.**

A pack-in-process inspection is performed at specified intervals during the packing of a parachute to insure that only authorized procedures and methods are being used. The inspection will be accomplished by a parachute rigger other than the packer or rigger preparing the applicable equipment for use. The intervals at which the inspection is performed will be specified within the pertinent parachute equipment publication for parachute packing.

**NOTE**

**Each emergency-type personnel parachute is equipped with a log record pocket which will accommo-**

date both the Army Parachute Log Record (DA Form 10-42 or 39121 and a copy of TM 10-1670-1 / AFM 64-15. Upon completion of pack, insure a copy of TM 10-1670-1 / AFM 6415 enclosed in a clear, heat-sealed polyethylene bag is placed into the emergency-type personnel parachute log record pocket.

#### 2-15. Routine Inspection.

A routine inspection is a visual check performed to ascertain the serviceability of all visible components of a parachute or other airdrop item which is packed or rigged for use. The inspection will be made on all components that can be inspected without opening the parachute pack/bag or derigging a load. All airdrop equipment will be administered a routine inspection by a parachute rigger prior to issue. Personnel parachutes issued for an airdrop operation and not deployed will receive a routine inspection prior to being placed into ready-for-issue storage. Additionally, emergency-type personnel parachutes packed for use will be inspected every 30 calendar days or at more frequent intervals as prescribed by the local unit commander. The necessity for shorter time periods between inspections may result from climatic conditions or other environmental aspects. TM 10-1670-201-23 T.O. 13C-1-41 NAVAIR 13-1-17

Routine inspections of emergency-type personnel parachutes performed by US Army aviation units will be accomplished in accordance with TM 551500-204-25 / 1.

#### 2-16. In-storage Inspection.

An in-storage inspection is a physical check conducted on a random sample basis of airdrop equipment which is located in storage. The purpose of the inspection is to insure that the equipment is ready for issue, that the item is properly identified and segregated from other types of equipment, that no damage or deterioration of equipment has been incurred, and that all modifications or similar action requirements have been completed. The inspection shall also concern the methods and procedures applied to the storage of airdrop items, the adequacy of storage facilities, efforts of pest and rodent control, and protection against unfavorable climatic conditions. Airdrop equipment which is in storage will be inspected at least semiannually and at more frequent intervals if prescribed by the local parachute maintenance officer. The frequency of inspection may vary according to the type of storage facilities and local climatic conditions. In storage inspections will be conducted only by parachute rigger personnel designated by local parachute maintenance officer.

### Section IV. TESTING PROCEDURES

#### 2-17. General.

There are some airdrop items which are required to be tested before being placed into use. The testing requirement may be on a one-time basis or at periodic intervals, depending on the item. However, regardless of the item type, only a parachute rigger will administer a test.

#### 2-17A. Fabric and Webbing Acidity Test

Airdrop items or associated components and parts that are constructed from fabric or webbing will be administered an acidity test whenever the material is discolored, stained, or the presence of acid is suspected. The acidity test will be accomplished using Tridicator universal three-color pH paper (P/N 1-11, MFR's Code 52419) that is offered in a pocket size roll

dispenser which accommodates the 20-foot-long roll of paper and provides a pH color chart on one side for color shade comparison. To accomplish an acidity test on a fabric or webbing item, proceed as follows:

a. Using a medicine dropper or equivalent type applicator, place one to two drops of water on the item in the intended test area. If the water drops do not penetrate the material, gently rub the moistened area with a flat side of a clean metal packing paddle.

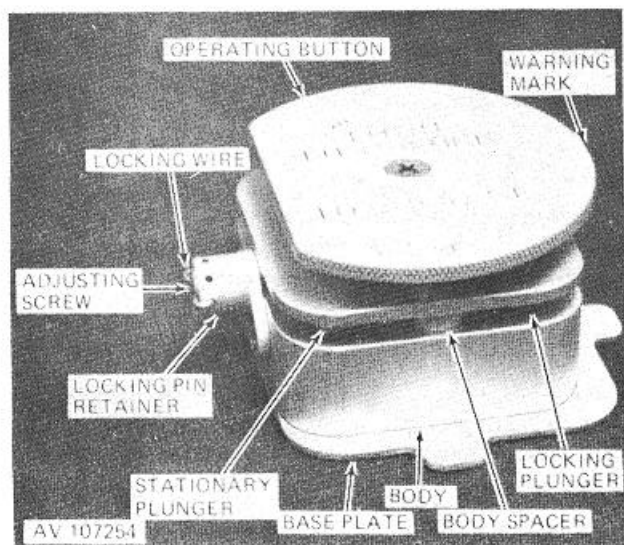
b. Tear a suitable sized piece of Tridicator pH paper from the roll dispenser. Place the piece of pH paper on the wetted area and press the full surface of the paper against the material with a flat side of the packing paddle used in paragraph a. above. Insure the pH paper becomes thoroughly wet.

c. Using the color chart on the side of the roll dispenser, compare the color of the moistened paper with the pH 1-3 color scale. If the color of the paper changes to orange or red, acid is present in the material. When it has been ascertained that the material of an item contains acid, the item will be condemned and processed for disposition in accordance with paragraph 2-10.

d. After a packing paddle has been used as outlined in paragraphs a. and b. above, thoroughly rinse and dry the paddle before using the paddle for any other function.

**2-18. Testing the Personnel Parachute Harness and Quick Release.**

Individual personnel parachute harnesses and quick releases (fig. 2-2) which are components of the T-10. maneuverable. and model MC1-1 personnel parachutes. will be tested upon receipt of new items. exchange of items within a unit or depot, disassembly of items for cleaning, replacement, or whenever there is an indication that a harness or quick release may be defective. Testing of a harness and quick release will be performed as follows:



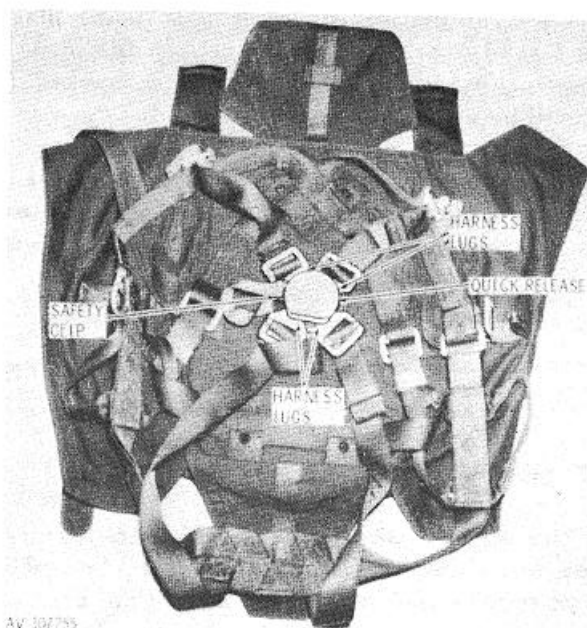
**Figure 2-2. The personnel parachute harness quick release**

a. Pull test.

**WARNING**

**Failure to rotate the release operating button to the unlocked position prior to placing the quick release into a vise for testing may allow damage to be incurred upon the center post camway. As a result, the operating button could then be manually depressed while in the locked position.**

(1) Assemble the harness lugs to the quick release. install the safety clip (fig. 2-31,. and rotate the release operating button to the unlocked position.



**Figure 2-3. Parachute harness tugs assembled on quick release and safety clip installed**

(2) Using a 3- to 4-inch vise, place a suitable type soft metal (A, fig. 2-4) or plywood 1 protector plate over each of the vise jaws. The plates shall be used to prevent subsequent damage to the quick release operating button.

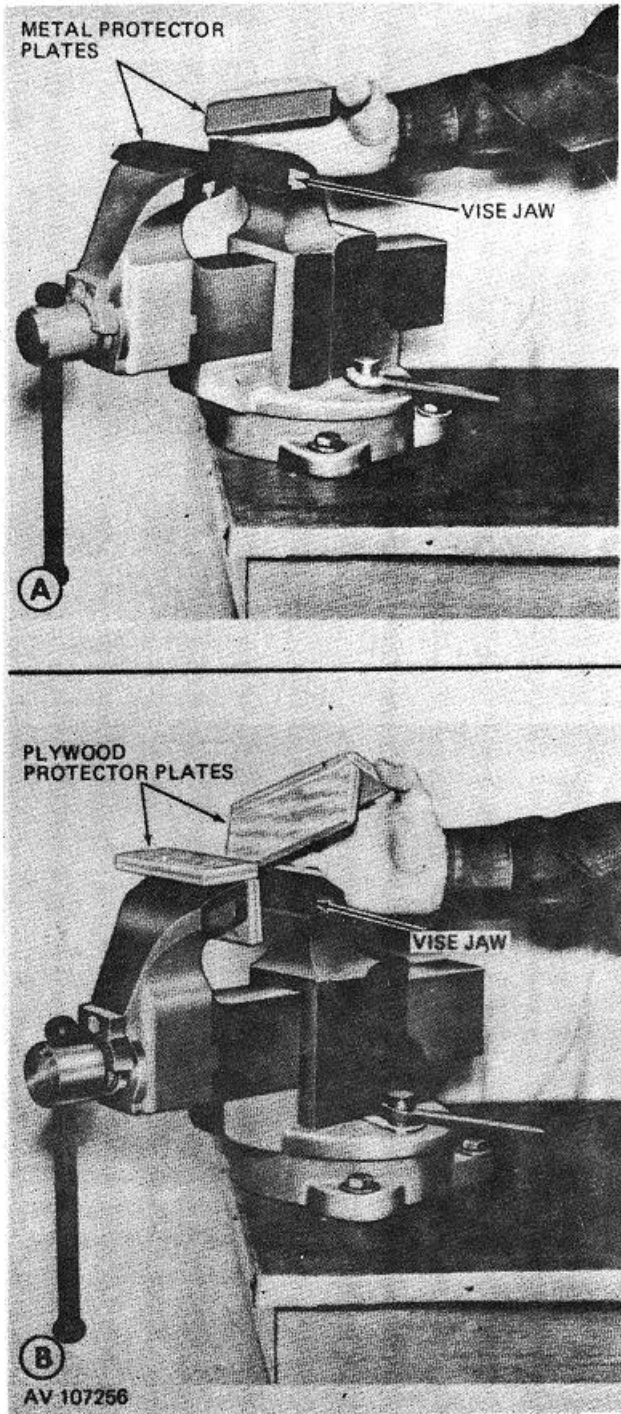


Figure 2-4. Positioning protector plates on vise jaws

(3) Place the quick release into the vise with the chest straps located at the top, the leg straps at the bottom, and the operating button centered between the vise jaws (fig. 2-5). Tighten the vise to a snug fit which should require 4- to 5-pounds of force applied with an 8-inch-long handle for leverage.

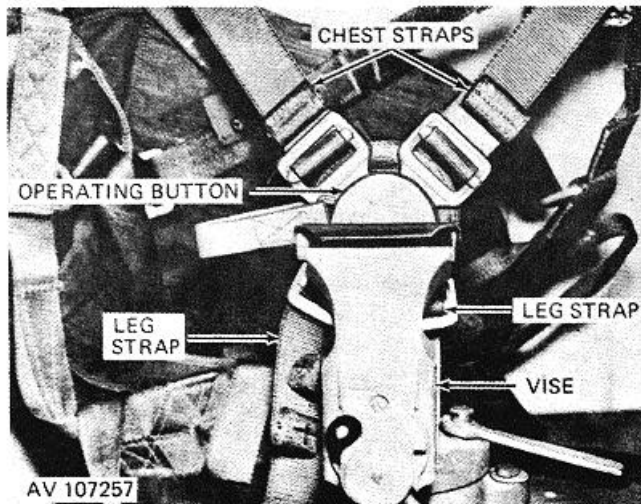
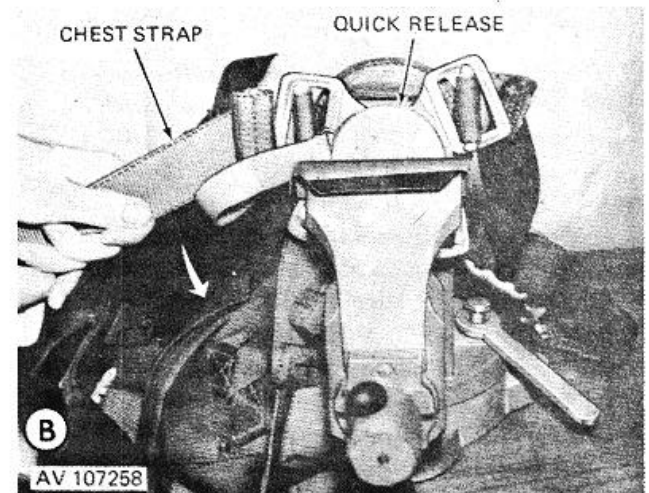
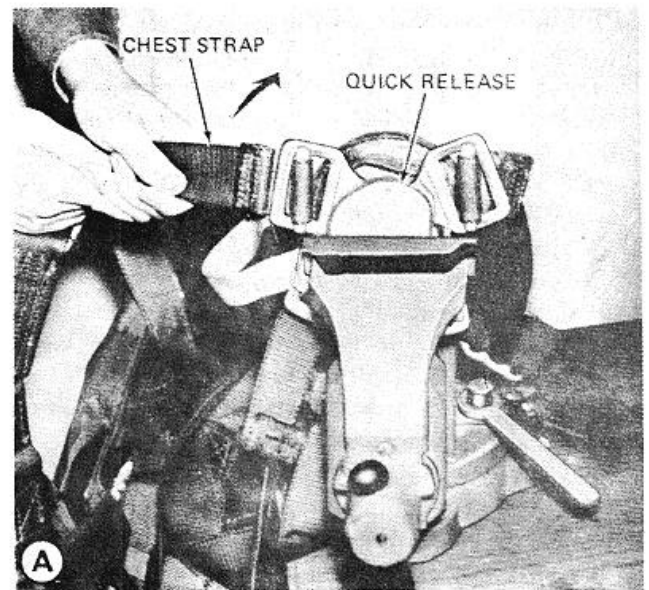


Figure 2-5. Quick release positioned in vise, typical.

**NOTE**

During application of the pull-test, all references to direction (right, left, top, bottom, rear) are presented as rigger's view when positioned to the side of a quick release contained within a vise.

(4) Grasp the right chest strap firmly with both hands as close as possible to the harness lug, and apply a steady hard pull toward the rear of the quick release (A, fig. 2-6). Maintaining a steady hard pull, alternate the direction of pull force 6 inches to the left and 6 inches to the right (B). Apply the alternating pull action six times without releasing the strap.



- A. Pulling to the rear of the quick release.
- B. Applying alternating pull force.

Figure 2-6. Performing harness strap pull-test on quick release typical.

(5) Repeat the procedure in (4) above on each of the remaining three straps. If any one of the four lugs separates from the quick release during application of the pull-test, the parachute harness and the quick release shall be rejected, removed from service, and disposed of entirely. Upon completion of the pull-test, remove the quick release from the vise. A quick release that satisfactorily complete the pull-test will be marked by painting the head of the installed release adjusting screw with black enamel paint, using a suitable type paint applicator.

**NOTE**

**Separation of a lug from a quick release indicates that the defect is a combination of an oversize chamfer edge on the underside of the harness lug and excessive top chamfer edge on the inside of the plungers of the quick release.**

b. Quick Release Operational Test. To accomplish the quick release operational test, place the release in one hand with the locking pin retainer (fig. 2-2) facing to the left and perform the following procedures.

**NOTE**

**All references to direction (right, left, clockwise, counterclockwise) are presented as rigger's view when facing the front of the quick release operating button.**

(1) Using the free hand, turn the release operating button one-quarter turn clockwise; the red warning mark located on the button edge should then face toward the operator.

**NOTE**

**If the red warning mark on the button edge is deteriorating, repaint the mark as prescribed in paragraph 3-6.**

(2) Depress the release operating button and check the three base plate screws for possible interference with the lock / unlocking function of the button. The release operating button should remain in the depressed position. The three locking plungers should be depressed into the body of the release and the stationary plunger should be in the locked position.

(3) Turn the release operating button one quarter turn counterclockwise and check the locking

plungers for spring action. If the operating button turns too hard or too easily, remove the locking wire, adjust the locking pin retainer adjusting screw, as required, and reinstall the locking wire.

(4) While the release is in the locked position, place the release on a table with the operating button facing up. Join both hands together, and using the palm of one hand, attempt to depress the release operating button by gradually applying 80 to 85 pounds of pressure. If the operating button can be depressed, the release shall be removed from service.

(5) Insert the safety clip into the quick release at a point under the red warning mark on the right side of the release. Insure the safety clip can be inserted and extracted without hindrance.

**NOTE**

**The procedure in (5) above shall be included when performing the quick release functional check during a technical/ rigger-type inspection.**

(6) Inspect the quick release to insure that three body spacers are in the proper position in the slot of the release body. Further insure that the beveled faces of all the release locking plungers face away from the center of the release. A quick release which is not properly assembled shall be rejected for use until corrective reassembly action has been performed.

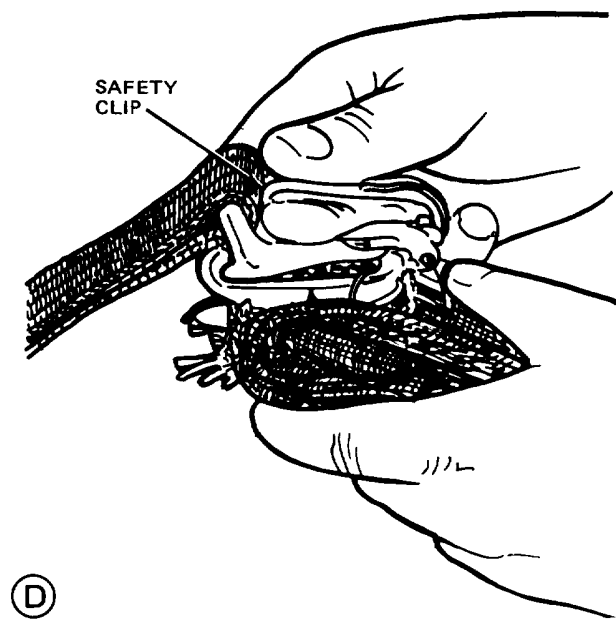
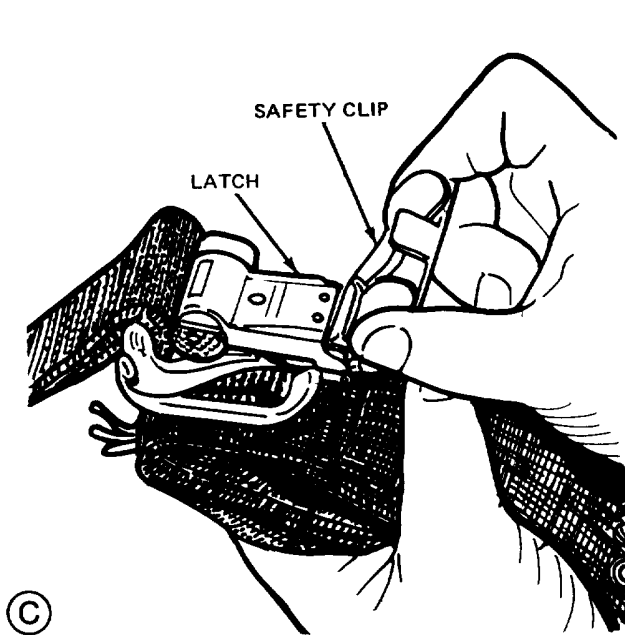
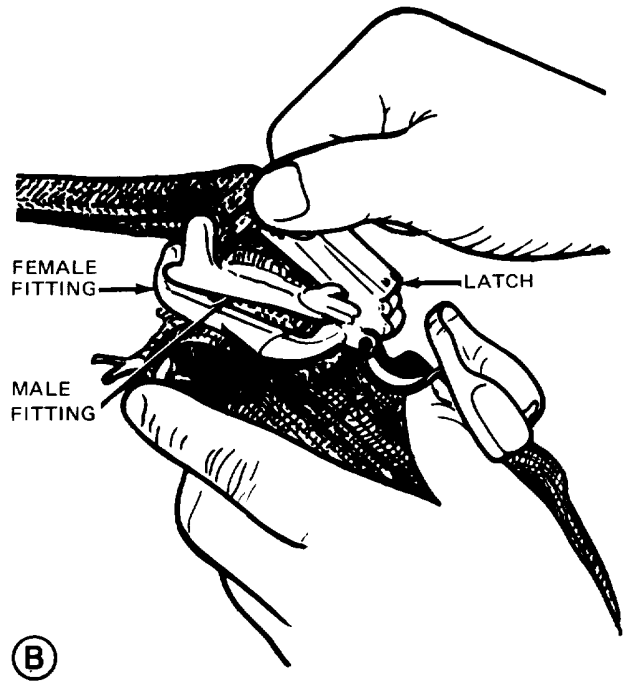
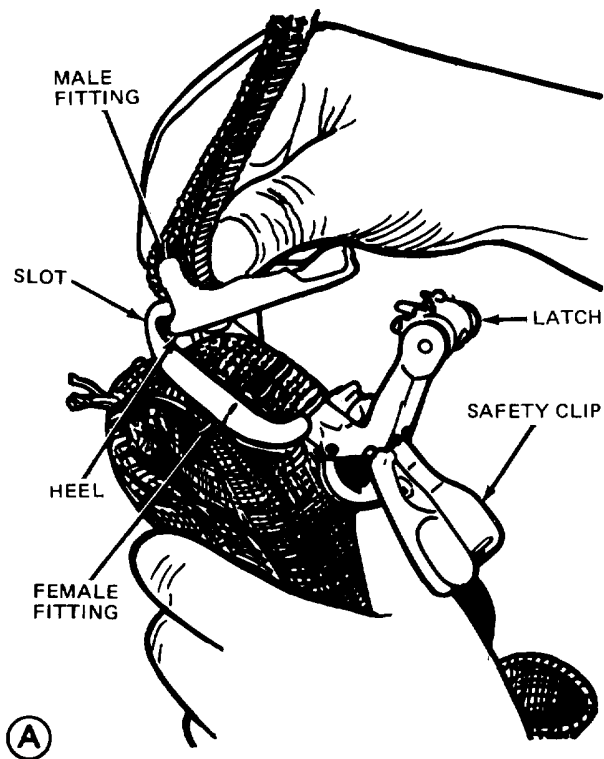
**2-19. Testing a Canopy Release Assembly.**

Each canopy release assembly on applicable type personnel parachutes (troop- and emergency-types, except the NB-8 back), will be tested at each repack and whenever a harness or riser is replaced. Assembly procedures for a canopy release with subsequent testing methods are as follows:

a. Check the latch for the presence of the red warning mark. If the mark has become worn, repaint with red enamel according to procedures in paragraph 3-6.

b. Operate the safety clip and latch to insure the movement of both parts is smooth and without binding.

c. Fit the heel of the riser male fitting into the slot of the harness female fitting (A, fig. 2-7). If the engagement of the two fittings is unsatisfactory, apply the following test:



A. Fitting male fitting heel into female fitting.  
B. Closing the latch.

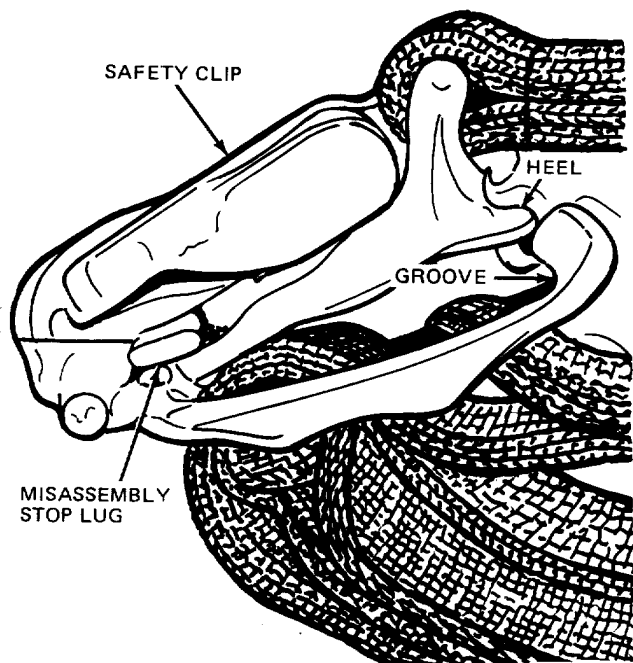
C. Positioning safety clip heel.  
D. Safety clip closed.

Figure 2-7. Assembly of a canopy release, typical

(1) Separate the riser fitting from the harness fitting.

(2) Reengage the release by placing the toe of the riser male fitting into the slot under the harness fitting misassembly stop lug. Do not allow the riser male fitting heel to engage the slot of the harness female fitting.

(3) Attempt to close the latch. If the misassembly stop lug engages the male fitting and the latch can be closed and locked (fig. 2-8), the canopy release is defective and will be removed from service. If the latch cannot be closed, the canopy release is considered serviceable.



d. Fit the toe of the riser male fitting into the groove of the harness female fitting and close the latch (B, fig. 2-7). Insure the latch is locked securely.

e. Operate the latch and check for the ease of operation.

f. Close and lock the latch in position.

g. Fit the heel of the safety clip into position at the heel of the latch (C) and close the safety clip

h. Cable Loop Type Canopy Release. The cable loop type canopy release will be assembled as illustrated in A through F of figure 2-8.1 and tested as outlined in paragraphs 2-19a through g. Make sure that cable loop is secured as shown in D of figure 2-8.1.

**2-20. Testing a Ripcord.**

a. *Application.* Ripcords on personnel parachutes, except those used in ejection-seat systems, will be tested on a one-time basis during initial entry into service. The test which will affect each of the locking pins on a ripcord and the ripcord grip, will be performed using a ripcord inspection kit and the following procedures.

**NOTE**

A strip of yellow pressure-sensitive tape wrapped around the center of a ripcord grip signifies the ripcord has been tested previously and as a result does not require testing again. However, if the serviceability of the grip or any locking pin on the ripcord length is questionable, the ripcord may be subjected to testing.

(1) *Ripcord locking pin test.*

(a) Insert 1/2 inch of a locking pin end into the hole of a fixed ripcord locking pin test block (A, fig. 2-9). Insure the test block is firmly secured in the fixed position.



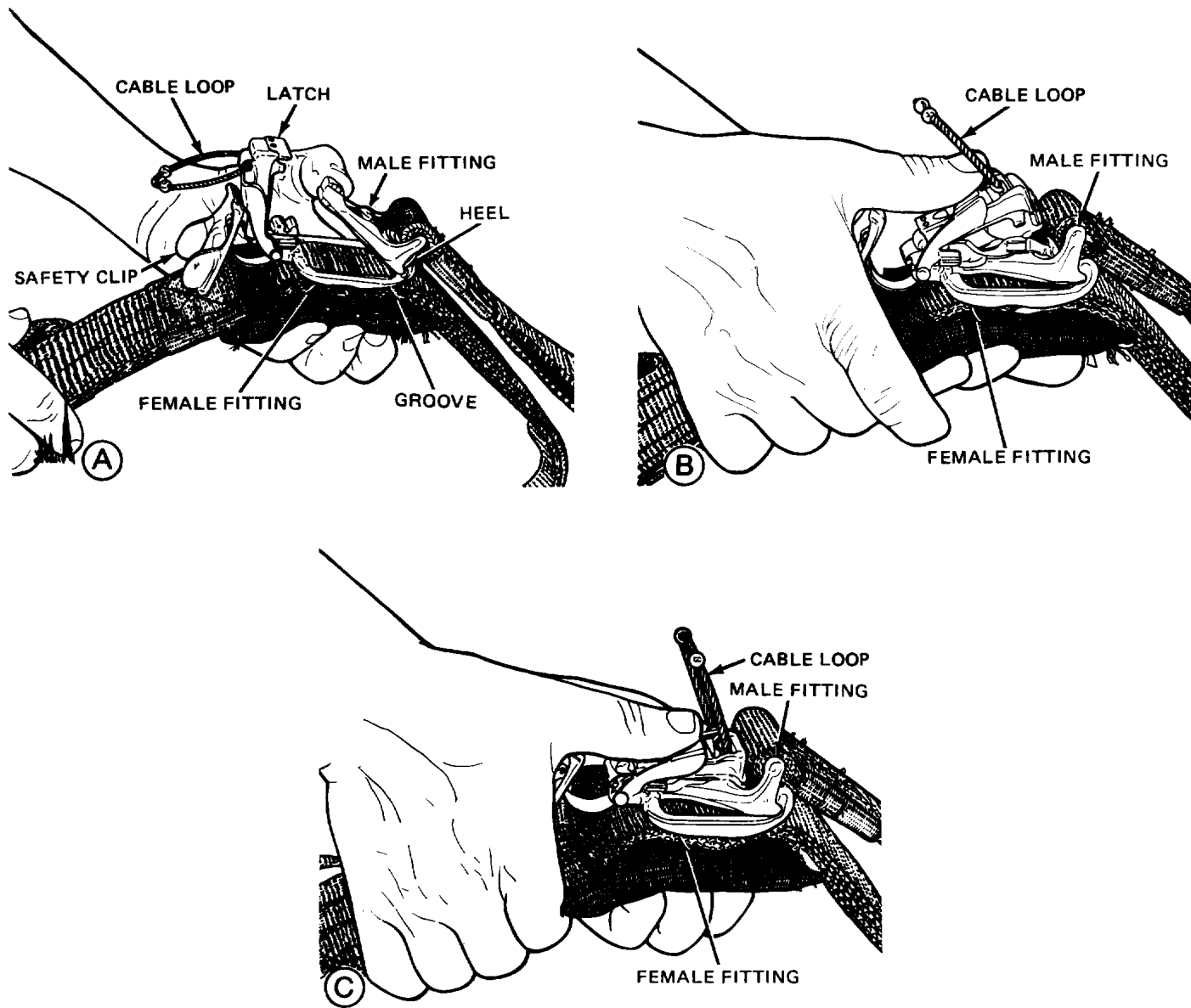


Figure 2-8.1. Assembling Cable Loop Type Canopy Release (Sheet 1 of 2).

Change 4 2-14A

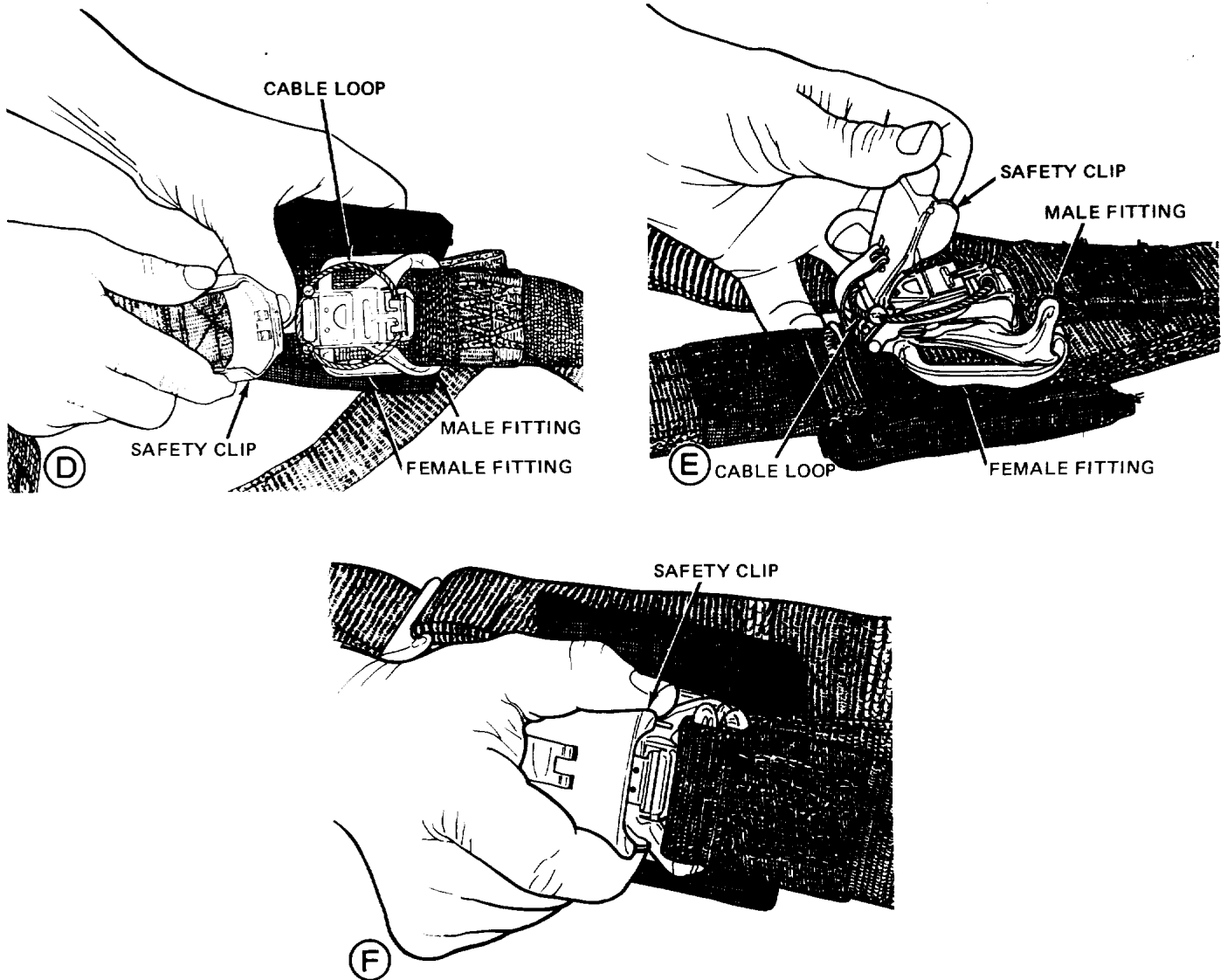
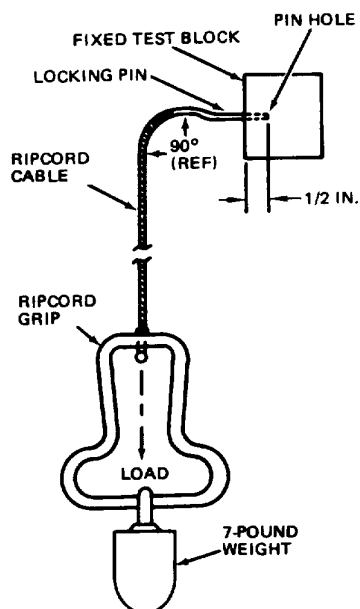
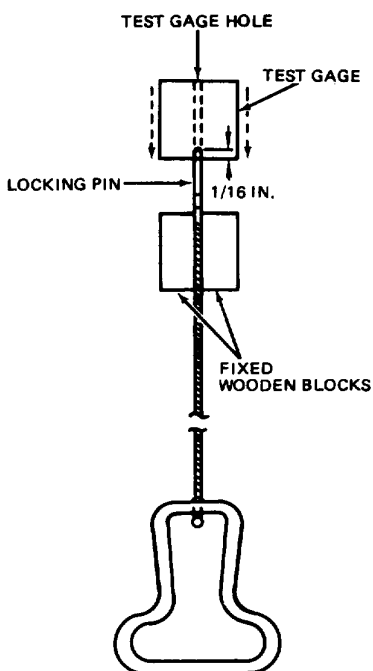


Figure 2-8.1. Assembling Cable Loop Type Canopy Release (Sheet 2 of 2).

Change 4 2-14B



(A)



(B)

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- A. Testing locking pin with test block.  
B. Testing locking pin with gage block.

Figure 2-9. Performing a ripcord locking pin test, typical.

(b) Attach a 7-pound weight to the ripcord grip handle and suspend the weight from the handle, exercising care to apply the load gradually without impact. The hands or lifting device, as applicable, must be fully removed from the weight.

**NOTE**

**A ripcord locking pin will withstand a 7-pound load without assuming a permanent set.**

(c) Remove the weight, rotate the locking pin one-quarter turn, and test the pin again by reapplying the load as prescribed in (b) above.

(d) Repeat the procedure in (c) above until the locking pin has been tested in four positions and rotated one-quarter turn prior to each test.

**NOTE**

**Each locking pin on a ripcord length will be tested under load in four positions.**

(e) Remove the weight from the ripcord grip and further remove the locking pin from the test block.

(f) Visually examine the tested locking pin to ascertain if it was marred, cracked, or distorted during the test under load. If any defects are noted, the ripcord will be removed from service.

(g) Repeat the procedures in (b) through (f) above for the remaining locking pins on the ripcord length. After testing all the locking pins, if there are no visual defects apparent, each of the locking pins will then be further tested for bends.

(h) Place a locking pin in a vertical position with the pin end facing upward and either clamp the pin between two wooden blocks at a point below the pin shoulder (B1) or hold between the thumb and index finger of one hand.

(i) Using a test gage block, manually locate the hole in the block over the end of the secured pin, allowing for a 1 / 16-inch maximum insertion.

(j) With the axis of the gage block hole aligned with the axis of the locking pin, release the gage block and allow the block to fall freely.

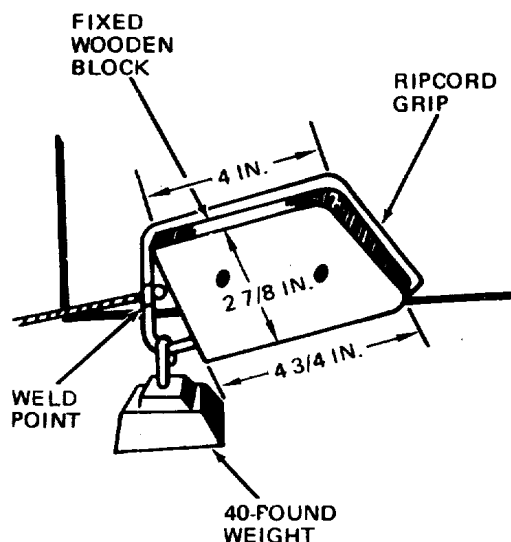
(k) When the weight of the gage block fails to cause full penetration of the pin into the gage block hole, the pin is excessively bent and ripcord will be removed from service.

(l) Repeat the procedures in (h) through (k) above for each of the remaining locking pins on the ripcord length.

(2) *Ripcord grip test.* A ripcord which has satisfactorily completed the locking pin test in (1) above will be further tested to ascertain that the ripcord grip tubing joint is properly welded.

However, a T-shaped HALO ripcord grip will not be subject to testing. Test a ripcord grip as follows:

(a) Position a back, chest or troop chest ripcord grip on a fixed wooden block previously cut to a size which will allow the grip to fit snugly (fig. 2-10).



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Figure 2-10. Performing a ripcord grip test, typical.

(b) Attach and suspend a 40-pound weight from the corner of the grip nearest the weld. Care will be taken to insure that the total weight is suspended without impact. Hands or lifting device, as applicable, must be fully removed from the weight.

(c) Using suitable illumination, visually inspect the welded joint for cracks or breaks. If any cracks or breaks are detected in the welded area, the ripcord will be removed from service.

(d) Remove the weight from the ripcord grip and further remove the grip from the wooden block or hook, as applicable.

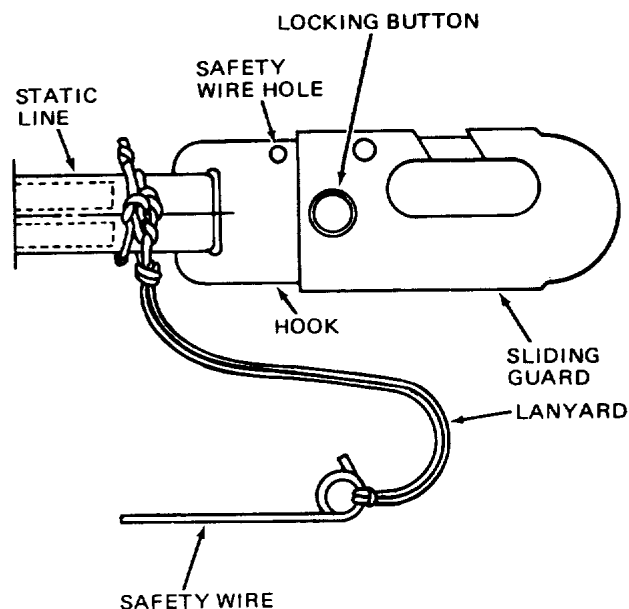
*b. Identifying Test Accomplishment.*

(1) A ripcord which has been tested according to above and is considered serviceable will be marked to indicate test accomplishment. The marking will be made by wrapping two turns of 1/2-inch-wide yellow pressure-sensitive tape around the center of the grip tubing at a point near the weld. However, insure the tape wrapping does not cover the welding joint.

(2) A HALO ripcord with a T-shaped grip that has satisfactorily completed the locking pin test will be marked with the tape prescribed in (1) above by making two turns around the center post of the T-shaped grip.

**2-21. Testing a Static Line Snap Assembly.**

A static line snap assembly (fig. 2-11) will be tested during the preventive maintenance intervals prescribed in the applicable parachute maintenance publication. Procedures for testing are as follows:



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Figure 2-11. The troop-type personnel parachute static line ant snap assembly.

a. Operate the snap assembly to insure that the locking button will depress below the surface of the sliding guard, thereby allowing the guard to slide on the hook. Also check that the guard slides freely on the hook and that the locking button snaps back when the guard is moved to the locked position. The function of the locking button should be observed carefully to insure that the button retains proper spring tension. A static line snap assembly which has a defective locking button or a guard which does not slide freely will be removed from service.

b. Insert the .080-inch-diameter safety wire in to the .093-inch-diameter safety wire hole on the snap assembly to insure that wire will fit in the hole. If the safety wire does not fit the hole in the snap assembly, replace the wire length according to fabrication procedures in TM 10-1670-213-23.

## 2-22. Drop-testing Criteria.

Drop-testing of airdrop equipment consists of physically airdropping an item from an aircraft in flight. The drop test is used as a means of proving the serviceability of an item or checking parachute rigger proficiency and will only be performed under the supervision of qualified parachute rigger personnel who satisfy the supervisory requirements outlined in AR 750-32. Drop-testing usually will be conducted by an activity responsible for the inspection and maintenance of airdrop equipment, which includes either parachute packing or airdrop load rigging. The criteria required to accomplish a drop test is as follows:

a. To drop-test a troop-type personnel parachute, the parachute will be jumped by a qualified parachute rigger. An emergency-type personnel parachute or reserve personnel parachute will be drop-tested through use of a dummy only.

b. When drop-testing either a personnel or cargo

parachute, the weight of the dummy or load, as applicable, will be proportionate with the standard design load of the specific parachute being tested. In addition, the applicable type parachute will be released under conditions which are consistent with the requirements for a personnel jump or equipment drop.

c. During the drop-test of any type parachute, the deployment of the parachute will be thoroughly monitored and observed to detect any indication of malfunction or defect. A subsequent record of the drop-test will be entered into the applicable parachute log record using the procedures in paragraph 1-5 c (1).

d. Any type of airdrop equipment which indicates any evidence of malfunction or defect during or after a drop-test will be disposed of as prescribed in paragraph 2-10.

e. A personnel parachute which is considered to have contributed to the injury of an individual parachutist (critical or fatal) will be disposed of in accordance with paragraph 2-10.

f. Airdrop equipment which does not reflect evidence of malfunction or defect upon completion of a drop-test will be administered a technical/rigger-type inspection as outlined in paragraph 2-13. If serviceable, the item(s) may then remain in use.

## Section V. SERVICE PROCEDURES

### 2-23. Shakeout and Airing.

As soon as possible after recovery, airdrop equipment used in airdrop operations will be administered a shakeout. In addition, the used equipment will be aired if previously exposed to moisture or other conditions causing dampness. Shakeout and airing of airdrop items will be accomplished as follows:

a. *Shakeout.* The purpose of individual item shakeout is to remove trash and debris from the item and also to permit early detection of obvious damage or defects. The shakeout of airdrop equipment may be performed either indoors or outdoors, depending upon the local climatic conditions. The methods to be used in the shakeout of equipment will vary according to the facilities available and the types of equipment undergoing shakeout. Regardless of the method being used, those personnel performing a shakeout function will continually check the equipment visually for evident damage or defects. Shakeout of airdrop items will be

performed using the following procedures, as applicable.

(1) *Shakeout of personnel parachutes and other small parachutes.* The shakeout of personnel parachutes and other small parachutes will usually be accomplished by a two-man team, either indoors within a shakeout room or outdoors at a shakeout tower. Each parachute will be suspended by the canopy vent and all debris removed by shaking the canopy thoroughly or by brushing with a dry soft-bristle brush as detailed below:

(a) With assistance from the No. 2 man, the No. 1 man will connect the snap on a pulley rope to the canopy bridle loop (A, fig. 2-12).

Key to figure 1-12:

- A. Connecting pulley rope snap to canopy vent.
- B. Grasping suspension lines to shake first gore.
- C. Removing suspension line entanglements.
- D. S-folding the suspension lines.

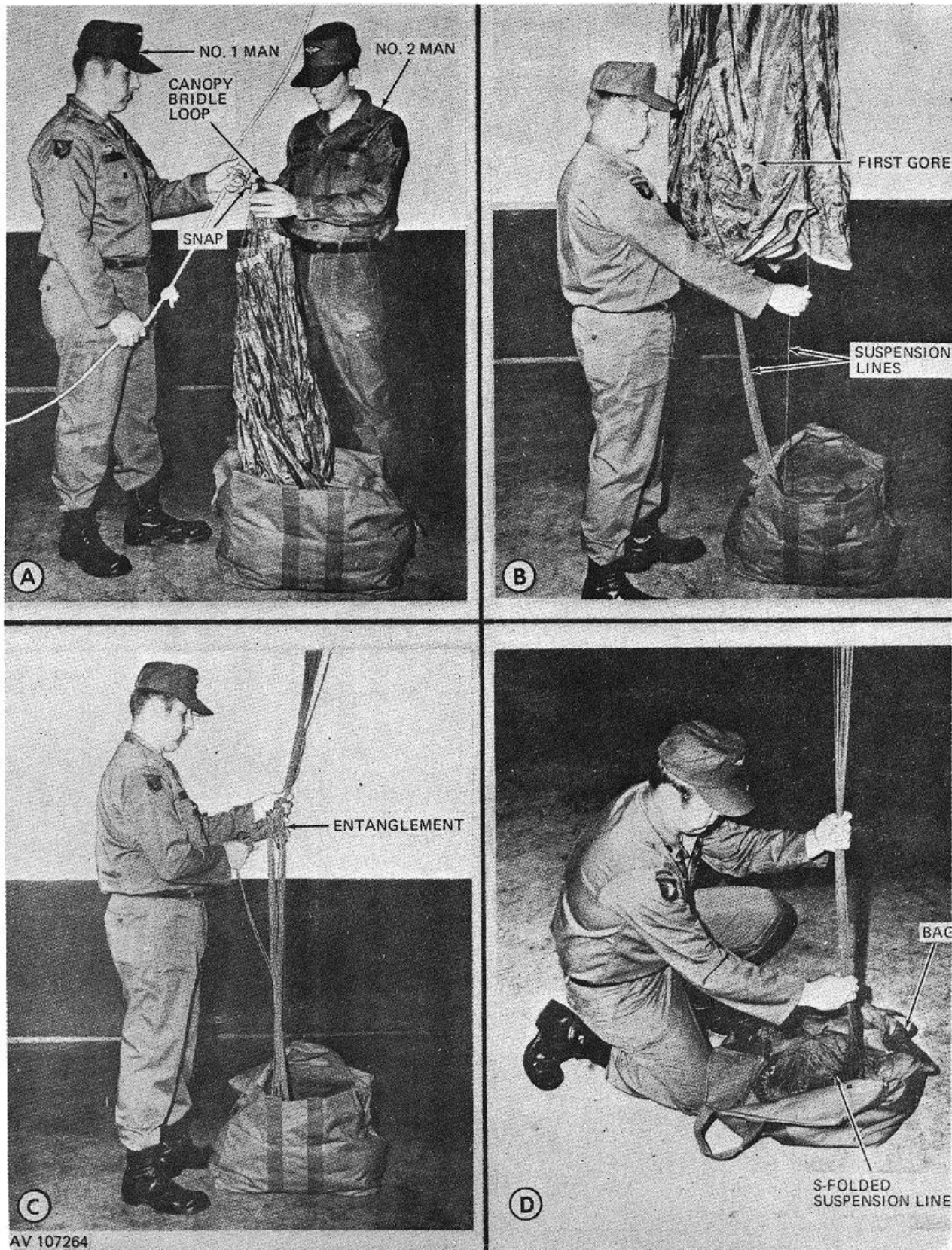


Figure 2-12. Performing shakeout on personnel and other small parachutes, typical.

(b) Through use of the pulley rope, the No. 2 man will raise the canopy to a suitable height which will enable the No. 1 man to perform shakeout on each of the canopy gores. Until the gore shaking process is completed the No. 2 man will maintain a steady pull on the pulley rope to hold the suspended canopy at the working height needed by the No. 1 man.

(c) The No. 1 man will grasp any two consecutive suspension lines, one in each hand (B), and vigorously shake the first gore. When the gore is free of debris, the No. 1 man passes the line from his right hand to the left hand and grasps the next consecutive suspension line in his right hand. The No. 1 man will shake out each consecutive gore until all suspension lines are held in the left hand and all gores are free of debris.

(d) Once the gore shaking process is completed, the No. 2 man will slowly raise the suspended canopy higher as the No. 1 man clears the suspension lines of debris and removes entanglements (C), when possible.

(e) After the suspension lines have been cleared, the No. 2 man may hold or temporarily secure the pulley rope while the No. 1 man proceeds to clear debris from other parachute components such as the risers, harness, pack, or deployment bag.

(f) When all components are free of debris, the No. 2 man will slowly lower the canopy while the No. 1 man S-folds the suspension lines into the pack, deployment bag, or parachute bag (D), as applicable. After the suspension lines have been completely folded, the No. 1 man will accordion-fold the canopy length on top of the folded lines.

(g) As the canopy folding is being completed, the No. 1 man disconnects the canopy vent from the pulley rope snap. Secure the folded canopy assembly for further handling.

(2) *Shakeout of large cargo parachutes.* When space and facilities are adequate enough to suspend large cargo parachute canopies, the shakeout of large cargo parachutes (G-12 and G-11A) will be accomplished as outlined in (1) above. If the available space and facilities are not adequate to suspend a large cargo parachute canopy, then shakeout will be performed as follows:

(a) Place the parachute in layout on a clean floor surface.

(b) Remove debris from the canopy outside by vigorously shaking the canopy material or by brushing each gore.

(c) Using a pedestal-type electric fan located a suitable distance from the canopy skirt or natural wind currents, inflate the canopy.

(d) Walk through the inflated canopy, from the skirt to the vent, and remove all debris from the canopy inside by hand or by brushing with a dry soft-bristle brush or broom.

(e) Deflate the canopy and clear the suspension lines of debris by shaking or brushing. Remove entanglements from the lines, when possible.

(f) Remove foreign matter from other components of the parachute, such as the deployment bag, by vigorous shaking or brushing.

(g) After insuring all debris has been removed from the parachute assembly, "chain" the suspension lines and S-fold the canopy and grouped suspension lines into the deployment bag for further handling.

(3) *Shakeout of other airdrop equipment.* To shakeout airdrop equipment other than parachutes, perform the following:

(a) Lay the applicable assembly or related components on a clean level surface.

(b) Remove all debris from the airdrop item(s) by vigorous shaking or by brushing with a dry soft-bristle brush. A compressed air hose may be used to remove foreign material from inaccessible areas.

*b. Airing.* Under certain conditions, parachutes and other airdrop equipment will be aired to prevent discoloration, mildew, and deterioration. Where dampness and mildew are prevalent, airdrop equipment will be aired at frequent intervals according to the severity of the prevailing conditions. Parachutes that have been previously packed or are unpacked, which have been subjected to conditions of dampness or mildew, will be aired for a period of at least 6 hours prior to being repacked. Airdrop items may be aired either indoors or outdoors in dry weather. However, fabric items will not be aired in direct sunlight. Airing may be accomplished by suspending or elevating the applicable item(s) in a manner which would allow entire exposure to the circulation of air. Outside facilities used for the shakeout of parachutes may be used for the airing of airdrop equipment if weather conditions permit. If the shakeout facilities are inadequate for airing, the applicable item(s) may be suspended or elevated at several points or by draping over suitable type objects which would not inflict damage.

## 2-24. Cleaning and Drying.

Airdrop equipment will be inspected after each use for dampness, dirt or other foreign material. Subsequent cleaning and drying of the equipment may be required to prevent a possible malfunction or deterioration of the item(s). Equipment that has been immersed in water will be processed as outlined in paragraph 2-10. The cleaning and drying of airdrop equipment will be accomplished as follows:

### CAUTION

**If, during the cleaning of an airdrop item there exists a possibility that a substance to be removed contains acid, an acidity test will be performed as prescribed in paragraph 2-17A. Should the substance be acid-free, the item will be evacuated to a direct support maintenance activity for determination as to the nature of the substance and item disposition. If a substance cannot be identified or if normal repair procedures will not eliminate all traces of chemical damage, the applicable item will be condemned.**

a. *Cleaning.* The practice of cleaning airdrop items should be held to a minimum and performed only when it is necessary to eliminate a malfunction potential or the possibility of material deterioration. The method of cleaning to be used must be compatible with the type of material to be cleaned and the nature of the substance to be removed. In addition, the cleaning process should be limited to the soiled area only. The cleaning of airdrop equipment will be performed using the following procedures, as applicable:

(1) *Shaking and brushing.* Most airdrop equipment assemblies and associated components should be cleaned by shaking or gently brushing with a dry soft-bristle brush. A dry stiff-bristle brush may be used on airdrop items constructed of canvas, metal, or wood.

(2) *Spot-cleaning.* A soiled area on a fabric airdrop item which cannot be cleaned by shaking or brushing will be spot-cleaned as follows:

### WARNING

**Due to flammable properties and nylon-damaging substances, cleaning solvents other than tetrachloroethylene will not be used in the spot-cleaning of airdrop equipment. Tetrachloroethylene will only be used in areas where substantial**

**ventilation is available. Repeated or prolonged inhalation of the solvent vapors can be detrimental to human health. In addition, avoid prolonged or repeated contact of the solvent fluid with areas of the skin. Tetrachloroethylene must not be taken internally.**

(a) *Cotton item.* Spot-clean a cotton item by rubbing the soiled area with a clean cloth dampened with tetrachloroethylene. Once the foreign substance has been removed, rinse the cleaned area by repeating the rubbing process with clean portion of the cloth which has been dampened with the cleaning solvent. Do not wring out the rinsed area if an undue amount of cleaning solvent is applied. Allow the applicable item to dry thoroughly.

(b) *Nylon and rayon items.* A soiled nylon or rayon item, except a personnel parachute harness soiled by airsickness, may be spot-cleaned using the procedures in (a) above. However, the tetrachloroethylene may be substituted by a solution composed of one-half cup of hand dishwashing detergent (liquid or powdered dissolved in one gallon of warm water). A soiled area cleaned with the soap and water solution will be rinsed with fresh, clean water and allowed to dry thoroughly. Do not attempt to wring out the material which has been cleaned and rinsed.

### CAUTION

**When cleaning a personnel parachute harness soiled by airsickness, insure the quick release assembly is not immersed in water. Additionally, insure the water used to wash a harness is only warm and not hot.**

(c) *Personnel parachute harness.* A personnel parachute harness which has been soiled by airsickness will be cleansed by immersing the harness in a soap and warm water solution similar to that prescribed in (b) above. A stiff-bristle brush may be used to remove stubborn foreign deposits by lightly brushing the affected area(s) during the soaping process. Rinse the cleaned area(s) in fresh, clean water until the rinse water remains clear, indicating complete removal of soap. Allow the harness to dry thoroughly without being exposed to direct sunlight or heat which exceed the specifics or paragraph b below.

(d) *Plastic and wood items.* Spot cleaning of a plastic or wood item will be accomplished by using procedures in (a) or (b) above, as required. Imperfections on plastic items may be removed by



buffing with crocus cloth. Similar type defects on wood items can be disposed of through use of a suitable grade sandpaper. When applicable, insure that the adjacent fabric materials are not damaged when buffing or sanding.

(e) *Metal items.* Burrs, rough spots, rust or corrosion on metal items that cannot be eliminated by brushing or spot cleaning, using procedures in (1) and (2) above, may be removed by filing with a metal file or by buffing and polishing with crocus cloth or steel wool, when applicable, insure that the adjacent fabric materials are not damaged when filing, buffing or polishing. When the metal item has been properly smoothed, remove all oils and filings by brushing and dipping in tetrachloroethylene. When the tetrachloroethylene has dried, spray the metal item with a dry film lubricant and allow to air dry for 24 hours and put hardware back into service. Shield adjacent fabric material when spraying dry film lubricant to prevent saturation. Small amounts of lubricant will not damage fabric, but may cause discoloration and make fabric appear soiled.

b. *Drying.* Airdrop equipment that is wet or damp

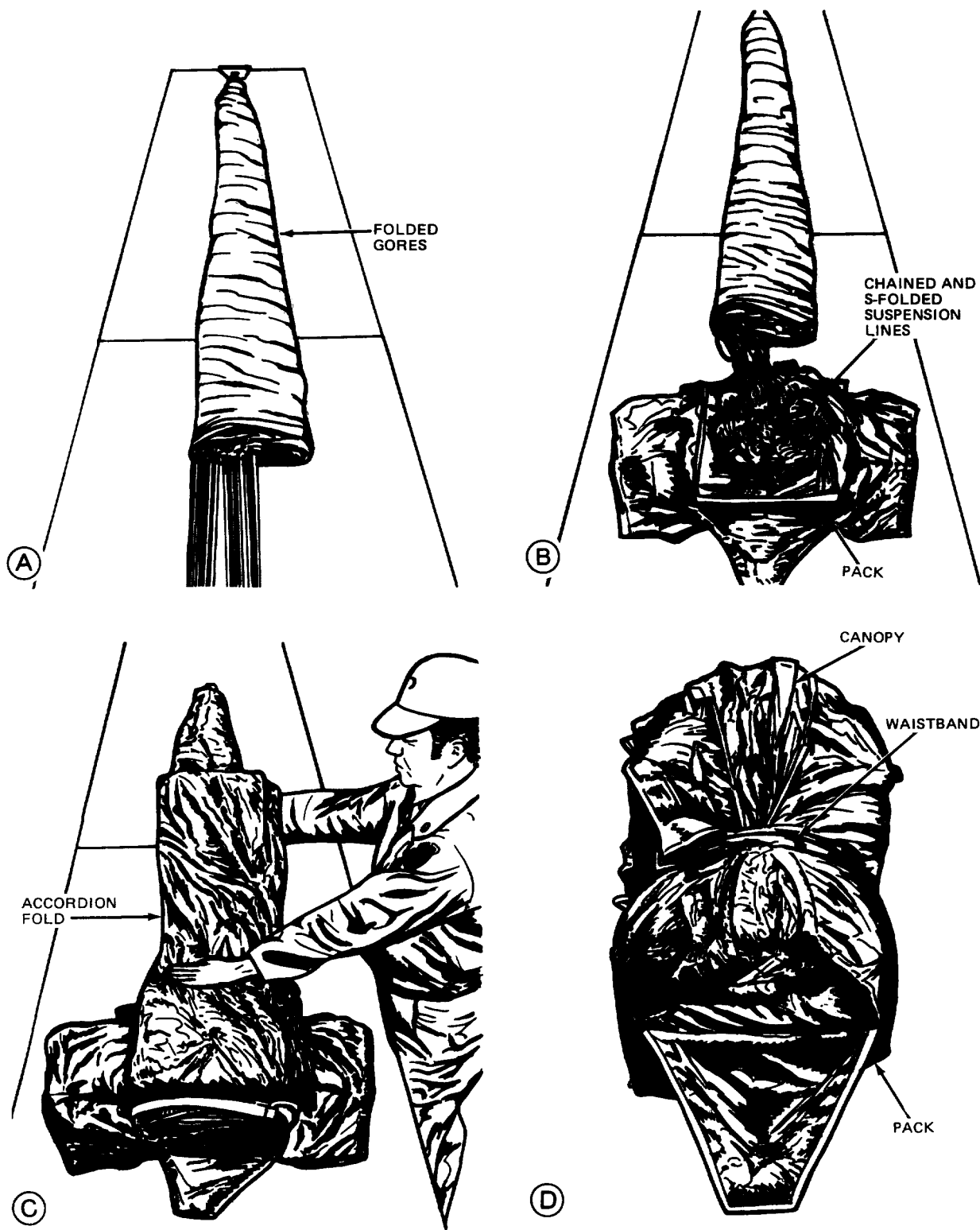
will be suspended or elevated in a well ventilated room or in a heated drying room. Item drying time may be reduced through the use of electric circulating fans. When heat is used, the heat temperature will not be in excess of 160° F with preferred temperature at 140° until the item is dry. Fabric or wooden items will not be dried in direct sunlight or by laying an item out on the ground, except in an emergency.

#### **2-25. Accordion Folding.**

Personnel parachute canopy assemblies that are not packed for use should be accordion folded prior to entry into storage. Other types of parachute canopy assemblies, except pilot parachutes, may be accordion folded for ease of handling. To accordion fold a parachute canopy assembly, perform the following:

a. Place the parachute canopy in proper layout under partial tension and dress the outside edges of both gore groups.

b. Fold the left group of gores over the right group of gores (A, fig. 2-13). Release tension.



A. Folding of gore groups completed.  
B. Suspension lines stowed on pack.

C. Accordion folding the canopy.  
D. Folded canopy secured.

Figure 2-13. Accordion folding a parachute canopy assembly, typical.

c. "Chain" the suspension lines and S-fold the "chained" lines on top of the applicable parachute pack (B).

d. Place the lower end of the canopy on top of the S-folded suspension lines and locate the lower edge of the canopy skirt at the lower end of the pack.

e. Accordion fold the remaining canopy length neatly on top of the canopy lower end (C). Turn the canopy vent under the last fold.

f. Temporarily secure the folded canopy to the pack with available webbing or pack components (D).

g. Upon completion of the accordion folding process, place the folded parachute assembly in a suitable type container for storage.

#### **2-26. Rigger Rolling.**

Personnel and other small parachutes will be rigger

rolled prior to being sent to or returned from a parachute repair activity. Other types of parachutes, except pilot parachutes, may be rigger rolled at any time between shakeout and repack for ease of handling and to prevent suspension line entanglement. Rigger roll a parachute as follows:

a. Place the applicable parachute in proper layout and apply partial tension.

b. Grasp the right and left suspension line groups separately and turn the two line groups in a manner which will locate the top center gore of the canopy on the bottom against the packing surface.

c. Using a fast circular motion, flip each of the two gore groups up and to the center radial seam. Tighten each gore group roll by hand bringing both rolled gore groups together at the center radial seam (A, fig. 2-14).

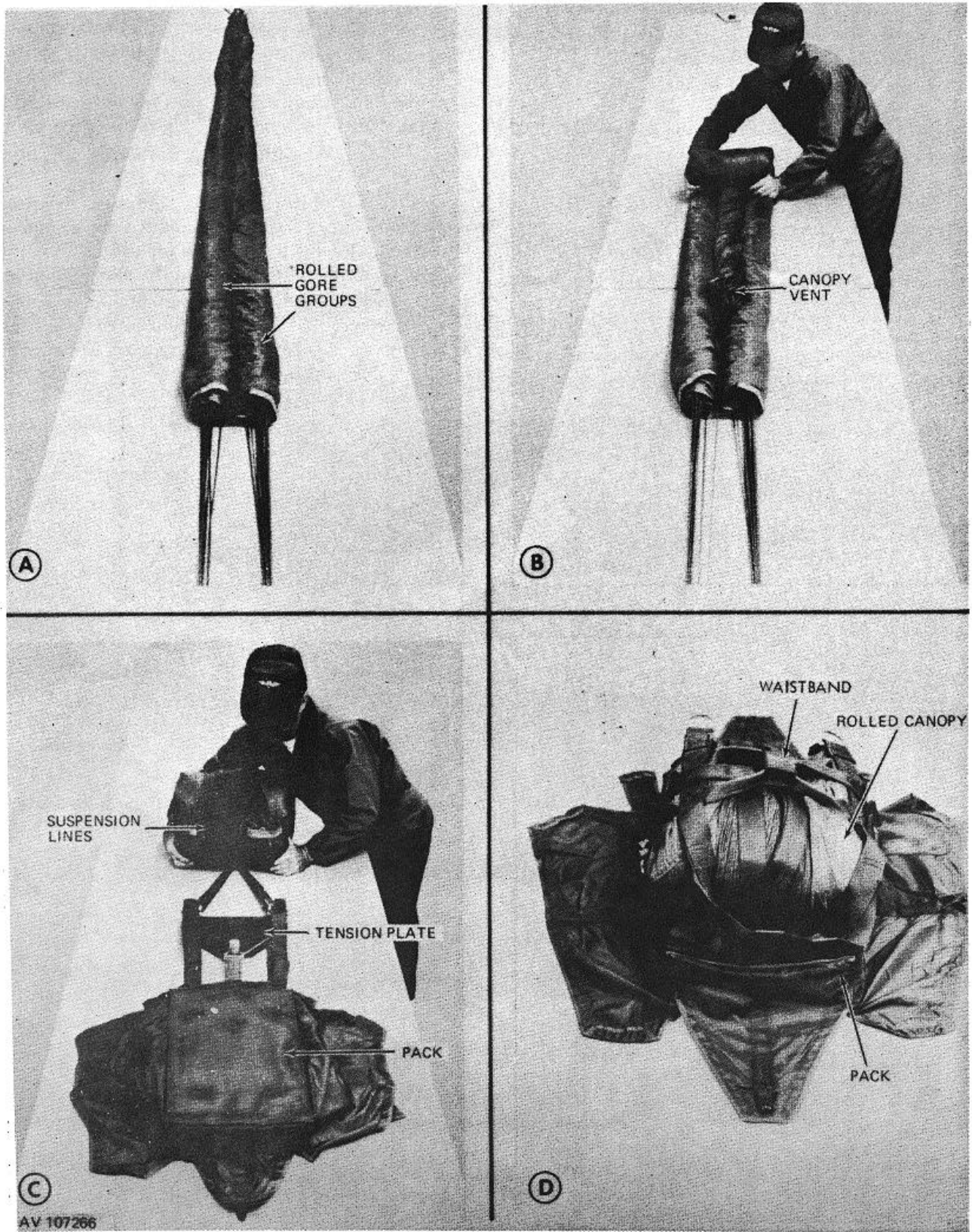


Figure 2-14. Rigger rolling a parachute canopy assembly, typical.

Key to figure 2-14:

- A. Individual gore group rolling completed.
- B. Rolling the canopy.
- C. Suspension lines on rolled canopy.
- D. Rolled canopy assembly on parachute pack.

*d.* Release tension and disconnect the canopy vent from the vent attaching device.

*e.* Fold the canopy vent down between the rolled gore groups to a point within 18 inches of the canopy skirt lower edge.

*f.* Beginning at the folded upper end of the canopy, roll the canopy tightly toward the canopy skirt (B). Insure the width of the rolled canopy does not

exceed the width of the applicable parachute pack or deployment bag.

*g.* Continue rolling the canopy toward the lower end of the suspension lines and risers, if applicable, locating the lines and riser webbing around the center of the roll (C).

*h.* As applicable, disconnect the suspension lines / risers from the attaching device and place the rolled canopy assembly on top of the pack / deployment bag inside.

*i.* Secure the rolled canopy assembly within the confines of the pack / development bag using either the straps or webbing of the pack or a length of suitable type cord (D).

## CHAPTER 3

### REPAIR INSTRUCTIONS

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#### Section I. PREPARATION PROCEDURES FOR FABRIC MATERIALS

##### 3-1. General.

Fabric materials such as cord, tape, and webbing that is cut for use in the maintenance of airdrop equipment will normally be heat-seared or dipped in a melted wax mixture, as applicable, to prevent the material from fraying or unraveling. However, in some instances the preparation of the material may not be necessary and will be specified accordingly within the applicable airdrop equipment maintenance publications.

##### **CAUTION**

**Cotton tape, webbing, or cord will not be seared.**

##### 3-2. Searing.

The ends of nylon tape, webbing, and cord lengths

may be prepared by heat-searing which is performed by pressing the material raw end against a hot metal surface until the nylon has melted sufficiently. Avoid forming a sharp edge or lumped effect on the melted end.

##### 3-3. Waxing.

The fraying or unraveling of cotton or nylon tape, webbing, and cord length ends may be prevented by dipping 1/2 inch of the material raw end into a thoroughly melted mixture of half beeswax and half paraffin. The wax temperature should be substantial enough to insure the wax completely penetrates the material rather than just coating the exterior fabric.

#### Section II. MARKING AND REPAINTING PROCEDURES

##### 3-4. General.

Information data, gore numbers, and identification markings, as applicable, are marked on individual airdrop items. Some airdrop equipment components possess painted red enamel warning marks to indicate to the user the critical nature of the applicable component. Some metal and wood airdrop items may be painted with olive drab paint as a corrosion preventive and a protection against climatic elements.

##### 3-5. Marking and Restenciling.

Original stenciled data or markings that become faded, illegible, obliterated, or are removed as a result of performing a repair procedure will be remarked with a ball point pen, felt tip marker, or restenciled. All marking or restenciling will be done on, or as near as possible to, the original location and should conform to the original lettering type and size. Airdrop items which are fabricated, altered, or modified by directive publications may require the placement of markings by original marking or stenciling. All marking, stenciling,

and pertinent item maintenance publications, using contrasting color parachute marking ink. The marking or stenciling process will be performed using marking and stenciling devices such as a ball point pen, felt tip marker, stenciling brush, or equivalent type applicator, and oiled stencil board.

##### **NOTE**

**Stenciling should be used whenever possible. A ball point pen or felt tip marker should be used only where stenciling is not possible or when stenciling devices are not available. However, only felt tip markers that contain parachute marking ink and marked "FOR PARACHUTE MARKING" are authorized for use in marking parachute components. Any type of ball point pen using black or blue ink may be used for marking on labels only.**

**3-6. Repainting.**

A warning mark on an airdrop equipment component that is chipped or worn will be repainted with red enamel paint using a proper size paint brush or any other suitable method for paint application. Likewise a mark previously painted on an airdrop item to signify

satisfactory completion of a specific test may be repainted with original color enamel and a suitable type applicator providing the item is still serviceable. Metal and wood items may be repainted with olive drab paint using the previously cited painting methods, as required.

**Section III. SEWING PROCEDURES**

**3-7. General.**

Sewing requirements will vary according to the type of item being repaired and the type of repair being made. The type of sewing machine, type of thread, the stitch range, and the stitch pattern, if applicable, required to accomplish a sewing procedure will be specified in the equipment publication applicable to the item being repaired. All original stitching that is cut

during the performance of a sewing procedure will be removed from the applicable item. Immediately after the accomplishment of a machine sewing procedure, trim thread ends to a point as close as possible to the material which has been sewed. Cotton threads used in various sewing procedures may be identified under two specification. Table 3-1 provides a listing which equates cotton thread identifications.

**Table 3-1. Cotton Thread Specification Comparability Listing**

Federal specification * V-T-276	Military specification MIL-T-5660
Type IV - Ticket No. 8/4	Style A - Ticket No. 3
Type IV - Ticket No. 8/5	Style A - Ticket No. 4
Type IV - Ticket No. 8/7	Style A - Ticket No. 5
Type IV - Ticket No. 8/9	Style A - Ticket No. 6
Type IV - Ticket No. 8/10	Style A - Ticket No. 7
Type IV - Ticket No. 8/11	Style A - Ticket No. 8
Type IV - Ticket No. 8/12	Style A - Ticket No. 9
Finish A (soft)	Type I (soft)
Finish B (glazed)	Type II (polished)

\* The direction of final twist for thread shall be "Z" twist, unless otherwise prescribed by the specification document.

**3-8. Basting and Temporary Tacking.**

Basting and temporary tacking are hand-sewing methods used to temporarily hold layers of cloth fabric together while a repair is being performed. The following is a list of procedures which apply to basting and temporary tacking actions.

a. Basting and temporary tacking should be made using thread which is of a contrasting color to the material being worked.

b. On personnel parachute canopies, small cargo and extraction parachute canopies, and most other small airdrop items, basting will be made using a single strand of size A nylon thread or ticket No. 24 cotton thread.

c. Basting on large cargo parachute canopies may be made using a single strand of ticket No. 16 cotton thread.

d. When basting, do not tie knots at any point in the thread length. Also, the sewing should be made with two stitches per inch.

e. Temporary tacking will usually be made using a length of size E nylon thread. However, an alternate type thread may be specified within the applicable item equipment publication.

f. Immediately upon completion of a repair, remove a previously made basting or temporary tacking.

**3-9. Stitching and Restitching.**

a. *Parachute Canopy Assemblies.* The stitching and restitching made on parachute canopies, including pilot parachutes, should be accomplished with thread that is contrasting in color to the fabric being stitched or the original thread being restitched. If contrasting color thread is not available, thread of matching color may be

used, providing all other specifications are met. Straight stitching and restitching on parachute canopy assemblies, including pilot parachutes, should be locked by at least 2 inches at each end of a stitch row, when possible. Zigzag stitching does not require locking; however, zigzag restitching should extend at least 1/4 inch into undamaged stitching at each end, when possible. When restitching parachute canopy assemblies, including pilot parachutes, stitch directly over the original stitching and follow the original stitch pattern as closely as possible.

*b. Other Airdrop Equipment.* Stitching and restitching on other airdrop equipment constructed from cloth, canvas, and webbing should be accomplished with thread which matches the color of the original stitching, when possible. All straight stitching should be locked by backstitching at least 1/2 inch. Restitching should be locked by overstitching each end of the stitch formation by 1/2 inch. Zigzag stitching does not require locking; however, zigzag restitching should extend at least 1/4 inch into undamaged stitching at each end, when possible. Restitching should be made directly over the original stitching, following the original stitch pattern as closely as possible.

### 3-10. Darning and Zigzag Sewing Repairs.

*a. Darning.* Darning is a sewing procedure used to repair limited size holes, rips, and tears in assorted airdrop items constructed from textile material such as parachute canopy gore sections and the cloth and reinforcement webbing of deployment bags, packs, and cargo. A darning repair may be made either by hand or sewing machine, depending upon the method preferred and the availability of equipment. However, a darning machine should be used to darn small holes and tears where fabric is missing. Darning of previously patched material can be performed provided darning size limitations prescribed in the applicable item equipment publication are not exceeded. A darning repair will be performed using the following procedures, as appropriate:

(1) *Machine darning.*

(a) Using an authorized marking aid of contrasting color, mark a square around the damaged area and insure that the marking is at least 1/4 inch back from each edge of the damaged area. The marking will be made with the warp and the filling of the material.

(b) Darn the damaged area by sewing the material in a back and forth manner, allowing the stitching to run with the warp or filling of the fabric (A, fig. 3-1).

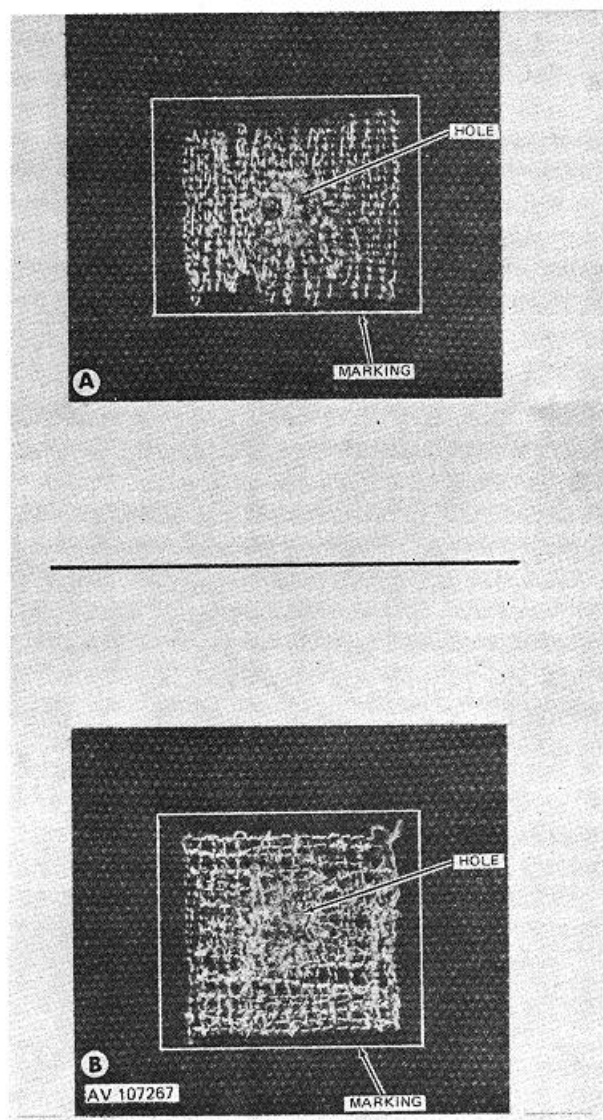


Figure 3-1. Darning method using a darning sewing machine, typical.



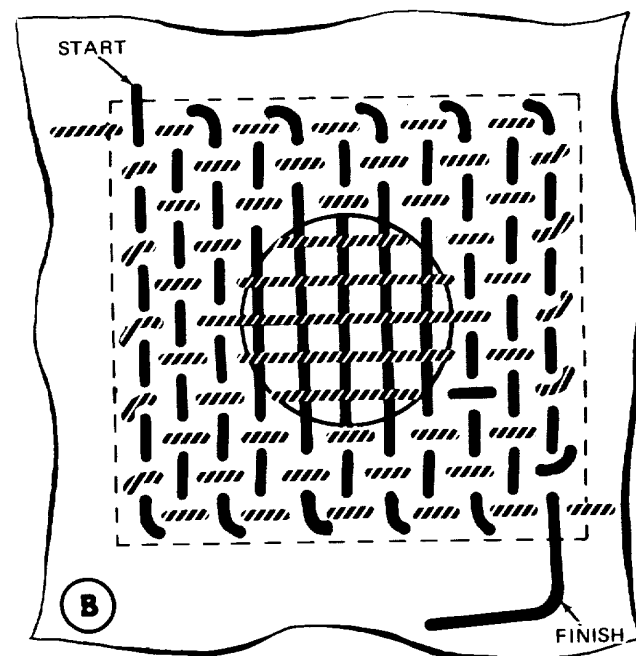
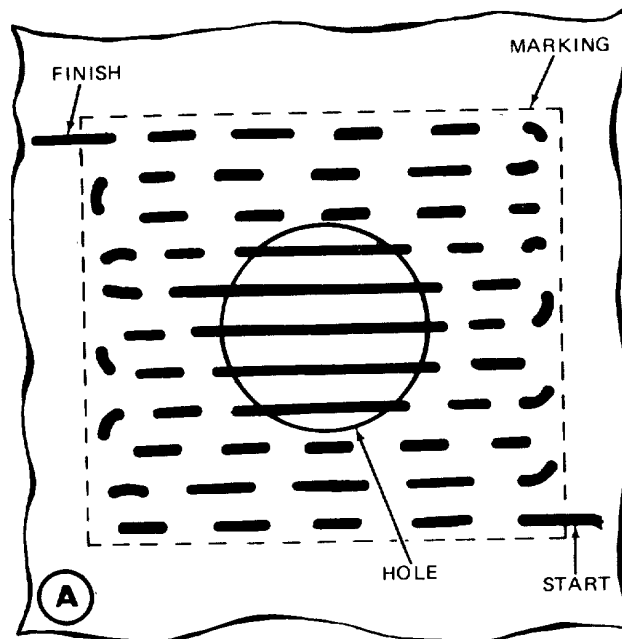
(c) Turn the material and stitch back and forth across the stitching made in (b) above until the hole or tear is completely darned (B).

(d) If applicable, restencil informational data, gore number(s), or identification marks using the criteria in paragraph 3-5.

(2) *Hand darning.* When repair of a hole or tear is made by hand darning, the darn should match the original weave of the damaged material as close as possible. Hand darning will be performed as follows:

(a) Using an authorized marking aid of contrasting color, mark a square around the damaged area and insure that the marking is at least 1/4 inch back from each edge of the damaged area. The marking will be made with the warp and the filling of the material.

(b) Using a darning needle and a length of suitable type thread, begin darning at one corner of the mark(d) area. Working in the direction of the fabric warp or filling, pass the needle and thread back and forth through the material until the opposite diagonal corner of the marked area is reached (A, fig. 3-2).



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A. Stitching with warp or filling.  
B. Hand darning completed.

Figure 3-2. Hand darning method, typical.

(c) Turn the material and weave the needle and thread back and forth across the stitching made in (b) above until the hole is completely darned (B).

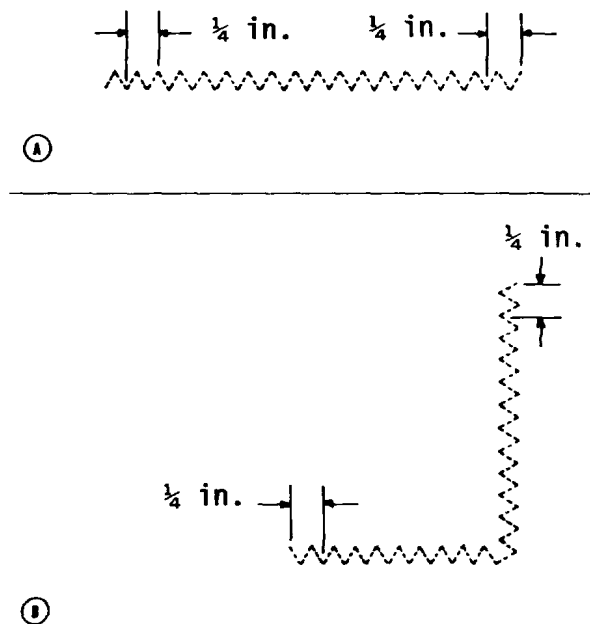
(d) If applicable, restencil informational data or identification marks as outlined in paragraph 3-5.

b. *Zigzag Sewing.* Airdrop items, except parachute canopies, made from textile materials that have sustained cut or tear damage may be repaired by zigzag sewing provided the applicable damaged area does not have any material missing and the cut or tear is straight or L-shaped. Should the damaged area be irregular shaped or have material missing, the repair will be achieved by either darning or patching, as required. A zigzag sewing repair will be accomplished using a zigzag sewing machine, the specifics cited in the applicable item equipment publication, and the following procedures.

(1) Set the sewing machine to the maximum stitch width.

(2) Beginning at a point 1/4 inch beyond one end of the cut or tear, stitch lengthwise along the damaged area to a point 1/4 inch beyond the opposite end of the cut or tear (A, fig. 3-3). The cited stitching procedure will also apply to an L-shaped cut or tear (B).

(3) If applicable, restencil informational data or identification marks as prescribed in paragraph 3-5.



A. Straight cut or tear stitching.  
B. L-shaped cut or tear stitching.

Figure 3-3. Repair method using a zigzag sewing machine, typical .

## Section IV. PATCHING PROCEDURES

### 3-11. General.

Patching is a procedure used to repair holes which cannot be darned in airdrop equipment constructed from textile materials. This procedure applies to items such as parachute canopies, deployment bags, packs, cargo bags, and other assorted canvas and webbing items.

### 3-12. Parachute Canopy Patching Limitations.

The following is a list of limitations which are applicable to all personnel and cargo parachutes, except ring-slot cargo extraction parachutes and ejection seat personnel parachute systems.

#### WARNING

**The limitations prescribed for parachute canopy patching will be stringently adhered to under all circumstances and without any deviations.**

a. A patch will not be applied to a damaged area that has been previously patched.

b. There is no limitation to the number of patches or size of patch to each canopy gore section or gore panel. However, determination should be made as to the most economical method to be used, i.e., two or more patches versus one large patch or one large patch versus a section replacement. A patch applied to a parachute canopy may extend from radial seam to radial seam. Table 3-2 prescribes sizes of parachute mending cloth patches for cargo parachutes.

c. Use of mending cloth on personnel parachutes. Use no more than two mending cloth patches on a canopy section. Limit the size of the finished patch to 10 inches. Round the corners of the patches to 1-inch radius. Use size E nylon thread, sew a row of 7 to 11 stitches per inch 1/16-inch in from outer edge of the patch.

d. Patching of a continuous line canopy may be performed in a manner similar to a noncontinuous line canopy. However, precautions will be taken to insure the canopy radial seam channel is not obstructed as a

result of the patching process. An obstructed radial seam channel will prevent free movement of a canopy line in a continuous line canopy.

#### NOTE

**If the canopy has a net, the patch may be placed on top of the net when stitching the patch to the lower lateral band.**

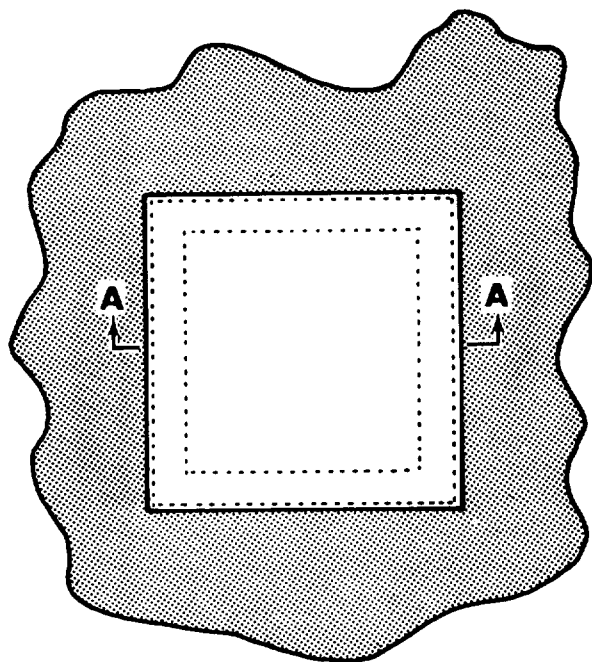
### 3-13. Making a Basic Patch.

A basic patch is used to repair damaged cloth when the affected area is no closer than 1 inch from a radial seam, edge reinforcement or lower lateral band. Should a damaged area be closer than 1 inch to the cited areas, a miscellaneous patch will be made as detailed in paragraph 3-14. There are three methods which may be used to apply a basic patch and the procedures for performing each method are outlined in paragraphs a through c as follows:

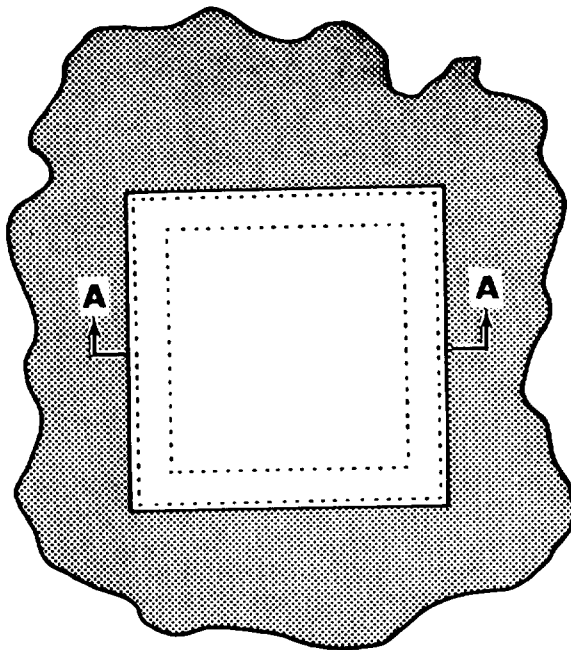
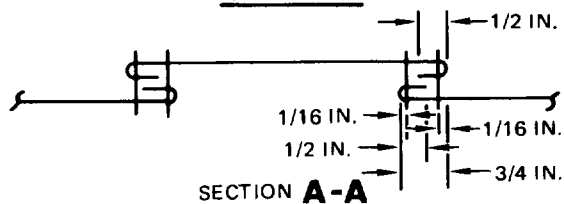
#### NOTE

**A basic patch for airdrop equipment other than a parachute canopy will be square or rectangular in shape. A basic patch applied to a parachute canopy by sewing will be square or rectangular in shape. A parachute canopy basic patch constructed from adhesive nylon parachute mending cloth or balloon cloth may be shaped, rectangle, or triangle, as required.**

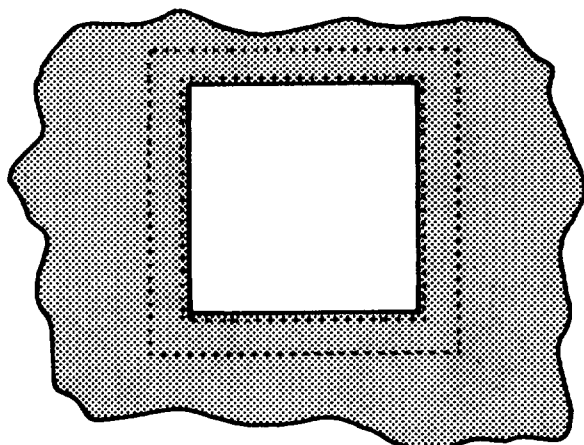
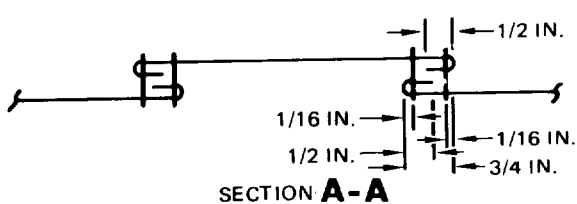
a. *The Sewn Patch.* The primary method of applying a basic patch is by sewing. When using this method of patching on a parachute canopy, the patch will be applied to the inside of the canopy (fig. 3-4). On all other airdrop equipment, the patch may be applied on either the inside or the outside of the item as prescribed by the applicable item equipment publication (fig. 3-5). Apply a sewn patch as follows:



INSIDE VIEW



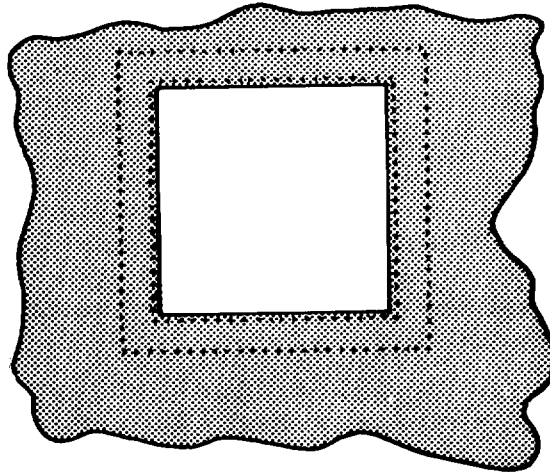
OUTSIDE VIEW



OUTSIDE VIEW

AV 107270

Figure 3-4. Basic patch application to parachute canopy, typical.



INSIDE VIEW

AV 107271

Figure 3-5. Basic patch application to other airdrop equipment, typical.

(1) Place the reparable item on a repair table, smooth the fabric around the damaged area, and secure the item to the table with pushpins. Do not pin the damaged area.

(2) Using an authorized marking aid of contrasting color, mark a square or rectangle around the area to be patched and insure that one side of the marked square or rectangle is parallel to the warp or filling of the fabric.

(3) Cut the damaged area fabric along the lines made at (2) above. Further cut the fabric diagonally at each corner to allow a 1/2 inch foldback in the raw edges.

(4) Make a 1/2-inch foldback on each raw edge. Pin and baste each foldback to complete the prepared hole. Basting will be performed using the procedures in paragraph 3-8.

(5) Using the same type material as in original construction, mark and cut a patch 2 1/2 inches wider and longer than the inside measurements of the prepared hole. Insure that the patch material is marked and cut along the warp or filling of the fabric.

(6) Center the patch material over the prepared hole and insure the warp or filling of the patch material matches the warp or filling of the fabric being patched. Pin the patch material in position.

(7) Make a 1/2-inch foldunder on each edge of the patch material and baste the patch to the prepared area. Basting will be performed using the procedures in paragraph 3-8.

(8) Remove the pushpins securing the item to the repair table and secure the patch by stitching, using the applicable details in figure 3-4 and the stitching specifics outlined in the applicable item maintenance publication. Make the first row of stitching completely around the patch. Turn the item over and make a second row of stitching around the prepared hole. Stitching will be performed in accordance with paragraph 3-9.

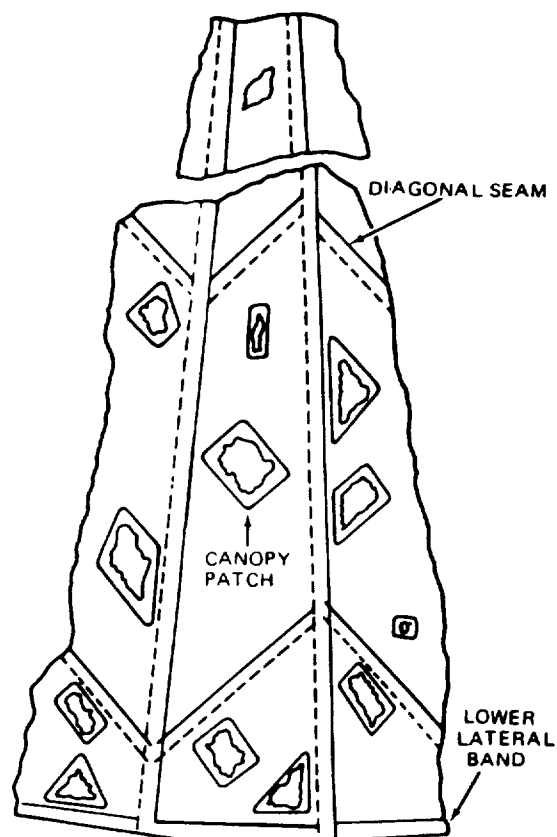
(9) If applicable, restencil informational data or gore number according to procedures in paragraph 3-5.

b. *The Parachute Mending Cloth Patch.* A second method of applying a basic patch is by use of 36-inch-wide adhesive nylon parachute mending cloth. However, this method shall only be used on the nylon canopies of G-11A, G-12C, G-12D, T-7A cargo parachutes and all personnel parachutes canopies except the canopies used with the ejection seat system. Application of this method to other parachute canopies or airdrop equipment is prohibited unless exception is

provided by a specific item equipment publication. Patching limitations as outlined in paragraph 3-12 shall be adhered to. The parachute mending cloth patching method may also be used on the applicable cargo parachute canopies in lieu of repair by darning. A complete canopy section replacement will be performed when an individual section has been patched extensively with parachute mending cloth and a noticeable stiffening of the section material occurs. This stiffening may adversely affect the proper layout parachute mending cloth patch is applied to the inside and the outside of the parachute canopy to form a laminate (fig. 3-6). Apply a parachute mending cloth patch as follows:

**NOTE**

**The age of parachute mending cloth, prior to application, will be less than three years from the date of adhesive coating marked on each roll of mending cloth.**



AV 107272

**Figure 3-6. Basic patching details using parachute mending cloth.**

(1) Lay out the parachute canopy with the damaged area exposed.

(2) To facilitate the application of the mending cloth patch a 1/2- by 20-inch smooth wooden board or similar smooth, hard-finished, rigid material, except paper board, under the damaged area.

(3) Trim the ragged, frayed, or severely burned areas of the canopy cloth to provide a smooth area for patch application.

(4) Using an authorized marking aid of contrasting color, mark a square, triangle, or rectangle, as applicable, around the damaged area.

(5) Measure and cut lengths of the mending cloth to achieve the shape and size of the intended patch. Cut the patch to provide an overlap of the damaged area using the specifics in table 3-2. Round off patch corners. Patches will be prepared in duplicate to allow for application on the inside and the outside of the canopy.

**Table 3-2. Mending Cloth Patching Specifications for Cargo Parachutes.**

Damaged area size	Patch minimum size
1 inch to 1 1/2 inches	2 inches
1 1/2 inches to 2 inches	3 1/2 inches
2 inches to 3 inches	4 1/2 inches
3 inches to 5 inches	9 inches
5 inches to 7 inches	10 inches
7 inches to 12 inches	15 1/2 inches
12 inches to 15 1/2 inches	19 1/2 inches

(6) Remove the paper backing from the adhesive side of the mending cloth by forming a crease, scoring the paper with a fingernail, and peeling the paper from the adhesive coating. Insure the mending cloth is not damaged when scoring the paper backing.

(7) Smooth the canopy material adjacent to the damaged area on the canopy outside and place the formed mending cloth patch over the damaged area.

(8) Using the edge of a packing paddle or a roller, apply pressure to smooth the patch on.

(9) Apply the duplicate-shaped patch to the damaged area on the canopy inside using the procedures in (6) and (7) above.

(10) Restencil gore section data, as required, in an area adjacent to the patched area according to procedures in paragraph 3-5.

*c. The Pressure-Sensitive (Iron-on) Patch.* A third method of applying a basic patch is a heat and pressure (iron-on) technique using pressure-sensitive-coated balloon cloth. This method is limited to use on the cotton muslin canopies of the G-14, G-13, and the 12- and 26-foot-diameter high-velocity cargo parachutes,

Further application of this patching method to other parachute canopies or airdrop equipment is prohibited unless exception is provided in a specific item equipment publication. Patching limitations will be in accordance with paragraph 3-12. A complete canopy section replacement will be performed when an individual section has been patched extensively with the pressure-sensitive patch material and an apparent stiffening of the section occurs. The stiffening effect may adversely affect the proper layout and packing of a parachute canopy. Apply a pressure-sensitive (iron-on) patch as follows:

(1) Place the canopy on a work table and smooth all wrinkles from the material surrounding the damaged area.

(2) Cut a piece of pressure sensitive-coated cotton balloon cloth large enough to extend 1 inch beyond all edges of the damaged area. If the damaged area extends to a point within 1 inch of the upper lateral band, only a sewn patch as outlined in paragraph a above will be allowed.

(3) Place the coated cloth patch over the damaged area with the adhesive side facing down. If the damaged area has no material missing, the patch will be applied to the inside of the canopy only. Whenever the damaged area has a space between the edges of the material which indicates that material is missing, the patch will be applied to both the inside and the outside of the canopy.

(4) Using a household-type electric iron with the heat regulated for cotton material, apply heat and pressure simultaneously to the patch material for at least 30 seconds. Insure that all of the patch material is subjected to heat and pressure, and that all edges of the patch have adhered to the canopy material. Also insure that the temperature of the iron remains constant during the patch application effort and that no other part of the canopy is underneath the area being patched.

(5) As required, restencil applicable markings or data in accordance with paragraph 3-5.

#### **3-14. Applying a Miscellaneous Canopy Patch.**

A miscellaneous canopy patch, which may be irregular shaped, is used to repair damaged canopy material when the location of the damaged area requires the patch to extend into or over a seam, reinforcement, or lateral band. The methods and techniques for applying a miscellaneous patch to a canopy are outlined in paragraphs *a* and *b* below.

#### **NOTE**

**Adhesive nylon parachute mending cloth will not be used in the construction or application of a miscellaneous canopy patch.**

*a. Patching a Canopy Gore Section.* A canopy gore section that cannot be patched with a basic patch as outlined in paragraph 3-13 will be patched with a miscellaneous patch. A miscellaneous patch may be made on a gore section by two methods, depending upon the type of material used in the original construction of the affected canopy. Apply a miscellaneous patch to a canopy gore section as follows:

(1) *The sewn patch.* A miscellaneous patch may be applied to a canopy gore section on all parachute canopies by sewing. A sewn patch will be applied to the inside of a canopy as follows:

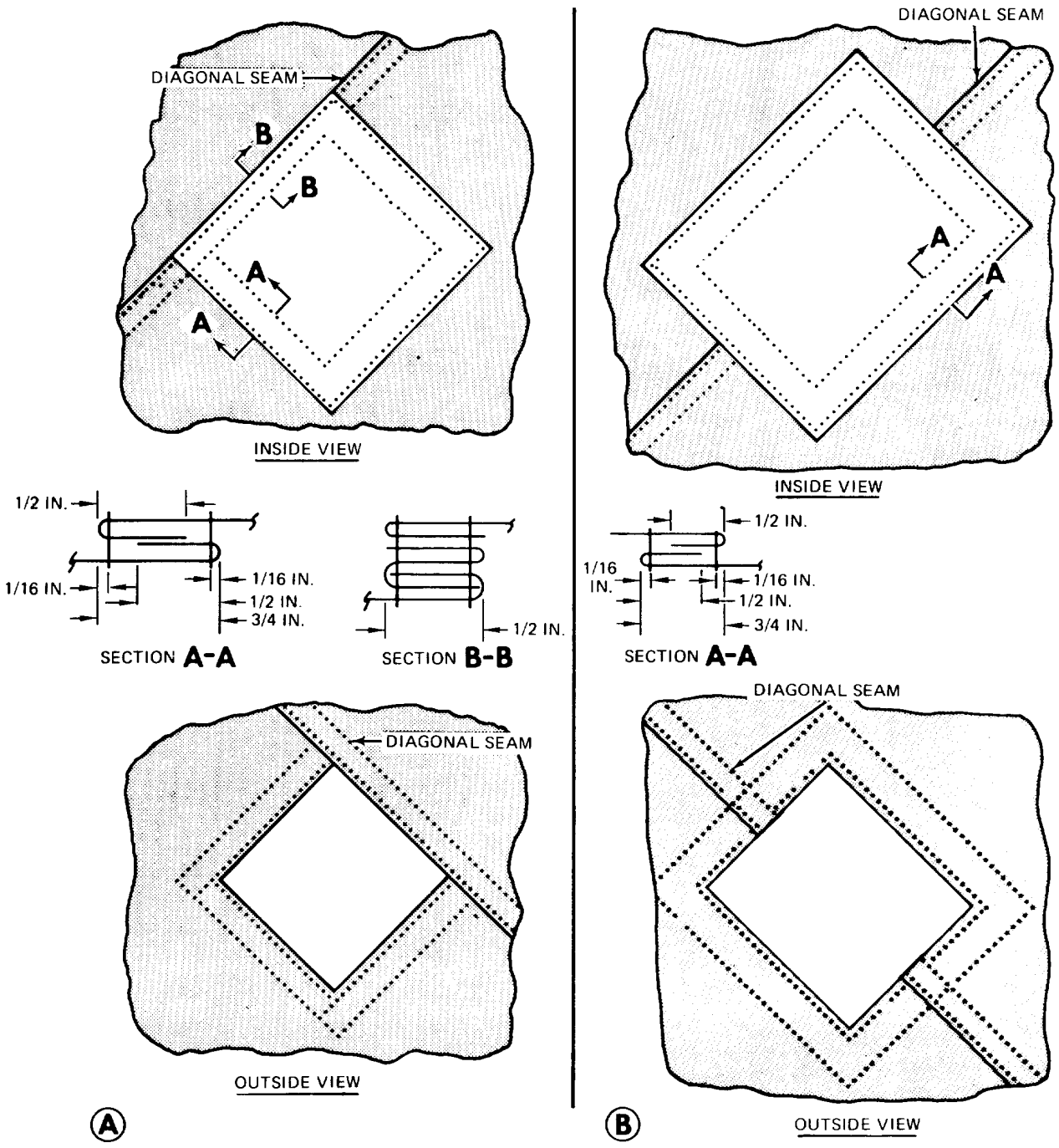
(a) Place the canopy inside out on a repair table, smooth the fabric around the damaged area, and secure the damaged gore section to the table with pushpins. Do not pin the damaged area of the gore section.

(b) As required, cut the applicable stitching to remove or lay aside items which may interfere with the patching process.

(c) Ascertain the type of patch required for a bias-constructed or block constructed canopy, using the details in figures 3-7 or 3-8, as applicable.

NOTE:

IF OUTSIDE OF DIAGONAL SEAM IS DAMAGED, CUT AWAY ENTIRE DIAGONAL SEAM IN DAMAGED AREA AND PATCH AS A BASIC PATCH.

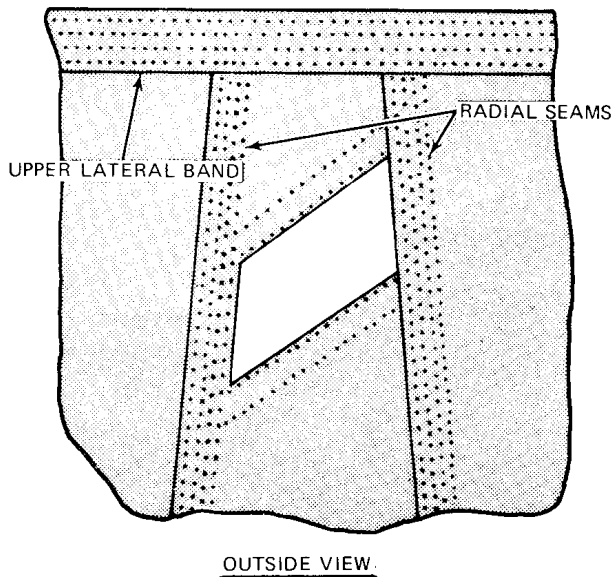
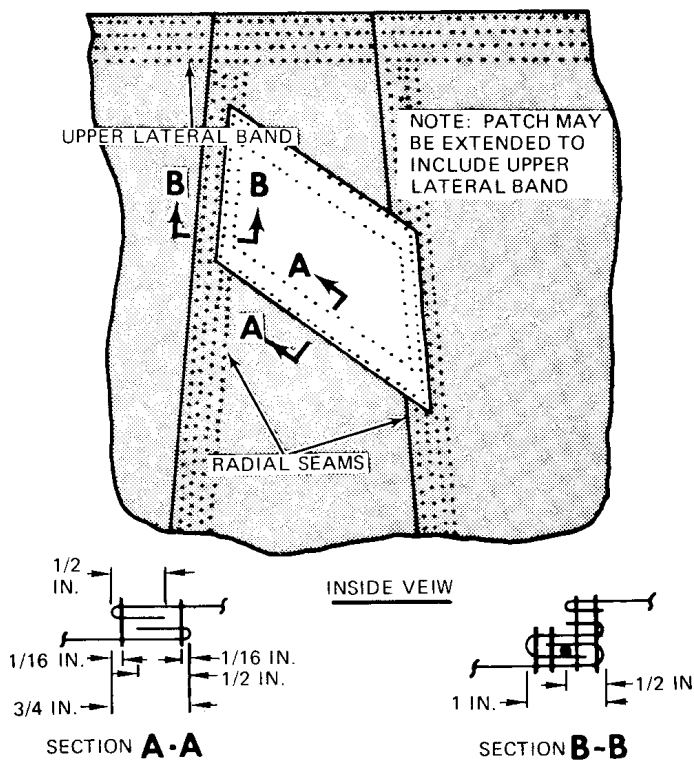


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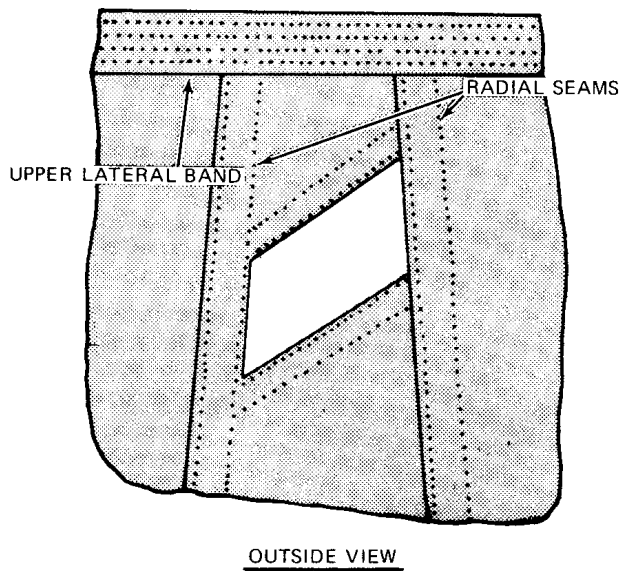
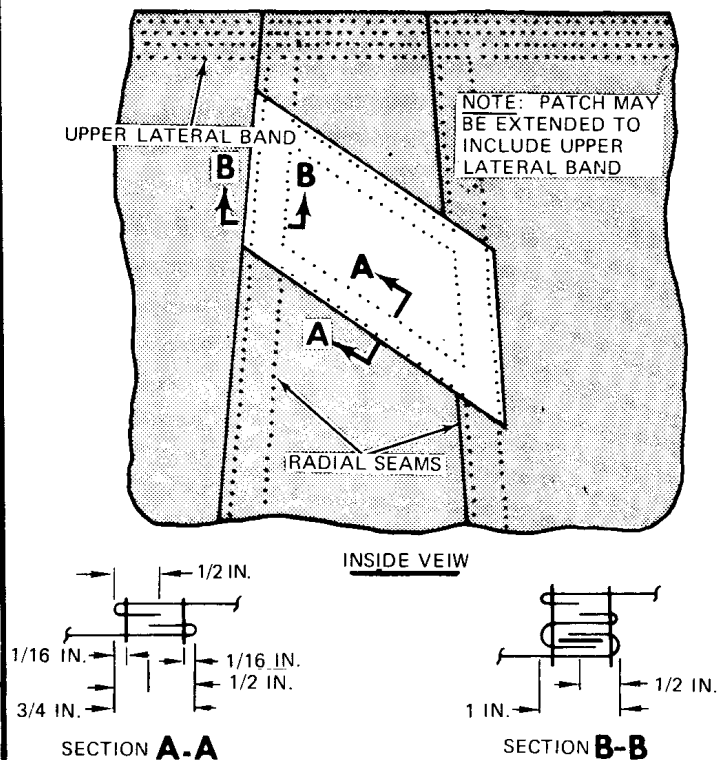
- A. Rectangular patch including a diagonal seam.
- B. Rectangular patch crossing a diagonal seam.

Figure 3-7. Common miscellaneous patches for bias-constructed canopies (sheet 1 of 7).





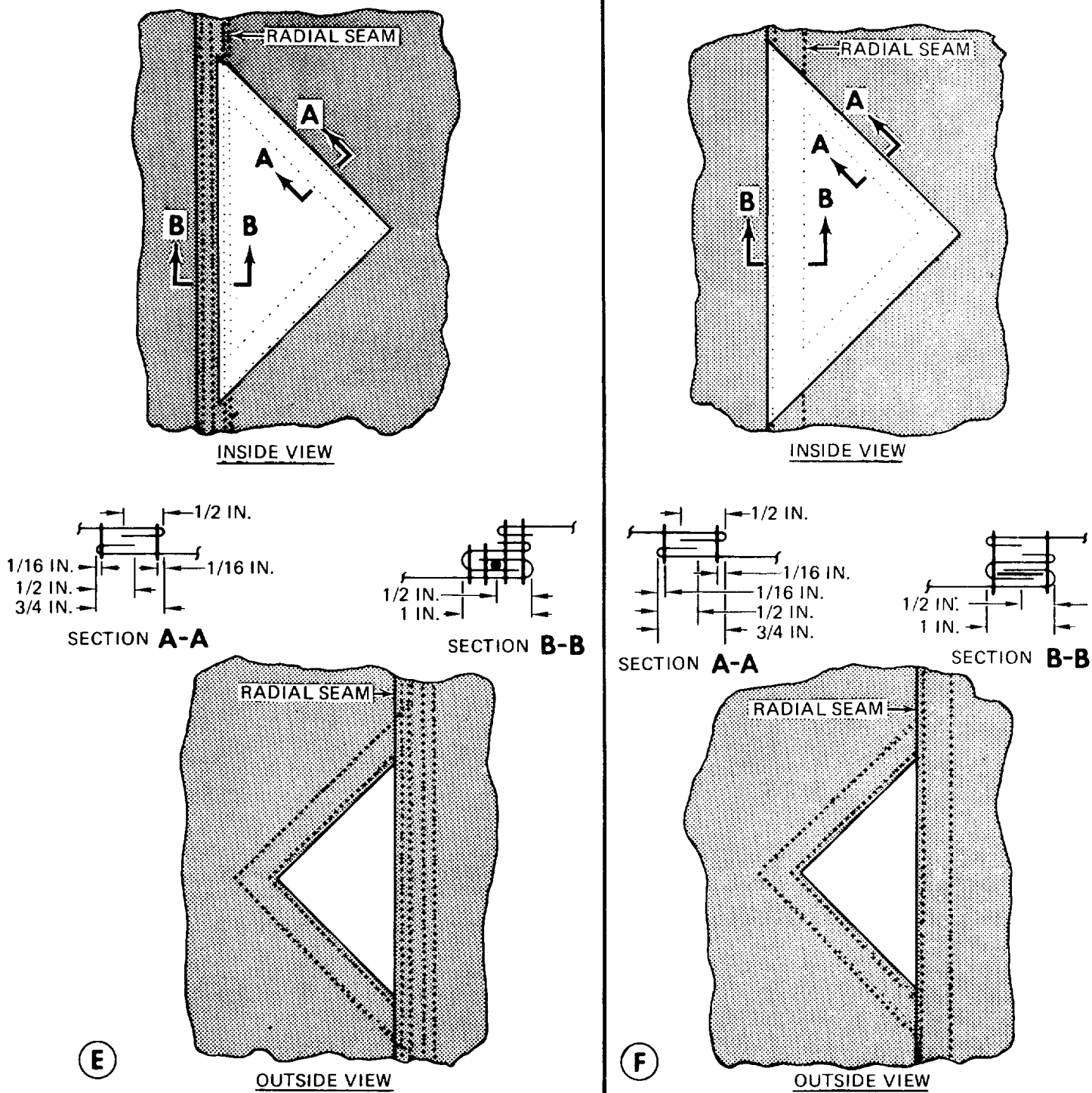
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- C. Irregular shape patch including two radial seams, continuous line canopy.
- D. Irregular shape patch including two radial seams, non-continuous line canopy.

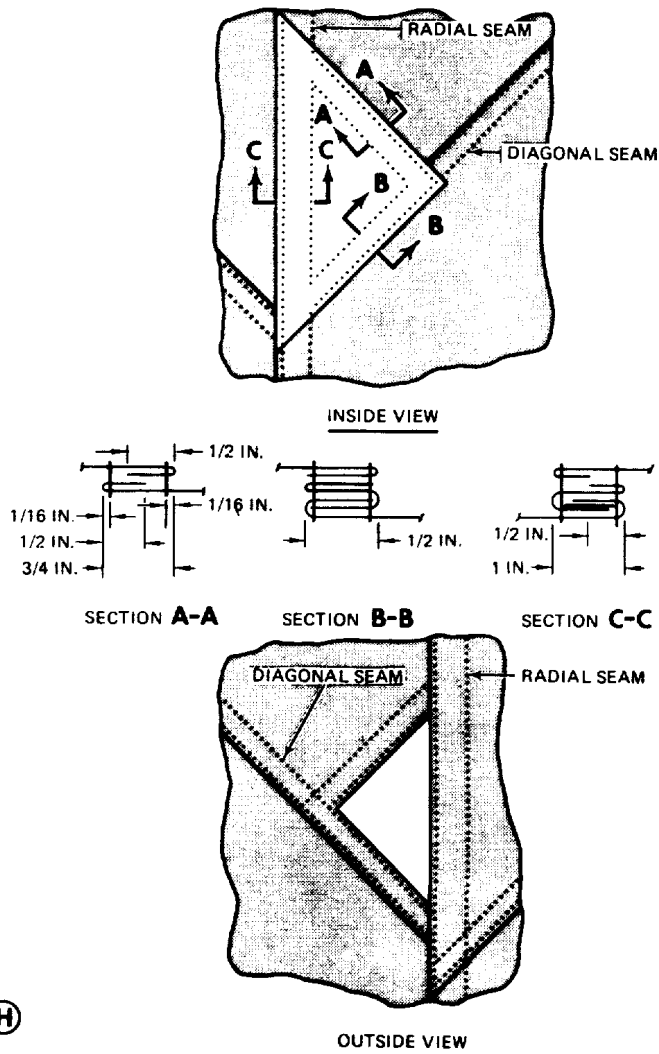
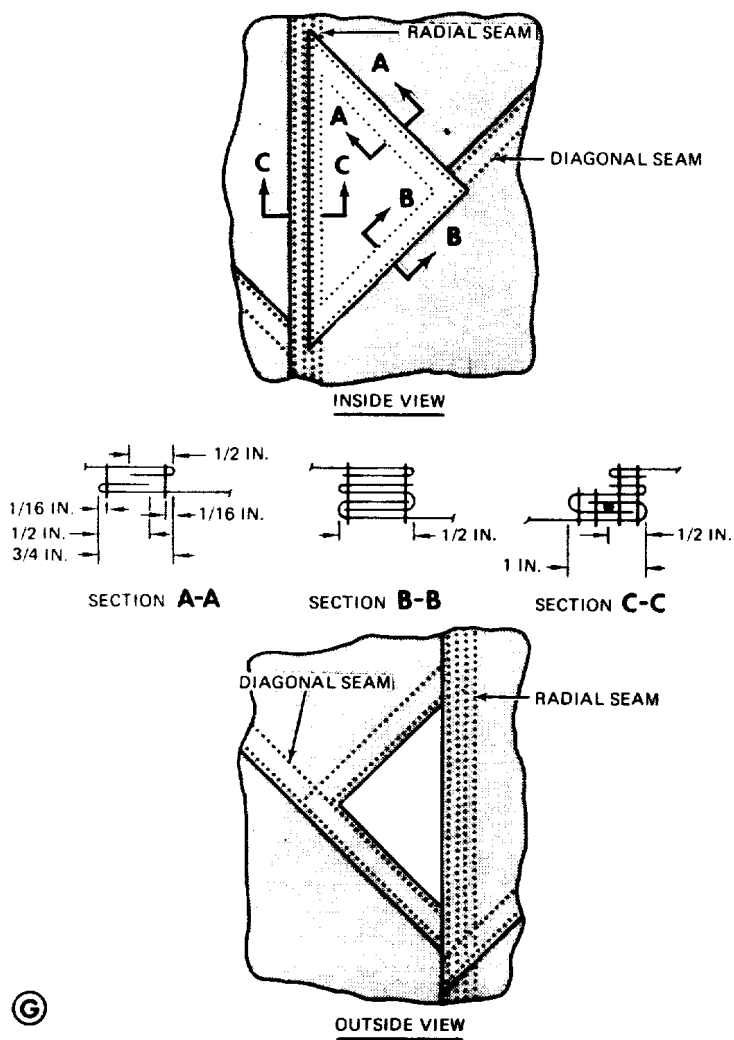
Figure 3-7. Common miscellaneous patches for bias-constructed canopies (sheet 2 of 7).



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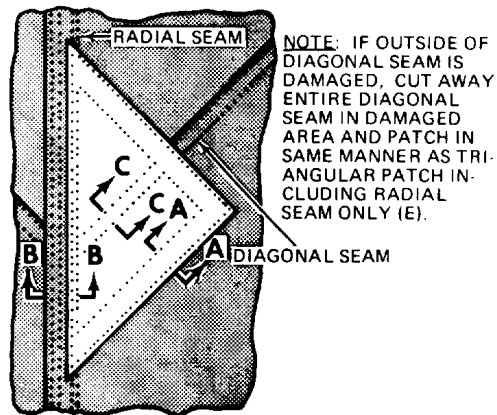
E. Triangular patch including radial seam, continuous-line canopy.  
F. Triangular patch including radial seam, noncontinuous-line canopy.

Figure 3-7. Common miscellaneous patches for bias-constructed canopies (sheet 3 of 7).



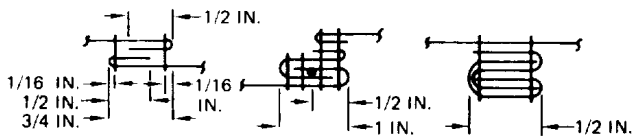
- G. Triangular patch including a radial seam and a diagonal seam, continuous-line canopy.
- H. Triangular patch including a radial seam and a diagonal seam, non-continuous-line canopy.

Figure 3-7. Common miscellaneous patches for bias-constructed canopies (sheet 4 of 7).

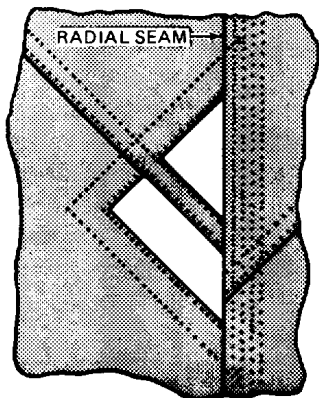


NOTE: IF OUTSIDE OF DIAGONAL SEAM IS DAMAGED, CUT AWAY ENTIRE DIAGONAL SEAM IN DAMAGED AREA AND PATCH IN SAME MANNER AS TRIANGULAR PATCH INCLUDING RADIAL SEAM ONLY (E).

INSIDE VIEW

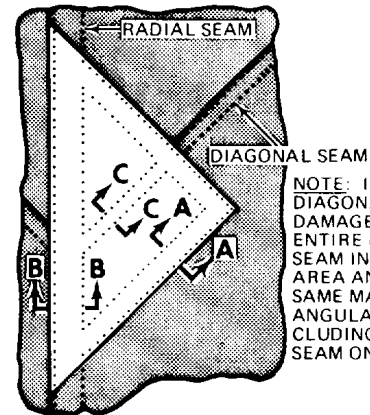


SECTION A-A SECTION B-B SECTION C-C



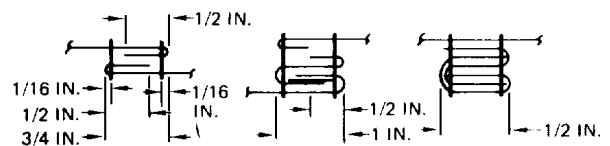
OUTSIDE VIEW

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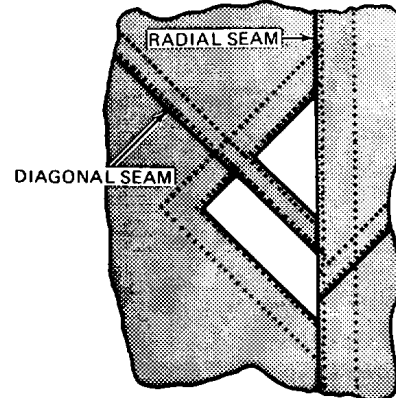


NOTE: IF OUTSIDE OF DIAGONAL SEAM IS DAMAGED, CUT AWAY ENTIRE DIAGONAL SEAM IN DAMAGED AREA AND PATCH IN SAME MANNER AS TRIANGULAR PATCH INCLUDING RADIAL SEAM ONLY (F).

INSIDE VIEW



SECTION A-A SECTION B-B SECTION C-C

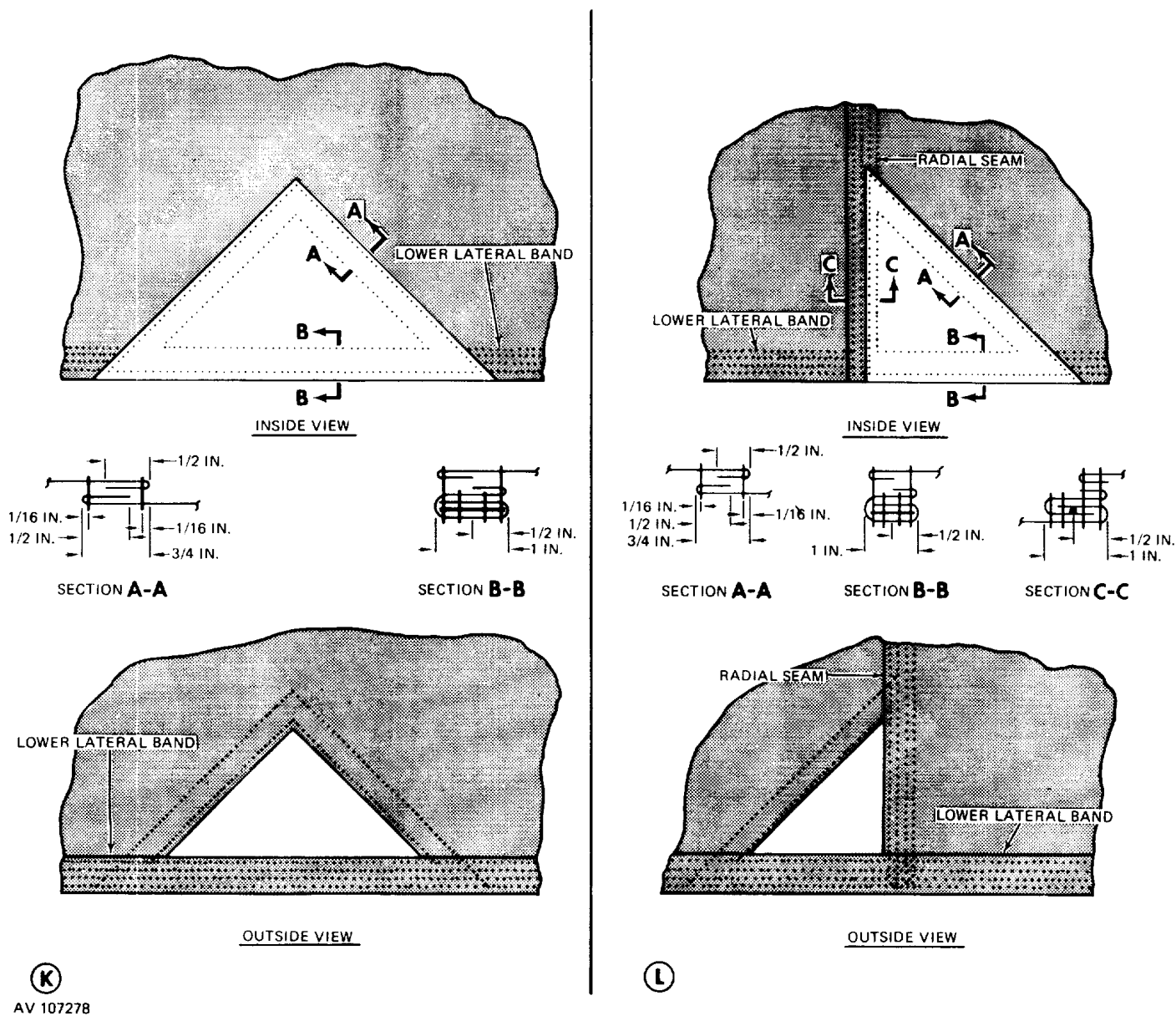


OUTSIDE VIEW

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- I. Triangular patch crossing diagonal seam and including radial seam, continuous-line canopy.
- J. Triangular patch crossing diagonal seam and including radial seam, noncontinuous-line canopy.

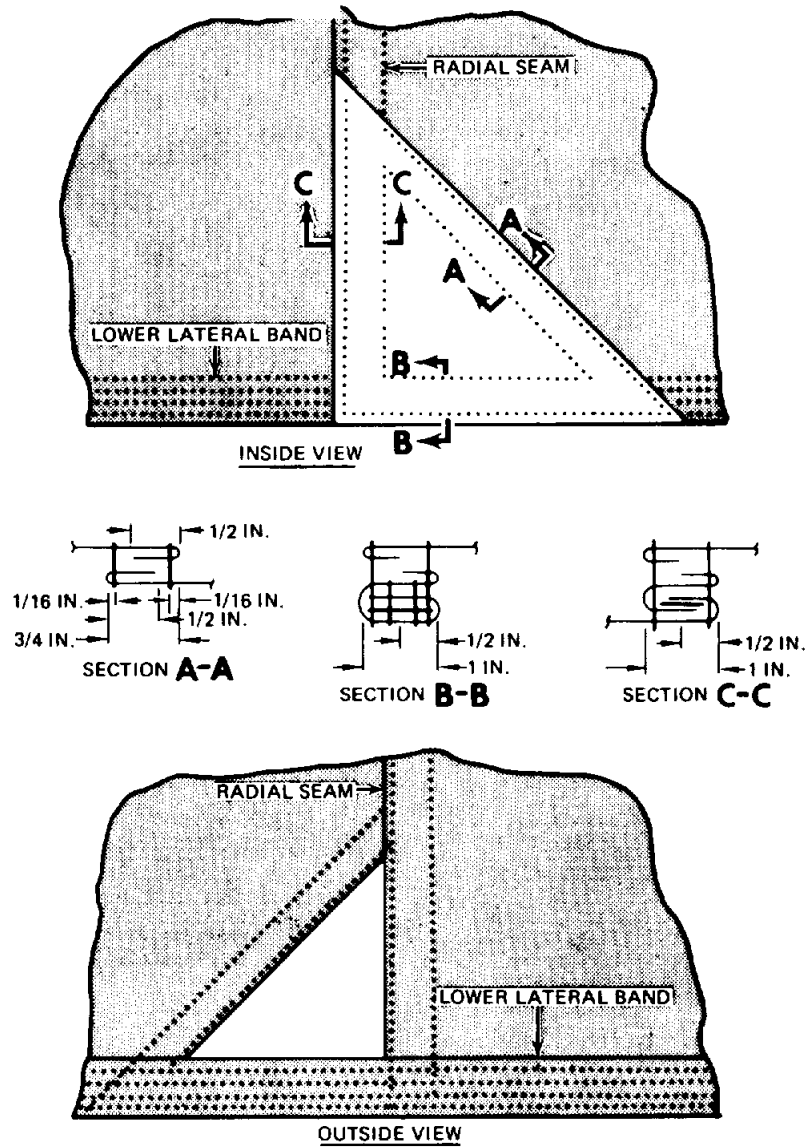
Figure 3-7. Common miscellaneous patches for bias-constructed canopies (sheet 5 of 7).



K. Triangular patch including lower lateral band.

L. Triangular patch including radial seam and lower lateral band, continuous-line canopy.

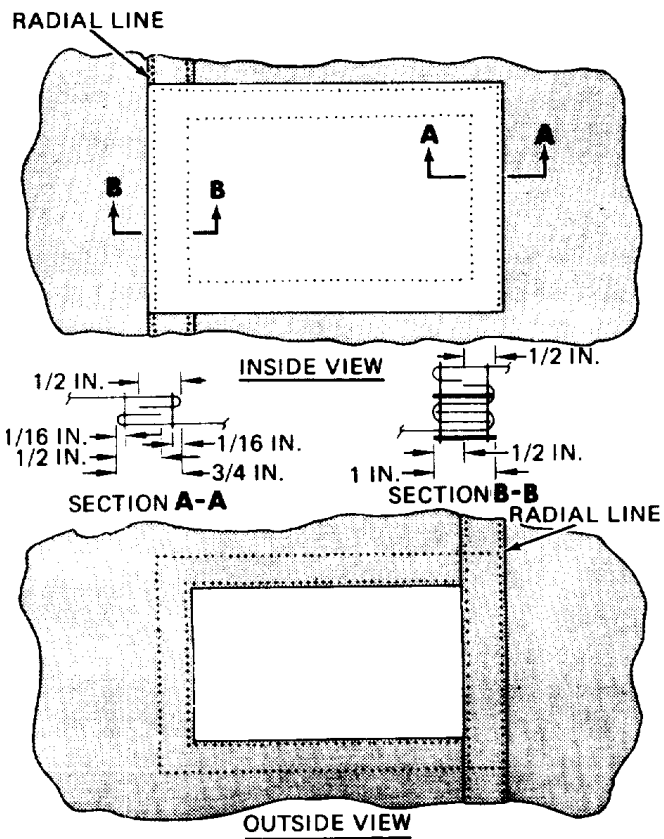
Figure 3-7. Common miscellaneous patches for bias-constructed canopies (sheet 6 of 7).



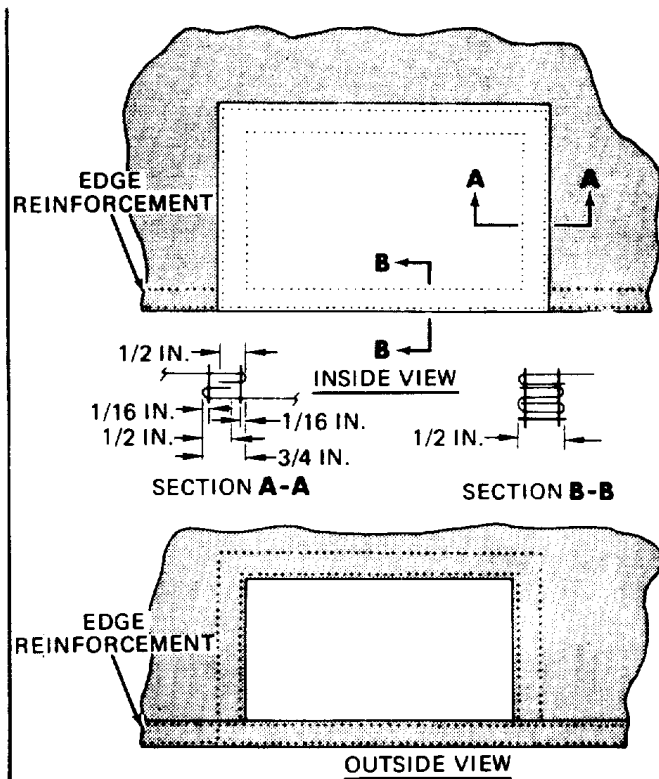
(M)  
AV 107279

M. Triangular patch including radial seam and lower lateral band, noncontinuous-line canopy.

Figure 3-7. Common miscellaneous patches for bias-constructed canopies (sheet 7 of 7).



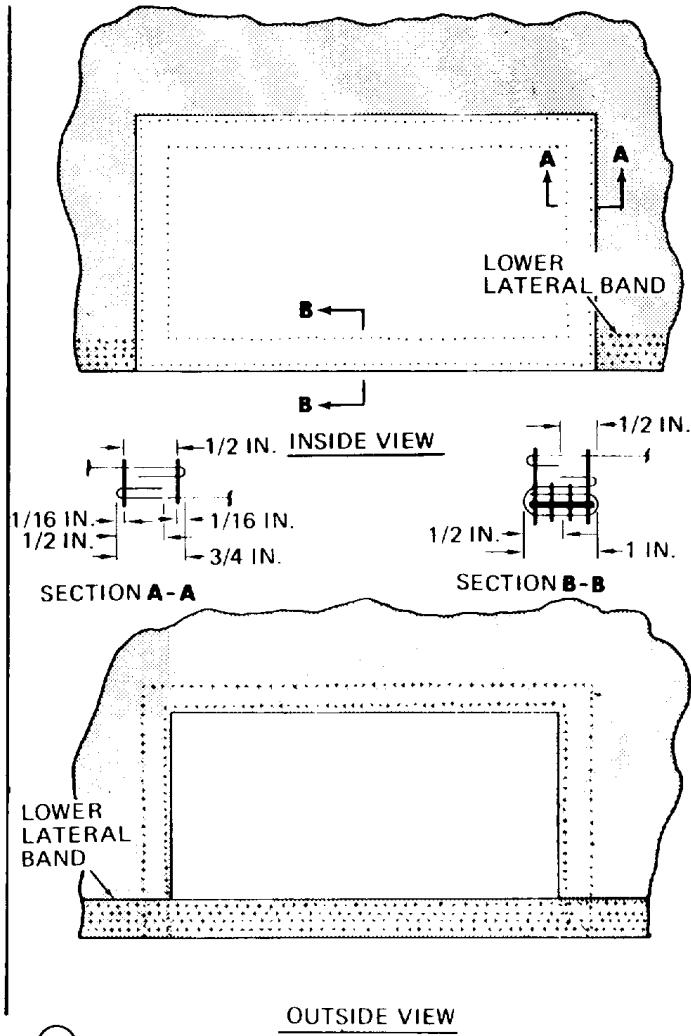
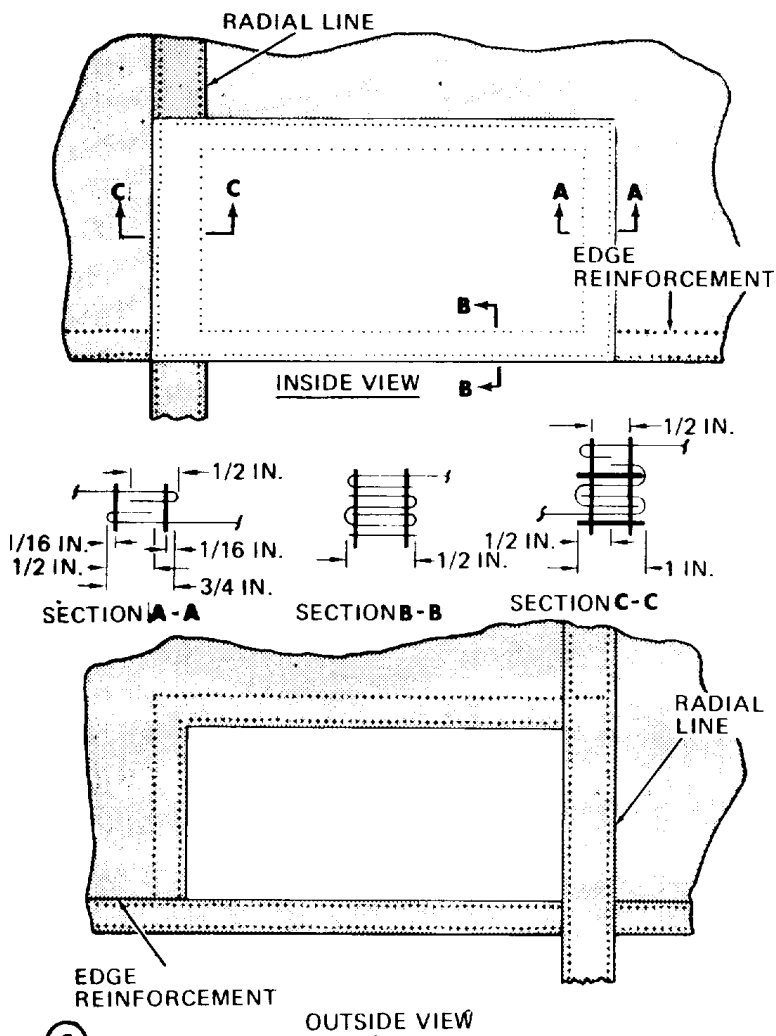
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Ⓑ

- A. Rectangular patch including radial line.
- B. Rectangular patch including edge reinforcement.

Figure 3-8. Common miscellaneous patches for block-constructed canopies (sheet 1 of 5).



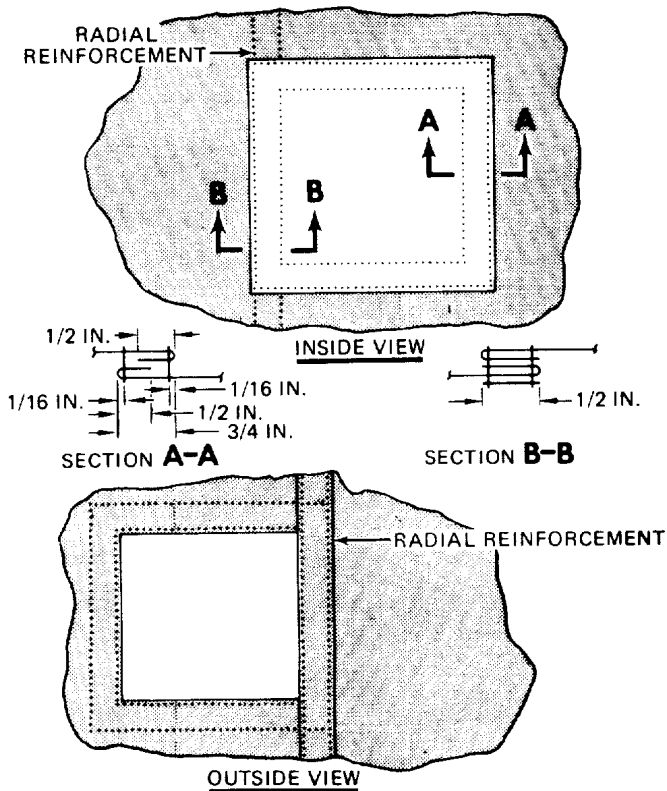
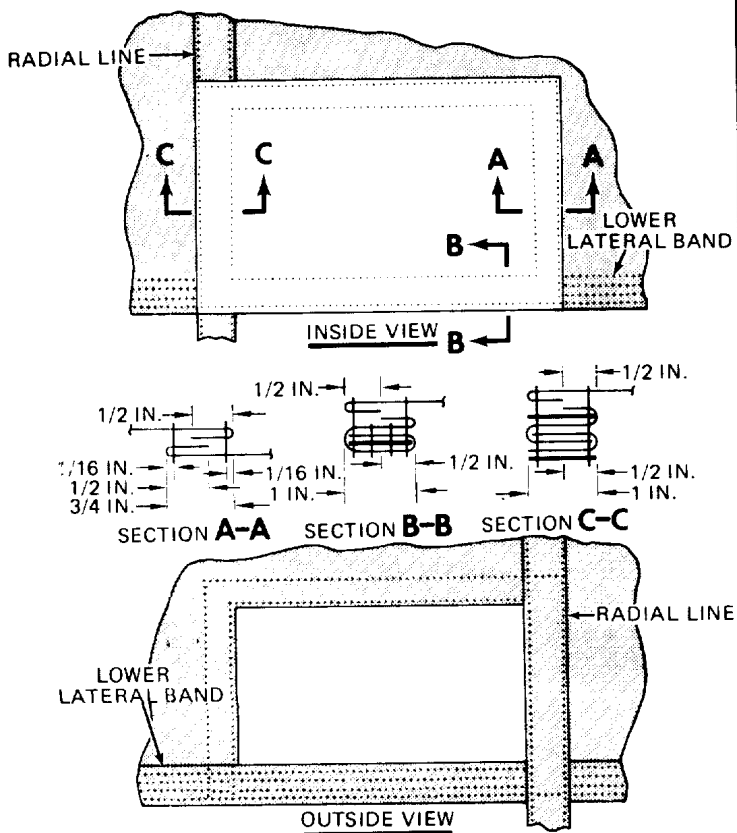
(C)  
 AV 107281

(D)

- C. Rectangular patch including radial line and edge reinforcement.
- D. Rectangular patch including lower lateral band.

Figure 3-8. Common miscellaneous patches for block-constructed canopies (sheet 2 of 5).





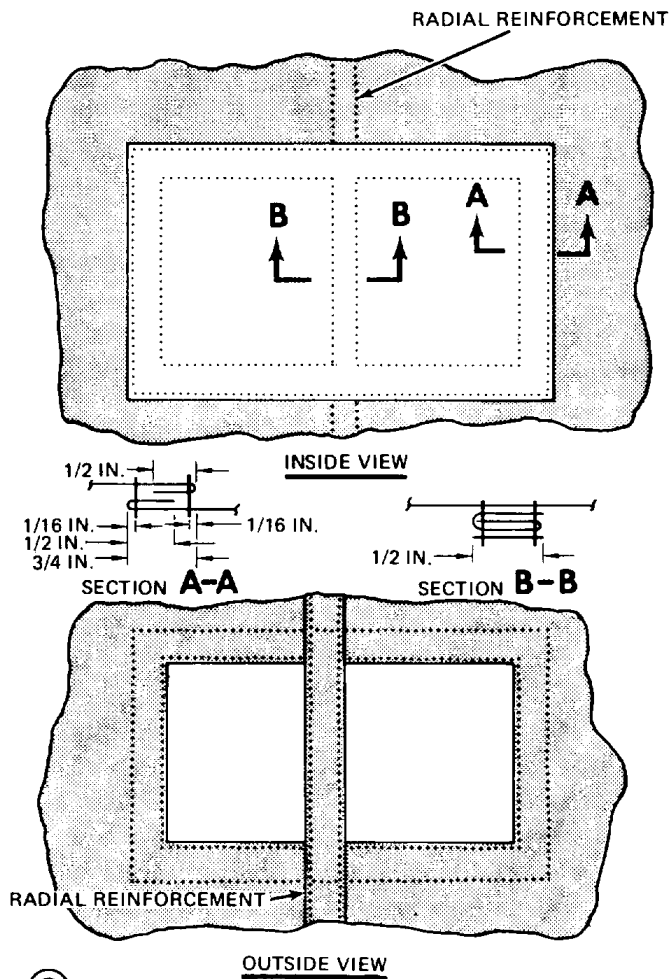
**E**

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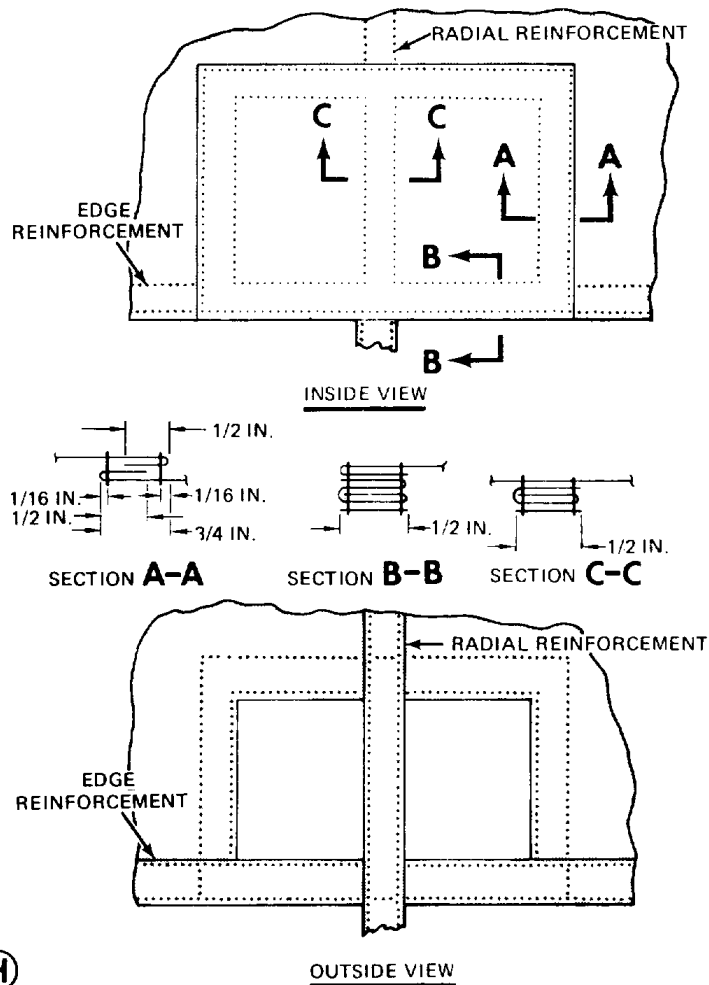
**F**

E. Rectangular patch including radial line and lower lateral band.  
 F. Rectangular patch including radial reinforcement.

Figure 3-8. Common miscellaneous patches for block-constructed canopies (sheet 3 of 5).



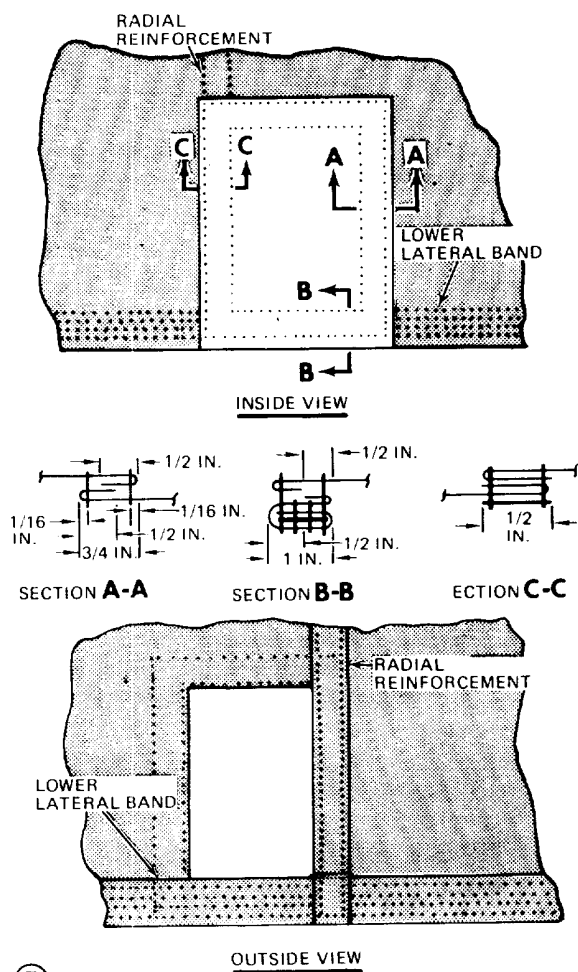
**G**  
AV 107283



**H**

- G. Rectangular patch crossing radial reinforcement.
- H. Rectangular patch crossing radial reinforcement and including edge reinforcement.

Figure 3-8. Common miscellaneous patches for block-constructed canopies (sheet 4 of 5).



I

AV 107284

I. Rectangular patch including radial reinforcement and lower lateral band.

**Figure 3-8. Common miscellaneous patches for block-constructed canopies (sheet 5 of 5).**

(d) Using an authorized marking aid of contrasting color, mark a rectangle or triangle around the damaged area. Make the mark 1/2 inch from any adjacent seam, reinforcement, or lateral band. Insure that one side of the marked rectangle or triangle is parallel to the warp or filling of the canopy material.

(e) Prepare the damaged area hole by cutting along the marks made in (d) above. Also make a diagonal cut at each corner of the formed hole to permit foldback of each raw edge.

(f) To complete hole preparation, make

a 1/2-inch foldback of each raw edge. Pin and baste each edge foldback using the procedures in paragraph 3-8.

(g) Using the same type material as in original canopy construction, mark and cut a patch 2 1/2-inches wider and longer than the inside measurements of the prepared hole. Insure that one side of the patch material is marked and cut along the warp or filling of the fabric.

(h) Center the patch material over the prepared hole and insure the warp or filling of the patch material matches the warp or filling of the fabric being patched. Pin the patch material in position.

(i) Make a 1/2-inch foldunder on each edge of the patch material and baste the patch to the prepared area. Basting will be performed using the procedures in paragraph 3-8.

(j) Remove the pushpins securing the canopy to the repair table and secure the patch by stitching according to the details in figures 3-7 or 3-8, as applicable, using the stitching specifics outlined in the applicable item equipment publication. Make the first row of stitching completely around the edges of the patch. Turn the canopy right side out and make a second row of stitching around the edges of the prepared hole. Stitching will be performed in accordance with paragraph 3-9.

(k) Reposition the items removed or laid aside in (b) above in the original location and secure each item to the canopy by restitching according to original construction details and paragraph 3-9.

(l) If applicable, restencil informational data or gore numbers according to procedures in paragraph 3-5.

(2) *The pressure-sensitive (iron-on) patch.* A miscellaneous patch constructed from pressure-sensitive-coated cotton balloon cloth will only be applied to the cotton muslin canopies of the G-14, G-13, and the 12- and 26-foot-diameter high-velocity cargo parachutes. Apply a pressure-sensitive (iron-on) patch as follows:

(a) Place the canopy on a work table and smooth all wrinkles from the canopy material surrounding the damaged area.

(b) Cut a piece of pressure-sensitive-coated cotton balloon cloth large enough to extend 1 inch beyond all edges of the damaged area. If an edge of the damaged area is closer than 1 inch to a radial

tape, radial seam, or diagonal seam, the piece of coated cloth must be cut to extend 1 inch beyond the radial tape, radial seam, or diagonal seam, as applicable. Should the damaged area be closer than 1 inch to the lower lateral band an edge reinforcement, the coated cloth must be cut to allow the patch to lap around the applicable reinforcement. However, if the damaged area extends to a point within 1 inch of the upper lateral band, only a sewn patch as outlined in paragraph (1) above will be permitted.

(c) Place the coated cloth patch over the damaged area with the adhesive side facing down. If the damaged area has no material missing, the patch will be applied to the inside of the canopy only. Should the damaged area be within 1 inch of the lower lateral band or an edge reinforcement, the patch will be lapped around the applicable reinforcement and applied to both sides of the canopy. Whenever the damaged area has a space between the edges of the material which indicates that material is missing, the patch will be applied to both the in side and the outside of the canopy.

(d) Using a household-type electric iron with the heat regulated for cotton material, apply heat and pressure simultaneously to the patch material for at least 30 seconds. Insure that all of the patch material is subjected to heat and pressure, and that all edges of the-patch have adhered to the canopy material. Also insure that the temperature of the iron remains constant during the patch application effort and that no other part of the canopy is underneath the area being patched.

(e) As required, restencil informational data or gore numbers according to procedures in paragraph 3-5.

*b. Patching a Radial Seam.* There is no limit to the length of a miscellaneous patch made on a canopy radial seam. In addition, a radial seam may be patched on both the inside and the outside of a canopy, as required. Patch a damaged radial seam as follows:

(1) Place the canopy on a repair table with

the damaged side of the radial seam facing up.

(2) As required, cut the applicable stitching to remove or lay aside items which may interfere with the patching process.

(3) Smooth the canopy material surrounding the damaged area and secure the undamaged portion of the seam to the table with pushpins. Do not pin the damaged area of the seam.

(4) Using the same type material as in original canopy construction, bias-cut a rectangular patch 3 1/2 inches wider and 4 inches longer than the damaged area. If one piece of material is not long enough to achieve the cited size, join additional pieces of bias-cut material with 1/2-inch-wide lapped seams.

**NOTE**

**Patch material for a damaged area that does not exceed 1 inch may be cut with the warp and filling.**

(5) Fold the patch material lengthwise and align the raw edges.

(6) Center and secure radial seam patch material over the damaged area with push pins. Fold under 1/2 inch on each side of the new patch material and secure each side with pins.

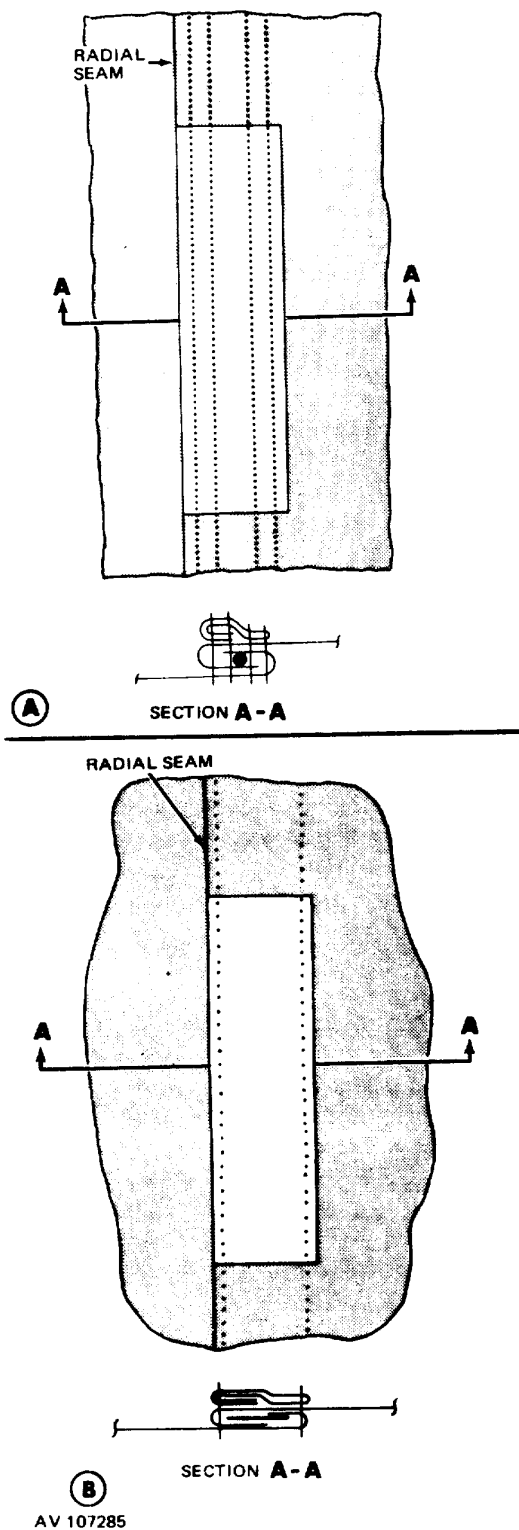
(7) Fold under 1 inch at each end of the new patch material and secure with pins. Baste both sides of the new patch to the canopy using the procedures in paragraph 3-8.

(8) Deleted.

(9) Remove the pins securing the canopy to the repair table. Secure the patch to the radial seam by stitching, using the procedures in paragraph 3-9 and the stitching specifics outlined in the applicable item equipment publication. If the radial seam is on a continuous-line canopy, the patch will be secured with four rows of stitching (A, fig. 3-9). When the radial seam is on a noncontinuous-line canopy, the patch will be secured with two rows of stitching (B).

(10) When applicable, repeat the stitching procedures in 19) above on the opposite side of the radial seam channel.

(11) Reposition the items removed or laid aside in (2) above in the original location and reattach each item to the canopy by restitching according to original construction details and paragraph 3-9. Stitching will be made using the stitching specifics cited in the applicable item equipment publication.



- A. Radial seam patch on continuous-line canopy.
- B. Radial seam patch on noncontinuous-line canopy.

Figure 3-9. Securing a patch on a radial seam, typical.

### SPLICING A FIBROUS CORD LINE WITH CORE THREADS

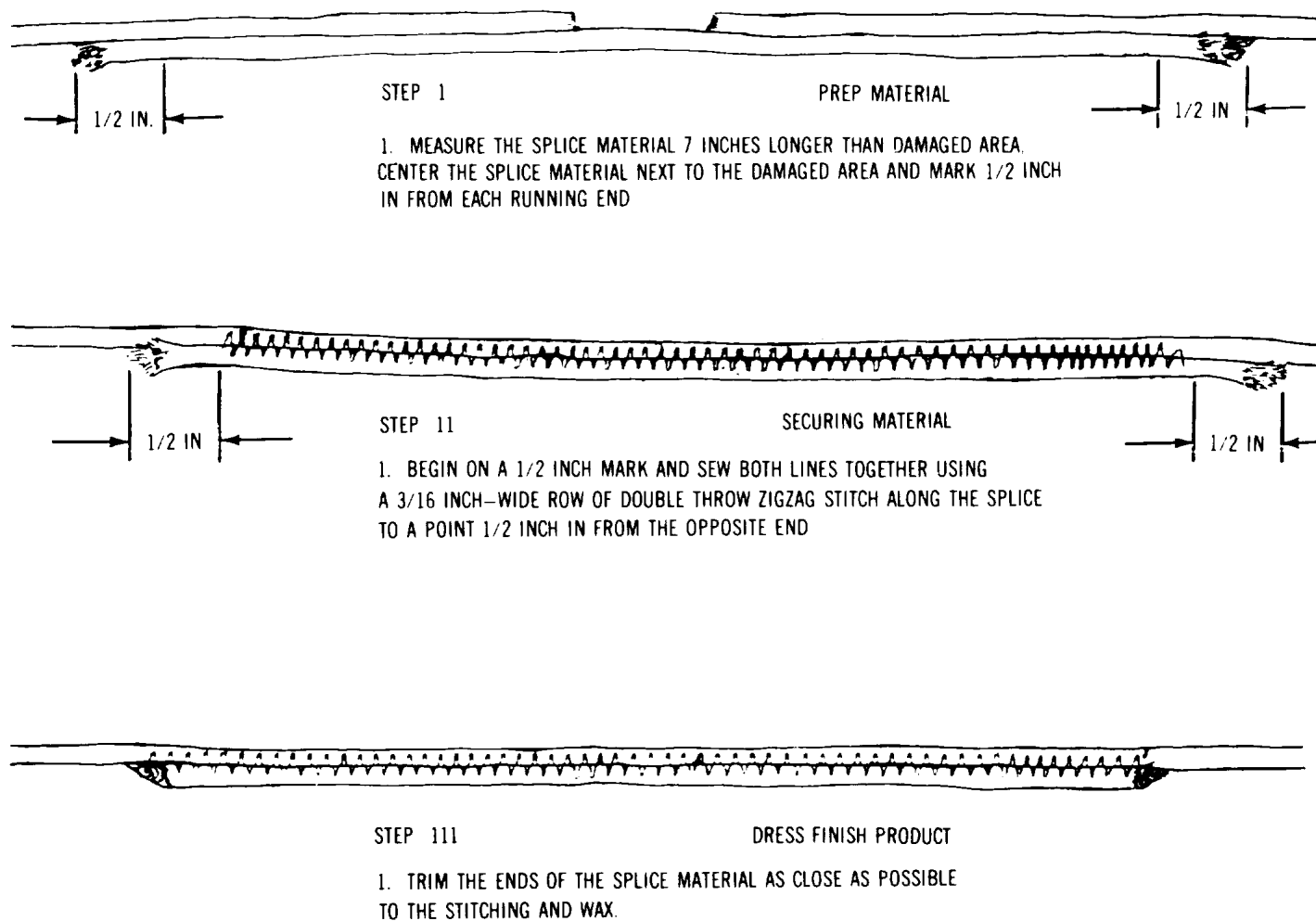


Figure 3-10. Splicing a fiborous cord line with core thread.

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## Section V. SPLICING PROCEDURES

### 3-15. General.

Splicing is a procedure used to repair lengths of cord, tape, or webbing on airdrop items. For the sake of clarity, the term "splicing" as used in air-drop equipment publications refers to procedures such as drawing a cord length end into a cord length body, laying a cord length alongside another cord length, or the placing of a length of tape or webbing lengthwise over another length of tape or webbing. In most instances, a splicing procedure is completed by securing the cord, tape, or webbing, as applicable, with stitching.

### 3-16. Splicing Vent Lines and Suspension Lines.

The splicing of vent lines and suspension lines is permitted on cargo parachute canopies only. However, the splicing of a damaged individual vent line or suspension line will only be performed if enough undamaged original line material is available to permit splicing. The technique used to splice a vent line or suspension line will vary according to the type of cord material from which the original line was constructed. Splice a damaged vent line or suspension line using the procedures *a* or *b* below, as applicable.

#### NOTE

**A cargo parachute canopy vent line or suspension line will be spliced one time only.**

#### *a. Splicing a Fibrous Cord Line with Core Threads.*

A vent line or suspension line constructed from fibrous cord containing core threads may be spliced as follows provided only one side of the cord casing is damaged and none of the core threads are severed.

(1) If required, remove the skirt hesitator tab by cutting the stitching securing the tab to the suspension line.

(2) Cut a length of fibrous cord with core threads 7 inches longer than the damaged area. Use only the same type cord or equivalent as that used in original construction.

(3) Center the cord length alongside of the damaged area.

(4) Beginning at a point 1/2 inch in from one end of the splice material, secure the splice material to the original line by stitching a 3/16 inch wide row of double throw zig-zag stitching along the splice to a point 1/2 inch in from the opposite end of the splice material. Trim the ends of the splice material as close as possible to stitching and wax. (Fig. 3-10). Stitching will be made using the stitching specifics in the applicable item equipment publication and the procedures in paragraph 3-9.

(5) As applicable, reinstall the skirt hesitator tab using the procedures and specifics in the applicable item equipment publication and the procedures in paragraph 3-9.

*b. Splicing a Coreless Fibrous Cord Line.* A vent line or suspension line made from fibrous cord which is coreless will be spliced as follows:

(1) If required, remove the skirt hesitator tab by cutting the stitching securing the tab on the suspension line.

(2) Cut and remove the damaged portion of the line.

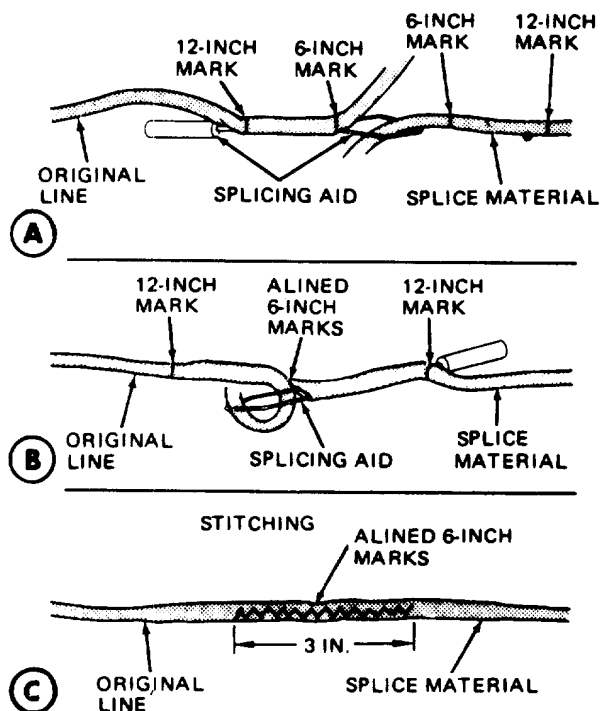
(3) Cut a length of coreless fibrous cord 24 inches longer than the damaged portion removed in (2) above for use as splice material. Use only the same type cord or equivalent as that used in original line construction.

(4) Taper-cut each end of the cord length and the ends of the original line from which the damaged portion was removed.

(5) Using an authorized marking aid of contrasting color, mark the splice material at points 6 and 12 inches from each end. Also mark the original line length at points 6 and 12 inches from each cut end.

(6) Insert a splicing aid into the body of the original line length at one 12-inch mark. Work the splicing aid through the cord body and to the outside at the 6-inch mark.

(7) Thread and secure one end of the splice material to the splicing aid. (A, fig. 3-11).



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- A. Preparing to pull splice material end into original line body.
- B. Preparing to pull original line end into splice material body.
- C. Line splicing completed.

Figure 3-11. Making a line splice with coreless fibrous cord, typical.

(8) Pull the threaded splicing aid back into the line and back through the line body until the 6-inch mark on the attached end of the splice material is alined with the 6-inch mark on the original line end being spliced.

(9) Hold the original line and the splice material at the alined 6-inch marks and continue pulling the splicing aid until the attached splice material end protrudes from the line body at the 12-inch mark, the point of original splicing aid insertion. Remove the attached splice material end from the splicing aid.

(10) While holding the splice at the alined 6-

inch marks, stretch the original line to allow the protruding splice material end to recede into the line body.

(11) Insert the splicing aid into the splice material body at the 12-inch mark nearest the alined 6-inch marks. Work the splicing aid through the body of the splice material and to the outside at the alined 6-inch marks.

(12) Attach the adjacent tapered line end to the splicing aid (B) and pull the splicing aid back into the splice material body.

(13) Pull the splicing aid back through the splice material until the attached line end protrudes from the 12-inch mark, the point of splicing aid insertion. Remove the attached line end from the splicing aid.

(14) Grasp the splice material free end and the original line, and stretch the material to allow the protruding line end to recede into the body of the splice material.

(15) Using the procedures in (6) through (14) above, splice the free end of the splice material to the remaining cut end of the original line.

(16) Secure each end of the line splice by stitching a 3-inch-long row of double-throw zig-zag stitching across each set of alined 6-inch marks (C). Stitching will be made using the specifics in the applicable item equipment publication and the procedures in paragraph 3-9.

(17) As applicable, reinstall the skirt hesitator tab using the procedures and specifics in the applicable item equipment publication and the procedures in paragraph 3-9.

### 3-17. Splicing Lateral Bands.

The splicing of damaged and/or severed upper and lower lateral bands is permitted on all parachute canopies. When a damaged lateral band is originally constructed with only one ply of webbing, a splice will be applied on the inside of the canopy. If a damaged lateral band is originally made of two plies of webbing, then the splice may be made on either the inside or the outside of the canopy, depending on the location of the damage. In the event both plies of webbing on a two-ply lateral band are damaged, a splice will be applied to both sides of the canopy. The following paragraphs provide procedures on the splicing of an upper lateral band and a lower lateral band.

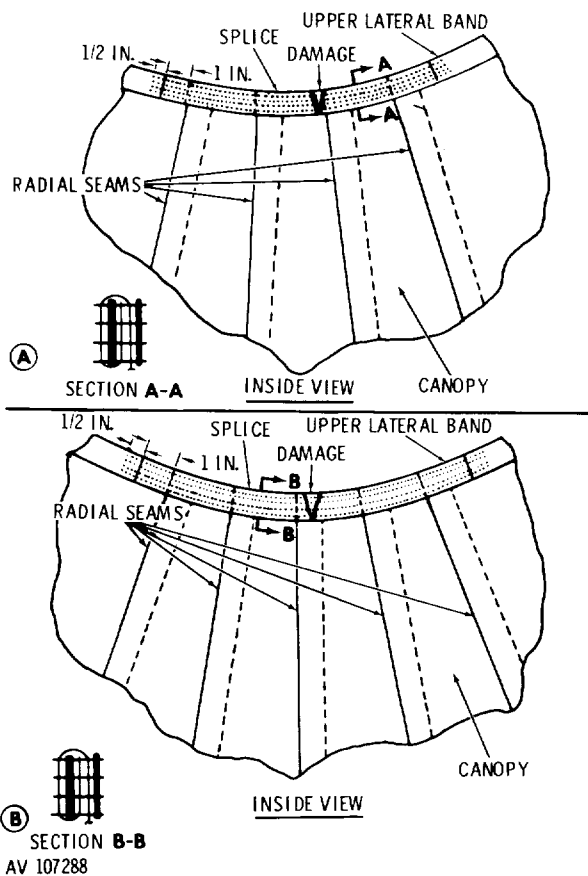
a. *Upper Lateral Band.* A parachute canopy upper lateral band may be spliced one time as follows:

- (1) Place the applicable canopy on a repair



table with the damaged side of the upper lateral band facing up and smooth out the canopy material in the affected area.

(2) If the damage is located between radial seams (A, fig. 3-12), cut the stitching securing the two vent lines on each side of the damaged area and lay the four vent line ends aside. Should the damage extend into a radial seam (B), cut the stitching of the vent line attached at the affected radial seam and also cut the stitching of the two vent lines located beyond each side of the damaged area. Lay the five vent line ends aside.



**Figure 3-12. Upper lateral band splicing details, typical**

(3) Cut a length of webbing long enough to extend 1 inch beyond the outside edge of the second radial seam located on each side of the damaged

area and wax the ends. The type of webbing material to be used will be as prescribed in the applicable item equipment publication.

(4) Center the webbing length over the damaged area and secure the splice material by making four rows of continuous stitching along the full length of the splice. Overstitch each webbing end by 1/2 inch. Stitching will be made using the stitching specifics in the applicable item equipment publication and the procedures in paragraph 3-9.

(5) Reattach the vent line ends removed in (2) above by restitching according to original construction details, using the stitching specifics in the applicable item equipment publication and the procedures in paragraph 3-9.

*b. Lower Lateral Band.* The lower lateral band of troop-type and emergency-type personnel parachute canopies may be spliced three times. The lower lateral band of cargo parachute canopies may have one splice applied between any two suspension lines. Lower lateral band splicing will be performed as follows:

(1) Place the applicable canopy on a repair table with the damaged side of the lower lateral band facing up and smooth out the canopy material in the affected area.

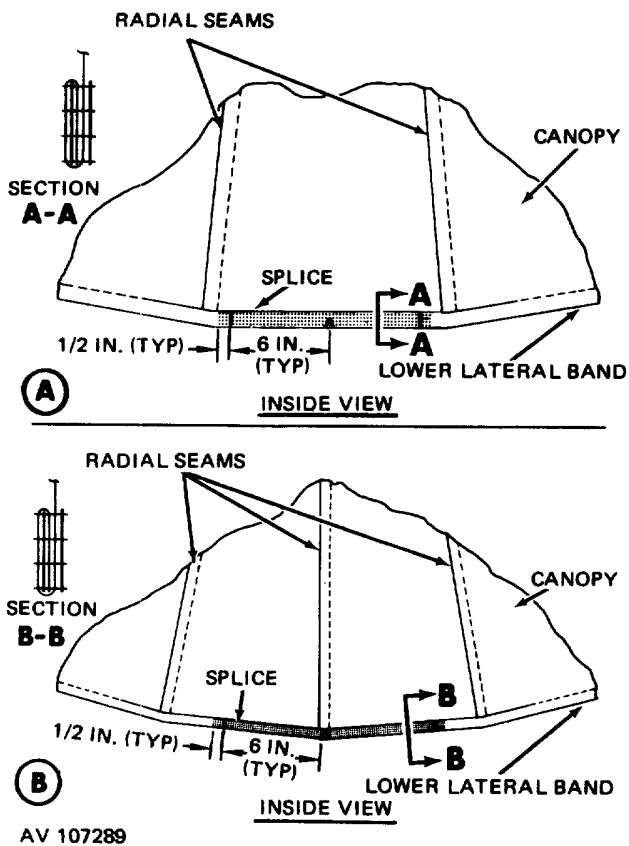
**NOTE**

**If the damage is located in a previously spliced area between two suspension lines, the earlier made splice material will be removed before attempting a second splice repair.**

(2) As required, cut the applicable stitching to remove or lay aside items which may interfere with the splicing process.

(3) Cut a length of webbing long enough to extend 6 inches beyond each side of the damaged area and wax the ends. The type of webbing to be used will be in accordance with the requirements cited in the applicable item equipment publication.

(4) Maintaining original dimensions, center the webbing length over the damaged and/or severed area and secure the splice by making four rows of continuous stitching along the full length of the splice (fig. 3-13). Overstitch each webbing end by 1/2 inch. Stitching will be made using the stitching specifics in the applicable item equipment publication and the procedures in paragraph 3-9.



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- A. Damage located between two radial seams.
- B. Damage extending into a radial seam.

Figure 3-13. Lower lateral band splicing details, typical

(5) Reposition the items removed or laid aside in (2) above in the original locations and reattach each item to the canopy by restitching according to original construction details and paragraph 3-9. Stitching will be made using the stitching specifics cited in the applicable item equipment publication.

### 3-18. Splicing Edge Bindings.

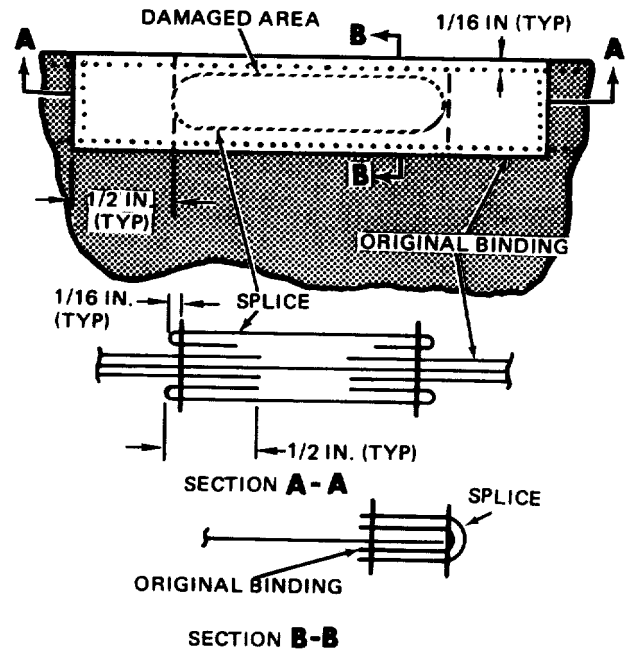
Edge binding on parachute canopies may be made of either textile tape or cloth. Both types of bindings can be spliced without any limitations using the following procedures, as appropriate.

#### a. Tape Edge Binding.

(1) Cut a length of textile tape 2 inches longer than the damaged area. The type of textile tape to be used will be as required by the applicable item equipment publication.

(2) Make a 1/2-inch fold under on each end of the tape length.

(3) Center and fold the tape lengthwise over the edge of the damaged area (fig. 3-14). Secure the splice by stitching a boxstitch formation, 1/16 inch in from each edge, along the full length of the splice material. Stitching will be made according to the procedures in paragraph 3-9, using the stitching specifics in the applicable item equipment publication.



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Figure 3-14. Tape edge binding splicing details, typical.

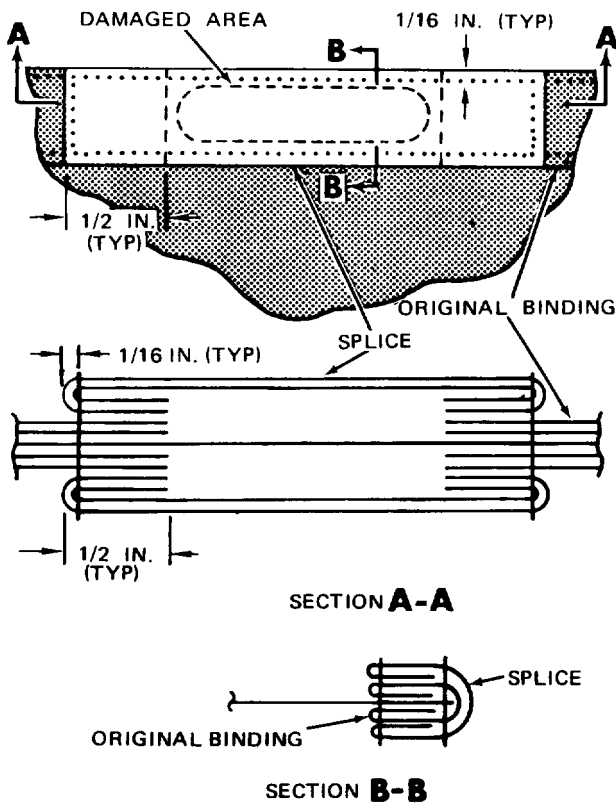
#### b. Cloth Edge Binding.

(1) Cut a piece of cloth 2 inches wider and 2 inches longer than the damaged area.

(2) Make a 1/2-inch fold under on each end of the cloth piece and baste the fold unders according to the procedures in paragraph 3-8.

(3) Center and fold the cloth piece lengthwise over the damaged area (fig. 3-15) and baste the cloth to the canopy edge binding according to the procedures in paragraph 3-8.

(4) Secure the splice by stitching a box-stitch formation, 1/16 inch in from each edge, along the full length of the splice material. Stitching will be made according to the procedures in paragraph 3-9, using the stitching specifics in the applicable item equipment publication.



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Figure 3-15. Cloth edge binding spicing details, typical.

## Section VI. FABRICATION PROCEDURES

### 3-19. General.

Fabrication is a means of replacing an airdrop item component which is damaged beyond repair and which is not an issue item. Though the act of fabricating an item is a replacement-type action, the function is actually a method of repairing an end item. Since most fabrication pertains to components which are peculiar to parachutes, the fabrication of components which are most general in nature will be detailed in the following paragraphs. Fabrication instructions for components that are unique or which only apply to one or a very few airdrop end items will be contained within the maintenance publication relevant to the end item(s).

### 3-20. Replacing Canopy Gore Sections.

Parachute canopy gore sections which are

damaged beyond repair may be replaced individually by normal procedure, by modified method, or in multiples. A replacement gore section will be fabricated using one of the following procedures, as applicable:

#### a. Normal Gore Section Replacement.

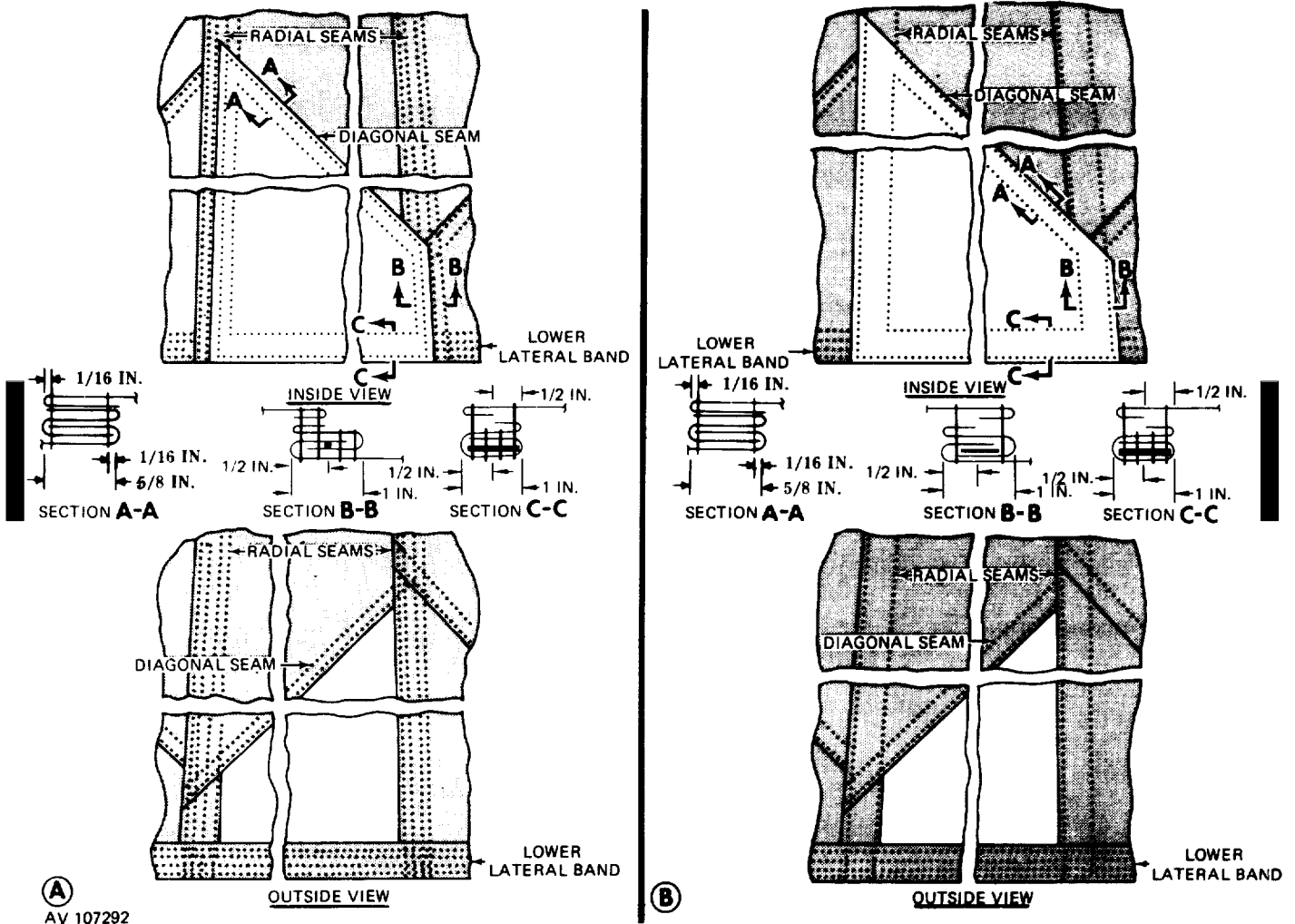
(1) Invert the canopy on a repair table and locate the damaged section.

(2) As required, remove or lay aside items which may interfere with the section replacement process by cutting the stitching securing the items to the canopy.

(3) Smooth out the damaged gore section and secure the surrounding canopy material to the repair table by placing push-pins through seams, lateral bands, or edge reinforcements as far above and below the damaged section as necessary. Insure

that all adjacent seams, lateral bands, and edge reinforcements are straight and the damaged section is not distorted.

(4) Ascertain the type of replacement gore section required using the details in figure 3-16.



- A. Bias-constructed gore section replacement, continuous-line canopy.
- B. Bias-constructed gore section replacement, noncontinuous-line canopy.

Figure 3-16. Normal gore section replacement details, typical (sheet 1 of 2)

pin and baste each folded edge to complete area preparation. Basting will be performed according to procedures in paragraph 3-8.

(8) Position a piece of serviceable cloth equal to the material used in original gore section construction over the prepared area with the warp and filling of the cloth piece aligned with the warp and filling of the original section material.

(9) Cut the cloth piece to a size that will cover the entire prepared area. Allow as many selvaged edges of the cloth piece to remain as possible. Also allow at least 3 inches of extra fabric to remain on each raw edge.

(10) Fold under each selvaged edge of the cloth piece to a width equal to the width of adjacent seams and align the cloth folded edges with the outside edges of adjacent seams or bands. Secure the folded edges to the seams or bands with pushpins.

(11) Fold the raw edges of the cloth piece as follows:

(a) Fold under the raw edges located adjacent to edge reinforcements and a lateral band, as applicable, and align the folded edges with the outside edges of the reinforcements or band. Secure the aligned edges to the applicable reinforcements or lateral band with pushpins.

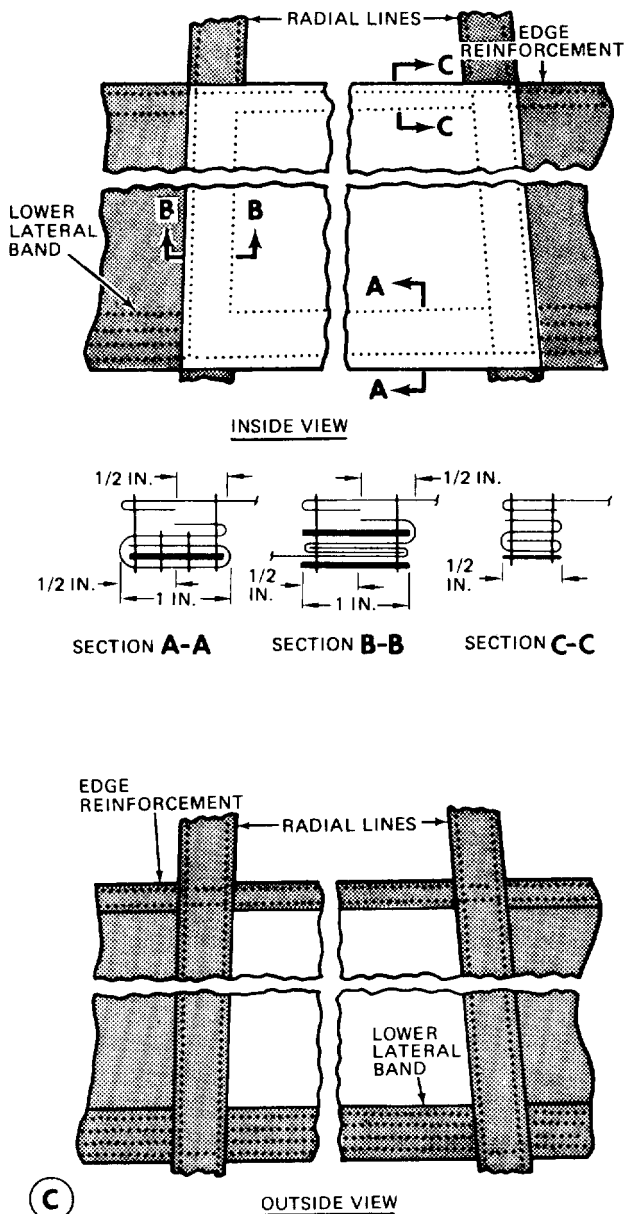
(b) Fold under the raw edges located along radial seams which have four rows of stitching and align the folded edges with the center of the radial seams. Secure the folded edges to the radial seams with pushpins.

(c) Fold under the raw edges located along radial seams which have two rows of stitching and align the folded edges with the outside edges of the radial seams. Secure the folded edges to the radial seams with pushpins.

(12) Secure the situated replacement section cloth to the canopy material by basting along each of the folded edges. Basting will be made according to the procedures in paragraph 3-8.

(13) Remove the pushpins from the edges of the replacement section and secure the section material to the canopy inside by stitching according to the details in figure 3-16. Stitching will be made using the procedures in paragraph 3-9 and the stitching specifics in the applicable item equipment publication.

(14) Turn the canopy right side out and trim the raw edges of the section material to a point 1/2 inch from the stitching made in (13) above.



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C. Block-constructed gore section replacement.

**Figure 3-16. Normal gore section replacement details, typical (sheet 2 of 2)**

(5) Remove the damaged section by, cutting the section material at a point 1/2 inch in from the inside edge of each adjacent seam, lateral band, or edge reinforcement.

(6) Cut the remaining fabric diagonally at each corner to allow the raw edges to be folded back.

(7) Fold each raw edge back by 1/2 inch and

(15) On the canopy outside, stitch completely around the prepared area using the stitching criteria in (13) above.

(16) Reposition the item(s) removed or laid aside in (2) above in the original location (s) and reattach each item to the canopy by restitching according to original construction details and paragraph 3-9. Stitching will be made using the stitching specifics cited in the applicable item equipment publication.

(17) Stencil informational data or other markings on the replacement section using the procedures in paragraph 3-5.

*b. Modified Section Replacement.* If a gore section which is located next to the lower lateral band on a bias-constructed canopy does not have damage extending into a corner that is bounded by the lower lateral band and a radial seam, the section may be replaced using a modified method as follows:

(1) When removing the damaged section, cut the section material diagonally across the corner with the warp or filling. Allow the corner material of the original section to remain intact and also allow a sufficient amount of material to remain to preclude the replacement section overlapping the pocket band.

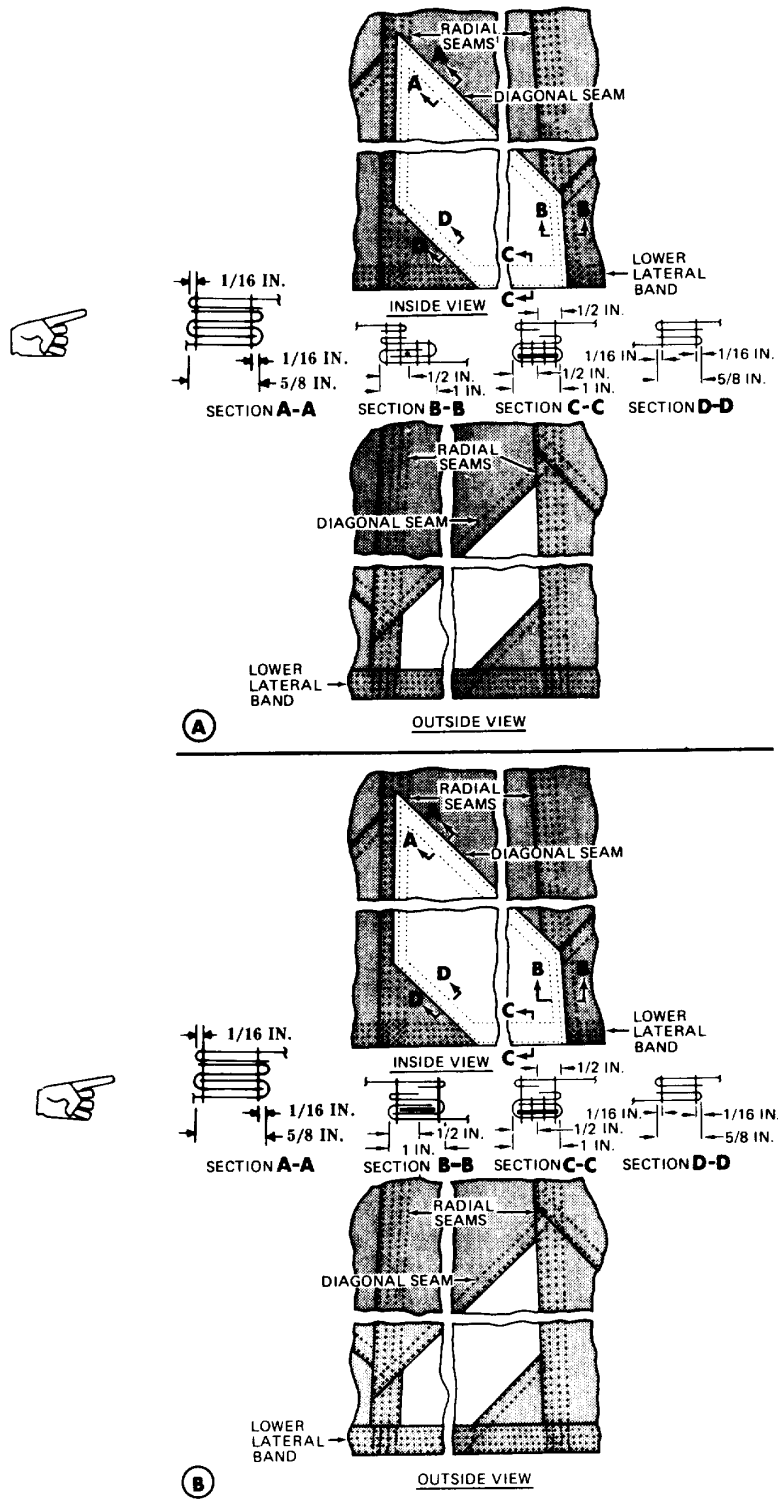
(2) Except for the procedure in (1) above, complete the section replacement using the applicable criteria outlined in paragraph a above and the details in figure 3-17.

**NOTE**

**When replacing a gore section on a biasconstructed canopy using the modified replacement method, it is not necessary to remove the V-tab or pocket band from the radial seam located alongside the damaged section.**

**NOTE**

**When replacing a gore section on a lower lateral band that has a net attached to it, removal of the new is not necessary.**

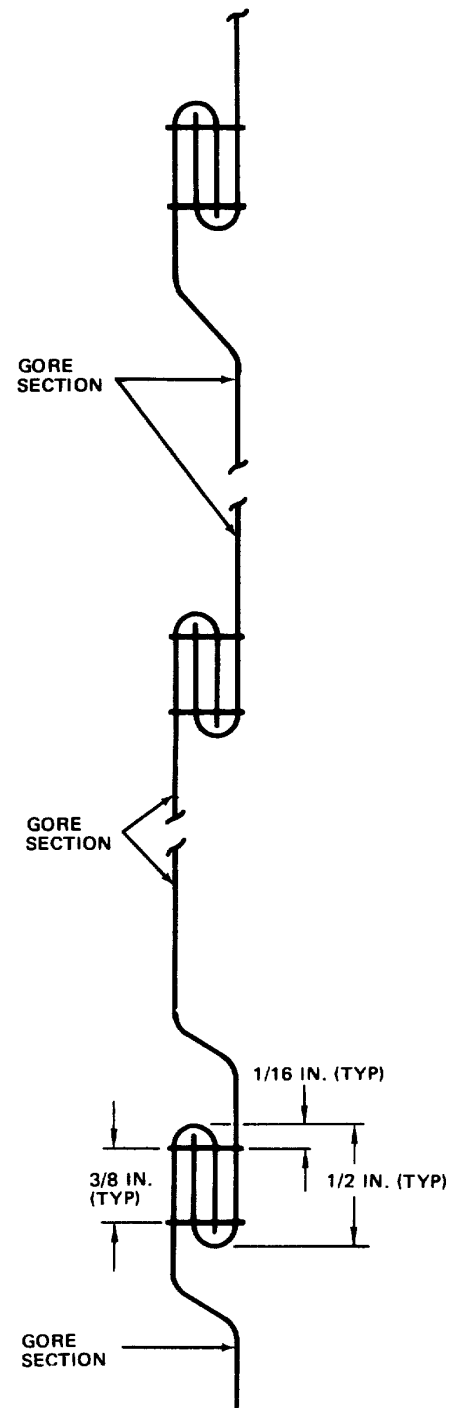


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- A. Bias-constructed gore section replacement, continuous-line canopy.
- B. Bias-constructed gore section replacement, noncontinuous-line canopy.

Figure 3-17. Modified gore section replacement details, typical.

c. *Multiple Section Replacement.* If two or more adjacent sections within a bias-constructed gore require replacement, cut and remove all affected sections, including the joining diagonal seams as prescribed in paragraph a above. Prepare the material for the replacement sections and join the replacement sections together with 1/2-inch-wide lapped seams (fig. 3-18). Install the joined replacement sections using the applicable procedures in paragraph a above.



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Figure 3-18. Lapped seams completed for multiple gore section replacement, typical.



### 3-21. Replacing Canopy Lines.

A canopy line is defined as a line which extends from a parachute connector link on one side of a continuous-line parachute canopy, up through a radial seam channel on one side of the applicable canopy, across the vent at the canopy top, and down through a radial seam channel to a parachute connector link on the opposite side of the canopy. Due to the routing, a canopy line thus forms two suspension lines, two radial lines, and a vent line. However, a canopy line must not be confused with independent suspension lines, radial lines, radial tapes, or vent lines. If a canopy line on a personnel parachute sustains any damage at all, the entire line will be replaced. Should a canopy line on a cargo parachute incur damage, the line may be repaired or replaced, depending upon the extent and location of the damage, and according to the criteria specified within the applicable item equipment publication. A parachute canopy line will be replaced using a two-man team and the following procedures.

#### NOTE

**The term "line" is intended to include those lengths of material from which a canopy line may be constructed such as cord, tape, or webbing. In addition, the use of the term "connector link assembly" will also apply equally to a connector snap or dee-ring, as applicable, throughout the canopy line replacement procedure.**

#### a. *Installing a Replacement Canopy Line.*

(1) Place the applicable canopy assembly in proper layout on a repair table or other suitable repair surface and apply partial tension to the assembly.

(2) Trace the damaged canopy line from the point of attachment on one connector link assembly to the opposite connector link assembly.

(3) Cut and remove all stitching securing the canopy line to the parachute canopy. Also cut and remove the stitching securing other components that would prohibit the canopy line length from moving freely across the lateral bands, through the V-tabs, and within the radial seam channels. As applicable, lay the removed components aside temporarily.

#### NOTE

**Do not remove a V-tab which contains a damaged canopy line unless the V-tab is also damaged.**

(4) Cut the affected line length at a point 24 inches below the skirt on each side of the canopy.

(5) Using a spool of material which is the same as that used in original canopy line construction, wax the exposed replacement line material end.

(6) Insert the replacement material waxed end into the sheath of one original canopy line end which is extending 24 inches below the canopy skirt. The waxed end will be inserted into the sheath by at least 1 inch and secure the two ends together temporarily by either whipstitching or effecting a similar suitable means of securance. As an optional method, instead of waxing end of cord, the replacement materials may be attached to the damaged line as follows:

(a) Using a needle and basting thread, lay end of thread on replacement line and starting at end of line, wrap thread back around line for approximately 1/2 inch with about 8 to 10 turns according to figure 3-18.1(A).

(b) Push needle under thread turns so that point of needle comes out center of cord end (fig. 3-18.1(B)).

(c) Pull inner core cords out of damaged line about one inch. Cut off these core cords next to cord sleeve. Pull sleeve down over core cords so they are up inside sleeve one inch. Turn needle backwards and push up through sleeve of damaged line and out through sleeve about one inch from the end (fig. 3-18.1(C)).

(d) Pull end of new line up into sleeve of damaged line. Using needle, make several stitches thru sleeve and end of new line (fig. 3-18.1(D)). Cut off thread about 1/4 inch from sleeve. Knots are not necessary.

(7) At a point within 24 inches of the skirt on the opposite side of the canopy, grasp and pull the extending end of the original canopy line. Work the line through the applicable V-tabs, radial seam channels, and across the canopy vent until the point at which the original and the replacement line ends are joined is located a minimum of 10 inches beyond the original attaching connector link assembly.

(8) Disconnect the original and replacement line ends by cutting the original line at the point where the two line ends were joined. Insure that 10 inches of replacement line material still extends past the original attaching connector link assembly.

(9) Using an authorized marking aid of contrasting color, mark the free end of the replacement line material at a point aligned with the inside edge of the original attaching connector link assembly.

(10) While holding the adjacent canopy line and the replacement line free end together tightly under equal tension at the original attaching connector link assembly, trace both lines from the link to the canopy skirt. Using an authorized marking aid of contrasting color, mark the replacement line at the point of intersection with the canopy lower lateral band lower edge. Check the correctness of the marking by releasing and then reapplying equal tension to the two lines.

(11) Working on the same side of the canopy as in (10) above hold the adjacent canopy line and the replacement line together tightly at the lower lateral band. Further grasp both lines at the canopy upper lateral band and apply equal tension to both lines. Using an authorized marking aid of contrasting color, mark the replacement line at the point of intersection with the upper edge of the canopy upper lateral band. Check the marking correctness as prescribed in (10) above.

(12) While holding the adjacent canopy line and the replacement line together tightly at the upper edge of the canopy upper lateral band, trace both lines to the opposite side of the canopy vent. Using an authorized marking aid of contrasting color, mark the replacement line at the point of intersection with the upper edge of the upper lateral band on the opposite side of the canopy vent. Check the marking correctness as prescribed in (10) above.

(13) Holding the adjacent canopy line and the replacement line together tightly at the upper edge of the canopy upper lateral band, grasp both lines below the canopy lower lateral band and apply equal tension. Using an authorized marking aid of contrasting color, mark the replacement line at the point of intersection with the lower edge of the canopy lower lateral band. Check the marking correctness as prescribed in (10) above.

(14) Hold the adjacent canopy line and the replacement line together tightly at the lower edge of the canopy lower lateral band and with equal tension applied, trace both lines from the canopy skirt to the second original attaching connector link assembly. Using an authorized marking aid of

contrasting color, mark the replacement line at a point aligned with the inside edge of the connector link. Check the marking correctness as prescribed in (10) above.

(15) At a point 10 inches beyond the connector link assembly, cut the replacement canopy line from the material spool.

(16) Release tension from the entire canopy assembly.

(17) Aline each of the marks made on the replacement canopy line with the appropriate edges of the canopy lateral bands and secure the line to the canopy by stitching at each attachment point according to original construction details, using the stitching specifics in the applicable item maintenance publication. If pucker is required in the canopy in the radial seams, insure each radial seam containing the replacement canopy line is correctly puckered upon completion of stitching.

(18) Reposition and reattach any items removed in (3) above by restitching according to original construction details, using the procedures in paragraph 3-9 and the stitching specifics in the applicable item equipment publication.

(19) Upon completion of line attachment, trace each end of the replacement canopy line from the appropriate connector link assembly to the canopy skirt to insure proper attachment, position, and sequence.

*b. Attaching a Replacement Canopy Line to Connector Link Assemblies.* Procedures used in the attachment of a replacement canopy line to the connector link assemblies will depend on the type material from which the canopy line is constructed and are as follows:

(1) *Attaching a cord canopy line with core threads to a connector link assembly.*

(a) Cut and remove an end of the original canopy line from one connector link assembly and note the original location of the line on the link.

(b) Pass the nearest loose end of the replacement canopy line through the connector link assembly in the original line location and aline the mark made in paragraph a (9) above with the inside edge of the connector link assembly. Secure the line end to the connector link assembly with a clove hitch and a half hitch (A, fig. 3-19) or two half hitches (B) according to original attachment details.

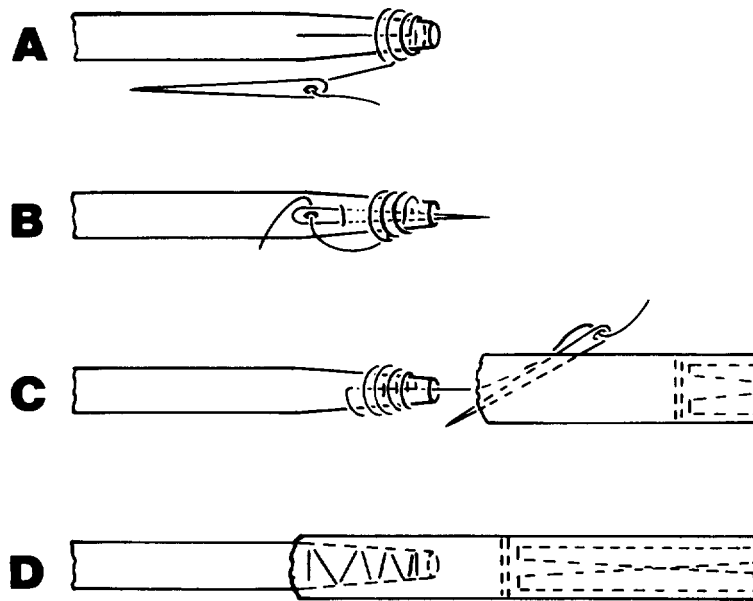
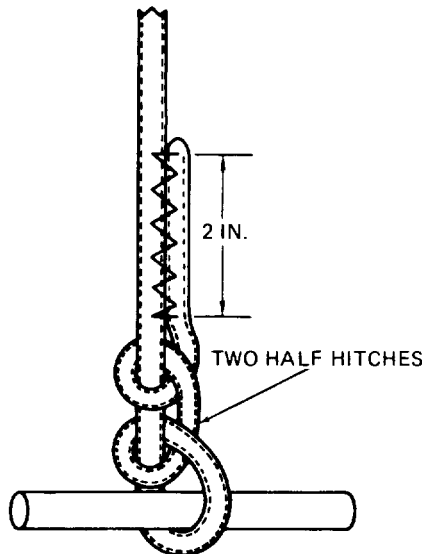
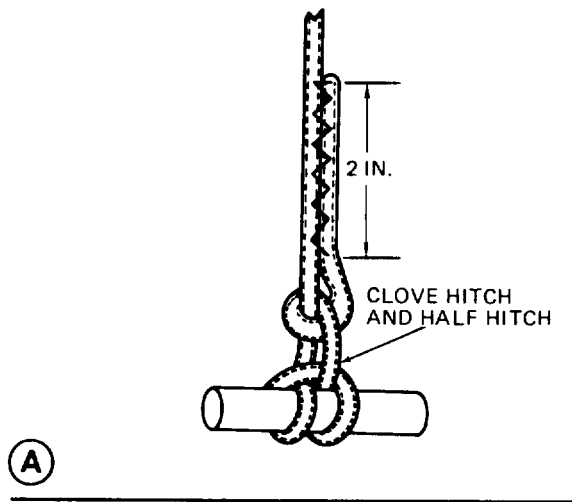


Figure 3-18A. Splicing damaged line to new line for line replacement.

Change 3 3-36A/(3-36 B blank)



AV 107296

- A.** Line end attachment with a clove hitch and half hitch.  
**B.** Line end attachment with two half hitches.

**Figure 3-19. Details for attaching cord canopy line with core threads to connector link assembly, typical.**

(c) Attach the opposite end of the replacement canopy line to the respective original attaching connector link assembly using the procedures in (a) and (b) above.

(d) Extend each tie running end toward the canopy skirt and beginning at a point 2 inches above the knots made in (b) and (c) above, secure each tie running end to the replacement canopy line

body by stitching a 3/16-inch-wide by 2-inch-long double-throw zigzag stitch formation toward the connector link assembly. Finish each stitch formation as close as possible to the securing knots and trim each running end to 1/4 inch.

(e) Compare the knots securing each end of the replacement canopy line with the adjacent knots made on the connector link assembly to insure compatibility. In addition, trace each end of the replacement line from the connector link assembly to the canopy skirt to insure proper attachment, position, and sequence.

(2) *Attaching a coreless cord canopy line to a connector link assembly.*

(a) Cut and remove an end of the original canopy line from one connector link assembly and note the original location of the line on the link.

(b) Working with the nearest loose end of the replacement canopy line, measure and cut the replacement line at a point 7 inches beyond the mark made in paragraph a (9) above. Further, taper-cut 1/2 inch of the line end.

(c) Using an authorized marking aid of contrasting color, mark the line length at points 6, 8, and 14 inches from the tapered running end.

(d) Pass 7 inches of the line tapered end through the connector link assembly in the original line location and fold the end back over the top of the link.

(e) Insert a splicing aid into the line body at the 14-inch mark and work the splicing aid through the inside of the cord body to the outside at the 8-inch mark.

(f) Thread and secure the line tapered end to the splicing aid and pull the splicing aid back into the line body. Work the splicing aid through the line body until the 6- and 8-inch marks are aligned.

(g) Hold the aligned marks together and continue pulling the splicing aid until the attached line end protrudes from the line body at the 14-inch mark. Remove the line end from the splicing aid.

(h) While holding the line at the aligned 6 and 8-inch marks, stretch the line length to allow the protruding line end to recede into the line body.

(i) Beginning at the aligned 6- and 8-inch marks and working toward the canopy skirt, secure the line attachment by stitching a 3-inch-long row of double-throw zigzag stitching (fig. 3-20) in accordance with paragraph 3-9, using the stitching specifics cited in the applicable item equipment publication.

canopy line to applicable connector link assembly on the opposite side of the canopy using the procedures in (a) through (j) above.

**3-22. Replacing Radial Lines.**

A parachute canopy that does not have continuous canopy lines may have radial lines which pass through radial seam channels and extend from the canopy skirt to the canopy vent. A radial line which is damaged will be replaced by fabricating as follows:

a. Place the canopy assembly in proper layout on a repair table or other repair surface and apply partial tension.

b. Trace the damaged radial line through the radial seam channel from the canopy skirt to the canopy vent.

c. Cut a length of the same type material used in original construction according to the length of an adjacent undamaged radial line under equal tension and wax the ends. The material length will be the distance measured from the upper edge of the upper lateral to the lower edge of the lower lateral band.

d. Cut the stitching that secures the applicable vent line and the affected radial line to the upper lateral band and the upper end of the radial seam. Lay the vent line free end aside.

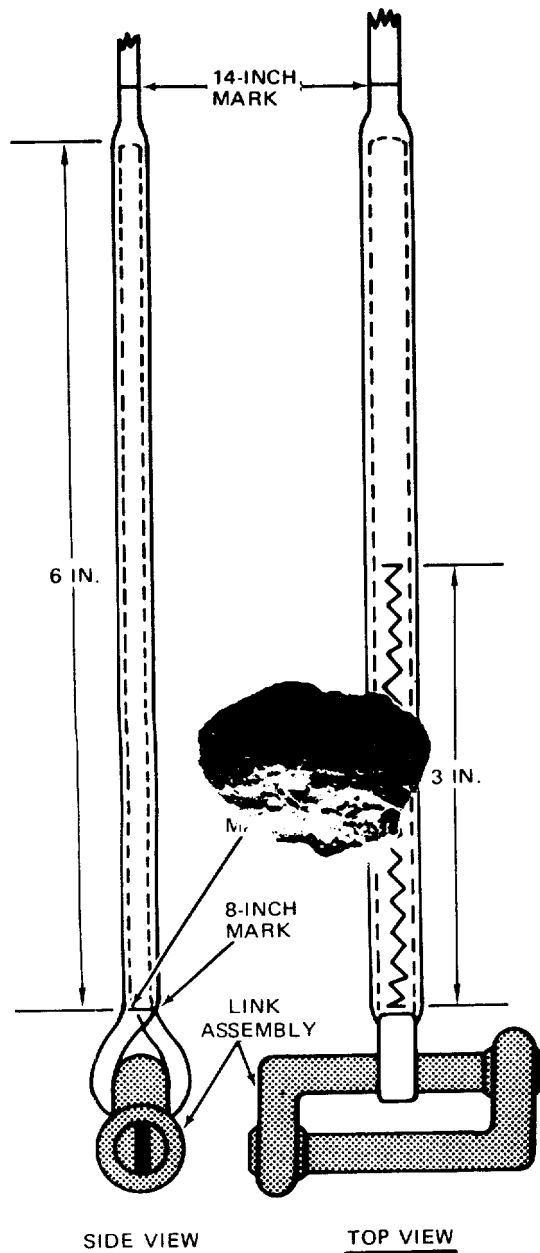
e. At the canopy skirt, cut the stitching that secures the end of the applicable suspension line and the radial line to the lower lateral band and the lower end of the radial seam. Lay the suspension line free end aside.

f. Attach one end of the material length cut in c above to the upper end of the original radial line at the upper lateral band by whipstitching the two ends together.

g. At the lower lateral band, grasp the end of the damaged radial line and gradually pull the original line length through the radial seam channel until the attached replacement line material end extends from the lower end of the seam. Release tension from the canopy assembly.

h. Detach the original radial line end from the replacement line end by cutting and removing the whipstitching securing the two lines together.

i. Temporarily secure the replacement radial line ends to the upper and lower lateral bands, using either temporary tacking (fig. 3-21) or pushpins. If temporary tacking is made, the procedures in paragraph 3-8 will apply.

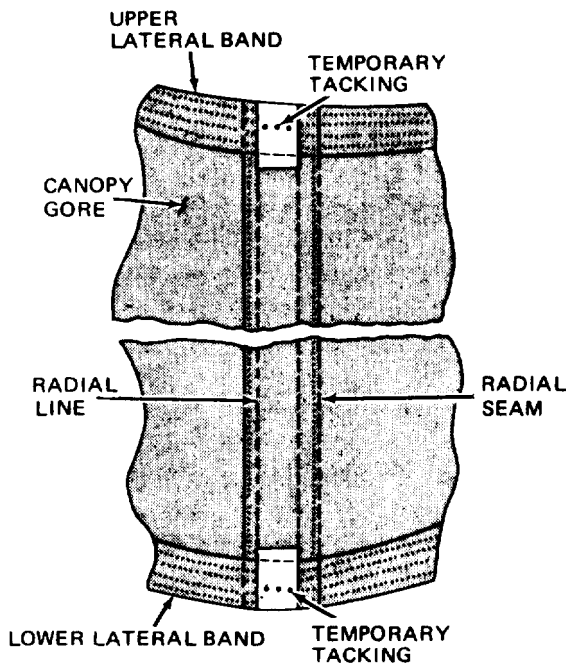


AV 107297

**Figure 3-20. Details for attaching a coreless cord canopy line to connector link assembly, typical.**

(j) Trace the replacement line from the connector link assembly to the canopy skirt to insure proper attachment, position, and sequence.

(k) Attach the free end of the replacement



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**Figure 3-21. Replacement radial line temporary tacking details, typical.**

j. Reposition the vent line end and suspension line end removed in d and e above and secure each line end along with the applicable radial line end to the canopy by restitching according to original construction details and paragraph 3-9. Stitching will be made using the stitching specifics cited in the applicable item equipment publication. If pushpins have been used as in i above, insure the pins are removed prior to stitching. As applicable, remove temporary tacking made in i above.

**3-23. Replacing Suspension Lines.**

A parachute canopy that does not have continuous canopy lines will be equipped with individual suspension lines, each of which is attached to a connector link assembly. A damaged suspension line that cannot be repaired will be replaced by fabricating using the following procedures, as applicable:

*a. Replacing a Fibrous Cord Suspension Line with Core Threads.*

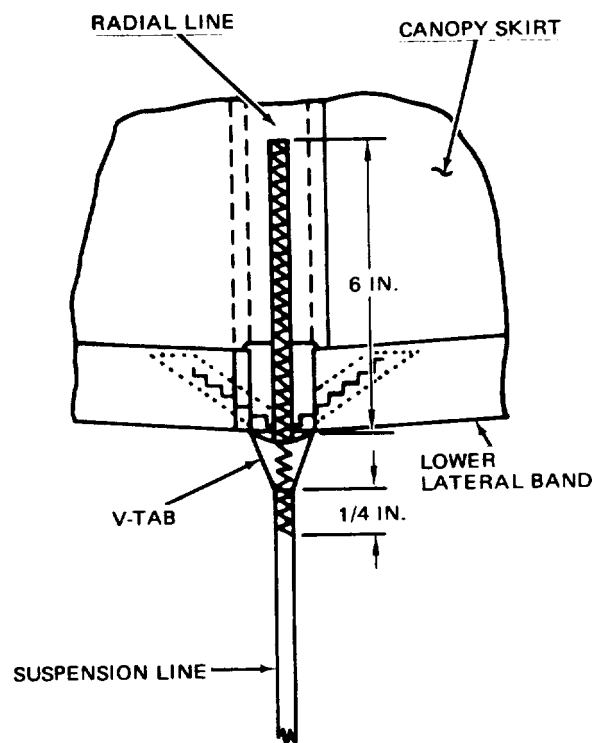
(1) Place the canopy assembly in proper layout on a repair table or other repair surface and apply partial tension.

(2) Trace the damaged suspension line from the canopy skirt to the applicable connector link assembly.

(3) Remove the affected suspension line from the canopy by cutting the stitching securing the upper end of the line length to the canopy skirt and applicable V-tab. Do not remove the V-tab unless damage has been incurred.

(4) Cut a length of the same type cord used in original construction, with the cut length measuring 24 inches longer than the distance from the canopy skirt to the original attaching connector link assembly. Wax one end of the cord length.

(5) Pass the waxed cord end up through the V-tab and position the cord end in the original suspension line upper end location. Secure the cord end to the canopy skirt and V-tab by stitching a double-throw zigzag stitch formation according to original construction details and the details in figure 3-22. Stitching will be made in accordance with paragraph 3-9, using the stitching specifics cited in the applicable item equipment publication.



AV 107299

**Figure 3-22. Attachment details for a fibrous cord suspension line with core threads, typical.**

(6) Hold an adjacent suspension line and the replacement line together tightly at the lower lateral band and while the lines are under equal tension

trace the length of both lines from the canopy skirt to the applicable connector link assembly. Mark the replacement line length at a point aligned with the inside edge of the link assembly. Reapply equal tension to both line lengths and check to insure the replacement line length is marked correctly. Release tension from the canopy assembly.

(7) Cut and remove the lower end of the original suspension line from the connector link assembly and note the original location of the line on the link.

(8) Pass the running end of the replacement suspension line through the connector link assembly in the original line location and align the mark made in (6) above with the inside edge of the link assembly. Secure the line end to the connector link assembly with a clove hitch and a half hitch (A, fig. 3-19) or two half hitches (B) according to original attachment details.

(9) Extend the tie running end toward the canopy skirt and beginning at a point 2 inches above the knots made in (8) above, secure the tie running end to the suspension line body by stitching a 2-inch-long double-throw zigzag stitch formation toward the connector link assembly. Finish the stitch formation as close as possible to the securing knots and trim the cord running end to 1/2 inch.

*b. Replacing a Coreless Cord Suspension Line.*

(1) Place the canopy assembly in proper layout on a repair table or other repair surface and apply partial tension.

(2) Trace the damaged suspension line from the canopy skirt to the applicable connector link assembly.

(3) Remove the affected suspension line from the suspension line attaching loop at the canopy skirt by cutting the loop formed on the upper end of the line.

(4) Cut a length of coreless cord of the same type used in original construction, with the cut length measuring 24 inches longer than the distance from the canopy skirt to the original attaching connector link assembly. Taper-cut one end of the cord length by 1/2 inch.

(5) Using an authorized marking aid of contrasting color, mark the cord length at points 6, 9, and 15 inches from the tapered end.

(6) Pass 7 1/2 inches of the tapered cord end through the original suspension line attaching loop and fold the cord back over the bottom of the attaching loop.

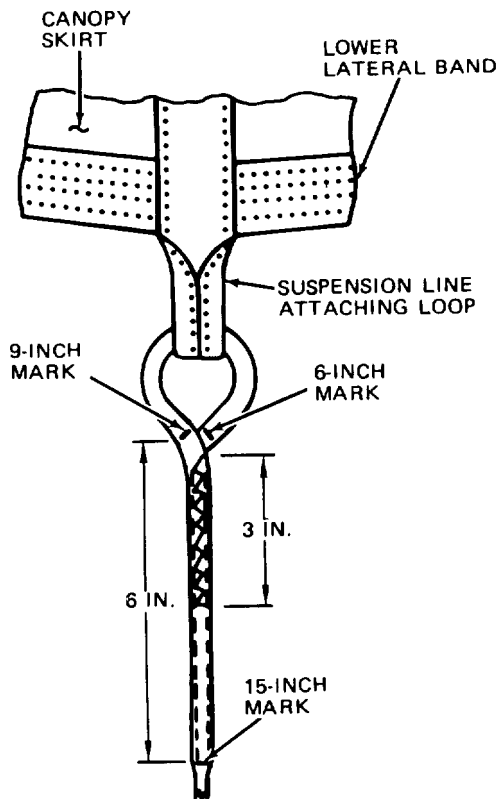
(7) Insert a splicing aid into the cord body at the 15-inch mark and work the splicing aid through the inside of the cord body to the outside at the 9 inch mark.

(8) Thread and secure the tapered cord end to the splicing aid and pull the splicing aid back into the cord body. Work the splicing aid through the cord body until the 6- and 9-inch marks are aligned.

(9) Hold the aligned marks together and continue pulling the splicing aid until the attached cord end protrudes from the cord body at the 15-inch mark. Remove the tapered cord end from the splicing aid.

(10) While holding the cord at the aligned 6 and 9-inch marks, stretch the cord length to allow the protruding cord end to recede into the cord body.

(11) Beginning at a point as close as possible to the aligned 6- and 9-inch marks, secure the cord attachment to the suspension line attaching loop by stitching a 3-inch-long row of 1/8-inch-wide doublethrow zigzag stitching toward the cord length running end (fig. 3-23). Stitching will be made in accordance with paragraph 3-9, using the stitching specifics cited in the applicable item equipment publication .



AV 107300

**Figure 3-23. Attachment details for a coreless cord suspension line, typical.**

(12) Hold the attaching loop of an adjacent suspension line and the attaching loop of the replacement line together tightly at the canopy skirt and while the lines are under equal tension, trace the length of both lines from the attaching loops to the applicable connector link assembly. Using an authorized marking aid of contrasting color, mark the replacement line length at a point aligned with the inside edge of the link assembly. Reapply equal tension to both line lengths and check to insure the replacement line length is marked correctly. Release tension from the canopy assembly.

(13) Cut and remove the lower end of the original suspension line from the connector link assembly and note the original location of the line on the link.

(14) Cut the running end of the replacement line at a point 7 inches beyond the mark made in (12) above. Further, taper-cut 1/2 inch of the remaining line end.

(15) Using an authorized marking aid of contrasting color, mark the line length at points 6, 8, and 14 inches from the tapered running end.

(16) Pass 7 inches of the line tapered end through the connector link assembly in the original line location and fold the end back over the top of the link.

(17) Insert a splicing aid into the line body at the 14-inch mark and work the splicing aid through the inside of the cord body to the outside at the 8 inch mark.

(18) Thread and secure the line tapered end to the splicing aid and pull the splicing aid back into the line body. Work the splicing aid through the line body until the 6- and 8-inch marks are aligned.

(19) Hold the aligned marks together and continue pulling the splicing aid until the attached line end protrudes from the line body at the 14-inch mark. Remove the line end from the splicing aid.

(20) While holding the line at the aligned 6- and 8-inch marks, stretch the line length to allow the protruding line end to recede into the line body.

(21) Beginning at the aligned 6- and 8-inch marks and working toward the canopy skirt, secure the line attachment by stitching a 3-inch-long row of double-throw zigzag stitching (fig. 3-20) in accordance with paragraph 3-9, using the applicable stitching specifics cited in the applicable item maintenance publication.

(22) Trace the replacement line from the connector link assembly to the suspension line attaching loop at the canopy skirt to insure proper attachment, position, and sequence.

### 3-24. Replacing Vent Lines.

A parachute canopy that does not have continuous canopy lines will have independent vent lines attached at the upper lateral band and extending across the canopy vent. A vent line that is damaged beyond repair will be replaced by fabricating as follows:

a. Place the canopy assembly in proper layout on a repair table or other repair surface and trace the damaged vent line front one side of the upper lateral band to the opposite side of the upper lateral band.

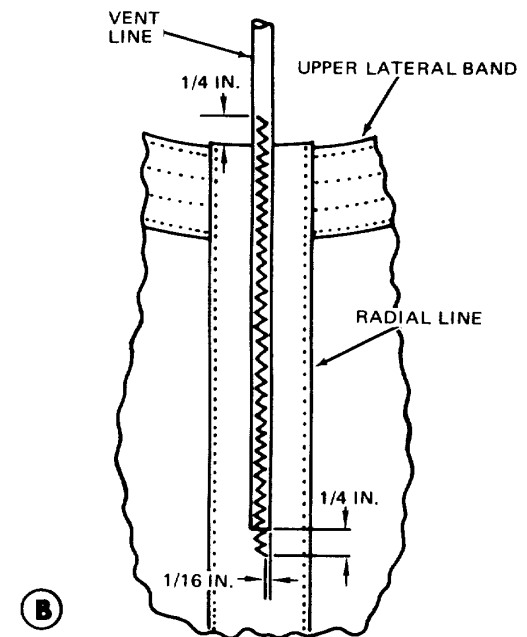
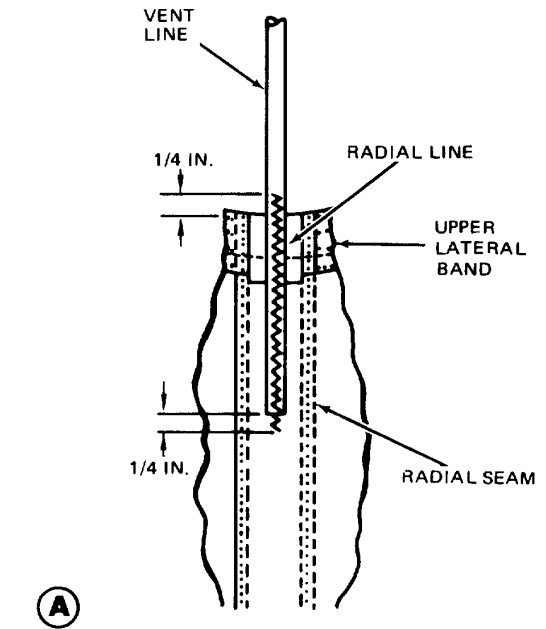
b. Remove the affected vent line by cutting the stitching which secures each end of the line to the canopy on both sides of the canopy vent.

c. Cut a length of the same type material used in original construction according to the length of an adjacent vent line under equal tension and wax the ends.

d. Position one end of the replacement line length in the exact location of one end of the original vent line and secure the line end to the



canopy by stitching a single row of double-throw zigzag stitching from a point 1/4 inch above the upper lateral band to a point 1/4 inch beyond the positioned line end (fig. 3-24). Stitching will be made in accordance with paragraph 3-9, using the stitching specifics cited in the applicable item equipment publication.



AV 107301

- A. Attachment of a cord vent line with core threads.
- B. Attachment of a coreless cord vent line.

Figure 3-24. Vent line attachment details, typical.

e. Pass the running end of the replacement vent line under the other vent lines and through the bridle centering loop or bridle loop, as applicable, to the opposite side of the canopy vent.

f. Position the replacement vent line running end in the original vent line end location and secure the line end as prescribed in *d* above.

### 3-25. Replacing Pocket Bands.

Parachute canopy pocket bands are constructed of varying lengths and types of textile tape, webbing, or cord. When installed on a parachute canopy, a pocket band will be positioned on the outside of the lower lateral band with a band end attached on each side of a suspension line, thereby allowing a free length of material to pass over the suspension line. A pocket band which is damaged will be replaced by fabricating using the following procedures, as applicable.

#### a. Replacing a Textile Tape or Webbing Pocket Band.

(1) Place the canopy assembly on a repair table or other repair surface with the damaged pocket band facing up.

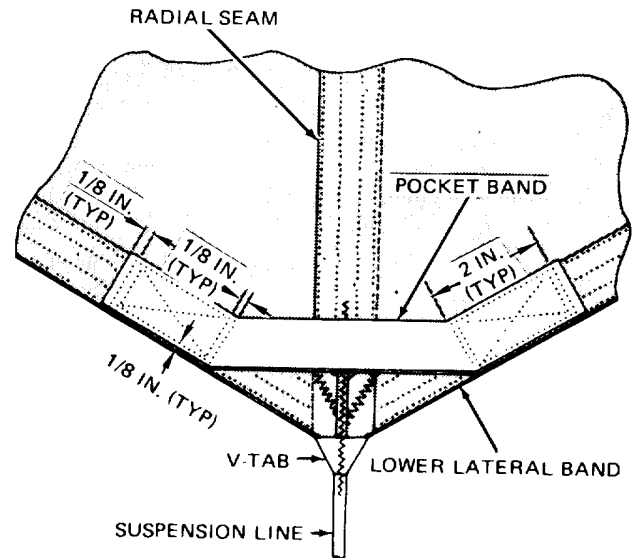
(2) Mark the lower lateral band at each end of the damaged pocket band length.

(3) Remove the affected pocket band from the canopy by cutting the stitching securing each of the band ends to the lower lateral band.

(4) Using the material type and length specifics prescribed in the applicable item maintenance publication, cut a length of replacement material and wax the ends.

(5) Position the replacement pocket band length in the original pocket band location and align the material ends with the marks made in (2) above.

(6) Secure each end of the replacement pocket band to the lower lateral band by stitching a 2-inch long single-X-box stitch formation with two double ends, 1/8 inch in from each edge, according to the details in figure 3-25. Stitching will be made in accordance with paragraph 3-9, using the stitching specifics cited in the applicable item equipment publication.



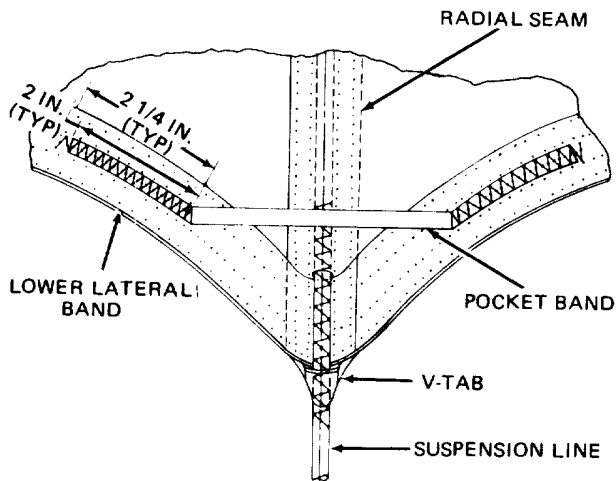
AV 107302

**Figure 3-25. Textile tape or webbing type pocket band replacement details.**

#### b. Replacing a Cord Pocket Band.

(1) Remove a damaged pocket band and fabricate a replacement item using the procedures in a (1) through (5) above.

(2) Secure each end of the replacement pocket band to the lower lateral band by stitching a 2 1/4-inch-long row of double-throw zigzag stitching according to the details in figure 3-26. Stitching will be made in accordance with paragraph 3-9, using the stitching specifics prescribed in the applicable item maintenance publication.



AV 107303

**Figure 3-26. Cord type pocket band replacement details.**

### 3-26. Replacing V-Tabs.

A parachute canopy V-tab may be constructed of either textile tape or webbing and, when damaged, will be replaced by fabricating as follows:

a. Position the canopy assembly on a repair table or other repair surface and turn the inside of the

lower lateral band to the outside to place the damaged V-tab facing up.

b. Using an authorized marking aid of contrasting color, mark the suspension line which is contained within the damaged V-tab at the point where the line intersects the lower edge of the lower lateral band.

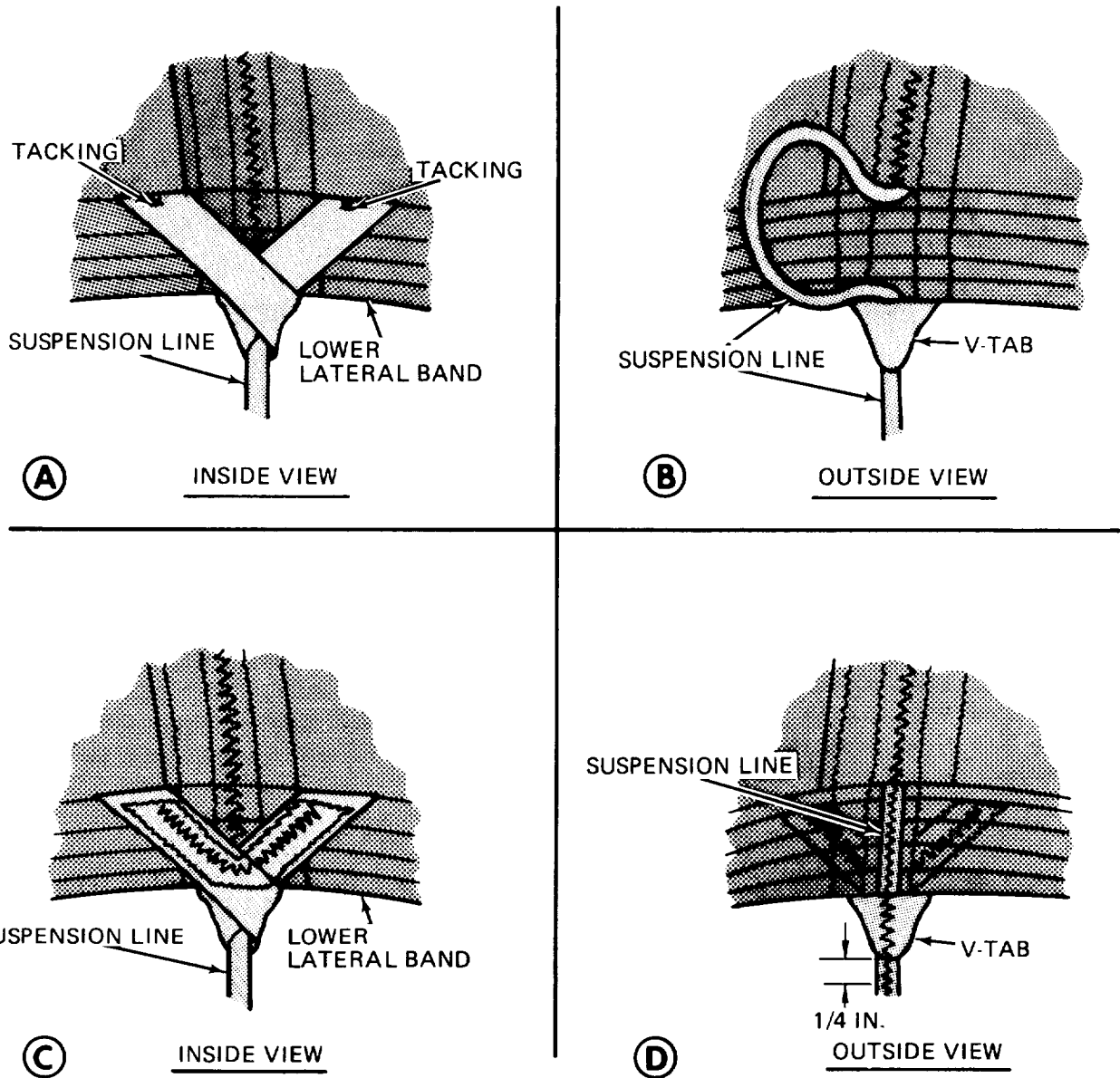
c. Remove the affected V-tab from the canopy by cutting the stitching securing the tab to the lower lateral band and the suspension line.

d. Using the type of material specified within the applicable item equipment publication, cut a 5-inch length of material and wax the ends.

e. Center the material lengthwise under the applicable suspension line, placing the upper edge of the material immediately adjacent to the lower edge of the lower lateral band.

f. Working from opposite directions, pass each end of the material length over the top of the suspension line. Draw the ends snug to develop a tight wrap around the line and to form a V-shaped design on the lower lateral band inside.

g. Secure each end of the replacement V-tab to the lower lateral band inside with temporary tacking. The temporary tacking will be made using the procedures in paragraph 3-8. Bias-trim each tab end even with the upper edge of the lower lateral band (A, fig. 3-27).



AV 107304

- A. Bias-trimmed V-tab ends secured with temporary tacking.
- B. Length of suspension line pulled up through V-tab.
- C. V-tab ends secured to lower lateral band.
- D. Suspension line secured to V-tab and canopy skirt.

**Figure 3-27. V-tab replacement details, typical.**

*h.* Pull a suitable length of the suspension line up through the V-tab on the outside of the lower lateral band (B) and lay the pulled length to one side.

*i.* Secure the V-tab ends to the lower lateral band inside by stitching a single row of double-throw zigzag

stitching along the center of the material, making a V-shaped design (C). Further stitch a single row of stitching 1/8 inch in, along the edges of the V-tab ends. Insure that the pulled suspension line length is held to one side during the stitching

process. Also insure the stitching does not extend above the upper edge or below the lower edge of the lower lateral band. Stitching will be made in accordance with paragraph 3-9, using the stitching specifics cited in the applicable item equipment publication.

*j.* Turn the lower lateral band right side out and pull the suspension line length back down through the V-tab. Insure the mark made in b above is alined with the lower edge of the lower lateral band.

*k.* Beginning at a point 1/4 inch below the V-tab lower edge, secure the suspension line upper end to the installed V-tab and the canopy skirt outside by stitching a single row of double-throw zigzag stitching (D) according to original construction details, using the stitching specifics outlined in the applicable item equipment publication.

## Section VII. REPAIRING AND REPLACING STOCKED ITEMS

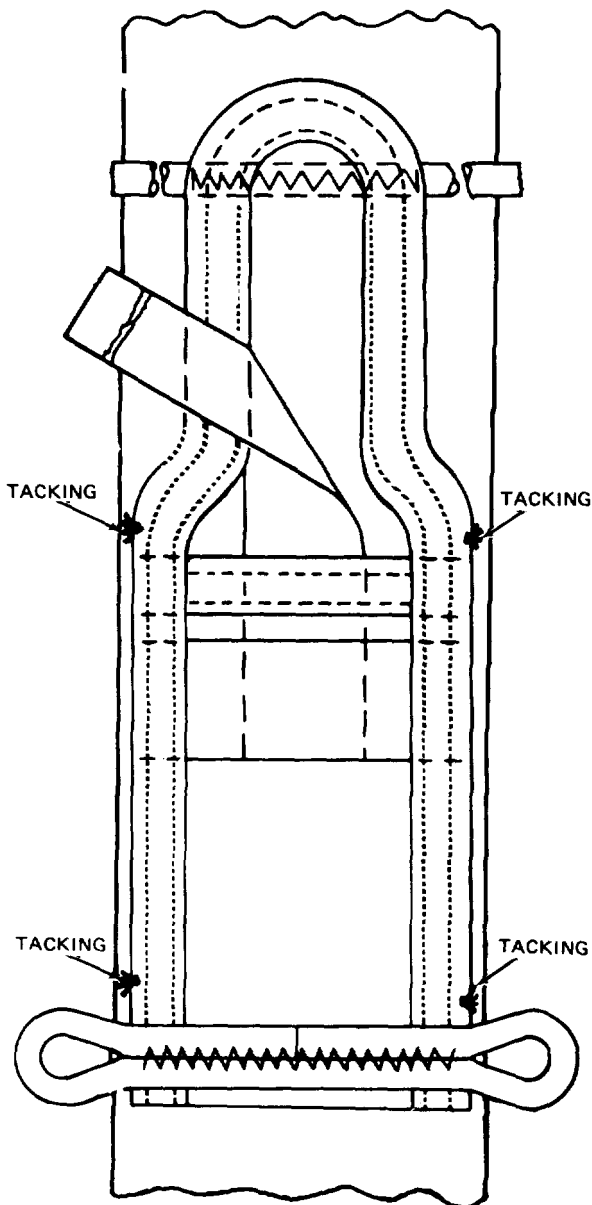
### 3-27. Parachute Inspection Data Pocket.

The parachute inspection data pocket is a cloth item used to contain the Army Parachute Log Record (DA Form 10-42 or 3912) on a cargo parachute assembly. The pocket, which is detachable, is constructed with a tie cord and tie cord loop that provide a means of closing and securing the pocket closing flap. When installed, the pocket may be either stitched or handtacked as prescribed by the individual item equipment publication. A parachute inspection data pocket which is damaged will be replaced with a serviceable item from stock and using the following procedures, as applicable.

*a.* Remove the pocket from the applicable parachute assembly component by cutting the stitching or tacking securing the pocket.

*b.* Position a serviceable pocket in the original pocket location and secure the pocket to the component according to original installation details, using the following procedures as applicable:

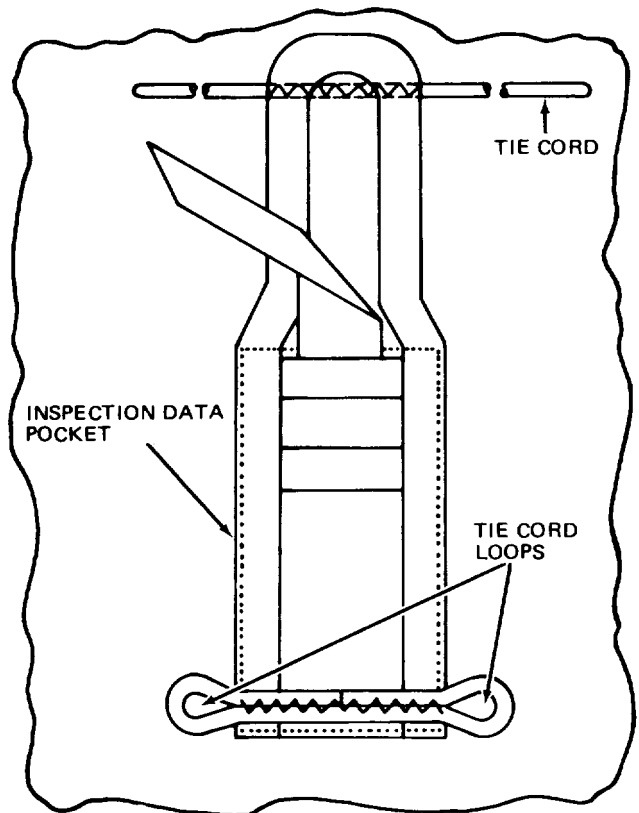
(1) *Tacking.* Tack the pocket at four points (fig. 3-28) using two turns double, ticket No. 5 waxed cotton thread at each point. Secure the tacking ends at each tacking point with a surgeon's knot and a locking knot. Trim tie ends to 1/4 inch.



AV 107305

**Figure 3-28. Parachute inspection data pocket tacking details, typical.**

(2) *Stitching.* A pocket that is to be secured with stitching will be stitched according to original installation details and figure 3-29. Stitching will be made in accordance with paragraph 3-9, using the stitching specifics cited in the applicable item equipment publication.



AV 107306

**Figure 3-29. Parachute inspection data pocket stitching attachment details, typical.**

**3-28. Parachute Harness Quick Release Assembly.**

The parachute harness quick release assembly (fig. 2-2) used with troop-type personnel parachutes and the A-21 airdrop cargo bag is a metal device which permits quick removal of the parachute harness or cargo sling after the parachutist or cargo load reaches the ground. Repair or replacement of a parachute harness quick release assembly will be performed using the following procedures, as applicable.

a. *Repair.* A parachute harness quick release that does not function properly, is damaged or dirty, or has been immersed in water will be repaired as follows:

- (1) *Removal from harness or sling assembly.*
  - (a) If applicable, remove the safety clip

from the release, rotate the operating button one quarter turn clockwise to the unlock position, depress the operating button with the palm of one hand, and remove the three harness lugs from the locking plungers.

(b) Remove the quick release from a harness or sling by inserting a putty knife, or equivalent tool, under the fourth harness lug, and work the tool to depress the stationary plunger enough to free the lug for removal from the release.

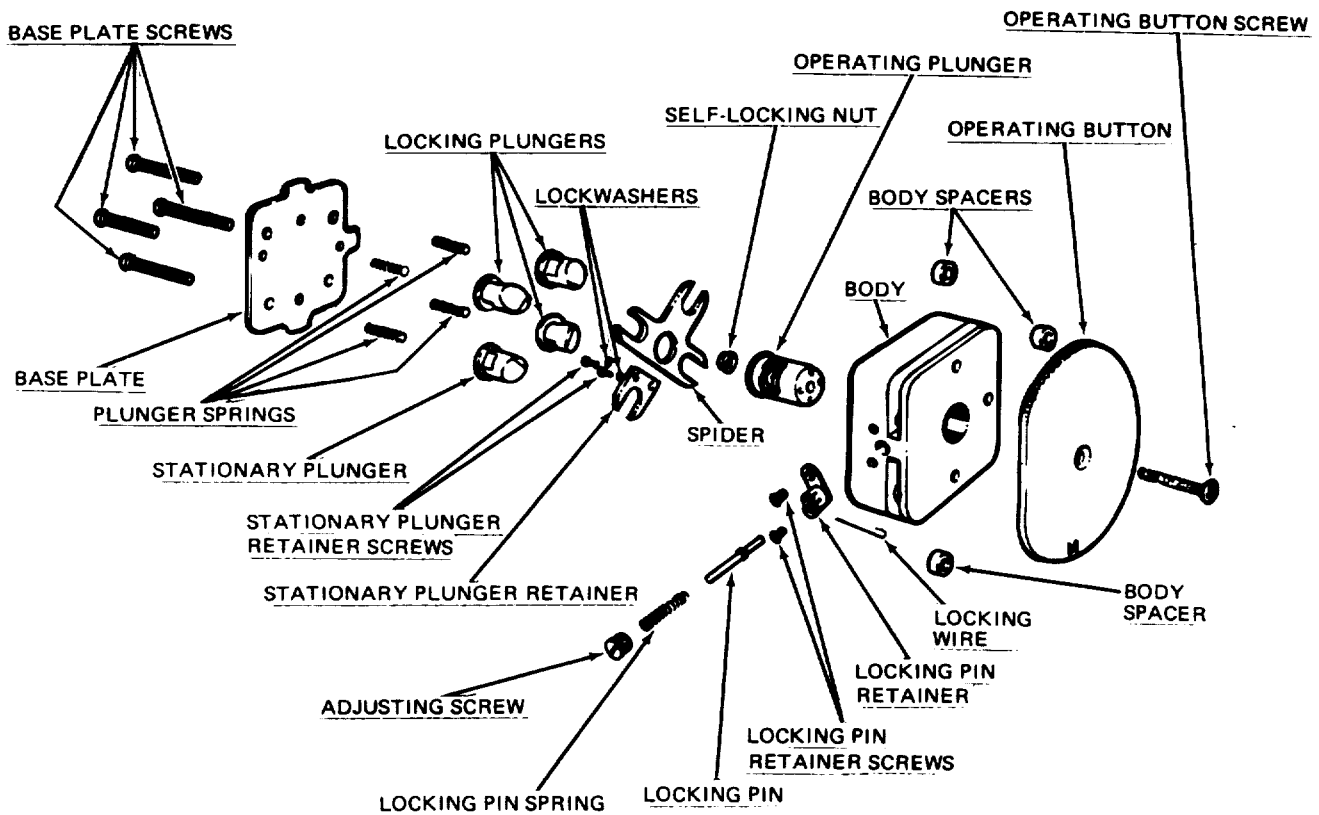
(c) If present, remove the pad from the bottom of the quick release.

(2) *Disassembly.*

(a) Turn the operating button (fig. 3-30) one-quarter turn counterclockwise to the locked position.

**NOTE**

The quick release will be in the locked position during disassembly to relieve as much tension as possible from the plunger springs.



AV 107307

Figure 3-30. Parachute harness quick release, exploded view.

(b) Place the quick release on a clear, unpadded work surface with the operating button facing down.

(c) Using a suitable type screwdriver, remove the four (three long and one short base plate screws and the base plate from the release. During removal of the screws, apply downward pressure to the base plate to prevent the screws from binding.

(d) Lift the four plunger springs from the release and also remove the three body spacers.

**NOTE**

With the four base plate screws removed the three body spacers will fall out of the release if the release body is tapped lightly.

(e) Turn the quick release over the operating button facing up and tap lightly on the button until the locking plungers and spider fall out.

(f) Turn the quick release over to place the operating button facing down, and using a suitable type screwdriver, remove the two stationary

plunger retainer screws and lockwashers from the stationary plunger.

(g) Turn the quick release back over to locate the operating button up and allow the stationary plunger retainer and stationary plunger to fall out of the release.

(h) Using a suitable sized wrench to hold the self-locking nut and a suitable type screwdriver, remove the locking nut, operating button screw, and the operating button.

(i) Using a suitable type tool, remove the locking wire length from the locking pin retainer.

(j) Using a suitable type screwdriver, remove the adjusting screw from the release body and further remove the locking pin spring, locking pin, and operating plunger.

(k) Using a suitable type screwdriver, remove the two locking pin retainer screws and the locking pin retainer to complete disassembly of the quick release.

(3) *Parts inspection.* A quick release which is completely disassembled will be administered a technical/ rigger-type inspection as outlined in paragraph 2-13 c (2) (a) to insure each part is without defect and serviceable for use. Additionally, the locking wire will be inspected for weakness or breaks which will cause the wire to be replaced. The operating button will be checked to insure the letter "M" is stamped on the top surface. If the stamped letter is not present, the operating button is considered unserviceable.

(4) *Parts replacement.* Unserviceable quick release parts will be replaced according to the following criteria:

(a) Any part of the quick release, except the locking wire, which is defective and ultimately unserviceable will be replaced, when possible, with a serviceable part, as available. If an unserviceable part cannot be replaced, the entire quick release is considered unserviceable and will be disposed of.

(b) A broken or weak locking wire will be replaced by fabrication, using a 1 1/4-inch length of 1/16-inch-diameter cadmium-plated commercial soft-iron wire or equivalent.

(5) *Cleaning.*

(a) Remove burrs, rough spots, rust, or corrosion from the quick release base plate, body, or operating button by either filing with a metal file or buffing with a crocus cloth.

(b) Place all quick release parts in a container of tetrachloroethylene and insure the solvent covers all the parts.

(c) Rinse and brush the immersed parts with a suitable type brush until the parts are thoroughly cleaned.

(d) Remove each part individually from the solvent container and dry with a soft clean cloth.

(6) *Lubrication.* Using aircraft and instrument grease (MIL-G-23827) or equivalent, apply a light grease coating to the operating plunger. the three locking plungers, the stationary plunger, the four plunger springs, the locking pin and the locking pin spring.

(7) *Reassembly.* Reassemble a quick release that has clean, lubricated, serviceable parts a, follows:

(a) Place the quick release body on end with the two screw holes facing up and using a suitable type screwdriver, attach the locking pin retainer with the two locking pin retainer screws.

(b) Insert the small end of the operating plunger through the body, from the body inside.

(c) With the locking pin retainer facing up, insert the locking pin into the retainer with the short end of the pin down and further install the locking pin spring over the locking pin.

(d) Place a finger over the end of the locking pin retainer and turn the operating plunger counterclockwise until the locking pin falls into the cam of the operating plunger.

(e) Install the adjusting screw in the locking pin retainer. Using a suitable type screwdriver, turn the adjusting screw until the screw top is flush with the top of the retainer.

(f) Position the quick release face up and align the flat side of the operating button with the locking pin retainer side of the release body. Press firmly on the button center until the pins located on the button bottom are seated in the mating holes of the operating plunger. Attempt to turn the operating button counterclockwise. If the button will not turn in the counterclockwise direction and the flat side of the button is parallel to the retainer side of the release body, the button is fitted properly. However, if the operating button will turn counterclockwise and the flat side of the button is not parallel to the retainer side of the release body, the button is fitted improperly.

(g) From the operating button side, insert the long operating button screw into the hole at the button center and pass the screw through to the opposite side of the body. Install the self-locking nut on the operating button screw threaded end. Using a suitable size wrench to hold the nut, tighten



the operating button screw with a suitable type screwdriver.

(h) Position the quick release with the operating button facing down. Slide one of the plungers into the slot of the stationary plunger retainer with the beveled face of the plunger directed away from the body center. Further insert the plunger into the stationary plunger hole of the release body and align the plunger retainer in a manner which directs the beveled face of the plunger away from the body center. Align the plunger retainer with the two mating screw holes on the body inside and using a suitable type screwdriver, secure the retainer with the two retainer screws and lockwashers.

(i) Slide each of the three locking plungers into the individual slots of the spider with the beveled face of each plunger directed away from the spider center. Align the three plungers with the mating holes in the release body and simultaneously install the plungers with spider into the release body.

(j) Install a plunger spring into the recess of each of the four plungers.

(k) Position the three body spacers in the body slot, one at a time, and align each spacer with a base plate screw hole.

(l) Fit the base plate over the inverted quick release body with the off center screw hole located on the locking pin retainer side of the body. Insure that each of the four plunger springs is seated in the mating spring recesses in the base plate.

(m) Insert the short base plate screw into the base plate on the locking pin retainer side of the body. Using a suitable type screwdriver, tighten the screw to a point one-half of the screw length.

(n) Insert the three long base plate screws into the three remaining holes in the base plate. Using a suitable type screwdriver, tighten all four screws evenly and insure the two body dowel pins are seated in the two mating holes of the base plate.

#### NOTE

**The base plate is constructed with a convex radius which provides a better seal when attached to the release body. If the four base screws are tightened excessively when installed, the convex radius will change to a concave radius. This condition will then allow the base screws to protrude and prohibit proper function of the operating button.**

(o) Align one pair of holes in the locking  
pin

retainer with the slot in the adjusting screw and install a locking wire according to original locking wire installation details.

#### (8) Testing.

(a) Reattach the reassembled quick release to a harness or sling by reversing the procedures in paragraph (1) above.

(b) Apply a pull-test and operational test to the reassembled quick release using the procedures in paragraph 2-18.

*b. Replacement.* A parachute harness quick release assembly which cannot be repaired or which is damaged beyond repair will be replaced with a serviceable item from stock.

#### 3-29. Parachute Harness Quick Release Pad.

The parachute harness quick release pad is required for use with the parachute harness quick release on troop-type personnel parachutes. The quick release pad consists of a circular leather pad which has a retaining strap with safety clip attached. A damaged parachute harness quick release pad will be repaired or replaced using the following procedures, as applicable.

##### *a. Repair.*

(1) *Restitching a leather pad.* Restitch broken or loose stitching on a leather pad according to original construction details and paragraph 3-9, using size 5 or 6 nylon thread and a heavy duty sewing machine, stitching 5-8 stitches per inch.

(2) *Restitching a retaining strap.* Restitch broken or loose stitching on a retaining strap according to original construction details and paragraph 3-9, using size E nylon thread and a light duty sewing machine, stitching 7-11 stitches per inch.

(3) Replacing a safety clip. Replace an unserviceable safety clip with a serviceable item from stock.

(4) Replacing a retaining strap. Replace an unserviceable retaining strap by fabricating as follows:

(a) As applicable and using the procedures in paragraph 3-28 a (1), remove the quick release and the quick release pad from the parachute harness and further remove the pad from the quick release.

(b) Remove the damaged retaining strap from the leather pad by cutting the stitching securing the strap. Cut the stitching to a point 3/4 inch on either side of the strap. Insure the pad leather is not damaged during the cutting process.

(c) Remove the safety clip from the attaching loop on the opposite end of the strap and retain the clip for further use, if serviceable.

(d) Cut a 10 1/2-inch length of 1-inch-wide type IV yellow nylon webbing and wax the ends.

(e) Make a 2 1/2-inch-long foldback on one webbing end and beginning at a point 1/2 inch back from the folded edge, secure the foldback by stitching a 7/8-inch-long single-X-box stitch formation, 1/8-inch in from each side edge (fig. 3-31). Stitching will be made in accordance with paragraph 3-9, using size E nylon thread and a light duty sewing machine, stitching 7-11 stitches per inch.

retaining strap location. Secure the webbing end by restitching leather pad according to original construction details and paragraph 3-9, using size 5 or 6 nylon thread and a heavy duty sewing machine, stitching 5-8 stitches per inch.

(g) Install a serviceable safety clip in the 1/2 inch-long loop on the strap running end.

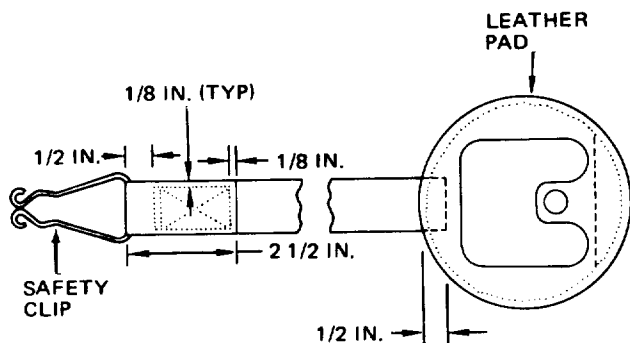
b. *Replacement.* A parachute harness quick release pad that is damaged beyond repair will be replaced with a serviceable item from stock.

**WARNING**

**Use of any type connector link assembly other than the L-bar connector link assembly on US Army trooptype personnel parachutes and ejection seat parachutes is prohibited.**

**3-30. Parachute Connector Link Assemblies.**

The three types of parachute connector link assemblies used on airdrop equipment are the L-bar, U-bar, and quick-fit (fig. 3-32). The L-bar connector link is the most common of the three link assemblies and has no restrictions on use. However, the U-bar and quick-fit connector link assemblies do have limited application for use on US Army airdrop equipment. The U-bar connector link assembly will only be used on cargo-type airdrop items, which include cargo parachutes. The quickfit connector link assembly is limited for use on emergency-type personnel parachutes only. A damaged parachute connector link assembly will be repaired or replaced using the following procedures, as applicable.



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**Figure 3-31. Parachute harness quick release pad construction details.**

(f) Insert 1/2 inch of the opposite webbing end between the layers of pad leather in the original

a. Repair.

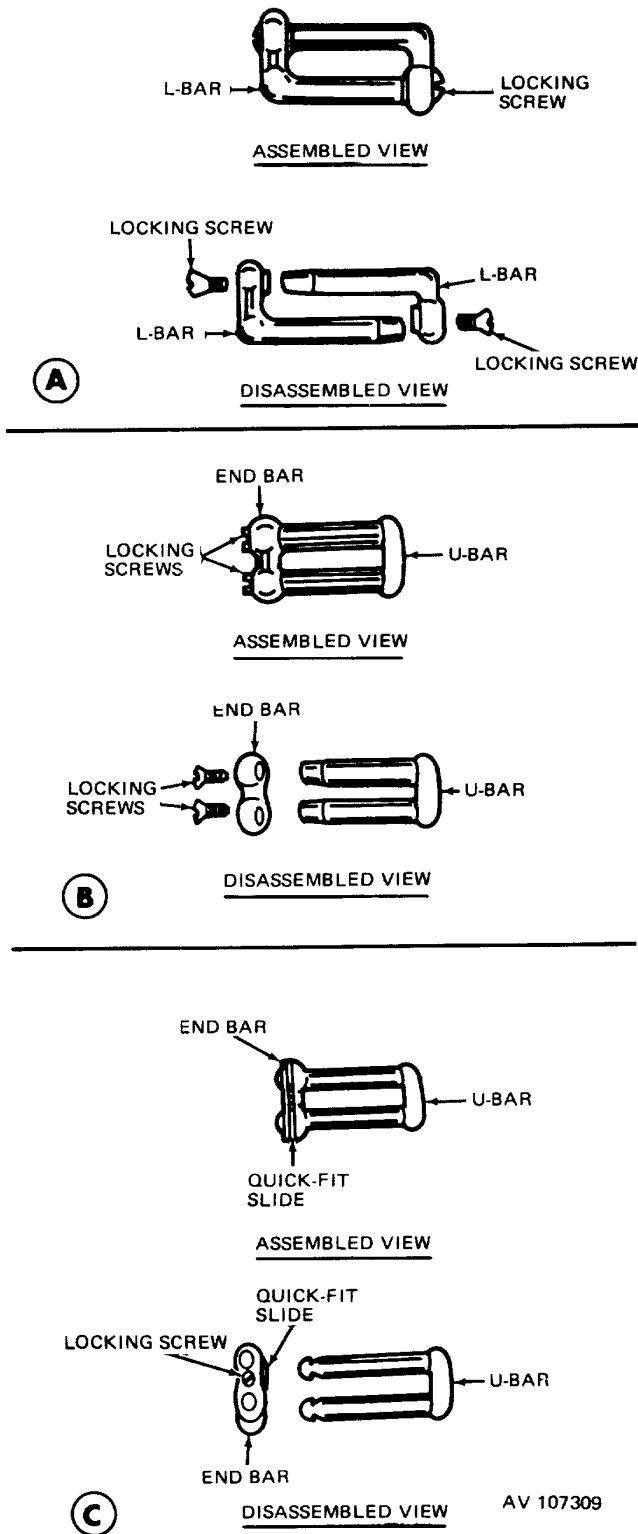
(1) *Cleaning.* Remove burrs, rough spots, rust, or corrosion from a parachute connector link assembly by either filing with a metal file or buffing with a crocus cloth.

(2) *Replacing a locking screw.* Replace a damaged or missing locking screw on a parachute connector link with a serviceable item from stock.

b. *Replacement.* A parachute connector link assembly, regardless of type, which is damaged beyond repair will be replaced with a serviceable L-bar parachute connector link assembly from stock and the following procedures:

(1) Using a suitable sized flat-tip (commonhead) screwdriver, remove the two locking screws from the ends of a replacement L-bar parachute connector link assembly and disassemble the link.

(2) Using a suitable sized flat-tip (commonhead) screwdriver, remove the two locking screws from the damaged original parachute connector link assembly. Disassemble the link assembly, using a link separator, (fig. 3-33), if necessary. If the connector link contains suspension lines, insure the lines are not allowed to slide off of the damaged link during the disassembly process.



A. The L-bar parachute connector link assembly.  
B. The U-bar parachute connector link assembly.  
C. The quick-fit parachute connector link assembly.

Figure 3-32. Parachute connector link assemblies

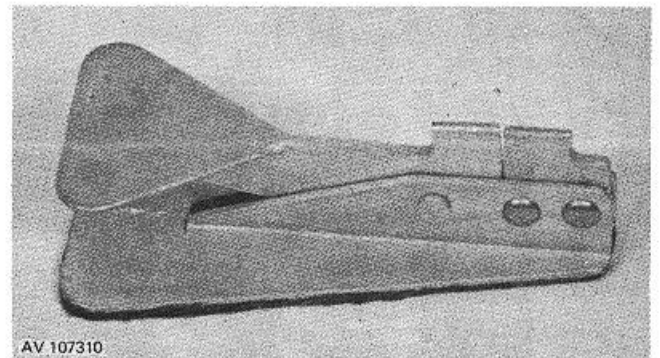


Figure 3-33. The parachute connector link separator.

(3) As applicable, position an L-bar of the replacement link assembly adjacent to the disassembled original link assembly and slide the suspension lines from the damaged link onto the replacement link L-bar.

(4) If required, pass the remaining L-bar of the replacement link through the attaching loop of the adjoining component.

(5) Fit the replacement link L-bars together and insure L-bar leg engagement by tapping the end of each L-bar with a phenolic mallet.

(6) As applicable, trace the suspension lines from the connector link assembly to the canopy skirt to insure the lines are properly installed and in the correct sequence.

(7) Reinstall the two locking screws removed in (1) above and tighten each screw using a suitable sized flat-tip (commonhead) screwdriver.

### 3-31. Pack Opening Spring Band

A pack opening spring band (fig. 3-34) consists of five parallel steel wire springs enclosed in a puckered nylon sheath with a pull-tab and a hook located at each end. The ends of each spring are permanently affixed to the end hooks. The sheath length covering the springs passes through the hook at each end, and when folded back and handstitched in place, forms the end pull-tabs. Repair or replace a damaged pack opening spring band using the following procedures, as applicable.

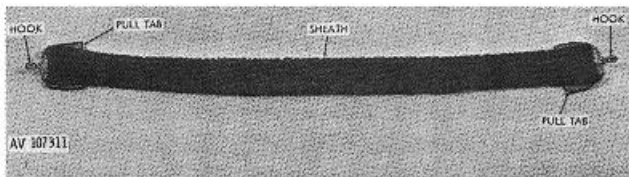


Figure 3-34. The pack opening spring band

a. *Repair.* Repair of a pack opening spring band entails restitching which will be accomplished as follows:

(1) *Machine-stitching.* Restitch broken or loose machine-stitching on a pull-tab according to original construction details and paragraph 3-9, using size E nylon thread and a medium duty sewing machine, stitching 7-11 stitches per inch.

(2) *Hand-stitching.* Restitch broken or loose hand-stitching on a pull-tab as follows:

(a) Cut and remove the original handstitching from the pull-tab.

(b) Secure the pull-tab to the spring by hand-stitching one row of backstitching according to original stitching details, using one turn double size 3 nylon thread. Insure each stitch encircles a

wire spring and lock the stitching at each end by making a concentration of hand-stitches.

b. *Replacement.* A pack opening spring band that has lost elasticity or which is damaged beyond repair will be replaced with a serviceable item from stock and the following procedures:

(1) If applicable, cut original stitching and remove or lay aside any item that may interfere with replacement accomplishment. In addition, cut the tacking securing the unserviceable pack opening band to the pack, as required.

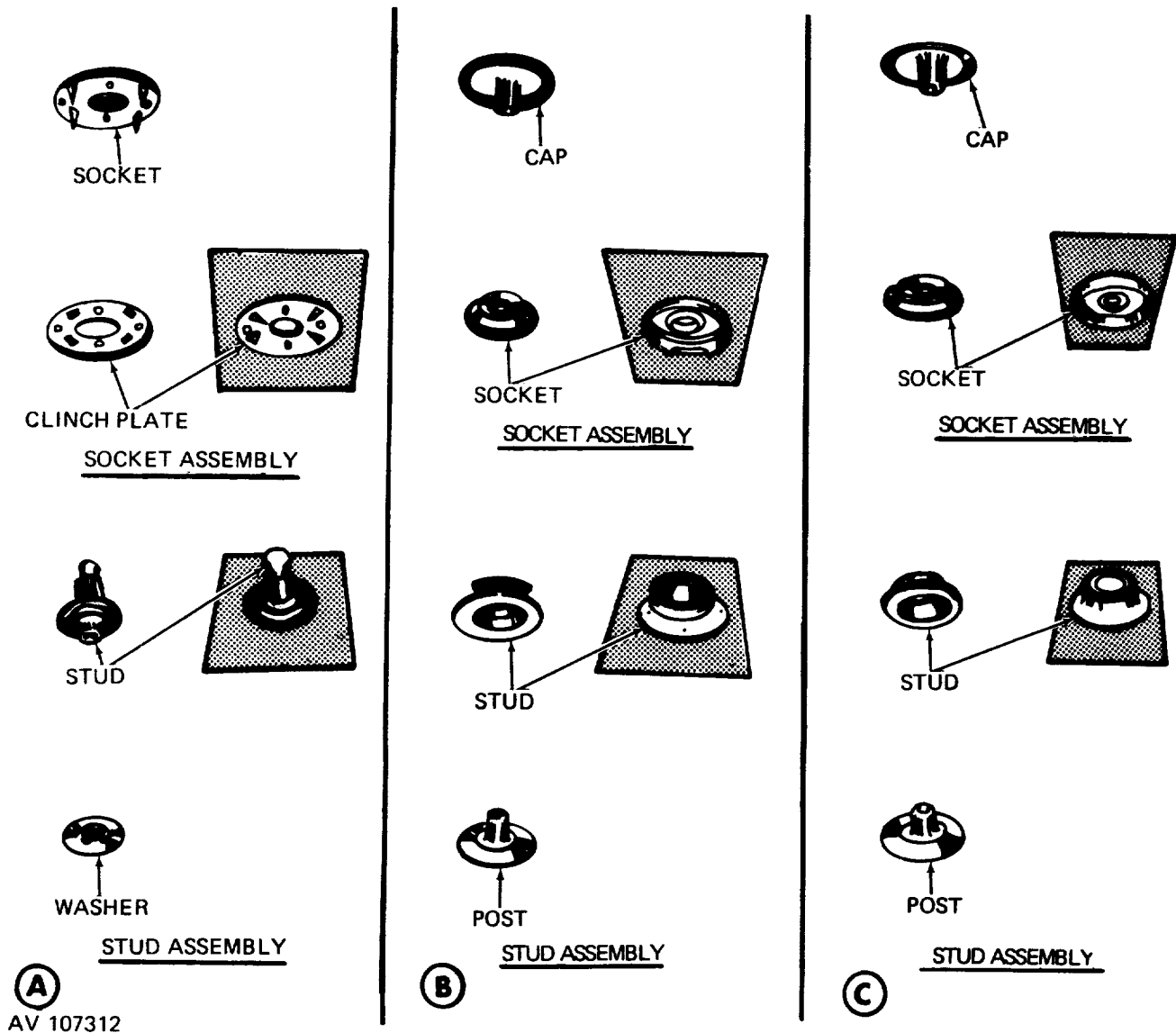
(2) Disconnect each end hook of the affected band from the attaching hookeyes and remove the band from the pack.

(3) Install a serviceable pack opening spring band or proper length in the location of the original band and insure the pull-tabs face up. Do not tack a replacement pack opening spring band to the pack.

(4) As applicable, reinstall the items removed in (1) above according to original construction details and paragraph 3-9.

### 3-32. Snap Fastener Assemblies.

A snap fastener assembly is a four-piece metal fitting used to secure flaps and tabs on parachute packs and harnesses. Two of the metal parts, the socket and clinch plate, or the button (cap) and socket, are installed on opposite sides of a flap or tab. The remaining two metal parts, the stud and the washer or stud and post, as applicable, are installed in a corresponding position on the main panel or body. The flap or tab is closed by snapping the mating parts together. The three types of snap fastener assemblies used on airdrop equipment are the lift-the-dot, pull-the-dot, and the durable (fig. 3-35). Repair or replace a defective snap fastener assembly using the following procedures, as appropriate.



A. The lift-the-dot snap fastener assembly.  
B. The pull-the-dot snap fastener assembly.  
C. The durable snap fastener assembly.

Figure 3-35. Snap fastener assemblies used on airdrop equipment, typical.

a. *Repair.* The only repair that may be performed on a snap fastener assembly is reseating of the fastener which will be accomplished using the applicable procedures and tools prescribed in paragraph b below.

b. *Replacement.* A snap fastener assembly which is defective or cannot be reseated will be replaced with a serviceable item from stock. However, if only one part of a fastener is defective, such as the socket or stud, just that particular portion of the fastener assembly will necessitate

replacement. Remove and replace a damaged snap fastener as follows:

(1) *Original snap fastener removal.*

(a) Cut the crimped edge of the applicable snap fastener assembly part at three or four points with diagonal nippers.

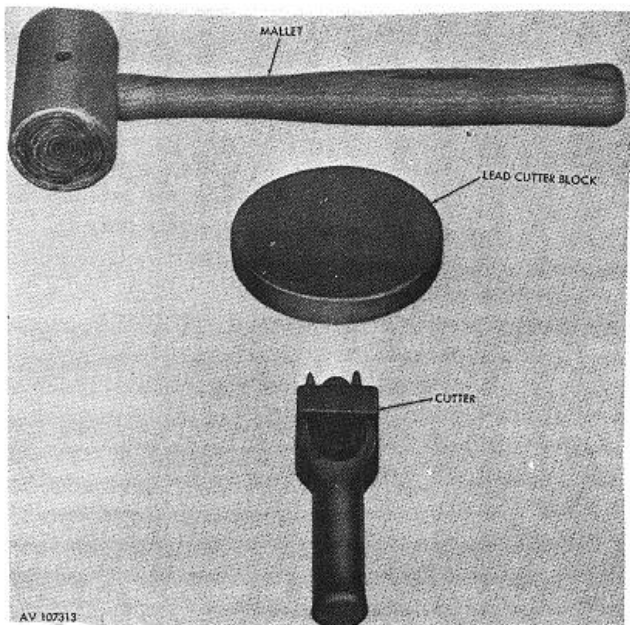
(b) Using a suitable type tool, pry back the fastener crimped edges and remove the applicable defective fastener parts.

(2) *Repair and preparation of the original snap fastener area.*

(a) If the fabric area around the original snap fastener has been damaged, repair the area by darning, using the procedures in paragraph 3-10a and the stitching specifics prescribed in the applicable item equipment publication. However, if darning does not provide an adequate repair, construct a suitable sized reinforcement of the same type material as that used in the original fastener location. Secure the reinforcement to the inside of the damaged area using the patching procedures in paragraph 3-13 and the stitching specifics cited in the applicable item equipment publication.

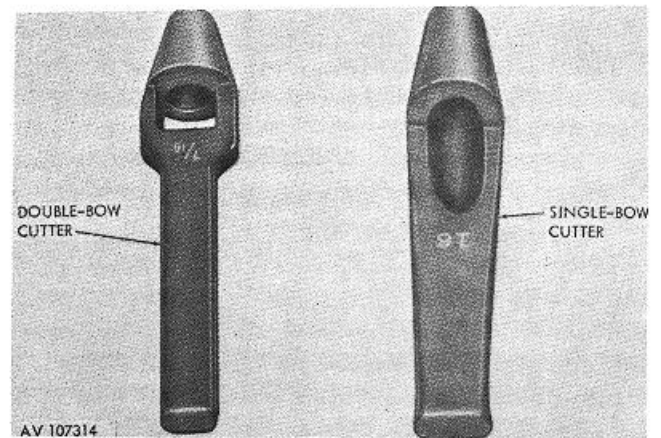
(b) After repair of the fabric in the original snap fastener area has been completed, further preparation of the repaired area may be required according to the following criteria.

1. When the replacement action involves a socket and clinch plate of a lift-the-dot snap fastener assembly, cut an appropriate sized hole in the repaired material to accommodate the size of the replacement fastener clinch plate and socket. Cutting of the material will be accomplished using a rawhide mallet or other non-steel impact device, a lead cutter block, and a lift-the-dot fastener cutter (fig. 3-36).



**Figure 3-36. Lift-the-dot snap fastener fabric cutting tools, typical.**

2. Normally, the replacement of a lift-the-dot snap fastener assembly stud and washer, a pull-the-dot snap fastener assembly, or a durable snap fastener assembly does not require cutting of a fabric area prior to component installation. However, if a situation occurs which necessitates fabric cutting to accommodate any of the cited assemblies, the cutting process will be accomplished using a mallet and lead cutter block as described in 1 above and an appropriate sized double or single bow cutter (fig. 3-37) as listed in table 3-3.



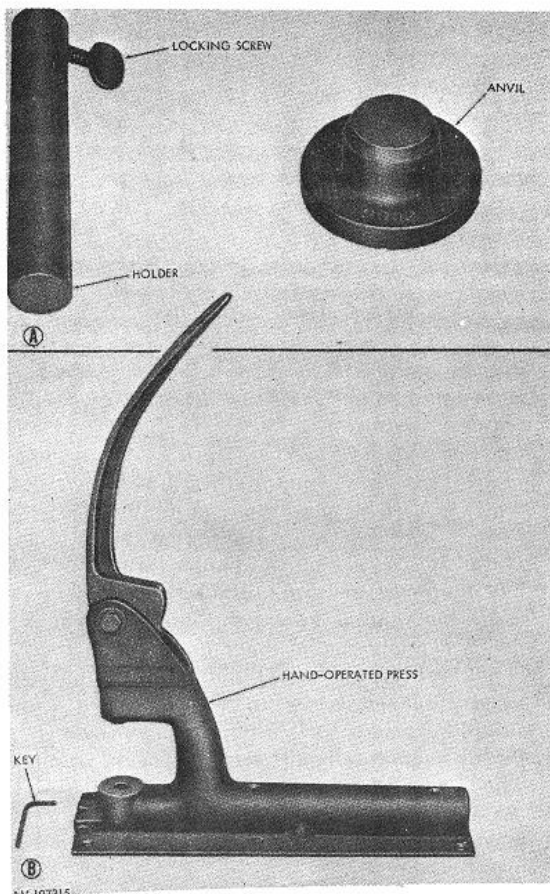
**Figure 3-37. Double- and single-bow fabric cutters, typical**

(3) Snap fastener installation.

(a) *General.* Installation of a snap fastener may be performed by three different methods. The most common method is the hand-held method that requires the use of a leather mallet (fig. 3-37) or other non-steel impact device, a holder to hold the appropriate sized chuck (A, fig. 3-38), and an anvil which is used to contain a compatible sized die. A second method of installing a snap fastener assembly is by use of the hand-operated press (B). The hand-operated press is a lever-type device that can accommodate an appropriate sized chuck and die. When installed in the hand-operated press, the chuck and die are individually secured in position by a threaded screw that is tightened using a suitable sized key (Allen-type hexagon wrench) or a flat-tip (common-head) screwdriver, as applicable. The third method of snap fastener installation is by use of the foot-operated press which, except for the means of operation, functions similar to the hand-operated press.

Table 3-3. Hand Tools for Snap Fastener- and Grommet Installation

Tool Nomenclature	Federal Stock Number
Press, Hand, Chuck and Die, 3-Inch, M-369	5120-880-0619
Press, Hand, Chuck and Die, 1 1/2-Inch, M-483	5120-244-9198
Rawhide Mallet, 1 1/4- by 2 3/4-Inch	5120-293-3398
Cutter, Single Bow, 3/16-Inch	5110-180-0941
Cutter, Single Bow, 1/4-Inch	5110-180-0943
Cutter, Single Bow, 5/16-Inch	5110-180-0945
Cutter, Double Bow, 3/8-Inch	5110-541-7697
Cutter, Double Bow, 7/16-Inch	5110-180-0922
Cutter, Double Bow, 1/2-Inch	5110-180-0923
Cutter, Double Bow, 9/16-Inch	5110-277-9805
Cutter, Double Bow, 5/8-Inch	5110-180-0924
Cutter, Lift-The-Dot Large, 9951	5110-509-8076
Holder, Die Fastener, 192	5120-357-6177
Anvil, Check Fastener, 9002	5120-357-6181
Key, Socket Head Set (Allen Type)	5120-684-7055
Lead, Fig. 5-Pounds (For Cutter Block)	9650-264-5050



A. Tools used with hand-held method.  
B. Hand-operated press with key.

Figure 3-38. Snap fastener installation tools, typical.

(b) Installing a durable or pull-the-dot snap fastener assembly.

1. Hand-held method.

(a) Using the specifics in table 3-4, ascertain the size die and chuck required for installing the fastener cap and socket or stud and post, as applicable.

(b) Place the selected chuck in the open end of the holder and secure the chuck in place using the locking screw located on one side of the holder. Further place the appropriate die into the anvil.

**NOTE**

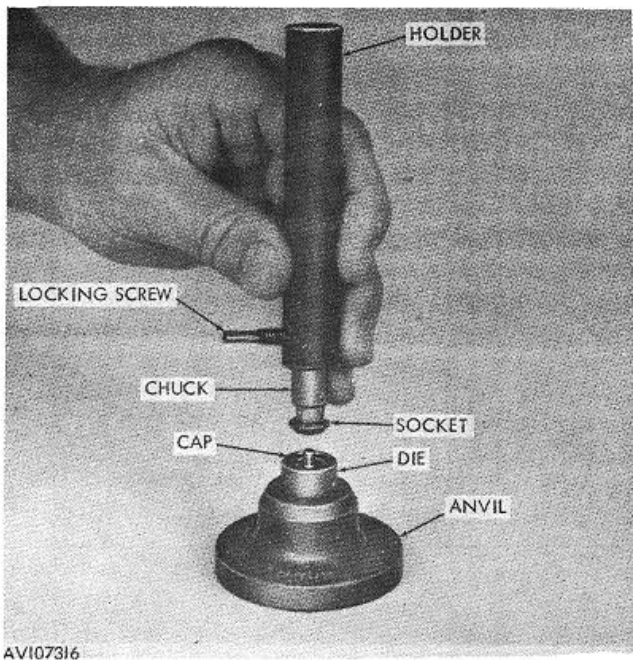
In most instances a chuck will be installed in the hand-held holder and a die will be placed in the anvil. However, there may be some occasions that require the location of the chuck and die to be reversed. This situation may also apply to the hand- or foot-operated press.

(c) Fit the socket or stud, as applicable, on the chuck lower end (fig. 3-37). Place the cap or post, as applicable, on the die with the barrel facing tip.

**Table 3-4. Snap Fastener Component Chuck and Die Compatibility List**

Component Nomenclature	Part Number	Federal Stock Number	Tool Nomenclature	Manufacturer's Part Number	Federal Stock Number
1. Durable Snap Fastener Assembly Small (Black Finish)					
Cap	MS27981-1B	5325-276-4954	Die	1483	5120-357-5751
Socket	MS27981-3B	5325-276-4966	Chuck	9323	5120-090-4401
Stud	MS27981-4B	5323-901-9660	Chuck	1486	3460-329-3297
Post / eyelet	MS27981-5B	5325-250-6859	Die	1488	5120-449-3744
2. Durable Snap Fastener Assembly (Large) (Black Finish)					
Cap	MS27980-1B	5332-339-6844	Die	1401	5120-090-4412
Socket	MS27980-6B	5325-285-6250	Chuck	1410	5120-144-2084
Stud	MS27980-7B	5325-842-1879	Chuck	1412	5120-144-2088
Post / eyelet	MS27980-8B	5325-838-1786	Die	1407	5120-144-2097
3. Pull-The-Dot Snap Fastener Assembly (3-Way-Lock) (Black Finish)					
Cap	MS27983-1	5332-891-9073	Die	9758	5120-343-8210
Socket	MS27983-2	5332-276-4972	Chuck	8059	5120-628-4265
Stud	MS27983-3	5325-276-4908	Chuck	9760	5120-329-3295
Post / eyelet	MS27980-8B	5325-838-1786	Die	1407	5120-144-2097
4. Lift-The-Dot Snap Fastener Assembly (Small) (Black Finish)					
Socket	MS27978-1B	5325-276-4979	Chuck	9470	5120-357-5594
Clinch plate	MS27978-3B	5325-276-4284	Die	9471	5120-357-5752
Stud	MS27978-4B	5325-250-0689	Chuck	9447	5120-357-5597
Washer	MS27978-5B	5325-276-4287	Die	9454	5120-449-3745
5. Lift-The-Dot Snap Fastener Assembly (Large) (Black Finish)					
Socket	MS27977-1B	5325-281-4356	Chuck	1454	5120-359-6490
Clinch plate	MS27977-3B	5325-276-4283	Die	1455	5120-144-2096
Stud	MS27977-8B	5325-276-5873	Chuck	1456	5120-144-2090
Washer	MS27977-10B	5325-969-6095	Die	1457	5120-144-2101
6. Lift-The-Dot Snap Fastener Assembly (Large) (Chrome Finish)					
Socket	MS27977-2N	5325-276-4961	Chuck	1454	5120-359-6490
Clinch plate	MS27977-3N	5325-276-4282	Die	1455	5120-144-2096
Stud	MS27977-8N	5325-917-7881	Chuck	1456	5120-144-2090
Washer	MS27977-10N	5323-276-4960	Die	1457	5120-144-2101





**Figure 3-39. Hand-held tools with snap fastener components prepared for use, typical.**

(d) Position the material over the barrel of the cap or post, as applicable. Insure that the fastener socket or stud, as applicable, will be located on the proper side of the material for subsequent fastener engagement.

(e) Place the socket or stud, as applicable, on the barrel of the cap or post, as applicable. With an applied strike from a mallet, clinch the two snap fastener components to the material.

(f) Remove the clinched snap fastener components from the chuck and die set and check the seating of the joined components. If the applicable components are not properly seated, repeat the procedure in (e) above.

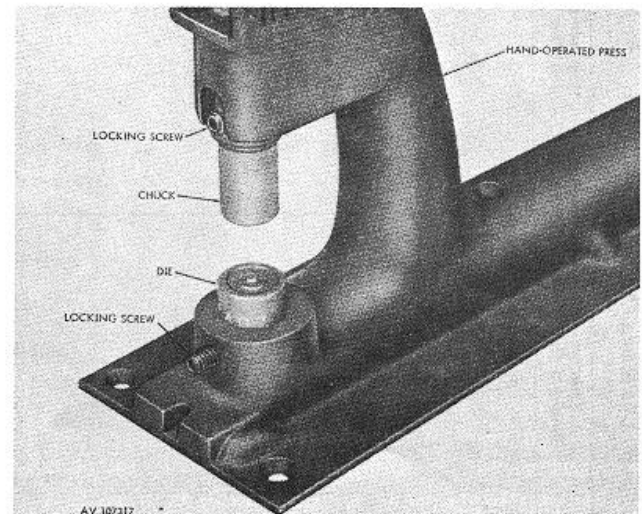
(g) Check the engagement of the installed snap fastener components with the opposite mating components to insure the open and closed snapping process is accomplished without hinderance. If the snap engaging process cannot be accomplished without difficulty, replace the opposite mating snap fastener components using the procedures in (a) through (f) above.

#### NOTE

**A durable snap fastener assembly will open and close from any direction. A pull-the-dot snap fastener assembly will open and close from only one direction.**

(b) As required, remove the chuck and die from the applicable snap fastener tools by reversing the procedures in (b) above.

2. *Hand- or foot-operated press method.* Installation of durable or pull-the-dot snap fastener assemblies by hand- or foot-operated press can be accomplished using the procedures in paragraph 1 above, except the chuck and die will be secured within the applicable press assembly using the available locking screws (fig. 3-40).



**Figure 3-40. Chuck and die installed in hand-operated press, typical.**

(c) *Installing a lift-the-dot snap fastener assembly.*

#### 1. Hand-held method.

(a) Using the specifics in table 3-4, ascertain the size chuck and die required the fastener socket and clinch plate or stud and washer, as applicable.

(b) Place the selected chuck in the open end of the holder and secure the chuck in place using the locking screw located on one side of the holder. Further, place the appropriate die into the anvil.

(c) Fit the socket (with prongs facing down) or stud (with barrel facing down) on the lower end of the chuck. Place the clinch plate or washer, as applicable, on the die.

(d) Position the material over the clinch plate or washer, as applicable.

(e) Aline the socket prongs with the precut holes in the material or the barrel of the stud at the center of the material-covered washer, as applicable. With an applied strike from a mallet,

clinch the two snap fastener components to the material.

(f) Remove the clinched snap fastener components from the chuck and die set and check the seating of the joined components. If the applicable components are not properly seated, repeat the procedure in (e) above.

(g) Check the engagement of the installed snap fastener components with the opposite mating components to insure the open and closed snapping process cannot be accomplished without hinderance. If the snap engaging process cannot be accomplished without difficulty, replace the opposite mating snap fastener components using the procedures in (a) through (f) above.

**NOTE**

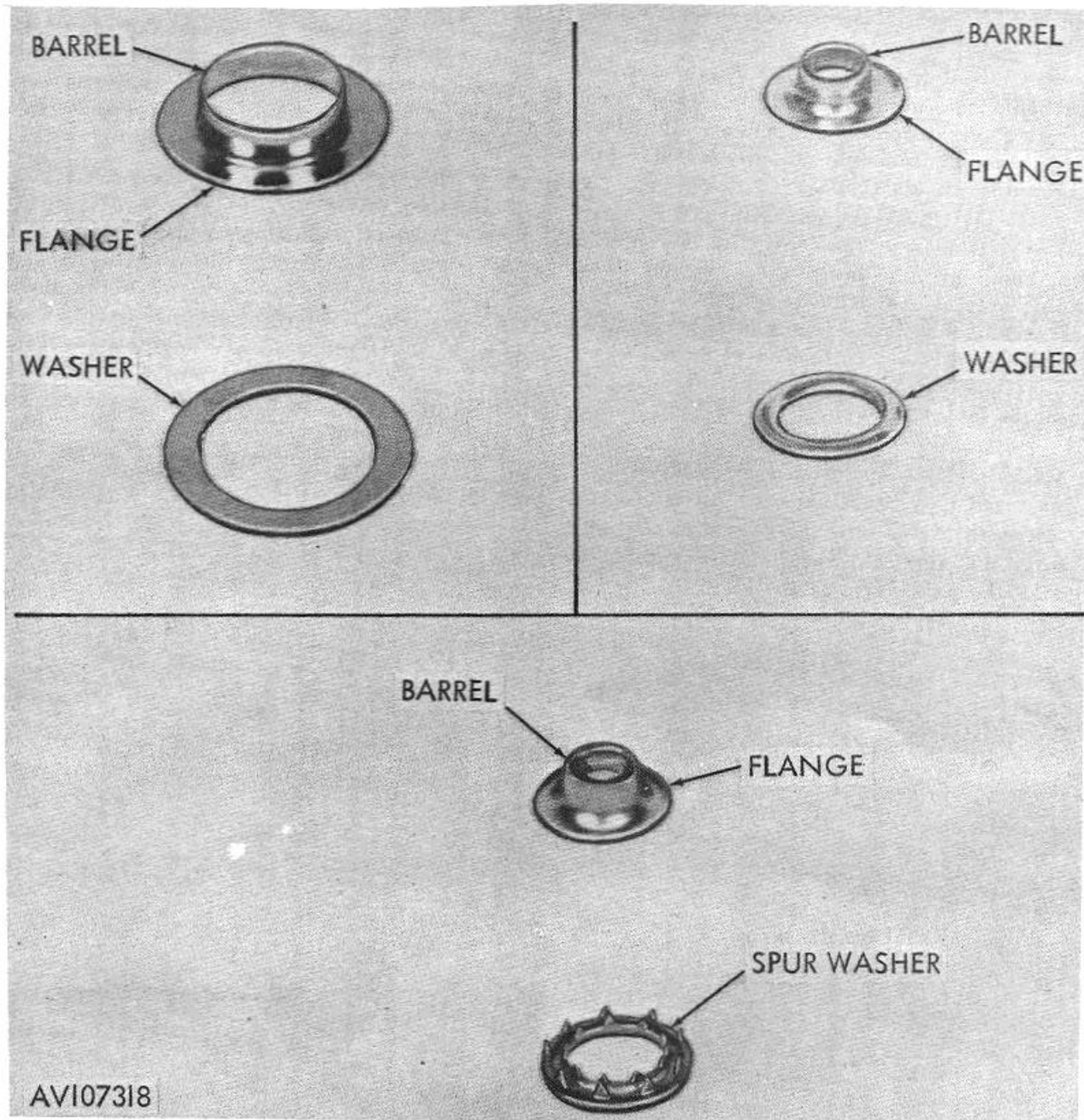
**A lift-the-dot snap fastener assembly will open and close from only one direction.**

(h) As required, remove the chuck and die from the applicable snap fastener tools by reversing the procedures in (b) above.

2. *Hand- or foot-operated press method.* Installation of a lift-the-dot snap fastener assembly by hand- or foot-operated press may be accomplished using the procedures in paragraph 1 above, except the chuck and die will be secured within the applicable press assembly using the available locking screws.

**3-33. Grommets.**

A grommet is a two-piece metal eyelet used to reinforce and protect textile material at a point where a hole has been made to permit the threading of a line, cord, webbing or the insertion of a retainer device. The three types of grommets used on airdrop equipment are the flat (A, fig. 3-41), plain (B), and spur (C), each of which is installed with an applicable type washer. Repair or replace a defective grommet using the following procedures, as appropriate.



**Figure 3-41. Grommets used on airdrop**

**a. Repair.**

(1) *Filing or buffing.* Remove burrs, rough spots, rust, or corrosion from an installed grommet by filing with a metal file or by buffing with a crocus cloth.

(2) *Reseating.* Reseat a loose grommet using the applicable procedures and tools in paragraph b below.

**b. Replacement.** A grommet which is damaged

or cannot be reseated will be replaced with a serviceable grommet and washer of the same size and type from stock and the following procedures, as applicable.

(1) *Original grommet removal.*

(a) Using a suitable type tool, lift the edge of the original washer at one point.

(b) Grip the lifted washer edge with diagonal nippers and roll the washer edge back to

lift the washer from the original grommet. Remove the original grommet from the material.

(2) *Repair and preparation of the original grommet area.*

(a) If the fabric area around the original grommet has been damaged, repair the area by darning, using the procedures in paragraph 3-10 and the stitching specifics outlined in the applicable item equipment publication. However, if darning does not provide an adequate repair, construct a suitable sized reinforcement of the same type material as that used in the original grommet location. Secure the reinforcement to the inside of the damaged area using the patching procedures in paragraph 3-13 and the stitching specifics cited in the applicable item equipment publication.

(b) Using a single or double bow cutter listed in table 3-3 that is compatible with the size of the replacement grommet. a lead cutter block, and a rawhide mallet or other non-steel impact device, -tit a

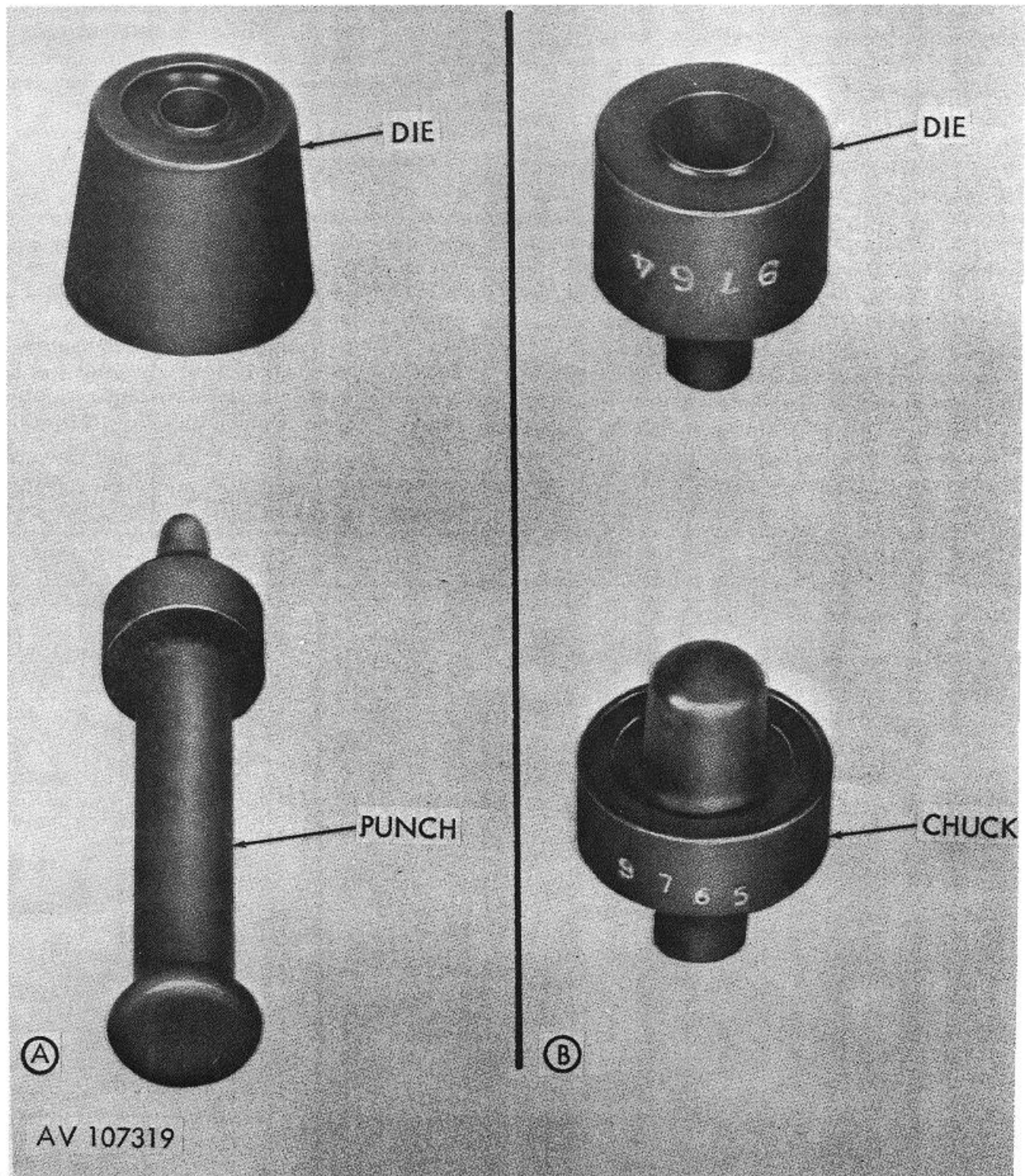
hole in the repaired fabric area to accommodate the barrel of the replacement grommet. Insure the hole is cut with a slightly smaller diameter than the diameter of the barrel of the replacement grommet.

(3) *Grommet installation.*

(a) *General.* Installation of a plain or spur grommet is accomplished by the hand-held method which requires the use of a suitable sized punch and die (A, fig. 3-42) as listed in table 3-5 and a rawhide mallet or other non-steel impact device. A flat grommet should also be installed using the hand-held method, but may be installed using a hand- or foot-operated press (B, fig. 3-38) and a suitable size chuck and die (B, fig. 3-42) as listed in table 3-5.

**Table 3-5. Grommet Assembly Chuck / Punch and Die Compatibility List**

Assembly Identification	Federal Stock Number	Tool Identification	Manufacturer's Part Number	Federal Stock Number
1. No. 3 Chrome Steel Grommet	5325-275-5973	Die	9764	5120-343-8213
Grommet and washer		Chuck	9765	5120-343-8214
2. No. 5 Chrome Steel Grommet	5325-275-5972	Die	9766	3460-329-3346
Grommet and washer		Chuck	9767	5120-343-8216
3. Plain Bras Grommet (MIL-P-16208)				
Size 00	5325-291-0302	3/16 in. punch and die	N/A	5120-357-5753
Size 0	5325-231-6589	1/4 in. punch and die	N/A	5120-357-5754
Size 1	5325-291-0275	5/16 in. punch and die	N/A	5120-224-7905
Size 2	5325-231-6590	3/8 in. punch and die	N/A	5120-250-9259
Size 3	5325-291-0277	7/16 in. punch and die	N/A	5120-256-2640
Size 4	5325-231-6591	1/2 in. punch and die	N/A	5120-256-0651
Size 5	5325-231-6592	9/16 in. punch and die	N/A	5120-256-9262
4. Brass Spur Grommet (MIL-P-16208)				
Size 2	5325-291-0289	7/16 in. punch and die	N/A	5120-221-1148
Size 3	5325-291-0293	1/2 in. punch and die	N/A	5120-221-1149
Size 4	5325-231-6586	9/16 in. punch and die	N/A	5120-221-1150
Size 5	5325-231-6588	5/8 in. punch and die	N/A	5120-221-1151



- A. Hand-held method punch and die.
- B. Hand- or foot-operated press chuck and die for flat grommet.

Figure 3-42. Tools used for grommet installation, typical.

**CAUTION**

Tools used to install a grommet will be compatible with the size and type of grommet as cited in table 3-5.

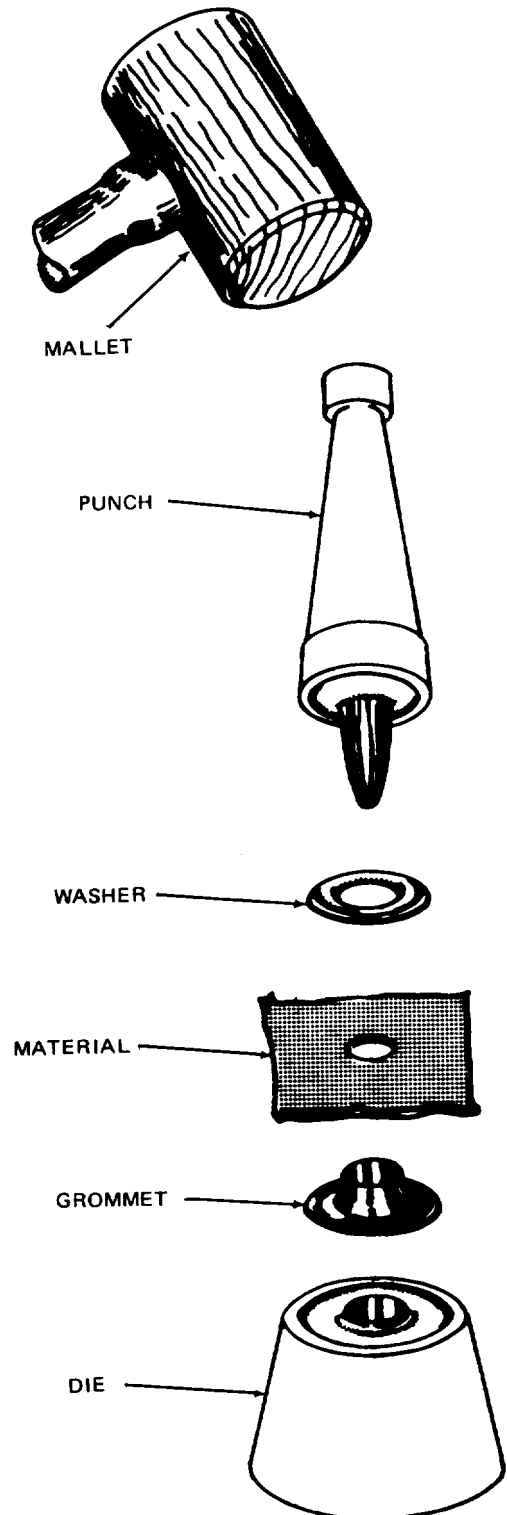
1. Insert the barrel of the replacement grommet through the accommodating hole in the material and insure the grommet flange is located on the same side of the material as the original grommet.

2. Position the grommet on a suitable sized die with the barrel facing up and place the applicable washer over the grommet barrel.

**NOTE**

When installing a flat grommet by the hand-held method, insure the grommet barrel and washer are alined to preclude off-center setting of the grommet.

3. Using a suitable sized punch and a rawhide mallet (fig. 3-43) or other non-steel impact device, spread the grommet barrel by hammering until the barrel collar is rolled down smooth on the washer. If the grommet barrel splits during the hamering process, remove and replace the installed grommet with a serviceable item from stock, subsequently repeating the procedures in 1 and 2 above.



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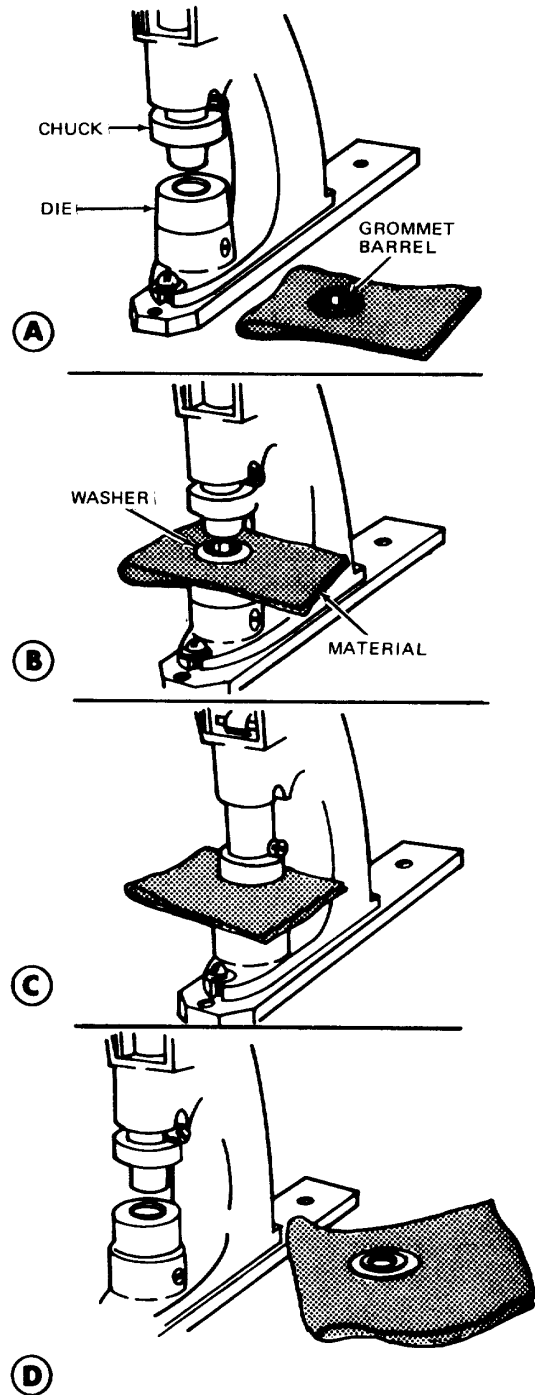
Figure 3-43. Grommet installation by hand-held method, typical.

4. Check the seating of the grommet and if the grommet can be turned by hand, repeat the procedure in 3 above until the grommet is firmly seated.

(c) Flat grommet installation by hand operated press.

1. Install a suitable sized chuck and die on a hand- or foot-operated press. Secure the chuck and die in place using the available locking screws (fig. 3-40) and a suitable sized key (Allen-type hexagon wrench).

2. Insert the barrel of the replacement grommet through the accommodating hole in the material (A, fig. 3-44). Insure the flange of the replacement grommet is on the same side of the material as the original grommet.



- A. Grommet barrel inserted in material hole
- B. Washer placed over grommet barrel
- C. Press activated to seat the grommet
- D. Grommet installation completed

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Figure 3-44. Flat grommet installation by hand- or foot-operated press, typical.



3. Position the grommet on the installed die with the barrel facing tip and place the replacement washer over the grommet barrel (B).

4. Depress the press handle or foot pedal (C) and spread the grommet barrel until the collar of the barrel is rolled down smoothly on the washer

5. Check the grommet for a firm seating. If the grommet can be turned by hand, repeat the procedure in 4 above until a firm seating of the grommet is achieved.

### 3-34. Dressmakers Eye (Hookeye.)

A metal dressmakers eye (hookeye) is used on various personnel parachute packs as attaching points for the hooks of pack opening spring bands. Repair or replace a dressmakers eye (hookeye) using the following procedures:

*a. Repair.* Retacking is the only repair function performed on a dressmakers eye (hookeye). Replace broken or loose tacking by adapting the procedures in paragraph b below.

*b. Replacement.* Replace a damaged or missing dressmakers eye (hookeye) with a serviceable item from stock and the following procedures:

(1) If applicable, cut and remove the tacking securing the original dressmakers eye (hookeye) to the parachute pack.

(2) If the fabric area supporting the original

dressmakers eye (hookeye) has been damaged, repair the area by darning, using the procedures in paragraph 3-10 and the stitching specifics prescribed in the applicable item equipment publication. However, if darning does not provide an adequate repair, construct a suitable sized reinforcement of the same type material as that used in the original dressmakers eye hookeye location. Secure the reinforcement to the inside of the damaged area using the patching procedures in paragraph 3-13 and the stitching specifics in the applicable item equipment publication.

(3) Position the replacement dressmakers eye hookeye in the original eye location and insure the elevated end of the eye is facing up to permit proper engagement of a pack opening spring band hook upon completion of installation.

(4) Secure the replacement dressmakers eye (hookeye) to the parachute pack by handtacking using two turns double, size No. E waxed nylon thread. If the tacking is to be made in an area of pliable material, then hand-tack according to the details in A, figure 3-4.5. However, if the tacking is to be made in an area containing a stiffener, then hand-tack as shown in part B. Secure tacking ends with a surgeon's knot and a locking knot. Trim tie ends to 1/4 inch.

#### NOTE

**A dressmakers eye (hookeye) may be sewn in place using a hookeye attaching machine, if available.**



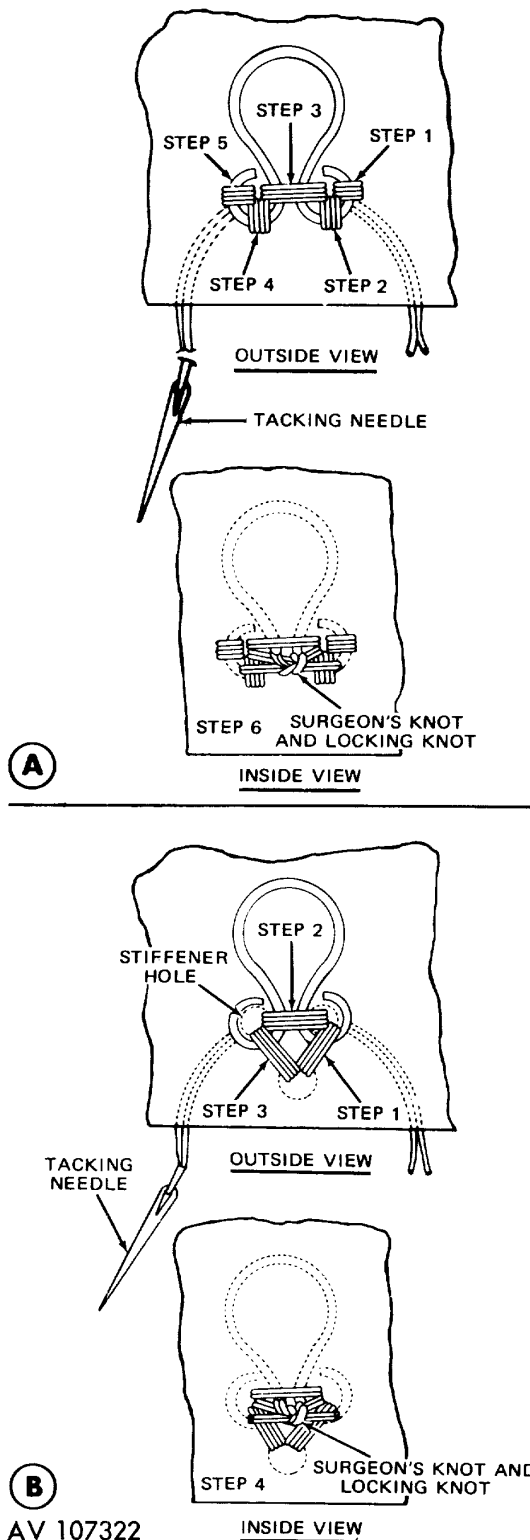


Figure 3-45. Dressmakers eye (hookeye) tacking details

Key to figure 3,-45:  
A. Tacking in a pliable material area.  
B. Tacking through a stiffener

### 3-35. Pack Releasing Cones.

Various parachute packs are equipped with metal pack releasing cones which are used in the opening and closing of a pack. Repair or replace a pack releasing cone using the following procedures:

a. *Repair.* Retacking is the only repair function performed on a pack releasing cone. Replace broken or loose pack releasing cone tacking by adapting the procedures in paragraph b below.

b. *Replacement.* Replace a damaged or missing pack releasing cone with a serviceable item from stock and the following procedures:

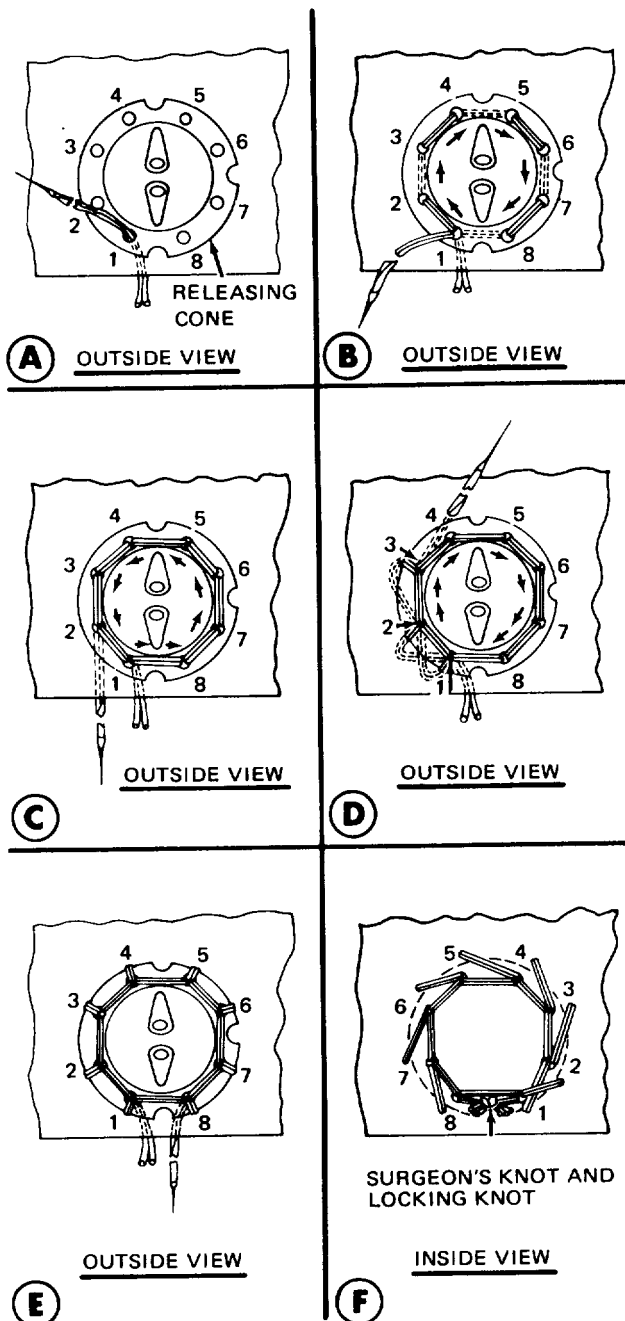
- (1) If applicable, cut and remove the tacking securing the original pack releasing cone to the pack.
- (2) If required, cut the original stitching and remove or lay aside any item that may interfere with replacement accomplishment. In addition, cut the tacking securing the unserviceable pack releasing cone to the pack.

(3) If the fabric area supporting the original pack releasing cone has been damaged, repair the area by darning, using the procedures in paragraph 3-10 and the stitching specifics prescribed in the applicable item equipment publication. However, if darning does not provide an adequate repair, construct a suitable sized reinforcement of the same type material as that used in the original pack releasing cone location. Secure the reinforcement to the inside of the damaged area using the patching procedures in paragraph 3-13 and the stitching specifics in the applicable item equipment publication.

(4) Position the replacement pack releasing cone in the original releasing cone location and insure the ripcord locking pin hole at the cone top is aligned in the same direction as the original releasing cone or other installed cones.

(5) Using one turn double size No. 3 waxed nylon thread, secure the replacement pack releasing cone by handtacking as follows:

(a) Pass a threaded tacking needle from the inside up through the parachute pack panel and through the No. 1 hole in the cone base (A, fig. 3-46). Allow 3 inches of the tacking thread free end to remain on the panel inside.



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- A. Beginning tacking
- B. The first row of tacking completed
- C. The second row of tacking completed
- D. Tacking the outside edge of the cone base
- E. Cone base outside edge tacking completed
- F. Releasing cone tacking completed

Figure 3-46. Pack releasing cone tacking details

(b) Working in a clockwise direction, pass the needle and thread length down through hole No. 2 and the parachute pack panel, and back up through the panel and hole No. 3.

(c) Continue tacking around the cone base using the procedure in (b) above until the needle and thread length are passed to the outside at hole No. 1 (B). Remove all slack from the completed tacking.

(d) Working in a counterclockwise direction, pass the needle and thread length down through hole No. 8 and the parachute pack panel, and back up through the panel and hole No. 7.

(e) Continue tacking around the cone base using the procedure in (d) above until the needle and thread length are passed to the panel inside at hole No. 2 (C). Remove all slack from the completed tacking.

(f) Pass the needle and thread length up through the parachute pack panel at a point adjacent to the outside edge of the cone base and hole No. 1.

(g) Pass the needle and thread length over the outside edge of the cone base and down through hole No. 1 to the inside of the parachute pack panel (D).

(h) Pass the needle and thread length back up through the parachute pack panel at a point adjacent to the outside edge of the cone base and hole No. 2.

(i) Pass the needle and thread length over the outside edge of the cone base and down through hole No. 2 to the inside of the parachute pack panel.

(j) Working in a clockwise direction, continue tacking around the outside edge of the cone base using the procedures in (h) and (i) above until the needle and thread are passed to the inside at hole No. 8 (E). Remove all slack from the completed tacking.

(k) Remove the tacking needle from the thread length and secure the tacking loose ends on the parachute pack panel inside with a surgeon's knot and a locking knot (F). Trim tie ends to 1/4 inch.

(6) Reinstall the items removed in 121 according to original construction details and paragraph 3-9. Stitching will be made according to the stitching specifics prescribed in the applicable item equipment publication.

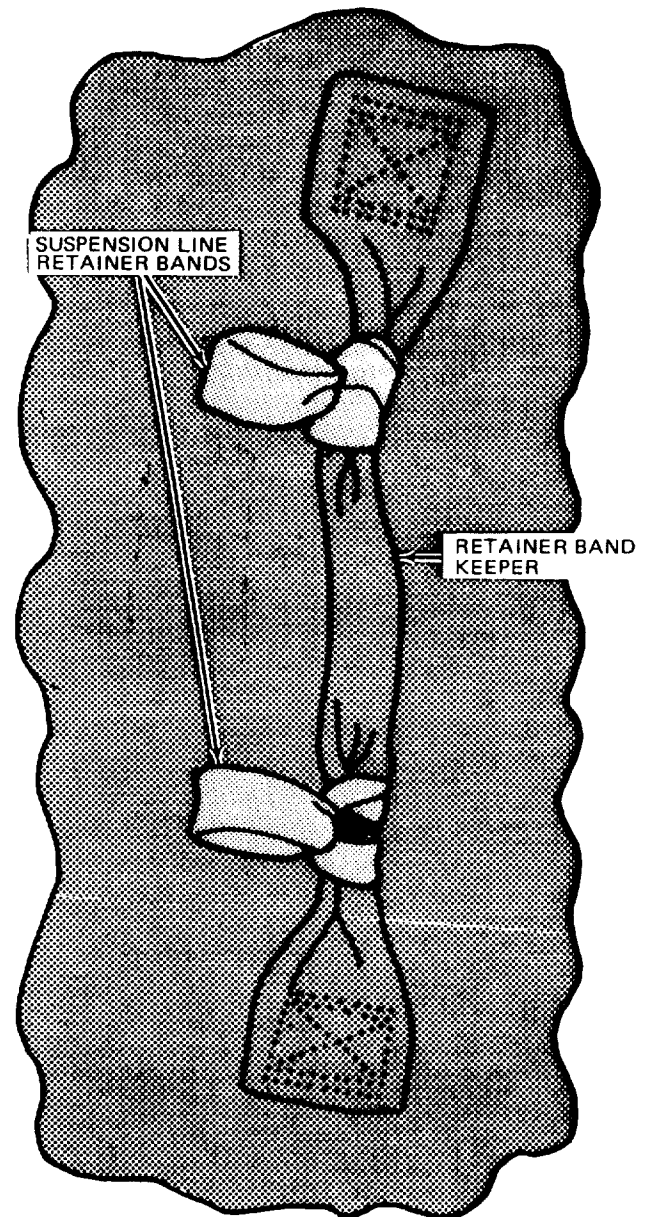
### 3-36. Parachute Suspension Line Retainer Bands.

Parachute suspension line retainer bands, which are made of rubber, are used on a variety of parachute pack and deployment bags as a means of securing suspension lines and static lines in position until parachute deployment is initiated. Though the size and construction of retainer band keepers will vary somewhat on the deployment bags and packs, retainer band will be installed on the keepers in a standardized manner. Since repairs cannot be made on a parachute suspension line retainer band, a band which is damaged or missing will be replaced with a serviceable item from stock and installed as follows:

#### NOTE

**There is no acceptable substitute item that may be used in lieu of the parachute suspension line retainer band (MIL-R18321)**

- a. As applicable, remove the original retainer band from the retainer band keeper.
- b. Pass one end of a replacement retainer band under the retainer band keeper in the original band location.
- c. Route the opposite end of the replacement retainer band over the retainer band keeper and pass the band end through opposite end of the band, drawing the band tight against the retainer band keeper (fig. 3-45).



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**Figure 3-47. Parachute suspension line retainer bands installed on retainer band keeper, typical.**

## CHAPTER 4

### SHIPMENT REQUIREMENTS

#### 4-1. Initial Shipment.

The initial packaging and shipping of airdrop equipment is the responsibility of item manufacturers who are required to comply with federal and military packaging specifications as stipulated in contractual agreements. Airdrop equipment is normally shipped to depot activities by domestic freight or parcel post, packaged to comply with overseas shipping requirements. Except for those airdrop items which are unpackaged and subjected to random inspections or testing by a depot activity, airdrop equipment received by a using unit will be contained in original packaging materials.

#### 4-2. Shipping Between Maintenance Activities.

The shipping of airdrop equipment between organizational and direct support maintenance activities will be accomplished on a signature certification basis using whatever means of available transportation. Used parachutes and other fabric items will be tagged in accordance with TB 750-126, and rolled, folded, or placed loosely in a parachute pack, deployment bag, aviator's kit bag, or other suitable container, as required. Used wood and metal airdrop items will be tagged as prescribed in TB 750-126 and placed into a suitable type container, if necessary. Unused airdrop equipment will be transported in original shipping containers. During shipment, every effort will be made to protect airdrop items from weather elements, dust, dirt, oil, grease, and acids. Vehicles used to transport parachutes will be inspected to insure the items are protected from the previously cited material damaging conditions.

#### 4-3. Other Shipping Instructions.

Airdrop equipment destined for domestic or overseas shipment will be packaged and marked in accordance with AR 700-15, TM 38-230-1, and TM 38-230-2. Shipment of airdrop items will be accomplished in accordance with AR 55-45.

#### 4-4. Shipping To and From Parachute Exchange Pools Via Commercial Transportation.

To prevent tampering and/or pilferage of personnel parachutes being shipped to and from Parachute Exchange Pools, metal container cans, drums or medical supply chests should be used when commercial transportation is utilized. Containers should be sealed using a lead seal with wire. If metal containers are not available, fiberboard containers should be used. These can be sealed with labels instead of lead seals. The fiberboard containers should be type - SF, class weather resistant, grade - V2s, style - FTC according to Federal Specification PPP-B-636. Shipping containers should be reinforced with encircling bands of flat steel, twist tie wire strapping or filament reinforced pressure sensitive weather resistant tape. Parachutes shipped in an unpacked condition should be placed in a plastic bag at least 0.003 inches thick. Tie with plastic or paper covered soft wire.

#### NOTE

**Care should be taken to provide physical security and protection from damage to parachutes during shipping between maintenance/storage activities and using units.**

## CHAPTER 5

### ADMINISTRATIVE STORAGE

---

#### 5-1. Storage Criteria.

Administrative storage of airdrop equipment will be accomplished in accordance with TM 740-90-1, AR 750-1. and the additional instructions furnished in paragraphs 5-2 and 5-3 below.

#### 5-2. General Storage Requirements.

To insure that serviceability standards of stored airdrop equipment are maintained, every effort will be exerted to adhere to the following storage requirements:

- a. When available, a heated building should be used to store parachutes and other airdrop items.
- b. Airdrop equipment will be stored in a dry, well-ventilated location and protected from pilferage, dampness, fire, dirt, insects, rodents, and direct sunlight.
- c. Airdrop equipment will not be stored in a manner which would prevent ventilation or interfere with light fixtures, heating vents, fire fighting devices, cooling units, exits, or fire doors.
- d. Airdrop items will not be stored in a damaged, dirty, or damp condition.
- e. All stored airdrop items will be marked, segregated, and located for accessibility and easy identification.
- f. Airdrop equipment will not be stored in direct contact with any building floor or wall. Storage will be accomplished using bins, shelves, pallets, racks, or dunnage to provide airspace between the storage area floor and the equipment. If preconstructed shelving or similar storage accommodations are not available, locally fabricate storage provisions using suitable lumber or wooden boxes.

g. All available materials handling equipment should be used as much as possible in the handling of airdrop items.

h. Periodic rotation of stock, conservation of available space, proper housekeeping policies, and strict adherence to all safety regulations will be practiced at all times.

#### 5-3. Storage Specifics for Parachutes.

In addition to the storage requirements stipulated in paragraph 5-2 above, the following is a list of specifics which must be enforced when storing parachutes:

- a. Except for those assemblies required for contingency' operation, parachutes will not be stored in a packed configuration.
- b. Emergency-type parachutes and ejection seat parachutes stored in a packed condition will be stored either in a vertical hanging position or layed in bins. However, under no circumstances will the cited parachutes be stored by stacking one on top of another.
- c. Troop-type back chest parachutes stored in a packed condition will be stored by stacking the parachutes in a staggered fashion. Troop-back parachutes will not be stacked more than seven high, while troop-chest parachutes will not be stacked more than 11 high.
- d. Stored parachute assemblies will be secured from access by unauthorized personnel.
- e. A parachute which is in storage, and is administered a cyclic repack and inspection, will not be exposed to incandescent light or indirect sunlight for a period of more than 36 hours. In addition, exposure to direct sunlight should be avoided entirely.

## APPENDIX A

### REFERENCES

---

#### A-1. Dictionaries of Terms and Abbreviations.

AR 310-25 Dictionary of United States Army Terms  
AR 310-50 Authorized Abbreviations and Brevity Codes

#### A-2. Publications Index.

DA PAM 310-4 Index of Technical Manuals, Technical Bulletins, Supply Manuals  
(types 7, 8, and 9), Supply Bulletins, and Lubrication Orders  
DA PAM 310-7 US Army Equipment Index of Modification Work Orders

#### A-3. Logistics and Storage.

AR 700-15 Packaging of Material  
DOD Manual 4500.32-R, VOL I. Military Standard Transportation and Movement Procedures  
(MILSTAMP)  
TM 38-230-1 and TM 38-230-2 Preservation, Packaging, Packing of Military  
Supplies and Equipment (vols. 1 and 2) Administrative Storage of Equipment  
TM 740-90-1 Storage and Materials Handling  
TM 743-200-1

#### A-4. Property Accountability.

AR 735-11 Accounting for Lost, Damaged, and Destroyed Property

#### A-5. Facilities Engineering.

FM 10-8 Air drop of Supplies and Equipment in the Theater of Operations  
AR 420-54 Air Conditioning, Evaporative Cooling, Dehumidification, and  
Mechanical Ventilation

#### A-6. Safety.

AR 385-40 Accident Reporting and Records

#### A-7. Disposal.

AR 755-2 Disposal of Excess, Surplus, Foreign Excess, Captured, and  
Unwanted Material  
DOD Manual 4160.21-M Defense Disposal Manual  
DOD Manual 4160.21-M-1 Defense Demilitarization Manual

#### A-8. Maintenances of Supplies and Equipment.

AR 750-1 Army Material Maintenance Concepts and Policies  
AR 750-32 Air Delivery, Parachute Recovery, and Aircraft Personnel Ejection  
Systems  
FM 10-16 General Repair of Tents, Canvas and Webbing  
TM 10-3530-202-24 Sewing Machines for the Repair of Parachutes and Allied  
Equipment  
TM 38-750 The Army Maintenance Management System (TAMMS)  
TM 55-1500-204-25/1 General Aircraft Maintenance Manual  
TB 43-0002-4 Maintenance Expenditure Limits for FSC Group 16

TB 750-126

OPNAVINST 4790.2

Vol. 1

NAVAIR 13-1-6.2

TO 00-25-241

Use of Material Condition Tags and Labels on Army Aeronautical  
and Air Delivery Equipment

The Navel Aviation Maintenance Program; Policies, Concepts,  
Organization, and Responsibilities

Aviation-Crew Systems, Parachute

Parachute Logs and Records

**A-9. Other Publications**

TM 43-0002-1

TO 13C3-1-10

Procedures for the Destruction of Air

Delivery Equipment to Prevent Enemy Use

**Change 4 A-2**

## APPENDIX B

### KNOT FORMATION DETAILS

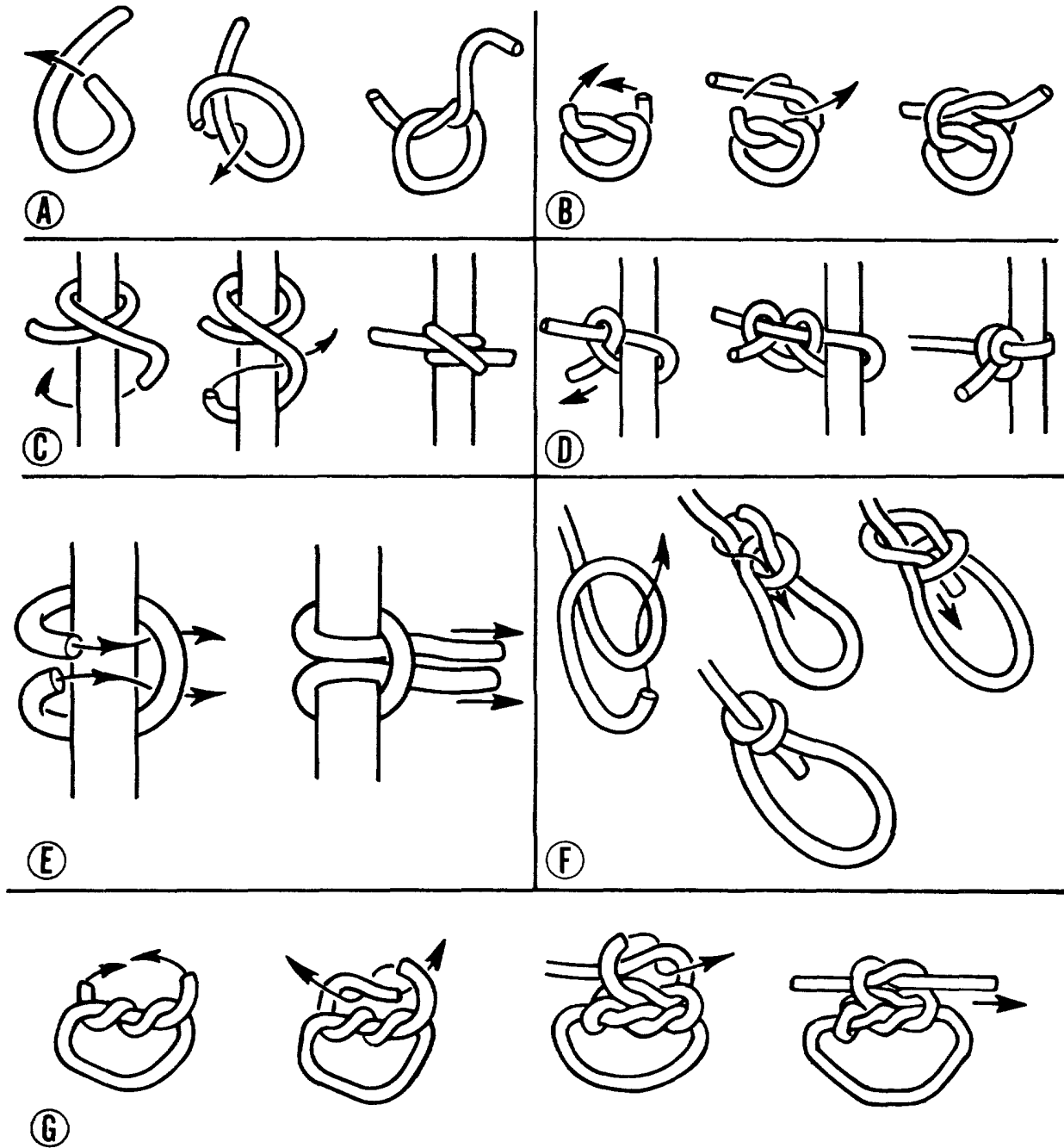
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During the performance of various maintenance functions performed on airdrop equipment, the making of certain type knots is prescribed. Details for the

formation of individual knots generally used in the maintenance of airdrop equipment are illustrated in figure B-1.

B-1





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- A. Overhand knot.
- B. Square knot.
- C. Clove hitch.
- D. Double half hitch.
- E. Slip loop.
- F. Bowline knot.
- G. Surgeon's and locking knot.

Figure B-1. Formation details for knots issued in airdrop equipment maintenance

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## The Metric System and Equivalents

### *Linear Measure*

1 centimeter = 10 millimeters = .39 inch  
 1 decimeter = 10 centimeters = 3.94 inches  
 1 meter = 10 decimeters = 39.37 inches  
 1 dekameter = 10 meters = 32.8 feet  
 1 hectometer = 10 dekameters = 328.08 feet  
 1 kilometer = 10 hectometers = 3,280.8 feet

### *Weights*

1 centigram = 10 milligrams = .15 grain  
 1 decigram = 10 centigrams = 1.54 grains  
 1 gram = 10 decigrams = .035 ounce  
 1 decagram = 10 grams = .35 ounce  
 1 hectogram = 10 decagrams = 3.52 ounces  
 1 kilogram = 10 hectograms = 2.2 pounds  
 1 quintal = 100 kilograms = 220.46 pounds  
 1 metric ton = 10 quintals = 1.1 short tons

### *Liquid Measure*

1 centiliter = 10 milliliters = .34 fl. ounce  
 1 deciliter = 10 centiliters = 3.38 fl. ounces  
 1 liter = 10 deciliters = 33.81 fl. ounces  
 1 dekaliter = 10 liters = 2.64 gallons  
 1 hectoliter = 10 dekaliters = 26.42 gallons  
 1 kiloliter = 10 hectoliters = 264.18 gallons

### *Square Measure*

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch  
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches  
 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet  
 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet  
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres  
 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

### *Cubic Measure*

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch  
 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches  
 1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

## Approximate Conversion Factors

<i>To change</i>	<i>To</i>	<i>Multiply by</i>	<i>To change</i>	<i>To</i>	<i>Multiply by</i>
inches	centimeters	2.540	ounce-inches	Newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	Newton-meters	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

## Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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**PIN: 027657-007**