



# **TECHNICAL DESCRIPTION**

**Directions for use and maintenance  
of the emergency parachute**

**ATL – 88/90 – 1**

**number P – 001 – 93**

Issue No.: 12

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## List of changes

If the text of this handbook is to be changed or completed the holder will be informed about it by means of bulletins authorized by the Design organisation or EASA agency. The new (corrected) sheets became the supplement of these bulletins. The holder is obliged to inscribe the received change into the List of changes and carry out the exchange of the invalid sheets for the valid ones. The changed or completed text parts will be indicated with a perpendicular side line. Further they will be indicated on the lower border with the change number and date of the change issue.

Serial No. of the change	Chapter	Sheet numbers concerned by the change	New sheets issue date	Bulletin number where the change issued	Authorization date of the bulletin	Execution date Signature





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# CHAPTER I

## Technical description of the emergency parachute ATL-88/90-1

### 1. Purpose

The emergency parachute ATL-88/90-1 (bellow only parachute) is designed personal parachute set to equipment aeroplanes, or so as so equipment crew, if need be traveller for use in emergency.

Parachute in compliance with the requirements Technical Standard Order ETSO C23d and Aerospace Standard SAE AS 8015B.

Parachute modification has the ETSO Authorization no. EASA.210.1011 Rev.A, issued by the EASA agency on the 14<sup>th</sup> May 2008.

### 2. Technical parameters

#### a) Basic parameters

- canopy's surface 36 m<sup>2</sup>
- parachute's weight without portable bag:
  - product code 02578-1 6,5 kg
  - 02579-1 7,0 kg
  - 02580-1 7,1 kg
- diemensions of packed parachute
  - Length 560 mm
  - Width 360 mm
  - Height 90 mm
- needful force to the pulling out of the ripcord 23 to 97 N

#### b) Construction

The parachute is produced in a three sorts of construction.

#### c) Functional parameters

- vertical sinking speed at. the load G = 77 kg up to 5 m.s<sup>-1</sup>
- swivelling through 360° 8,6 s

#### d) Product's restriction

Parachute is restricted to use:

- the person's till the weight ( with equipment ) 115 kg ( 254 lb)
- to the speed in a moment open parachute 277,8 km h<sup>-1</sup> (150 kt EAS)
- minimal allowable high of the use 100 m
- at the aircraft's speed 110 km h<sup>-1</sup>
- temperatures imunity from - 40 to + 93,3 °C

Note:

The parachute showed the reliable function at the tests with the load's weight 138 kg at the speed 333,4 km.h<sup>-1</sup>.



e) Guarantee period

The guarantee period is 5 years in the case of the timely carrying out of repair and change of the worn out parts, keeping the store and transport conditions and carrying out of the regular inspection and treatment that is linked with the parachute canopy's ventilation. The guarantee period comes in force from the parachute's dispatchment day for maximum 6 months from the date of production (marked on the canopy and on the label in the parachute's pack).

The manufacturer doesn't accept the reclamation in these following cases:

- if the parachute is damaged by forcible way or the instructions mentioned in Technical description and directions for use and maintenance are not observed
- if the parachute log book is not attached to the parachutes or if the operational records are not carried out correctly.

In case of logbook loss, visual check of the parachute will be carried out by an authorized person from producer. The check will be connected with a note about the parachute condition into Protocol of parachute inspection to issue parachute logbook copy. Record will be sent to producer and on the basis of satisfactory result of such record, producer issues a new parachute logbook with a sign „DUPLICATE“.

Visual inspection may be also carried out at the producer and in such a case; the note of parachute condition is stated in Check list.

In case that the parachutes are damaged, where the character of damage (stains of unknown origin, considerable burns, shifts of thread in fabric, damaged lines, worn out straps or other signs of great damage) supposes changes of mechanical-physical conditions of materials, the organization authorized for performing maintenance carries out tests of mechanical-physical conditions of parachute materials.

Provided that the parachute will require repair, organization authorized for performing maintenance will do so on the basis of agreement with user.

f) Lifetime

The total parachute lifetime is specified for the maximum of 20 years from the production date providing the instruction specified in the Technical description and directions for use and maintenance are observed.

The total lifetime depends on the technical state of the parachute or its parts. The person authorized for performing the parachute packaging for use is obliged to check the parachute completeness and its technical state prior to its packaging for use.

If the parachute state is compliant, an authorized person will pack the parachute. The parachute eligibility for further operation is confirmed for the period of max. 365 days.

The person authorized can apply this procedure until using the total lifetime of the parachute.

In case of finding unsuitable technical state of individual parachute parts which is in breach of the regulations stated in the Technical description and

directions for use and maintenance, the parachute must be eliminated from operation, and the incompliant part must be replaced, or the parachute must be sent to an organization authorized for performing maintenance.

The organization authorized for performing maintenance will recommend the performance of potential repair work of the parachute or eliminate the parachute from operation and terminate its use.

- g) Temperatures imunity of parachute ATL - 88/90-1 is interval temperature from - 40 to + 93,3 °C and at the relative humidity corresponding to this temperatures.

The parachute can be packed before its use at the longest 365 days.

It is necessary to examine the parachute in professional way after its every use and to send to the organization authorized for performing maintenance in the case of its damage.

The results from the examination are recorded into the parachute log-book.

### **3. Function of the parachute**

After leaving of the plane the pilot puts the parachute into operation by means of the drawing out the release from the pocket positioned on the left side of the parachute harness at the pilot's breast height.

Drawing out of the ripcord downwards - from the chest to the pilot's waist - will cause an ecstasy of release's pins from the closing line's loops, the flaps of the parachute pack will release, a pilot parachute will bounce out to the air flow and it will draw out a canopy with the lines from the parachute pack. The lines will release from the rubber bands of the closing flap, will stress and the canopy will fill up with the air. The filled canopy secures a quiet descent and a safe landing.

### **4. The parachute construction (fig. 1)**

The parachute contains these main parts:

I. pilot parachute	PV - 031 - 1	1 piece
II. connecting line	SS - 054	1 piece
III. canopy	V - 070 - 2	1 piece
IV. supporting harness	PS - 041 - 1	1 piece
V. parachute peck	OP - 094 - 1	1 piece
VI. release (ripcord)	U - 048/A	1 piece
VII. portable bag	G - 59	1 piece

### **5. List of interchangeable parts**

5.1. Pilot parachute	PV - 031 -1
5.2. Connecting line	SŠ - 054
5.3. Release	U - 048/A
5.4. Portable bag	G - 59
5.5. Closing cord	l = 320 <sub>-15</sub> mm
5.6. Rubber band	2 x 3/8"
5.7. Back padding	P - 022
5.8. Back padding	P - 026
5.9. Back padding	P - 028

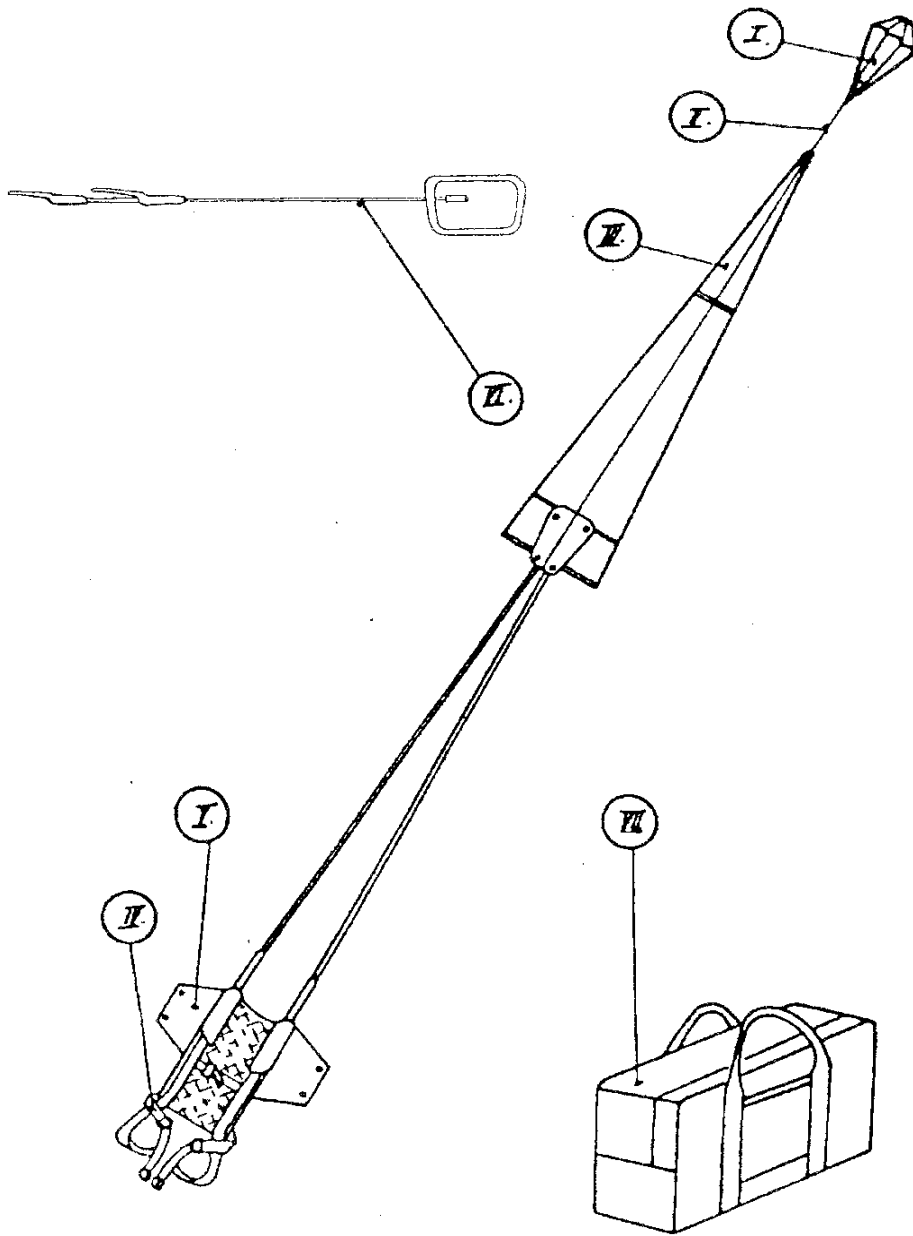


fig.1

## 6. Technical description of the parachute

### 6.1. Pilot parachute PV - 031 - 1 (fig. 2)

It is assigned for the canopy's drawing with the lines out of the parachute's pack. The canopy's base (1) of the pilot parachute is made from polyamide fabric UTT 38866.

The section (2) in the shape of triangular is made front polyamide clothing tulle - rough, business item 01200310300. The pilot parachute is reinforced with the edgings (3) that create a bridle (4) in the bottom part. A steel spring of the cylindrical shape (5) is sewn in the pilot parachute. In upper part of the pilot parachute and at the place of the spring's connection there are the edging loops sewn with brass rings (6) assigned for the passing through of the closing line and so for the folding and fastening of the pilot parachute in the parachute's pack.

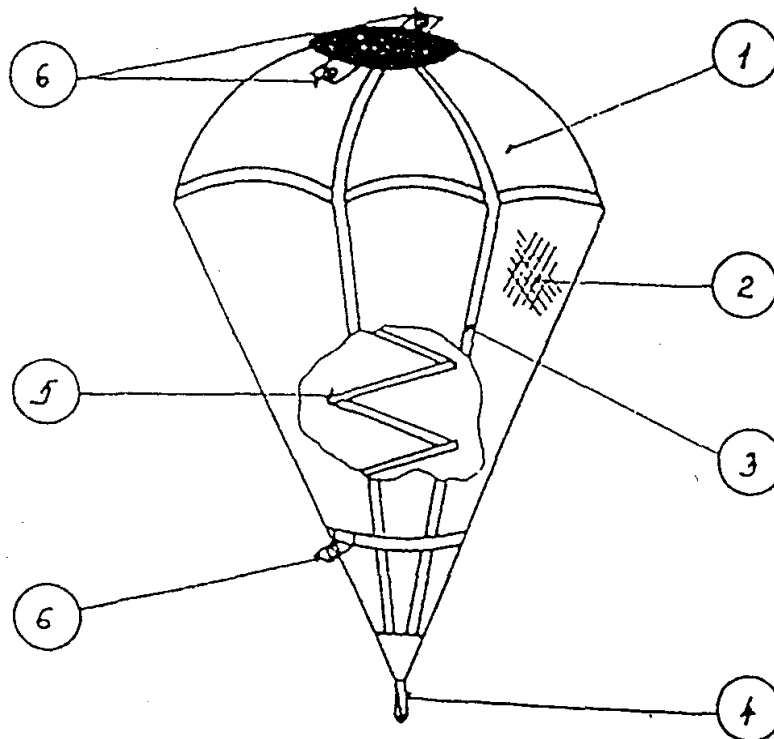


fig.2

## 6.2. The connecting line SŠ - 054 (fig. 3)

The connecting line connects the pilot parachute with the pole lines of the main parachute canopy. The connection line is made of polyamide stitchbounded fabric whose length is 2000 mm. Both ends of the connecting line are fitted with the loops for the connection of the pilot parachute with the canopy.

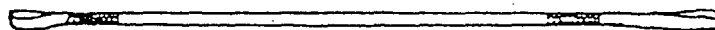


fig.3

## 6.3. The canopy V - 070 - 2 (fig. 4)

The canopy (1) with the surface  $36 \text{ m}^2$  is made of the polyamide fabric UTT 38866 and UTT 38960 and it consists of, 20 gores.

The canopy's construction is reinforced with 13 mm edgings - supporting (2) and circular (3), (4) and (5).

The bottom edge (6) and the pole whole's edge (7) are reinforced with the edgings 25 mm. The pole hole is stiffened with the pole lines (8).

In the back canopy's part two gores (9) are filled partly with the polyamide tulle -soft, business item 01200210300, securing stability, forward speed and parachute's controllability.

20 suspension lines (10) are attached to the canopy whose length is 5000 mm and minimal strength 2.600 N. In the bottom part the red control lines (11) are connected to the lines number 3 and 18. The suspension, lines are stowed during the packaging to the rubber bands  $2 \times \frac{3}{8}$ " of the closing flap (12) that is sewn on the bottom canopy's edge near the suspension line number 11. The suspension lines No. 1 and 20 are fitted with coloured marking (13) near the bottom edge and near the loose ends of the supporting harness for the easier canopy's pleating.

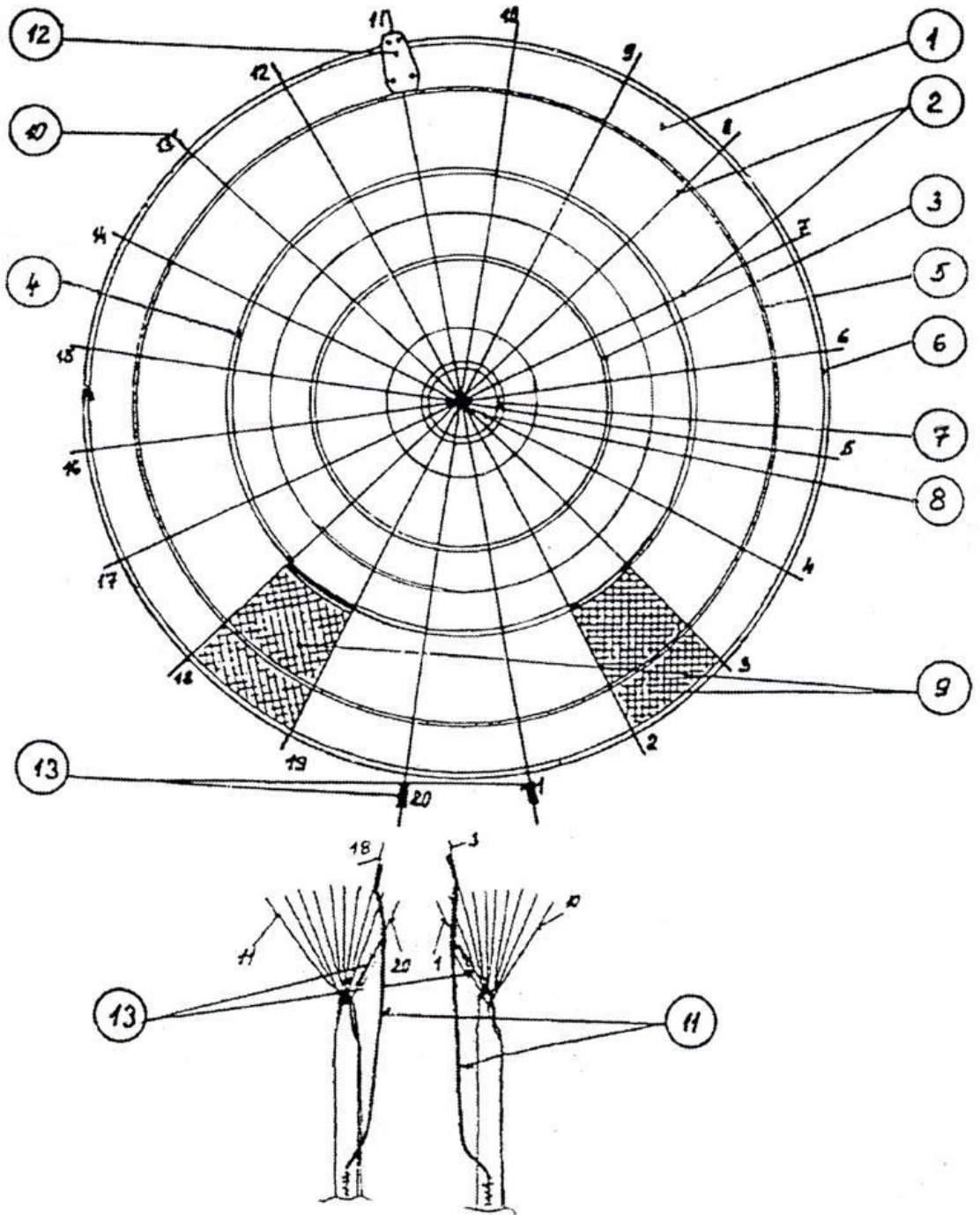


fig. 4

#### 6.4. Supporting harness PS - 041 - 1

#### 6.5. Parachute pack OP - 094 - 1

The supporting harness with the parachute pack creates one unit (fig. 5).

The supporting harness serves for the parachute's connection to the pilot's body and for the distribution of dynamical shock. The supporting harness is made of polyamide webbing of minimal tensile strength 14.700 N. It consists of two main straps - left (1) and right (2) and chest (4) and strap of the loins (3). The main straps are strengthened with the edgings (5) whose width is 43 mm, in the shoulder part they pass into the loose ends (6) and from them into the back webbings (7) that are folded and stitched over the webbing of the loins (3). Transition strength of the main webbing to the loose end is secured with the steel oval loops (8). The breast webbing (4) is sewn in the chest part of the left main webbing. Over it the webbing loop (9) is sewn in for the release guiding. Under the chest webbing there is the pocket (10) created for the placing of the release's handle. In the right main webbing the tightening clasp (11) is sewn into the chest part, it is assigned for the passing through of the chest webbing' and so for the supporting harness' clamping in the chest part. Hook and loop fasteners (12) that are designed for the settings of the supporting harness' length are sewn on the both main webbings. The loose ends are fitted with loops (13) for the canopy's lines connection. The webbing of the loins is fitted with clasps (14) on both ends that are assigned for the tightening of the supporting harness to the pilot's body. The hole serving for the passing through of the main webbings is created between two wrappings (15) on the every ends of the webbing of the loins. The parachute pack is designed for the stowing of the canopy with lines, connection line and pilot parachute.



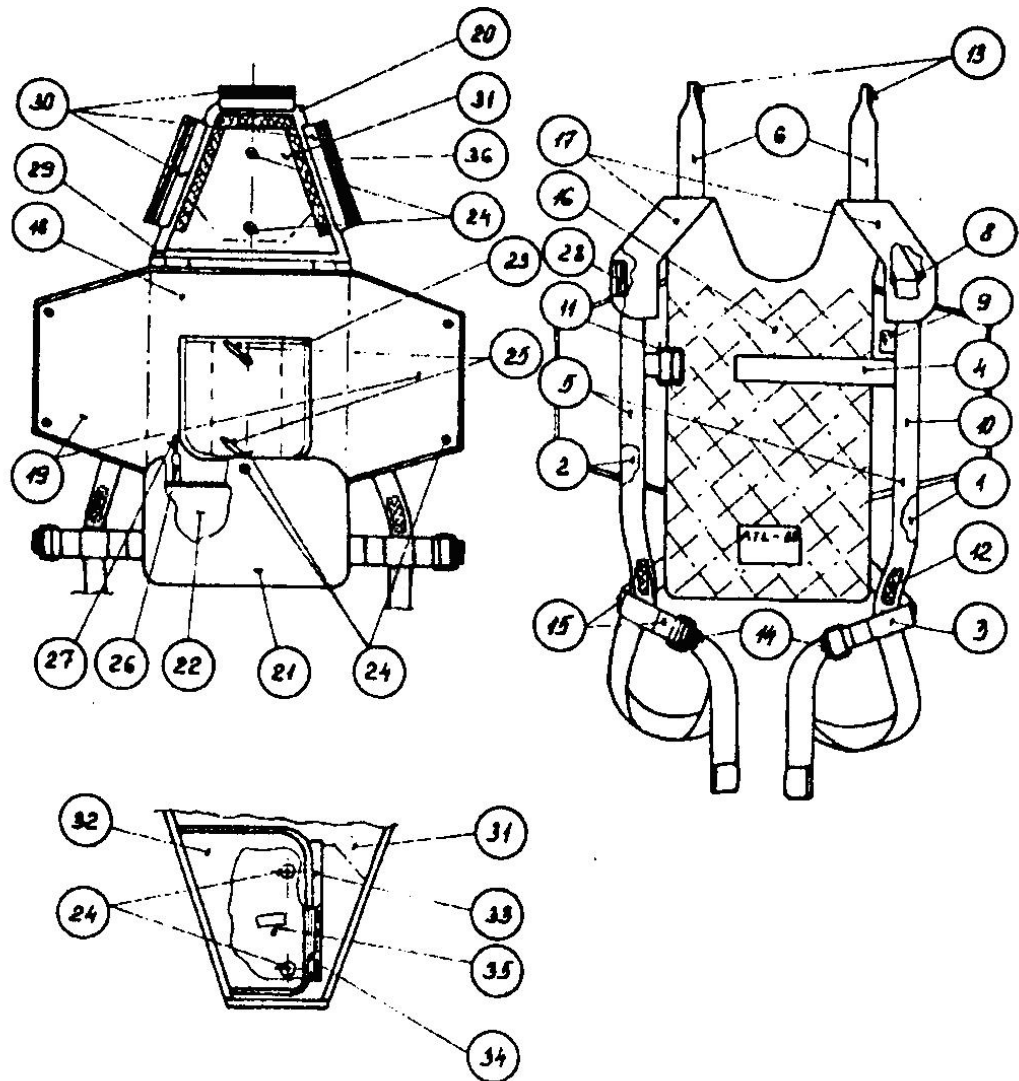


fig. 5

The parachute pack is made of polyamide or polyester fabric in the shape of envelope. To the main parts belong: the back pad (16), that passes into two shoulder upholstered bands (17); the centric part of the parachute pack (13) with the side flaps (19), the upper flap (20) and the bottom flap (21).

The centric part of the parachute pack (18) with the aide flaps (19) is sewn in the other side of the upholstered part creating the bottom of the parachute pack (22). The packing flap (23) serving for the separation of the pilot parachute from the canopy is sewn on the centric part. The centric part is fitted next with two rings (24) through them the closing line (25) is passed. The closing line is assigned for the notion demarcation and for pilot parachute's folding and for closing of the parachute pack. Both side flaps are fitted also with the rings (24). Into the bottom edge of the centric part there are two webbings (26) sewn in passed through the rubber bands  $2 \times \frac{3}{8}$ " (27) that are assigned for the clamping of the suspension lines to the parachute pack. The lower flap has knocked a ring (24) in the upper part. The upper flap is of the triangulated shape and it changes into the upper parts of the shoulder-upholstered bands. Along the inside perimeter the flap is stitched through shoulder-upholstered bands of the back pad. The outside connection is secured with the help of the hook and loop fasteners (28). The upper flap consists of two main parts: the outside flap (29) fitted with the webbings with the hook and loop fasteners (30) and the inside flap (31) on that the covering flap (32) is sewn in that overlaps the opening mechanism of the parachute pack. The flap is fitted with the hook end loop fasteners (33) that connects into the hook and loop fastener (34) on the inside flap. The opening mechanism consists of two rings (24) through them the closing line passed during the packaging of the pack and it is secured by means of the release's pins.

Another edging (35) that serves for the release's connection is sewn into the inside flap. The hook and loop fasteners (36) are sewn into internal side of the flap (31) to the hook and loop fastener (36) will be connected the hook and loop fastener (30) of the outside flap and so both flaps are connected.

#### 6.6. Release U – 048/A (fig. 6)

The release is assigned for the closing and opening of the parachute pack. It consists of the handle (1), the steel cable (2), two pins (3), and a cable-atop (4).

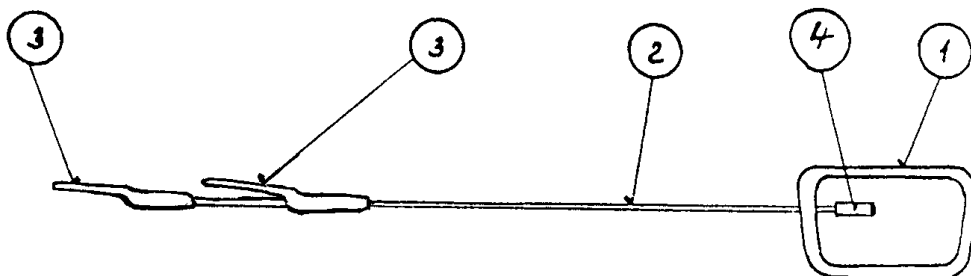


fig. 6

### 6.7. Portable bag G - 59 (fig. 7)

The portable bag is assigned for the parachute's placing at the storage and at the transport. It is made of the polyamide canvas it is in the shape of the right parallelepiped with dimensions 640 x 400 x 230 mm. In the upper part of the bag the zip fastener (1) is sewn in for the bag's closing. The portable bag has two handles (2) and on the lateral side the sewn-in pocket (3) that is closed with the help of hook and Loop fastener (4). The pocket serves for the placing of the parachute log-book and for the spare parts.

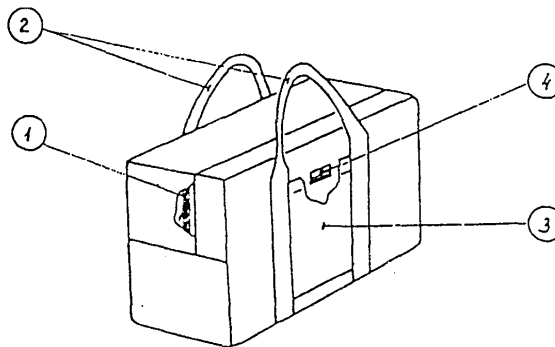


fig. 7

## CHAPTER II

### Instructions for the parachute's packaging

#### 1. General instructions

- 1.1. Only the person entitled to the parachutes' packaging carries out the parachute's packaging.
- 1.2. Before the packaging it is necessary to carry out the inspection of the technical state and entirety of the parachute.
- 1.3. The damaged functional parts are necessary to change or to repair.
- 1.4. The parachute's repair will be carried out according to the Technical conditions for the repair No. 0-1-93 of the parachute ATL-88/90-1.
- 1.5. The change of the parts and the repairs are written into the parachute log-book.
- 1.6. For the sealing of the ripcord's pins will be used green thread with the strength 4,5 to 7,5 N.
- 1.7. For the sealing of the portable bag's closing will be used red thread with the strength 49 to 68,8 N.
- 1.8. During the parachute's packaging we recommend not to expose the canopy to direct solar radiation.

## **2. Inspection of the parachute before the packaging**

2.1. The inspection will be carried out in this sequence:

- pilot parachute
- connection line
- canopy with the lines
- supporting harness
- parachute pack
- release
- portable bag

### 2.1.1. Inspection of the pilot parachute

Check the damage of the fabric, webbings, seams and metal rings on the webbings. If the spring is enough deformed or broken the pilot chute will be replaced.

It is checked a stitching of webbings with sleeves to spring and their location in the middle of spring basis.

### 2.1.2. Inspection of the connection line

The damage of the webbing and the sewing is inspected.

### 2.1.3. Inspection of the canopy

The canopy is inspected at the stretching state, the best against light. The damage of the fabric, webbings and seams is inspected. After the inspection even the suspension and control lines are rechecked.

### 2.1.4. Inspection of the supporting harness

At the supporting harness an entirety of the straps and sewing, the ripcord's pocket, state and function of the buckles is inspected.

### 2.1.5. Inspection of the parachute pack

The damage of the fabric, webbings and reinforced bands, state of the metal ring's are inspected. The special attention must be givers to the closing line - if it is damaged it is necessary exchange it.

### 2.1.6. Inspection of the release

The state of the release - release's cable, lock and the pins (pressing, rust, notches) are inspected.

The damaged release will be replaced.

### 2.1.7. Inspection of the portable bag

Check the damage of the fabric (stains), handles' webbings and zip fastener's state.

## 2.2. The replacement of the damaged parts

In operation it is allowed to exchange the parts mentioned in Chapter I., par. 5.

### 3. Packing aids

3.1. The parachute's packaging carries out on the packing table or on the army packing table.

3.2. For the parachute's packaging it is necessary to use two accessory packaging lines of the length approx. 1 m and several weights.

### 4. Packaging of the parachute

The parachute's packaging is carried out by one person.

After the packaging of the parachute the man will write records into the parachute log-book.

Process of packaging:

- 4.1. Preparation for packaging
- 4.2. Canopy pleating
- 4.3. Inspection of the canopy and lines
- 4.4. The lines' stowing into the locking flap
- 4.5. Inspection of the lines' stowing
- 4.6. Canopy pleating into the parachute pack
- 4.7. Pilot chute's pleating and closing of the parachute pack
- 4.8. Inspection of the packed parachute

#### 4.1. Preparation for packing

The parachute will be spreaded on the packing table. The lines of the pole vent will be fixed at the packing table's end, canopy and suspension lines will be straighten along the whole length. The pilot chute will be put along the canopy. The supporting harness with the parachute pack will be put upwards with the parachute pack, the canopy will be divided in two so that the lines No. 1 ÷ 10 laid to the right and the lines No.11 ÷ 20 to the left (fig. 8). Thread the wire of the release device with needles through the tube connecting the supporting harness and the parachute packing then thread the wire through the border trimming on the inside flap of the parachute packing.

The release's handle will put in to the pocket on the supporting harness and will secured by means of the hook and loop fasteners.

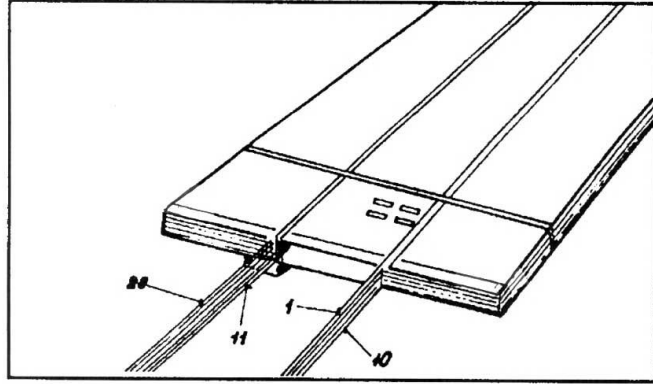


fig. 8

#### 4.2. Canopy pleating

The left half of the canopy is folded on the right side (fig. 9). The line No. 12 will put on the line No. 11, the gore along these lines will pleat in two and along the whole length will levelled (fig. 10).

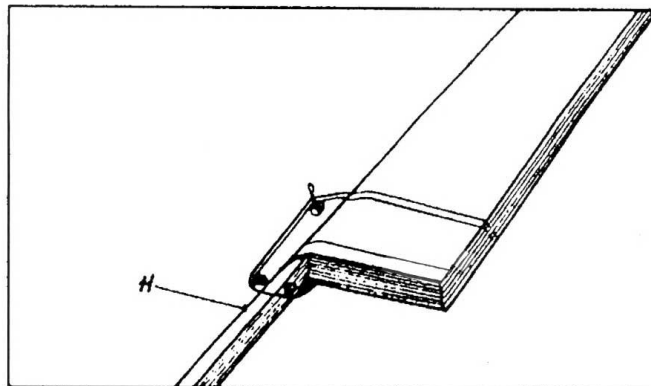


fig. 9

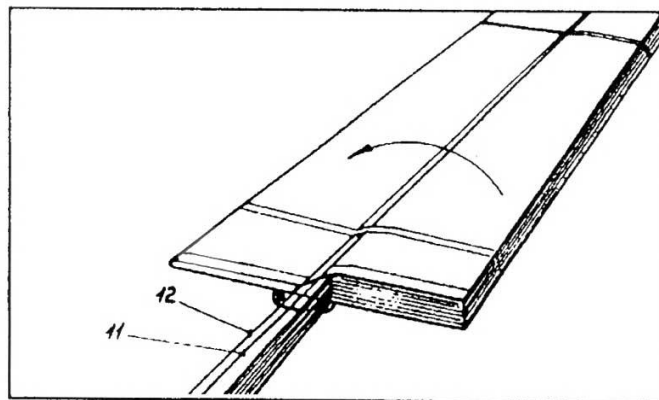


fig. 10

In this way the whole left canopy's half up to line No.20 will be pleated (fig. 11).

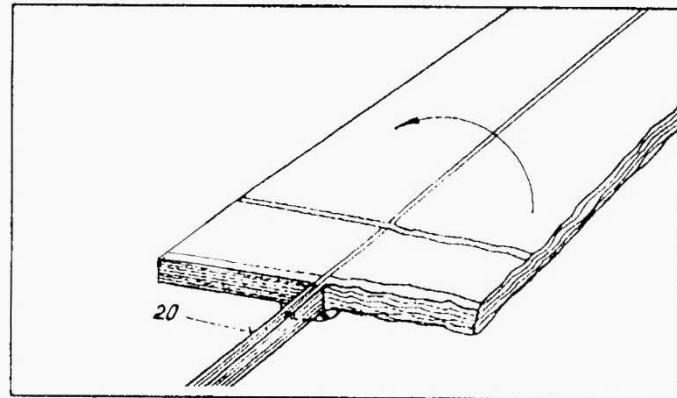


fig. 11

The unfolded right half of the canopy is placed on the left pleated half and is levelled in the same way as the left half (fig. 12). The gore between lines No.1 and 20 is placed on the left side (fig. 13).

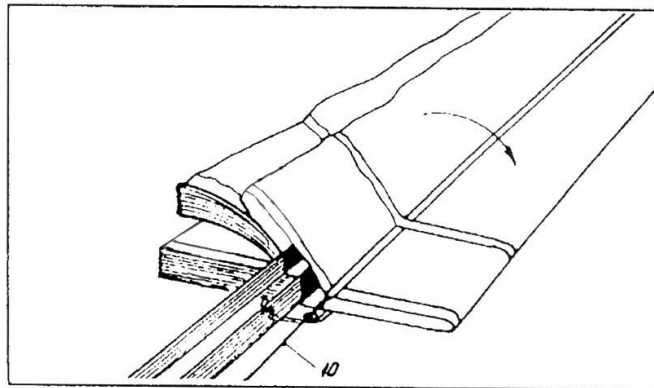


fig. 12

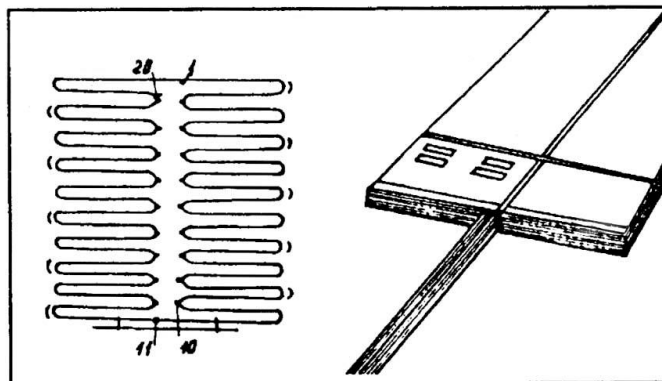


fig. 13

The canopy is folded at the bottom end from lines at a 45° angle (fig. 14a), the left and the right half of the canopy is folded in two (fig. 14b).

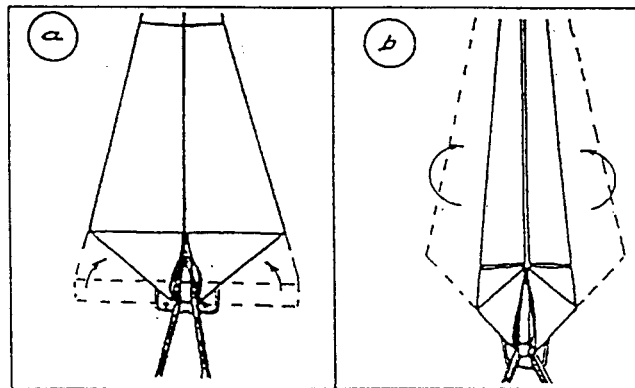


fig. 14

In this way packed canopy is folder into thirds so that first the right side of the canopy is put and on it then the left side of the canopy, the canopy is loader with the weights (fig. 15).

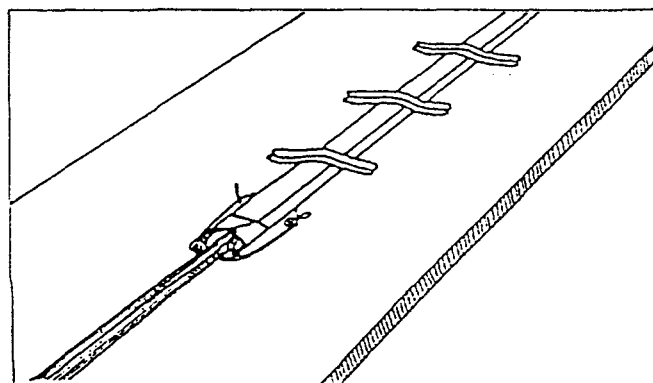


fig. 15



### 4.3. Inspection of canopy and lines

The packer grasps the lines No.1 and 20 (at the canopy and at the loose ends with red mark), lifts up them and goes from the canopy to the loose ends of, the supporting harness. In this way he checks the looseness of the lines from the canopy's edge up to free ends of the supporting harness (fig. 16).

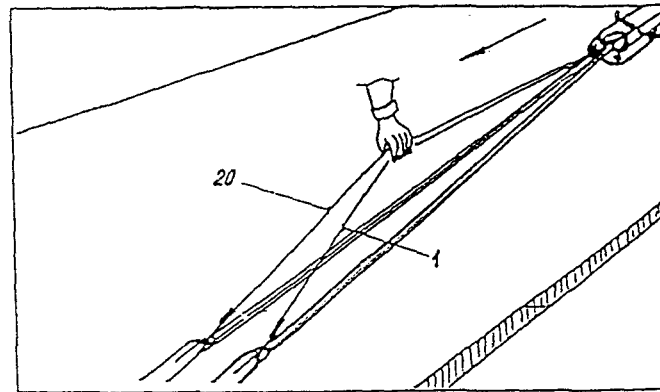


fig 16

### 4.4. Lines' stowing to closing flap

The suspension, lines will be grasped near the bottom edge of the canopy and the bottom part of the canopy is folded so that the closing flap was folded in a half. The rubber bands connected in the bottom part of the closing flap on all sides of the folded canopy will pass through metal rings in the upper part of the closing flap and the suspension lines are stowed step by step into all rubber bands placed in the bottom part of the closing flap (fig. 17a, b and 18).

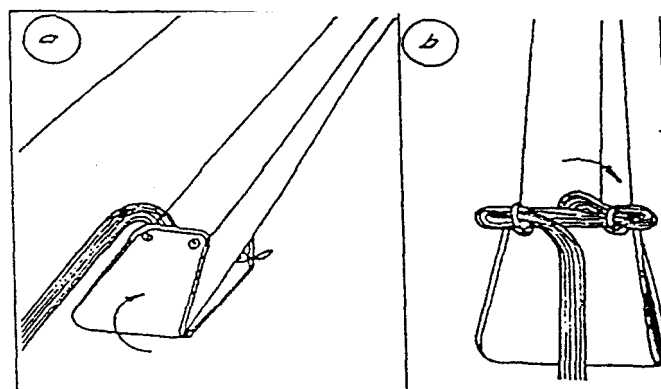


fig. 17

The loops' length behind the rubber bands is 30 - 50 mm.  
The lines should not be twisted.  
During the lines' stowing the parachute pack is drawn towards the canopy.

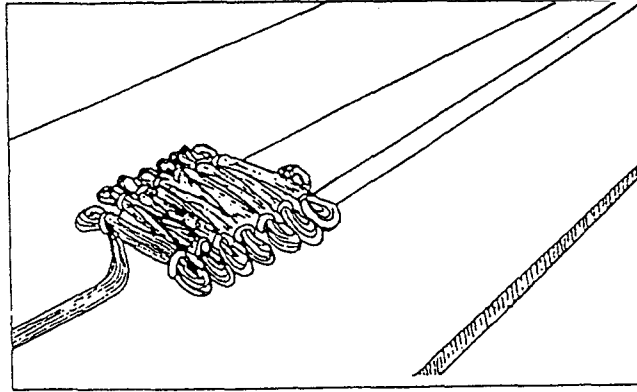


fig. 18

#### 4.5. Checking of stowed lines

The packer visually checks the lines for proper storing.

#### 4.6. Canopy's stowing into parachute Pack

The loose ends of the supporting harness are folded into the parachute pack and the lines at free ends are passed through the rubber bands on the bottom of the parachute pack. The auxiliary packing lines will be passed through the loops of the closing line (fig. 19). The lower edge of the canopy with stowed lines is stowed on the left side of the lower edge of the parachute pack's bottom under lower flap of the parachute pack (fig. 20).

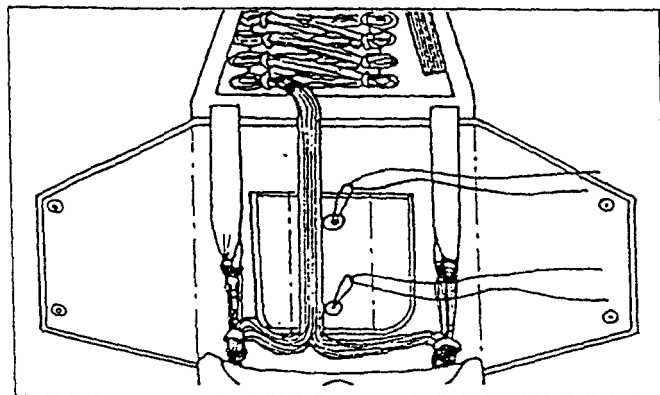


fig. 19

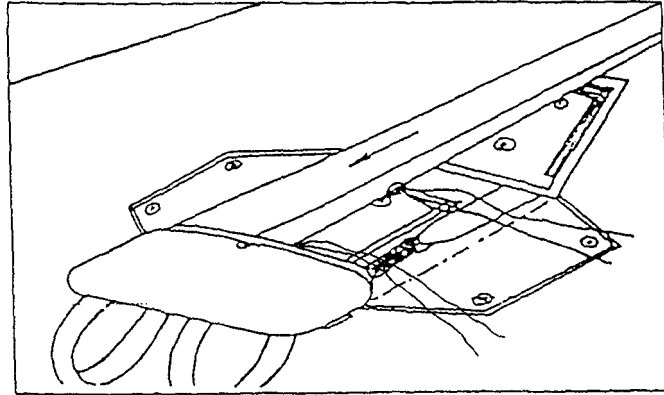


fig. 20

Further is following: the folded canopy in the puckered way will stow under the lower flap up to right side of the parachute pack and then it is guided in the whole length of the parachute pack, is folded in the pack's corner, the folding goes on in the parachute pack's width, is folded again in the corner and along the parachute pack's length it is pleated in the direction of the lower flap.

The upper edge of the canopy with the pole lines is bent and connection line is stowed in the puckered way into place between loops of the closing line (fig. 21). The auxiliary packing line will pass through the ring in the lower flap.

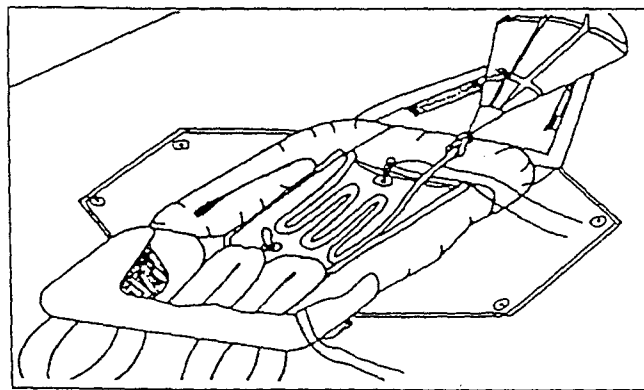


fig. 21

#### 4.7. Stowing of pilot parachute and closing of parachute pack

The pilot parachute with gore in the shape of triangular is put on the folded connection line and the auxiliary packing lines are passed through the edgings and rings. The pilot parachute's spring is pressed down and fabric of its canopy is stowed in the direction of in along the individual spring coils (it should not be stowed below or above the pressed down spring) (fig. 22, 23).

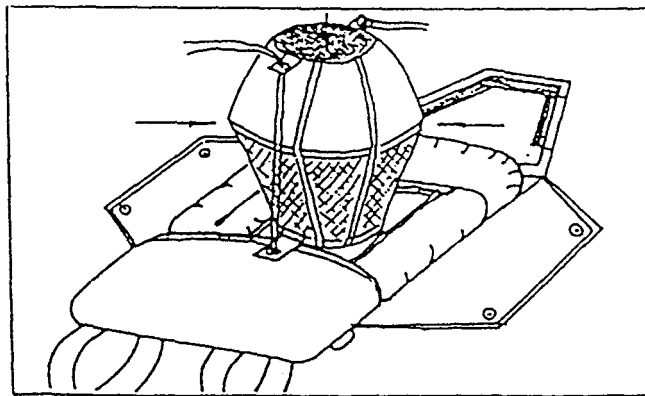


fig. 22

The packer holds by the left hand the pressed-down pilot parachute and by the right hand he puts the right side flap over the pilot parachute and passes the auxiliary packing line through the rings. In the same way he goes on with the left side flap (fig. 24).

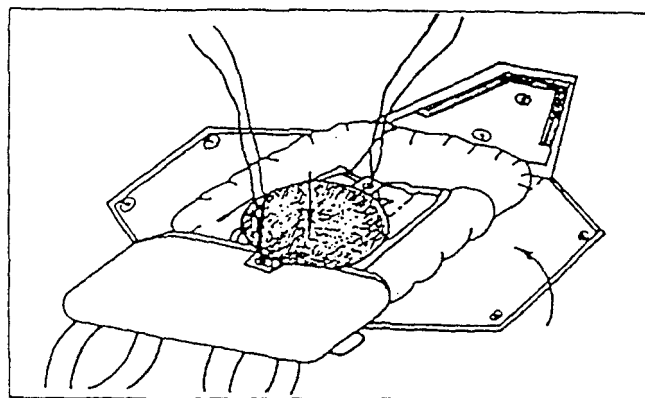


fig. 23

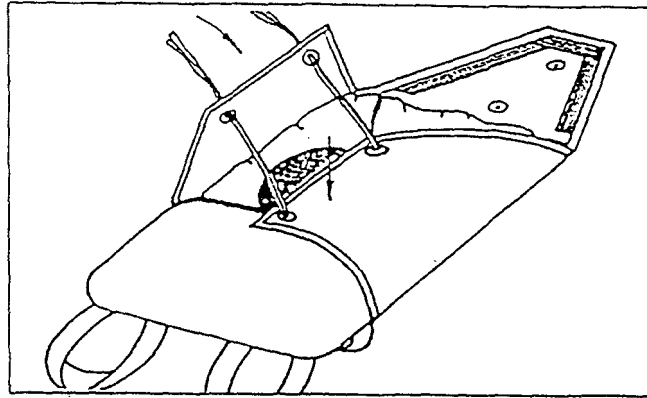


fig. 24

The auxiliary packing lines are passed through the rings in the inside flap of the upper parachute pack's flap, the upper flap is put on the side flaps. By pulling out of the auxiliary packing lines the loops of the closing line in that the ripcord's pins are inserted, are drawn out and so the parachute pack is closed. The auxiliary packing lines are pulled down below the ripcord's pins and they are pulled out from below of pins (closing lines should not be damaged) (fig. 25).

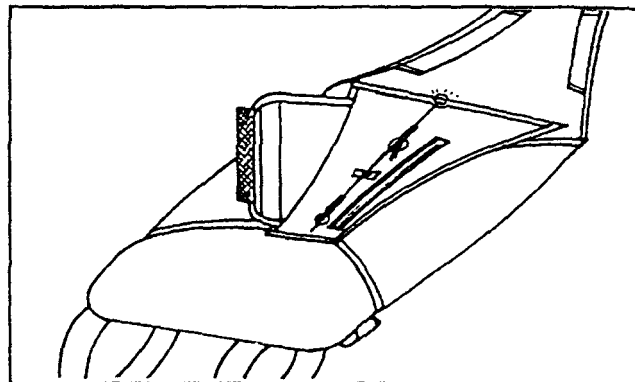


fig. 25

#### 4.8. Inspection of packed parachute

The packer checks the packed parachute and secures with green sealed thread of 4,5 - 7,5 N tensile strength both pins of ripcord.

String the thread through the eyelet of the locking rope and beyond the needle part forcing. Bind the string ends with three knots.

At a distance 20 to 30 mm from the: knots the threads' ends are knotted together and the knot is secured with paper sticky tape (fig. 26).

The sticky tape is marked with the date of the packaging and signature of the packer.

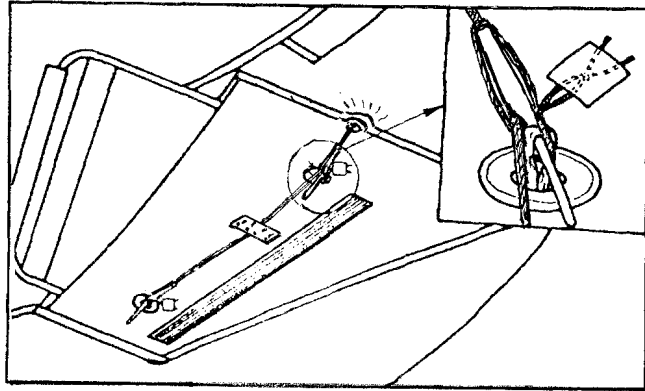


fig. 26

The closing mechanism is overlapped with the covering flap by means of the hook and loop fastener and the divided upper flaps closed with hook and loop fasteners from three sides.

The parachute's packaging is finished (fig. 27).

The packer makes a record about the packaging into the parachute log-book and signs it.

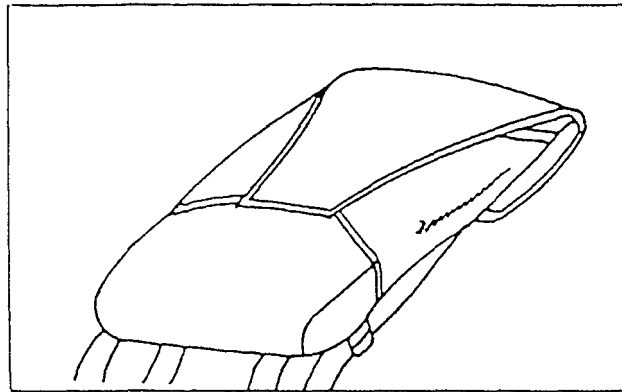


fig. 27

## **CHAPTER III**

### **Instructions for use of parachute.**

#### **1. Preparation of parachute before flight**

The pilot checks the position of release ripcord pins in the loops of closing line, date of parachute packaging and makes sure that the seal thread is intact. Then he checks the state and functionality of metal parts of the parachute. The pilot puts on the parachute and adjusts the straps' length using the harness buckles.

#### **2. Opening of parachute**

Refer to Chapter I, par. 3 - Parachute's function.

After using (opening) of the parachute must be carried out the professional inspect of the parachute.

The damaged parachute is sent to the organization authorized for performing maintenance for repair.

# CHAPTER IV

## Storage and transportation of parachute

### 1. Preparation of parachute for storage

Prior to storage the parachute should be ventilated, inspected, repaired and faulty components replaced. The parachute is stored packed in portable bag (for 365 days from last packing) or unpacked.

The unwrapped canopy is assembled by gores, the left half is foiled over the right half and the canopy is rolled up from the apex to the lower edge. The suspension lines are chain-braided. The parachute is stowed in portable bag so that the back pad of the parachute pack with registration number faced up. The parachute log-book is stored into the pocket on the portable bag.

### 2. Storage of parachute

The parachute is stored in shelves in dry, dark and air-conditioned room. The distance of the bottom shelf from the floor should be at least 0,15 m, distance of the shelf from wall at least 0,5 m and min. 1m from a heater. If the parachute is stored for a long time, it should be ventilated for 24 hours at least once in 365 days. The parachute is ventilated in a shaded place. It should not be exposed to strong sun light.

The date of ventilation should be entered in the parachute log-book.

Rooms for storing of the parachutes should be free from oils, acids, diluents and other chemicals and metal objects not pertaining to the parachute. The following conditions should be observed in the storing room:

daily temperature	+ 14 to +
24 °C	
daily relative humidity	35 to 73 %

### 3. Transportation of parachute

3.1. The parachutes in operational conditions are transported in portable bags aboard the plane or in covered (canvassed) trucks.

3.2. In other cases the parachutes are transported unpacked in portable bags stowed in cardboards, boxes, transport cases or containers. The containers should have smooth and clean interior. Wall should be lined with wrapping paper.

3.3. The parachute stowed in cardboards, boxes or containers should be transported in covered transportation means.

3.4. The special conditions of parachutes' transportation should be specified in special order.



# CHAPTER V

## Parachute's repair at the user

### **1. The authorized person from producer can carry out the following repairs:**

- 1.1. Sewing of the patches on the fabric, edgings, webbings
- 1.2. Complementary stitches on the damaged sewing
- 1.3. Replacement of hooks and loop fasteners and rings

#### 1.1. Sewing of the patches on the fabric, edgings, webbings

a) sewing of the patches on fabric (referring to all parts of the parachute):

- repair of the damaged fabric (fracture, burn) is carried out with the sewing of one- sided or two-sided patch on the injured place from the same kind of material as the damaged material is
- the patches can be in the shape of square or rectangular and after sewing the minimal dimensions 30x30 mm or 30 x 60 mm, max. allowable dimension after sewing 250x250 mm
- stitched patch mustn't deform the basic fabric
- stitched patch must overlap the twice greater surface than the damaged part is. The warp and weft direction of the patch must agree with the warp and weft direction of the basic material
- if the damage is in the direction that is shorter than 20 mm from the stitch the patch for the repair must be sewn into the stitch (scheme No. 1)
- sewing of the patch with cutting out (scheme No. 2)
- the ending of patch's sewing must overlap min. 20 mm over the begin of the patch's sewing at the patch sewn-in stitch (scheme 1) the stitch's interruption must be reinforced with the stitching in length min. 75 mm in every side
- by sewing the two-sided patch (scheme 3) at first the patch from the inner side is sewn with the folding of the patch's edges' min 10 mm
- after sewing from the inner side the patch is sewn from outside. The patch's edges are folded min 10 mm. The outside patch should be have the dimensions about 15 mm greater than the inside patch
- the patches are sewn with sewing threads BONDED/VENUS No. 40
- the number of patches is not limited; Decision on number of patches is left to the body carrying out repairs and to the body carrying out the use certification
- if there are too much patches in one place or if the damage is greater than 1/3 of gore's surface it is necessary to send the parachute for the repair
- the one-sided patch can be sewn by hand
- only the patches from outsider are sewn on the parachute pack

b) stitching of the patch on the webbings and edgings (referring to all parts of parachute) scheme No. 4:

- repair of the damaged edgings (fracture, burn, etc.) is carried out with stitching of the patch from the same kind of material
- min. length of the patch after stitching must be 100 mm, its max. length 250 mm
- the sewn-in patch must overlap min 50 mm into every side of damaged part
- the sewn-in patch must not deform stitched basic edgings
- the patch is sewn in the face, if it is not possible to sew the patch at allowable dimensions, the parachute will send to the repair
- the patch's sewing will carry out by stitching with the single- or double-needle sewing machine. The edgings' ends are folded 10 ÷ 20 mm. The ending of patch's sewing must overlap 75 mm over the patch:
- it is permitted to sew the patch by hand
- the number of patches is not limited; Decision on number of patches is left to the body carrying out repairs and to the body carrying out the use certification
- if there are greater number of the patches it is necessary to change the damaged parachute. The parachute will send to the repair,
- the patches stitching is carried out with sewing threads BONDED/VENUS No. 40.

### 1.2. Complementary stitches on damaged sewing, scheme No.5

- the interrupted stitch (breakage) is corrected with the complementary stitch
- the complementary stitch must overlap min 75 mm into every side from the damaged place
- the complementary stitches are carried out with sewing threads BONDED/VENUS No. 40

### 1.3. Replacement of the book and loop fastener and rings

- the damaged, teared or separated hook and loop fasteners will be replaced, the new one must be of the same length as the origin, The stitching is carried out with sewing threads BONDED/VENUS No. 40
- the damaged, feared out or absented rings will replace with stringing of the new ring of the same kind, If the fabric is teared in the position of the ring the two-sided patch is stitched before the striking,
- the damaged or broken rubber bands will replace with new bands of the same size.

## 2. Number of stitches by the sewing at individual kinds of threads

- sewing threads BONDED/VENUS No. 60    30 - 35 stitches in 100 mm
- sewing threads BONDED/VENUS No. 40    25 - 30 stitches in 100 mm
- at lattice stitch    30 -  
35 steps in 100 mm

**List of material for the parachute's repair, mechanical – physical properties of materials**

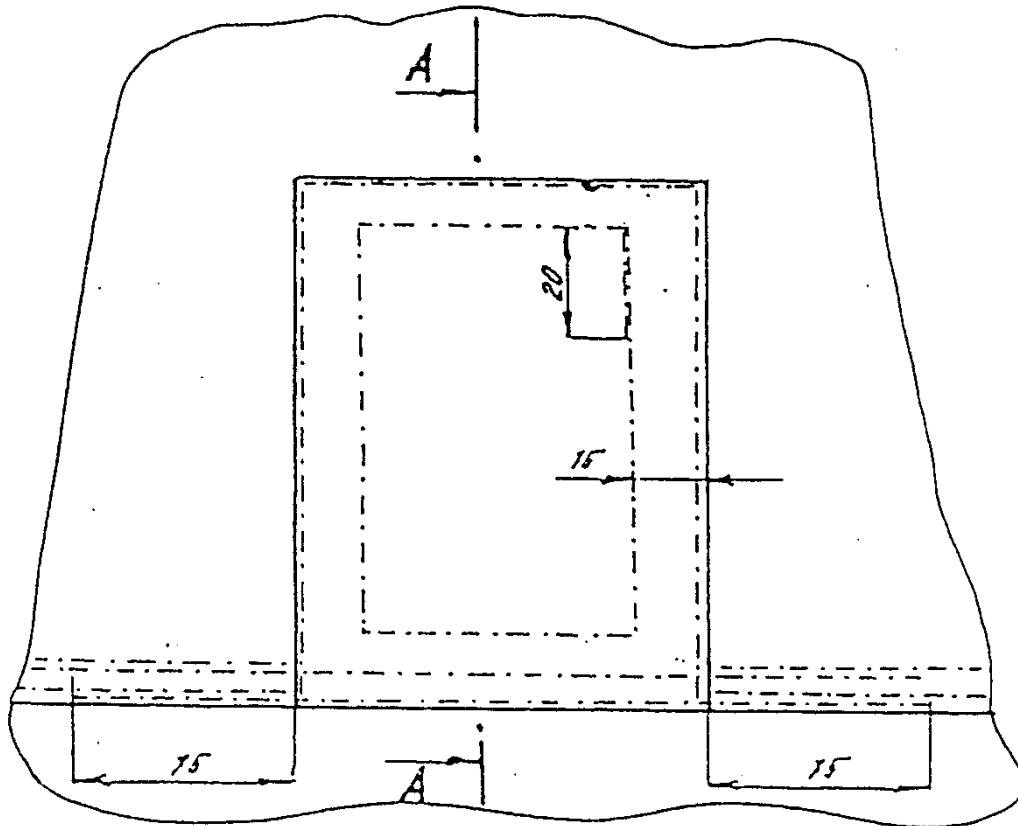
	Manufacturer business item	Standard	Strength (N) warp/weft	Elong (%) warp/weft	Air perm. (l)	
					aver.	max.
1.	Upper material					
	UTT 38866	05100410160	Instruction QS 03/02, PIA-C-44378	400/325	20till40/20till40	- 15
	UTT 38960	05100710120	Instruction QS 03/02, MIL-C-7020	370/370	20till30/20till30	200till 300 -
	UZARON UNI ZA 1 PRINT	01300100140	PN 012823/051/80/80	1800/1750	44till63/37till54	-
2.	Lining and trimming					
	Harness PAD	02200770044	PN 45192162/037/80/92	14.700	38	
	Harness PAD 9886-1	06200800044	Instruction QS 03/02, MIL-W-4088	27.500	65	
	Webbing PAD 13 mm	02100210013	PN 45192162/037/80/92	700	30	
	Webbing PAD 15 mm	02100410015	PN 45192162/037/80/92	1.100	30	
	Webbing PAD 20 mm	02100870020	PN 45192162/037/80/92	500	30	
	Webbing PAD 25 mm	02100310025	PN 45192162/037/80/92	2.000	40	
	Webbing PAD 43 mm	02100669043	PN 45192162/037/80/92	5.000	40	
	Hook and loop lower	02400270020	PN 44569599-028/80/04			
	Hook and loop upper	02400170020	PN 44569599-028/80/04			
	Support harness – vesicle	02201410015	PN 45192182/037/80/92	6.500	30	
	Sew. threads BONDED No.10	02600400010	-	195	22 till 30	
	Sew. threads BONDED/VENUS No. 60	02600400060	-	30	14 till 26	
	Sew. threads BONDED/VENUS No. 40	02600400040	-	44	14 till 28	
	Sew. threads PES-SYNTON No.40	02600770040	-	42	16,5 till 21	
3.	Metal					
	Bushing brass S 7690-0	07320000000	-			
	Bushing stainless S 7690 SS 0L	07320200000	-			

Note for table: PAD = polyamid

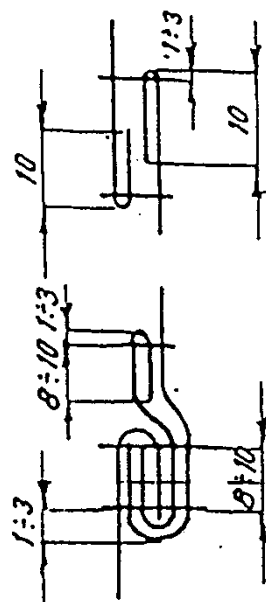
For repair of parachute can be used similar material whose mechanical - physical values corresponding with in table mentioned materials

Scheme No. 1

### THE PATCH IN SEAM



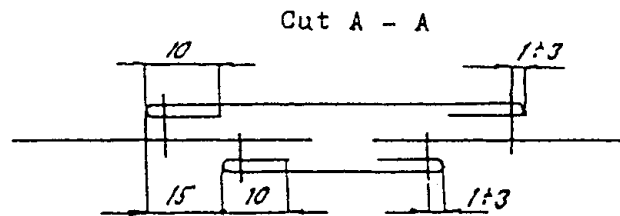
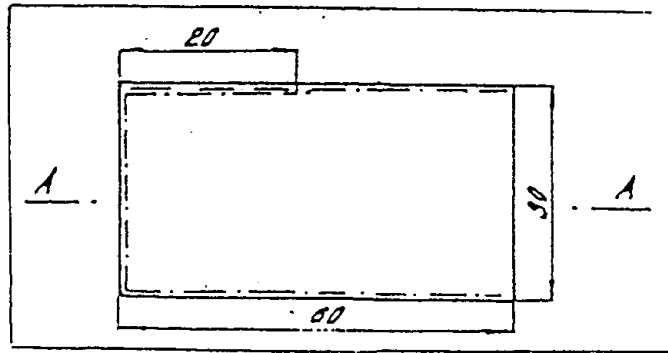
Cut A - A



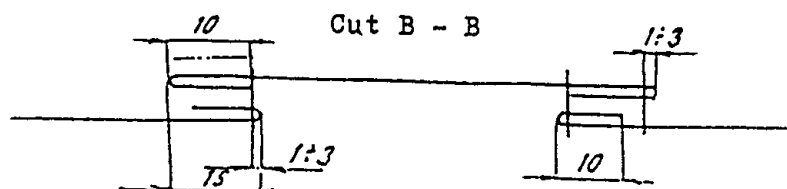
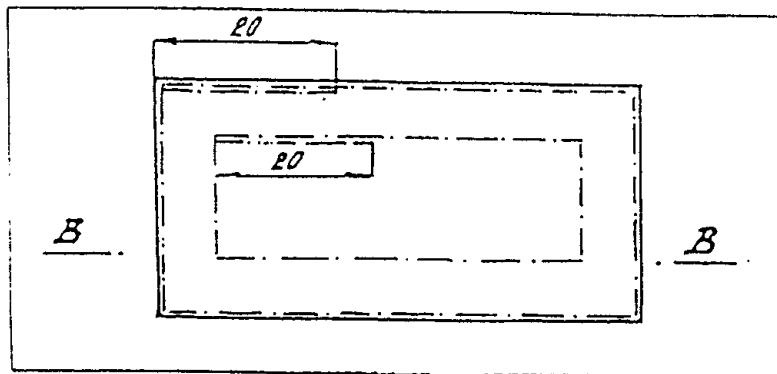
Scheme No. 2

### DOUBLE PATCH WITHOUT FABRIC'S CUTTING OUT

DOUBLE PATCH WITHOUT FABRIC'S CUTTING OUT



PATCH WITH CUTTING OUT OF DAMAGED FABRIC

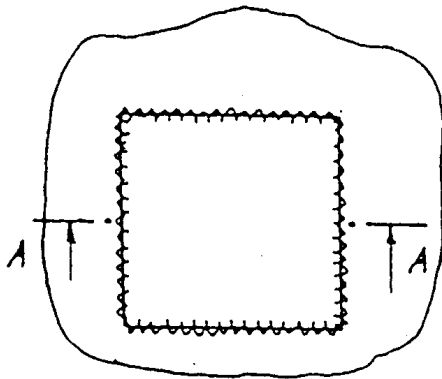


Scheme No. 3

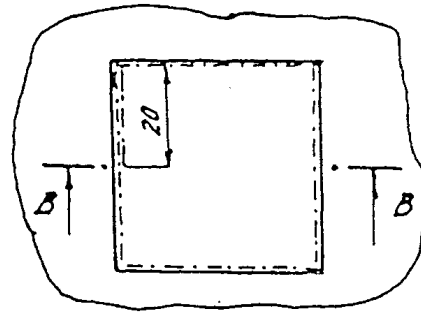
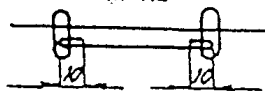
PATCH SEWN-IN BY HAND

PATCH SEWN-IN BY MACHINE

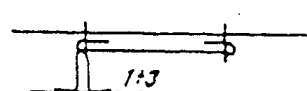
one-sided patches



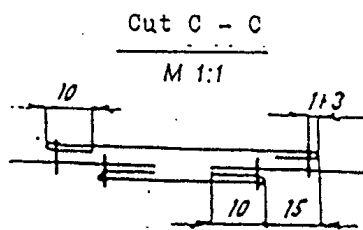
Cut A — A  
M 1:2



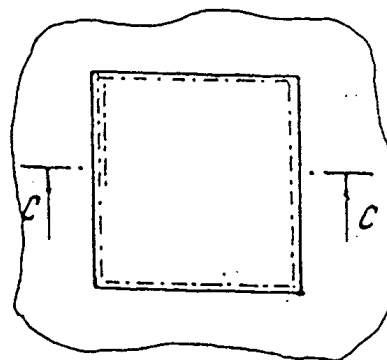
Cut B — B  
M 1:2



two-sided patches

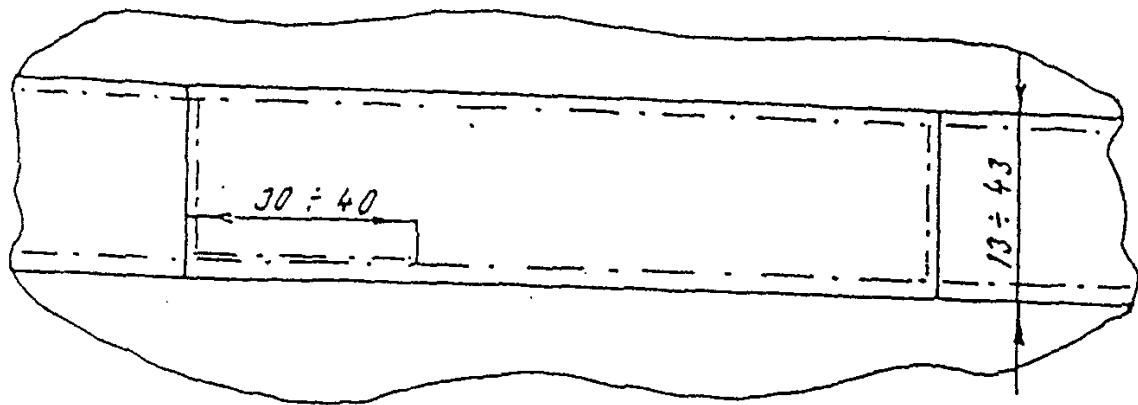
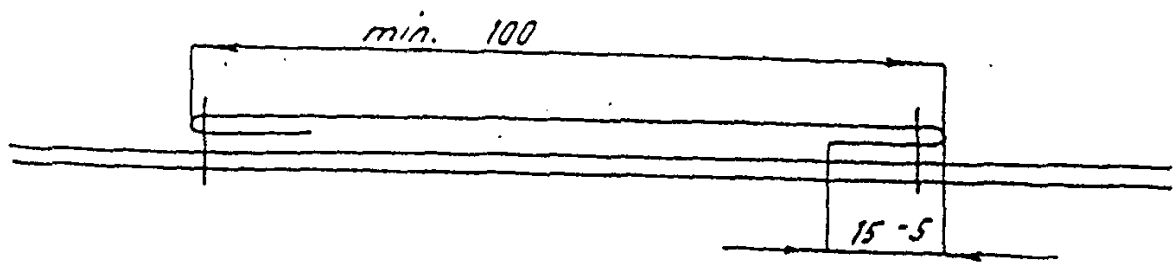


Cut C — C  
M 1:1



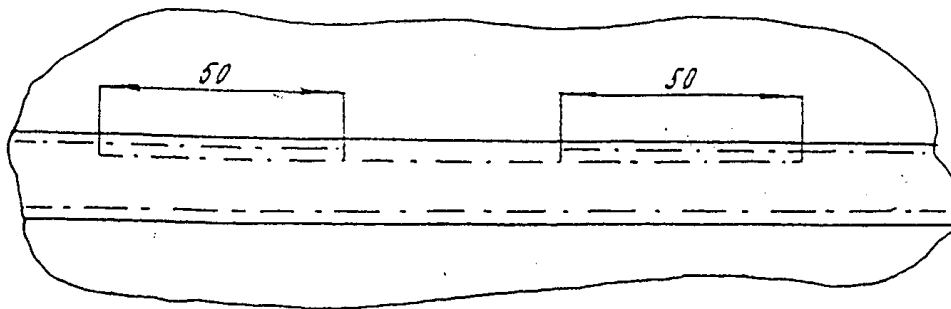
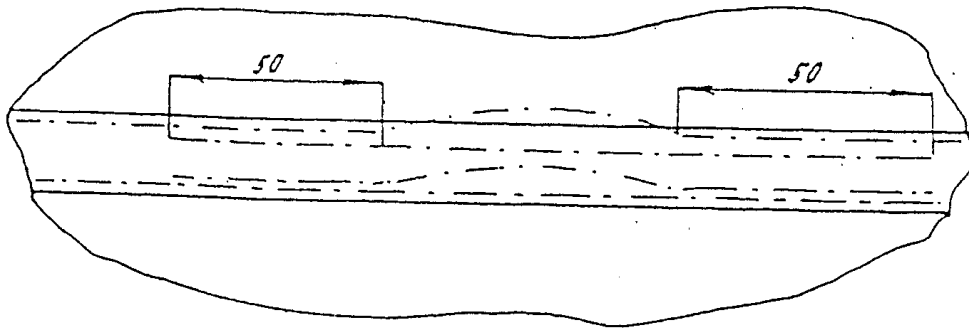
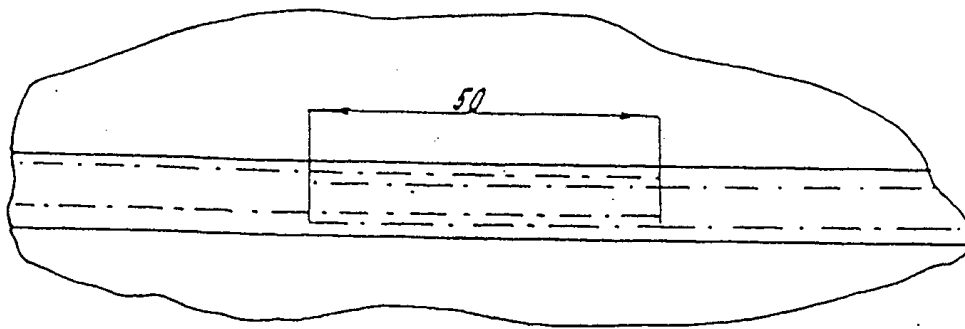
Scheme No. 4

PATCH ON WEBBING



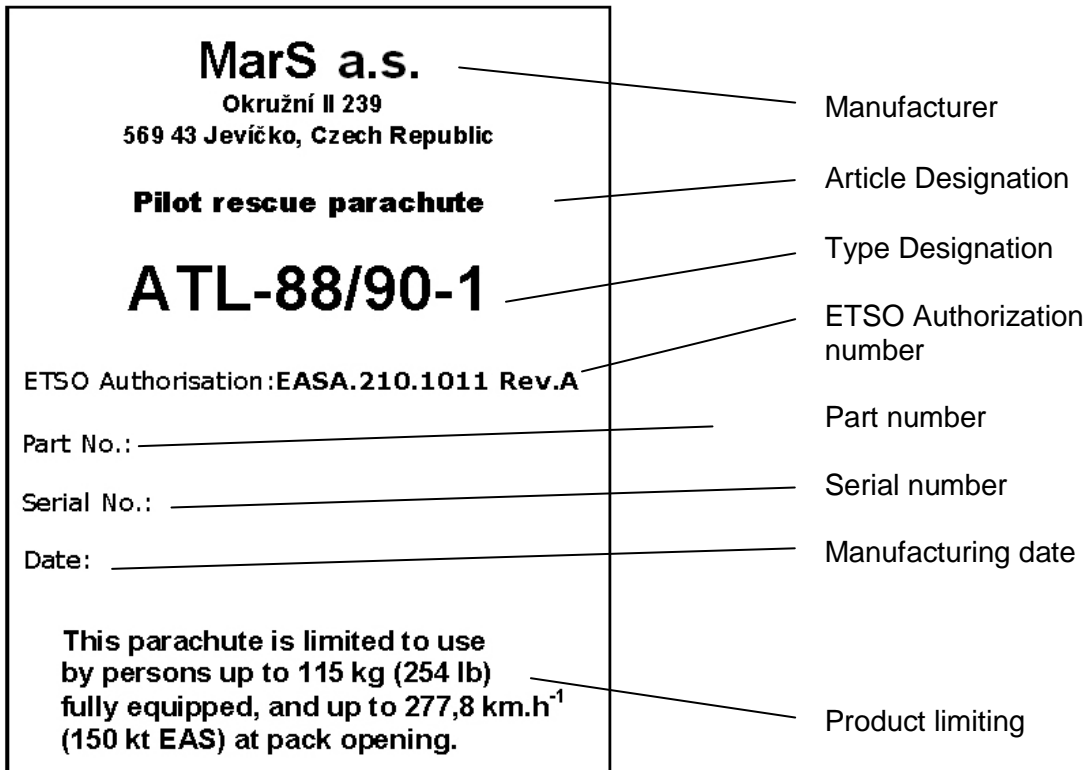
Scheme No. 5

STITCHING WITH COMPLEMENTARY STITCHES IN THE CASE  
OF BREAKING AND WRONG STITCHES





**Performance of the label with emergency parachute  
ATL - 88/90 - 1**



## **Instructions for the ATL – 88/90 – 1 emergency parachute alternative packing number P – 001 – 07**

Packing procedure:

1. Preparation of packing – see Technical Description, Operating and maintenance instructions for the ATL- 88/90-1 emergency parachute no. P – 001 – 93, Chapter 4, point 4.1
2. Canopy Folding – see Technical Description, Operating and maintenance instructions for the ATL-88/90-1 emergency parachute no. P – 001 – 93, Chapter 4, point 4.2
3. Inspection of canopy and lines - see Technical Description, Operating and maintenance instructions for the ATL-88/90-1 emergency parachute no. P – 001 – 93, Chapter 4, point 4.3
4. Storage of lines into the closing flap - see Technical Description, Operating and maintenance instructions for the ATL-88/90-1 emergency parachute no. P – 001 – 93, Chapter 4, point 4.4
5. Inspection of stored lines – see Technical Description, Operating and maintenance instructions for the ATL-88/90-1 emergency parachute no. P – 001 – 93, Chapter 4, point 4.5
6. Storage of the canopy into the container - see Technical Description, Operating and maintenance instructions for the ATL-88/90-1 emergency parachute no. P – 001 – 93, Chapter 4, point 4.6 incl Fig. 19

After performing the above mentioned steps, continue with the alternative packing.

Put the bottom edge of the canopy with stored lines into the right corner of the container bottom under the container bottom flap. One fold of the stowed canopy is placed into the left corner of the container bottom (Fig. 20).



**Fig. 20**

The next step is to perform S-folding of the canopy on the container bottom in the parachute width (Fig. 21).



**Fig. 21**

Then insert the canopy into the space between the closing line loops (Fig.22, Fig. 23).

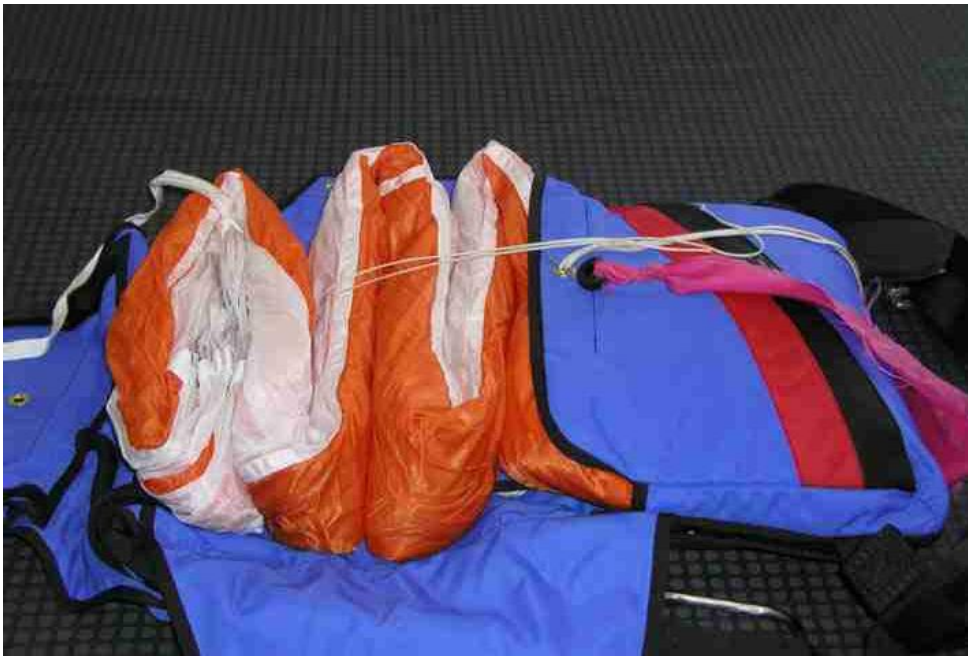


**Fig. 22**



**Fig. 23**

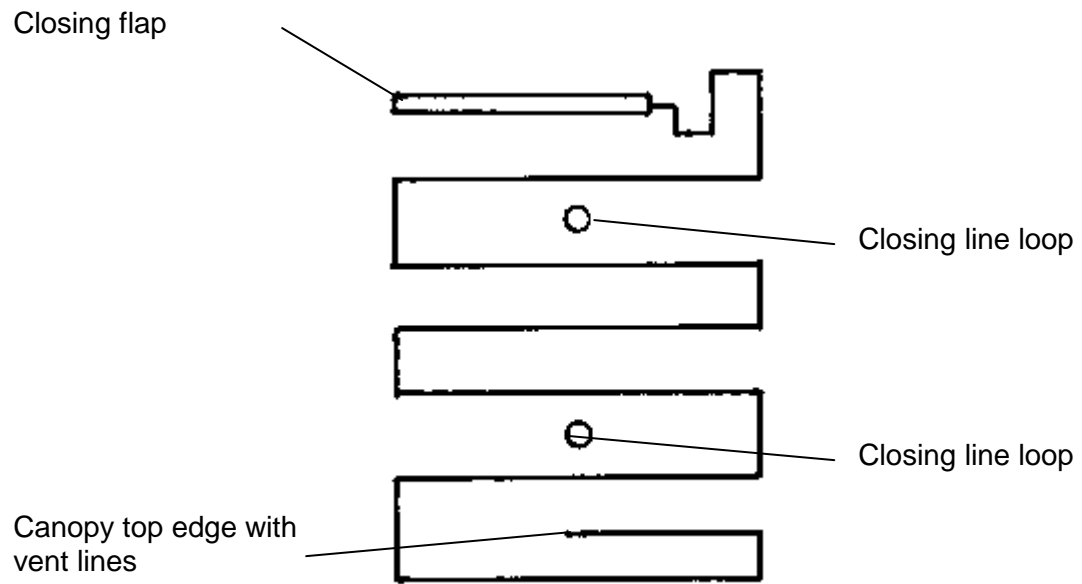
Then S-fold the remaining canopy part above the closing line top loop until it fills up all the space in the container bottom. Fold the top edge of the canopy with vent lines into the last fold (Fig. 24).



**Fig. 24**



Scheme of the alternative canopy storage in the parachute container (Fig. 25)



**Fig. 25**

S-fold the connecting line/bridle between the closing line loops (Fig. 26).



**Fig. 26**

## 7. The pilot chute storage and container closing

Place the pilot chute with its bottom on the folded bridle, then thread the auxiliary packing lines through the webbings with rings in the bottom part of the pilot chute. The auxiliary packing lines are used for taking out the closing line loops that are secured with auxiliary packing pins (Fig. 27).



**Fig. 27**

Put the auxiliary packing lines through the webbings with rings in the top part of the pilot chute, press the pilot chute spring, put the canopy fabric inwards between the spring windings and pull out the closing line loops with auxiliary packing lines. The loops are secured with auxiliary packing pins (Fig. 28).



**Fig. 28**

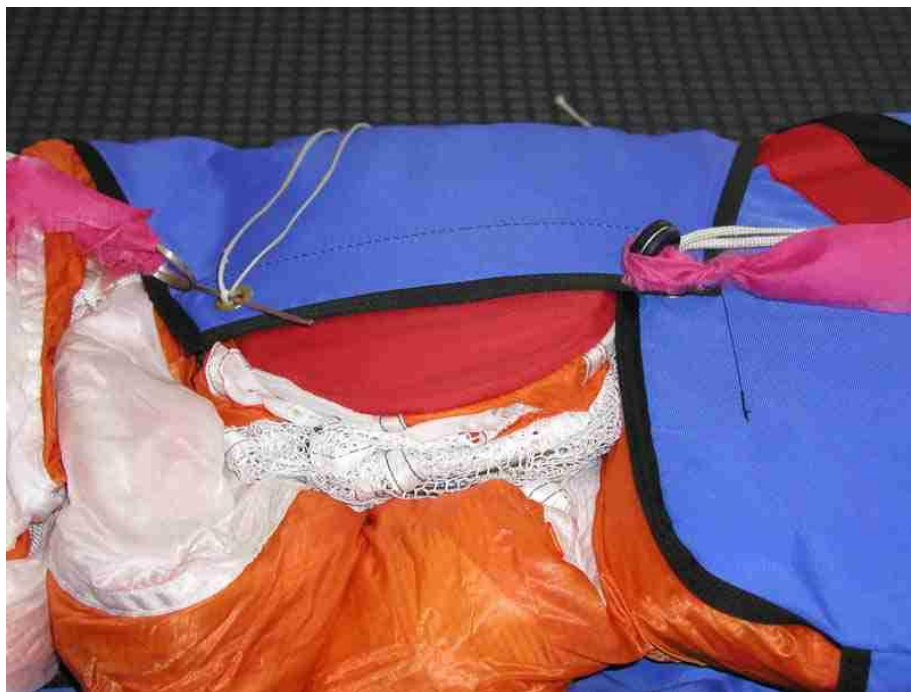
Closing of the container bottom flap.

Thread the bottom auxiliary packing line through the grommet in the container bottom flap, which pulls out the closing line loop and secure the loop with an auxiliary packing pin (Fig. 29).



**Fig. 29**

Thread the auxiliary packing lines through the grommets in the right side flap and pull out the closing line loops and secure them with auxiliary packing pins (Fig. 30).



**Fig. 30**



Thread the auxiliary packing lines through the grommets in the left side flap and pull out the closing line loops, then secure them with auxiliary packing pins (Fig. 31).



**Fig. 31**

Thread the auxiliary packing lines through the grommets in the inner flap of the top flap, put the top flap on side flaps and pull out the closing line loops with auxiliary packing lines. Insert the release pins into these loops, which closes the container. Pull down the auxiliary packing lines under the release pins and pull them out in such a manner that it prevents the closing lines from being damaged (Fig. 32).



**Fig. 32**



8. Inspection of packed parachute – see the Technical description, Operating and maintenance instructions for the ATL - 88/90 – 1 emergency parachute no. P – 001 – 93, Chapter 4, point 4.8. (Fig. 33, 34).



**obr. 33**



**obr. 34**

9. Closing of the Container

The cover flap overlaps the closing mechanism with a Velcro strap cover flap and the divided top flap is closed with a Velcro strap from three sides. Thus the parachute packing is finished (Fig. 35).



**Fig. 35**

The packer records the packing into the parachute logbook and signs it.







**2015**

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