Instructions for the packing and use of container and harness MarS I OP – 087

Technical description of a container and harness MarS I (OP – 087)

P-001-01

Edition 8.

In Jevíčko, 09/2009

List of Changes

If it becomes necessary to change or extend this manual, the parachute owner will be notified by means of bulletins approved by the Civil Aviation Authority of the Czech Republic. New (corrected) data sheets will be enclosed with those bulletins. The manual owner is obliged to record any notified changes in the List of Changes and to replace outdated data sheets with valid ones. Changed or newly added parts of the text will be marked with a vertical line on the side, and with a change number and the change issue date indicated on the bottom of the page.

Change seq. No.	Chapter	Numbers of sheets to which the change relates	New sheet issue date	No. of bulletin in which the change was published	Bulletin approval date	Execution date Signature

CAUTION!

1. Proper training and experience are necessary in order to reduce possible risks, the occurrence of serious injuries, or death.

A - Never use this equipment if you did not read, or had any problems understanding this caution tag, and if you have not completed a training program prescribed for the use of this equipment.

OR

B – Furthermore, do not use this equipment if you did not read, or had any problems understanding, all of the flying manuals and packing instructions, and have not completed at least 100 parachute jumps.

2 . In order to reduce the risk of death, serious injury, and damage or destruction of the parachute canopy, it is recommended not to exceed the following limits.

MAX. PARACHUTING VELOCITY	**240 km/hour (130 KNOTS)**
MAX. LOAD WEIGHT (parachutist + equipment + gear)	**100 kg / 220 lb**
M O D E L	**OP-087 / PS-034 RW** **OP-087 / PS-034 U** **OP-087 / PS-034 UU**
C O M P O N E N T No.	
S E R I E S	
P R O D U C T I O N D A T E	

MarS a.s.
Okružní II. čp. 239
569 43 Jevíčko
The Czech Republic

SECTION I

Technical description of a container with a harness

1. Designation
2. Tactical parameters
3. Functions of the packing
4. Packing parts
5. List of replaceable parts
6. Technical description of packing parts

SECTION II

Packing and use instructions

1. General instructions
2. Inspection of the container before packing
3. Fault removal
4. Parts replacement procedure
5. Packing aids
6. Packing of the container
7. Cypres EXPERT, MPAAD assembly machines

SECTION III

Storage and transportation of the container

1. Container preparation for storage
2. Container storage
3. Container transportation
4. Dirt Removal, Washing, Cleaning

SECTION I

Technical description (TD) of the MarS I (OP-087) container

1. Designation

1.1. This TD is designed to provide basic information about parameters, parts, and rules applied to the use of the container with a harness.

1.2. The container with a harness is designed for sports parachute jumps, mainly those classified as RW events, and aerobatics. It is suitable only for free fall jumps.

2.Tactical-technical parameters

2.1. Basic parameters

SIZE OF MARS I CONTAINER	RESERVE PARACHUTE VOLUME (cm^3/ cu.in)	MAIN PARACHUTE VOLUME (cm^3/cu.in)	MAX. VELOCITY AT CONTAINER OPENING	MAX. WEIGHT (kg/lbs)	NOTE
01 N	4070/248	4594/280	240/130	100/220	
02 N	4810/293	5546/338	240/130	100/220	
03 N	5550/339	6096/372	240/130	100/220	
04 N	5850/357	6718/410	240/130	100/220	
05 N	6290/384	8357/510	240/130	100/220	
3N	7780/474	10109/615	240/130	100/220	
4N	7770/474	10109/615	240/130	100/220	

2.2. Functional parameters of the container

The container secures proper functioning if:

- The parachutist's weight, including his/her gear, complies with the data in Table 2.1.
- The flying speed is from 90 to 240 $km.hour^{-1}$
- The parachute canopy is detached from the supporting harness by means of a discard releaser
- A parachute is used for free fall jumps with a dwell of at least 3 seconds.

2.3. Operational conditions

- Both main and reserve parachutes packed for jumps for a maximum period of 180 days.
- The proper function of the packing is guaranteed at temperatures ranging from - 30 to + 80 ^{o} C and at a relative humidity corresponding with those temperatures.
- The parachute's gar must be attached to his body so that the proper function of the packing is possible.

2.4. Parameters defining reliability

Warranty period

a) The warranty period runs for 24 months provided that repairs are carried out and worn our parts are replaced, storage conditions are observed, and regular inspections accompanied with parachute ventilation are completed.

b) The warranty period is counted from a parachute dispatch date, but no later than from 24 months from a production date.

c) The manufacturer will not honor any complaints during the warranty period in the event that:

- the parachute was damaged by becoming caught in gearing
- the user has violated parachute packing, storage, and/or maintenance conditions
- the parachute is not submitted along with the parachute's log book, or if that log book is not completed correctly
- the instructions described herein have not been complied with
- if the parachute was modified in unprofessionally

2.5. General overhaul

- General overhaul is performed on those parachutes that have been recognized unfit for further use by the user's representative.
- General overhauls are carried out by the manufacturer, or an organization/person authorized by him.

2.6. Total service life

Maximum service life has been determined to be 15 years, since the production date depending mainly on the technical condition of the packing. Therefore, the following conditions must be observed:

a) Damaged parts must be replaced immediately. Their replacement must be properly recorded in a parachute log book.

b) Parachutes and their parts must be repaired immediately, following repair-related technical conditions. Each repair must be properly recorded in a parachute log book.

c) After 5 years of use technical inspections must be carried out (their maximum validity is 2 years – results must be properly recorded for the parachute) until a parachute becomes unfit for jumps.

The technical condition of a parachute (technical inspection) is examined directly by its manufacturer or an organization/person authorized by him.

3. Functions of the packing

Free fall jump with manual opening

After jumping out of an airplane and after the lapse of at least 3 seconds, the parachutist throws away the pilot parachute, or, as the case may be, pulls out the release for the main parachute. The parachute packing opens up and the pilot parachute pulls out the container with a parachute canopy from the packing. Supporting lines roll out from the rubber eyes on the container and the container's closing flap becomes released. CAUTION!! Use only eyes that tightly outline the bundle of the lines.

When the lines become taut along their entire length, the container pulls down from the parachute canopy and the canopy's chambers gradually fill up with air.

The slider retards the opening of the parachute canopy. The slider is anchored to four bundles of supporting lines.

The parachute opens when all of the parachute canopy's chambers have been filled with air, and the slider has moved to the loose ends of the supporting harness. The parachutist releases the controlling loops. When tightening the controlling loops (up to the chest line) the controlling lines become released from the braking rings on the loose ends. When all of the preceding steps have been taken, the parachute canopy slides in the air. Using the controlling lines, the parachutist maneuvers the parachute to a designated area.

4. Harness packing parts

4.1	Packing (OP – 087)	1 piece
4.2	Harness (type PS – 034 RW or type PS – 034 U, or PS – 034 UU)	1 piece
4.3	Reserve parachute releaser (U – 051)	1 piece
4.4	Cast-away releaser (U – 053)	1 piece
4.5	Reserve parachute pilot parachute (PV- 028 or PV-038)	1 piece
4.6	Reserve parachute canopy container VV – 050 (VV – 051)	1 piece
4.7	Reserve parachute controlling loops (ŘP – 006, ŘP – 007)	1 pair
4.8	Main parachute loose ends (VK – 33/500 (400), VK – 33/400 ŘP, VK – 44/400/K)	1 pair
4.9.	Main parachute canopy container (VV-041/…)	1 piece

5. List of replaceable parts

Except for the packing and the harness, all other parts can be replaced.

6. Technical description harness packing parts

6.1. OP – 087 packing (picture 1 a, b)

The parachute packing contains both the main parachute and the back-up parachute. The packing is trapezoidal, its edges are round, and is made of polyamide fabric. When sewn together the back strap, the main parachute's packing, and the reserve parachute's packing form one whole unit. The main parachute's packing is made of the back strap on the bottom and with the peripheral piece of the main parachute's packing along its circumference. This is sewn with a bottom flap and with the left and right side flaps of the reserve parachute's packing. The looser part of the central flap overlaps the upper part of the main parachute's packing and overhangs this same upper part as far as the reserve parachute's packing. The packing of the reserve parachute consists of a main part that changes into the left and right flaps of the reserve parachute. The neck section of the back strap is sewn with the reserve parachute's upper flap and closing flap, the former being inserted in the upper part of the central flap. The bottom of the reserve parachute is fitted with the closing line of the reserve parachute packing. The closing lines of the main parachute packing is sewn onto the bottom of the reserve parachute in the area of the main parachute packing.

picture 1 a

picture 1 b

6.2. Supporting harness (picture 2)

This packing can be complemented with the PS – 034 U harness (Picture 2).

picture 2

The harness is made of a PAD strap with a minimum strength of 15,000 N and is used to attach the parachute packing to the parachutist's body. The supporting harness consist of main straps, leg straps, cross straps, and a loin strap. The main strap is doubled and divides in two above the castaway ring (Ø 33 mm or 44 mm). The divided strap forms ends with loops that are used to attach the reserve parachute. The rear straps are sewn together with a piece that brakes the reserve parachute (Wing type). The leg straps are attached with sewn-on leg straps. The main straps are also fitted with pockets holding the releaser for both reserve and main parachutes.

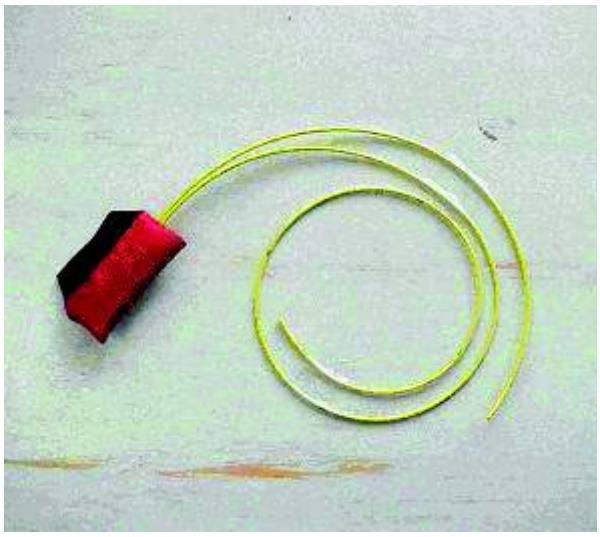
6.3. Reserve parachute releaser - U – 051 (picture 3)

The releaser opens the reserve parachute packing. Its handle is made of stainless tube and is trapezoidal. The releaser further consists of a rope and a needle.

Picture 3

6.4. Castaway releaser - U – 053 (picture 4)

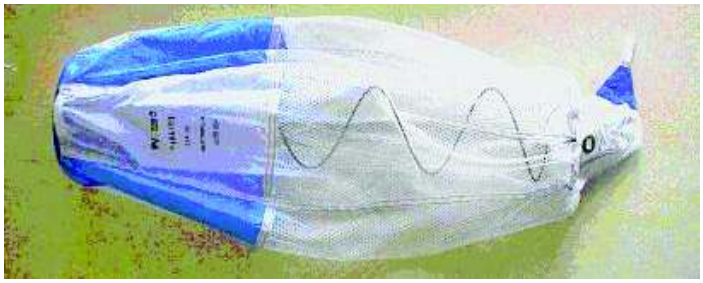
The castaway releaser disconnects the main parachute's parachute canopy from the supporting harness. This releaser consists of a handle and steel rope coated with plastic. The Velcro tape sewn onto the releaser handle serves to fix the releaser in the pocket attached to the supporting harness.



Picture 4

6.5. Reserve parachute pilot parachute - PV – 028 (picture 5a)
Reserve parachute pilot parachute - PV – 038 (picture 5b)

The pilot parachute is used to open the reserve parachute's packing and to pull out the parachute canopy bag (containing the reserve parachute's canopy) from the reserve parachute's packing. The pilot parachute is made of PAD fabric and fishnet. Its bottom is reinforced with duralumin sheeting. The pilot parachute PV-028 is fitted with a coiled spring with a minimum displacement force of 100 N for AAD CYPRES, VIGIL.
The pilot parachute PV-038 is fitted with a coiled spring with a minimum displacement force of 180 N for AAD MPAAD.



picture 5 a

picture 5 b

6.6. Reserve parachute canopy container - VV – 051 (picture 6)

The container is used for storing the packed parachute canopy of the reserve parachute in the reserve parachute's packing piece. It is made of PAD fabric. The central section of the container is equipped with pressed-on bushings through which the reserve parachute's closing lines are led. The bag is sewn with a hemming strap that is 50 mm wide and 5400 mm long. The other end of the hemming strap is fitted with a loop to attach the PV – 028 or PV – 038 pilot parachute.

Picture 6

6.7. Reserve parachute's controlling loop (RP-006, RP-007) picture 7a, b

The controlling loop maneuvers a Wing-type reserve parachute.
(RP - 006 without stiffening, picture 7a, RP – 007 with stiffening – picture 7b) The loops are made of a 20 mm wide PAD strap. The control loop consists of an eye completed with a pressed bushing through which the main controlling line is introduced. The end of the loop is sewn together forming a round block. Insert it into the divided main controlling string to brake the parachute canopy during packing.

Picture 7a

RP - 006

Picture 7b

RP – 007

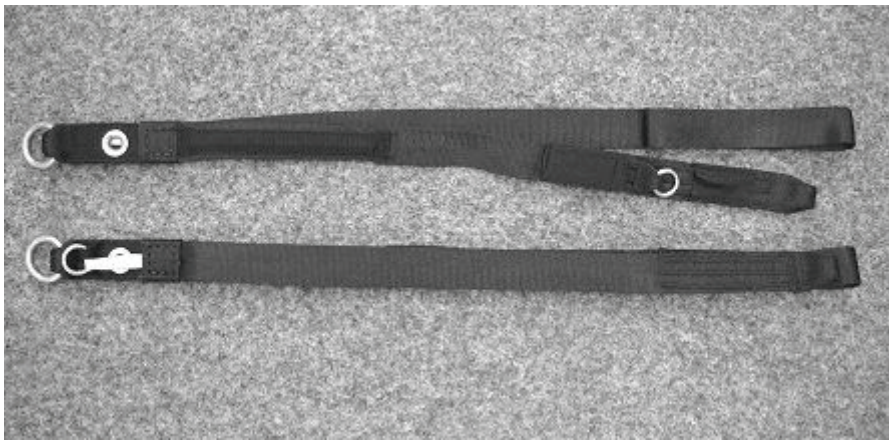
6.8. Loose ends of the

a) VK – 33/500 (400) supporting harness – Picture 8a

The loose ends of the main parachute's supporting harness are used to connect the parachute canopy to the PS – 034 harness by means of a system of three rings. These ends are made of a 26 mm wide PAD tape with a minimum strength of 17,000 N. The bottom (divided) part is made of the set of three rings that serve to fasten the parachute to the harness. The tapes end with loops into which the screwing clips introduce the supporting lines of the main parachute canopy. The backs of the tapes are sewn with a 15 mm ring that guides the main controlling line. Below its guiding line, a 20 mm wide Velcro tape is sewn. This tape facilitates the attachment of a controlling loop.
The number below the line of a fraction i.e. 500 or 400, indicates the length of tapes measured from the point of split.

Caution:

Around the rings that form the three-ring system, it is necessary to maintain the tape in an easy-to-bend condition. Therefore, the tape must be loosened at least once a month in order to prevent hardening that results in impaired functioning during disconnection from the three-ring system.



Picture 8a

b) VK – 44/400 (500) / K supporting harness – Picture 8b

The loose ends of the main parachute's supporting harness are used to connect the parachute canopy to the PS – 034 harness by means of a system of three rings. These ends are made of a 43 mm wide PAD tape with a minimum strength of 17,000 N. The bottom (divided) part is made of the set of three rings that serve to fasten the parachute to the harness. The tapes end with loops into which the screwing clips introduce the supporting lines of the main parachute canopy.

Picture 8b

c) VK – 44/400 (500) / RP supporting harness – Picture 8c

The loose ends of the main parachute's supporting harness are used to connect the parachute canopy to the PS – 034 harness by means of a system of three rings. These ends are made of a 43 mm wide PAD tape with a minimum strength of 17,000 N. The bottom (divided) part is made of the set of three rings that serve to fasten the parachute to the harness. The tapes end with loops into which the screwing clips introduce the supporting lines of the main parachute canopy.

Picture 8c

Caution:

Around the rings that form the three-ring system, it is necessary to maintain the tape in an easy-to-bend condition. Therefore, the tape must be loosened at least once a month in order to prevent hardening that results in impaired functioning during disconnection from the three-ring system.

SECTION II

Container packing instructions

1. General instructions

a) Remember to check the parachute for completeness and proper technical condition before packing. Any damaged or impaired parts must be replaced or repaired.

b) It is recommended not to expose the parachute to the sun during packing.

c) The parachute is to be packed by one person only. Each packing is recorded in the parachute's log book.

d) MarS I container is used in combination with these parachute canopies: WITTY PLUS, M 176, M 196, M 216, M 291, M 252, M 282 M 330 Z manufactured by MarS, or, as the case may be, with other parachute canopy types, in which case approvals from the manufacturer and the Testing Laboratory of AeČR are required.

e) Any modifications to the parachute are forbidden.

2. Container inspection before application

Container parts are checked in the following sequence:

- PS – 034 U harness (PS – 034 UU, PS – 034 RW)
- OP – 087 parachute packaging
- U – 053 castaway releaser
- U – 051 reserve parachute releaser

The above-stated parachute components are checked for damage and for the intactness of stitches, fabrics, hemming strap, and tapes.

Metal parts are also inspected carefully:

- Releasers (metal bushings) that must not display any obvious intactness, frays, or other damage.
- The plastic surface of the castaway releaser must be intact. The ends of the cables that stick out from castaway hoses must be of the same length (however, at least 120 mm).
- Closing lines (of main and reserve parachutes) must not be impaired or damaged in any way.
- The cable of the reserve parachute packaging releaser must have an appropriate length (allowing for a minimum packing length slackness of 50 mm).
- The releaser cable must be straight, and free of any bents or sharp creases.
- The releaser needle must be absolutely straight.

3. Fault removal

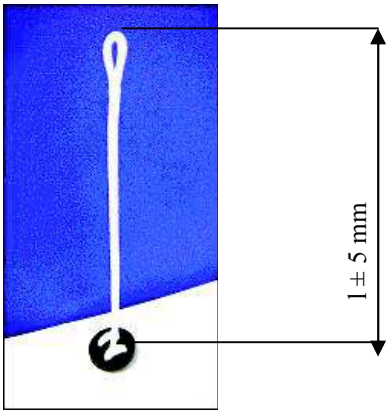
a) Remove any possible faults by replacing damaged parts, or by repairing them according to the manual provided in the Technical Repairs Conditions.

b) Parts that are allowed to be replaced during operation:

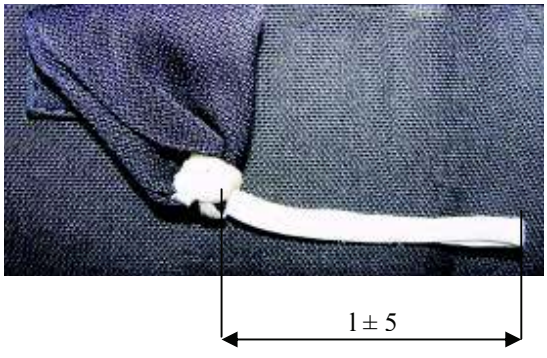
- U – 051 reserve parachute releaser
- U – 053 castaway releaser
- Replacement of the loose ends of the supporting harness of the main parachute
- Closing string of main and reserve parachutes
- Reserve parachute controlling loops
- Reserve parachute canopy bag

Set length of the closing line to close the OP-087 Reserve container depending on the size of the Reserve container and used type of the Reserve parachute with the MPAAD safety device:

OP-087 Container size	Reserve parachute ring (PZS-92)	Reserve parachute wing type
000 N	--	(WP-110) 70 ± 5 mm
00 N	--	(WP-110) 70 ± 5 mm (WP-130) 75 ± 5 mm
00 N	--	(WP-130) 75 ± 5 mm
01 N	--	(WP-130) 75 ± 5 mm
02 N	--	(WP-130) 75 ± 5 mm (WP-150) 75 ± 5 mm
03 N	--	(WP-150) 75 ± 5 mm (WP-175) 80 ± 5 mm (WITTY PLUS) 105 ± 5 mm
04 N	--	(WP-150) 75 ± 5 mm (WP-175) 80 ± 5 mm
05 N, 06 N	110 ± 5 mm	(WP-175) 80 ± 5 mm
06 N	110 ± 5 mm	(WP-210) 100 ± 5 mm
2 N, 3 N, 4 N	110 ± 5 mm	(WP-175) 80 ± 5 mm (WP-210) 100 ± 5 mm
4.1 N	110 ± 5 mm	(WP-260) 105 ± 5 mm

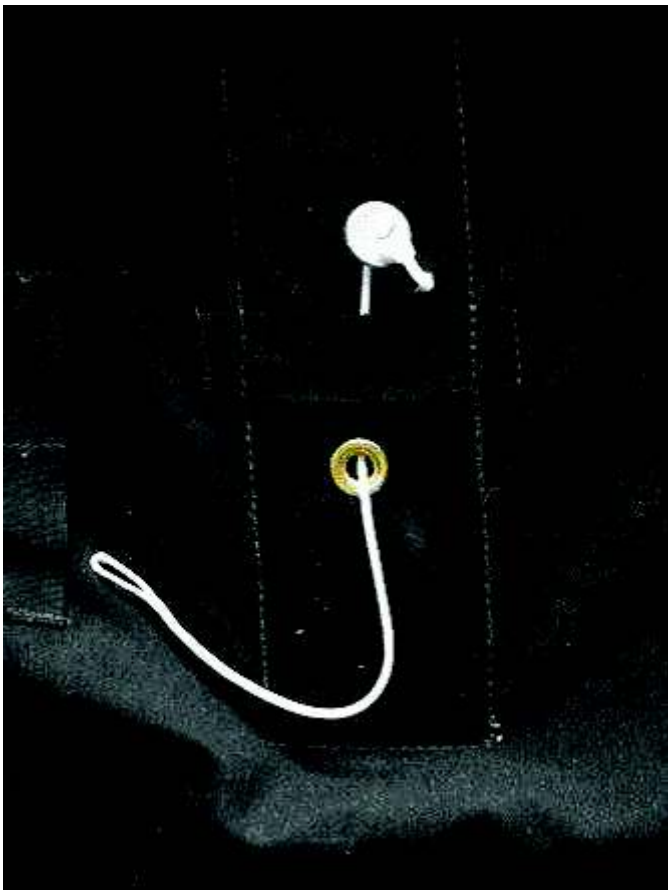


Recommended length of the closing line to close the Main container
80 ± 5 mm (for size: 000 N, 00 N, 01 N, 02 N)
85 ± 5 mm (for size: 03 N, 04 N, 05 N, 06 N)
95 ± 5 mm (for size: 2 N, 3 N, 4 N)



4. Parts replacement (assembly) procedure

a) Replacement of the reserve parachute packing string (Picture 9a,b)



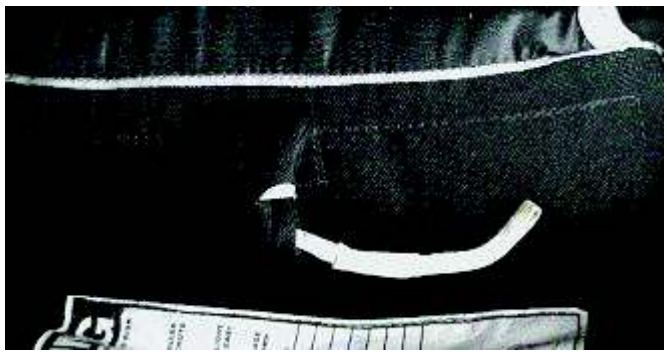
Picture 9a

Picture 9 b

b) Replacement of the main parachute packing string (picture 10)

Picture 10a

Picture 10b



Picture 10c

c) Tying the PV – 028 pilot parachute to the hemming strap of the parachute canopy bag (picture 11a)

Picture 11a

d) Tying the PV – 038 pilot parachute to the hemming strap of the parachute canopy bag (picture 11b)

Picture 11b

e) Connecting the RP – 006 (RP- 007) controlling loop to the main controlling line (picture 12 a,b)

Picture 12 a

Picture 12b

f) Reserve parachute braking (Pictures 13 a, b)

Picture 13 a

Picture 13 b

Connecting the loose ends of the supporting harness of the main parachute to the harness (Pictures 14 a, b, c, and d) Connecting the loose ends of a supporting harness without a bushing in the strap.

Picture 14 a

Picture 14 b

Picture 14 c

Picture 14 d

5. Packing aids

Use the following aids to pack the reserve parachute:

a) Auxiliary packing strap (with a buckle)
b) Auxiliary needle with a hemming tape
c) Container expansion limiting string
d) Packing string

6. Container packing

6.1. Pack the reserve parachute according to the instructions for packing the reserve parachute canopy, specifically the stage of packing the reserve parachute canopy into the container. Then proceed as shown in pictures No. 15 through 22. The flaps close in the sequence of their numbering; i.e. from No. 1 to 6.

Picture 15

Picture 16

Picture 17

Picture 18

Picture 19

Picture 20

Picture 21

Picture 22

6.2. Pack the main parachute according to the technical description of packing the main parachute. The container flaps close in the following sequence: lower, upper, left, and right (see pictures 23-31).

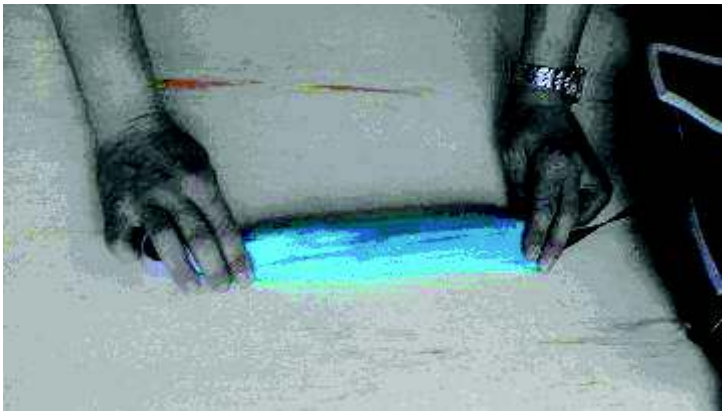
Picture 23

Picture 24

Picture 25

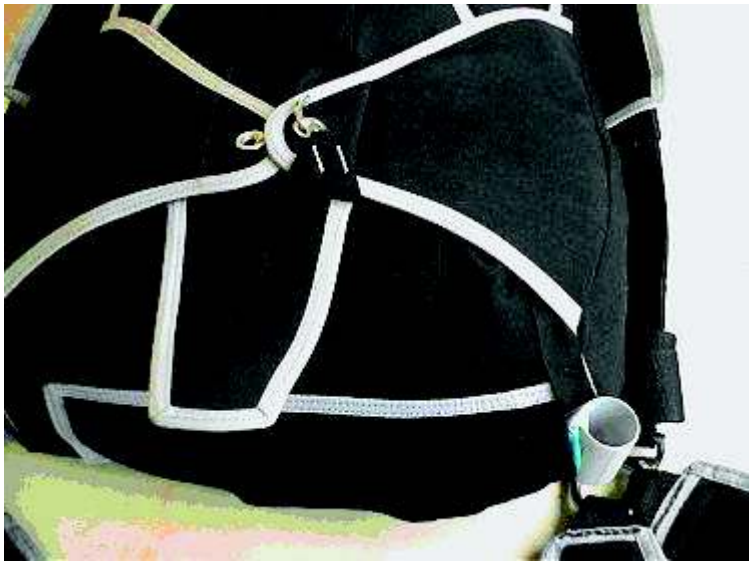
Picture 26

Picture 27

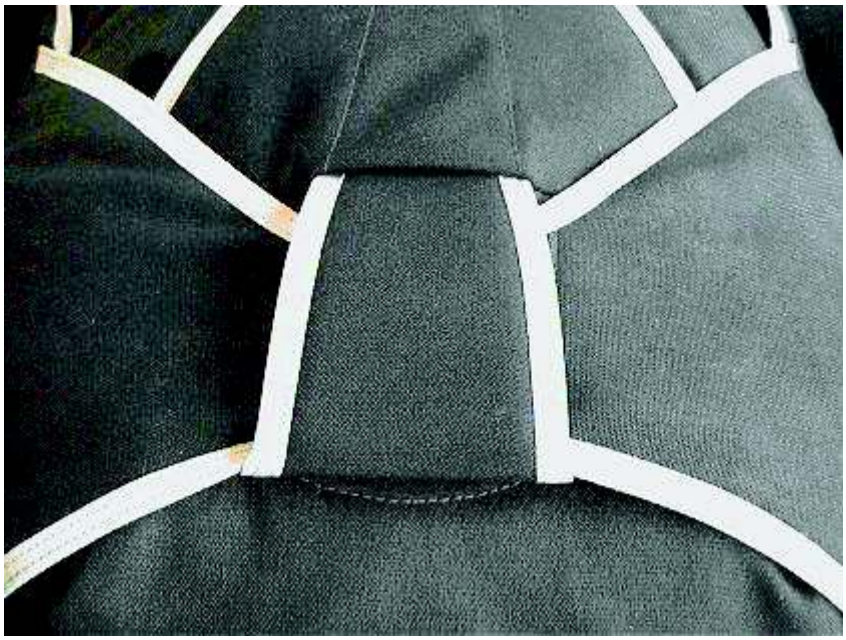


Picture 28

Picture 29



Picture 30



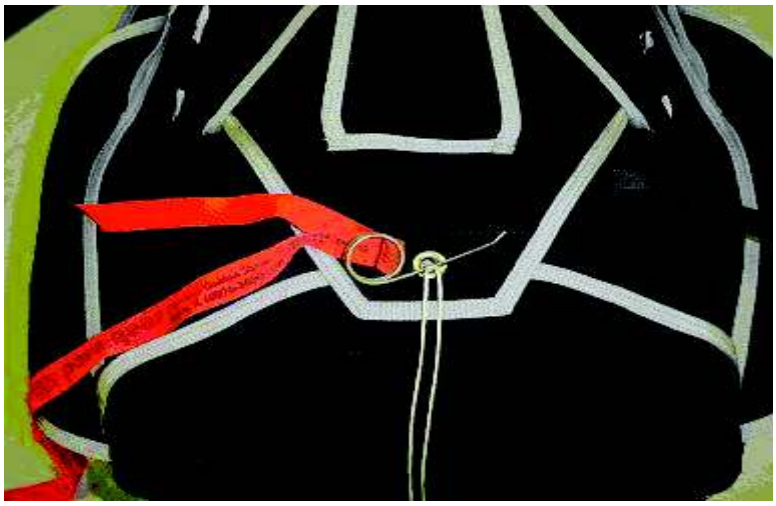
Picture 31

Special caution:

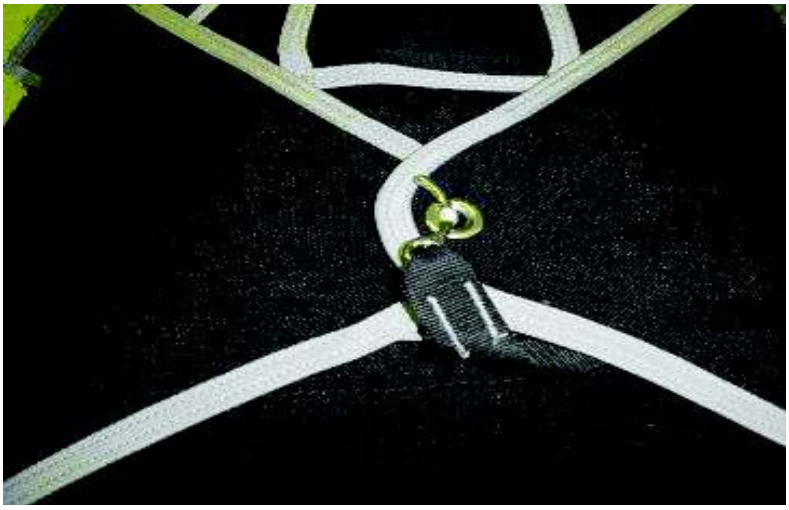
1. The container with the canopy is always placed with its lines away from the reserve parachute; i.e. facing the lower packaging part and going to the upper, left and right parts.
2. The closing line of the main parachute must not be shortened by making knots on the string!

Picture 32

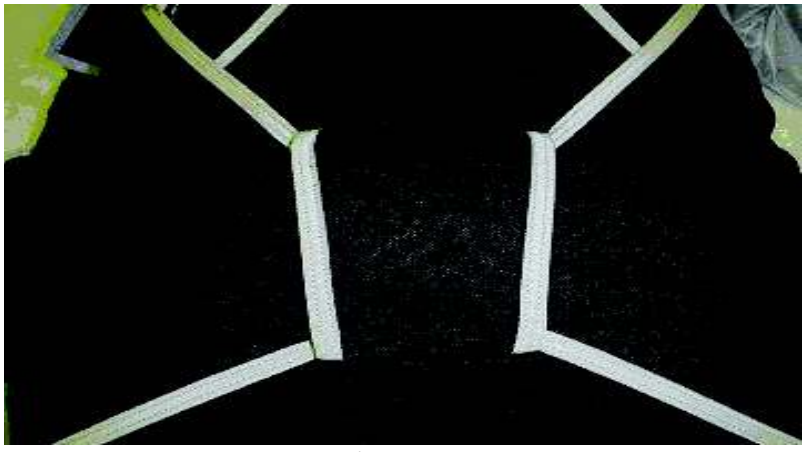
Picture 33



Picture 34



Picture 35



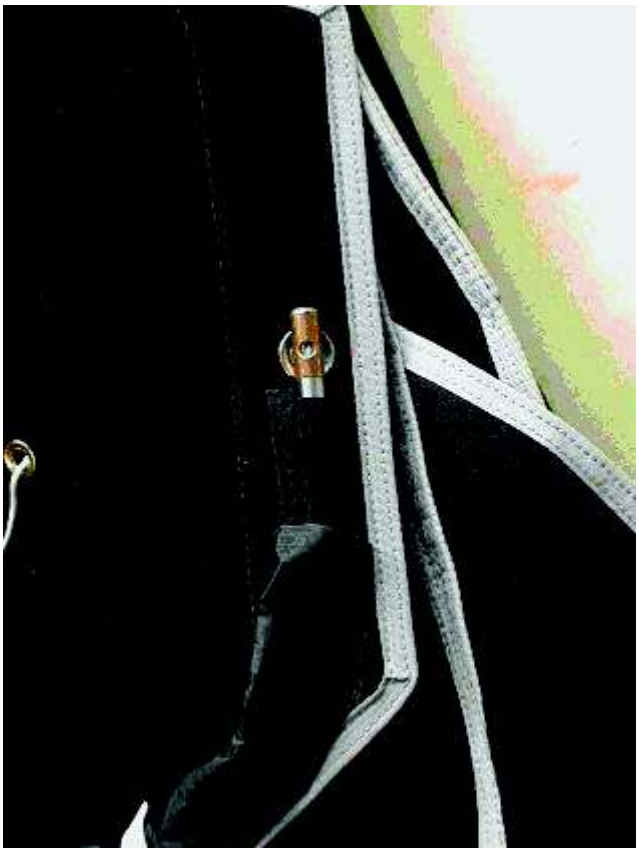
Picture 36

7. Cypres Expert assembly apparatus

1. **Assembly must follow the instructions given in Cypres User´ s Guide (machine description).**

2. Assembly is very simple and consists of the following steps:
   a) Locate the controlling unit into the elastic pocket (make sure to locate it in the correct position - picture 37).
   b) Release the cables. Again, follow their correct sequence: the thin cable must stay on the bottom, the thick cable is on top).
   c) Locate the working part (pyro-cartridges) (picture 38).
   d) Install the controlling unit. Insert it through the opening on the container bottom of the reserve parachute and lead the cable closely around the container periphery (picture 39).
   e) Carefully insert the controlling unit in the area with the bushing in the back section of the packaging.
   f) Complete the final installation of the cables and attach them with Velcro tapes.
   g) Upon assembly, complete the inspection of installation that is a part of an apparatus functional inspection.

Picture 37



Picture 38

Picture 39

Assembly of an MPAAD device

The assembly is carried out according to Instructions for use no. P-008-03
- the Users´Manual of MPAAD Automatic Safety Device.

SECTION III

Storage and transport of the parachute (container)

1. Preparation of the parachute (container) for storage

Before storing the parachute (container), inspect it and if need be carry out necessary repairs, part replacements, and ventilation adjustments. Parachutes (containers) are stored either packed in portable bags (for 180 days from packing), or unpacked.

Insert the parachute log book in the portable bag pocket.

2. Parachute (container) storage

Parachutes are to be stored on racks in a dry, dark, and well-ventilated room. The bottom rack must be at least 150 mm from the floor, and racks must stand at least 500 mm from walls. If a parachute is stored for a longer period, it must be properly ventilated for minimally 24 hours at least once in six months. Ventilation must take place in the shade, away from exposure to the sun.

Ventilation must be recorded in the parachute log book.

It is forbidden to store parachutes in the same room with metal objects that are not their parts, or with acids, oils, solvents, and other chemically aggressive substances.

A parachute storage room must comply with the following climatic conditions:

Daily temperature: + 14 to + 24°C

Daily relative humidity: 35 to 70%

Average relative humidity: 45 - 55 %

3. Transportation of parachutes

3.1. Under the conditions of their active use, parachutes are transported in portable bags.

3.2. Prevent the parachutes from the following effects during transportation:

a) Moistening of the containers

b) Contamination of the containers with oil and/or chemicals

c) Mechanical damage

4.Dirt Removal, Washing, Cleaning

1. Dirt (sand, soil, mud, etc.) on the parachute container and supporting harness contaminated during the use can be cleaned mechanically (e.g. by brushing, shaking or rubbing off).

2. Dirt that cannot be removed mechanically, can be removed with a damp piece of cloth moistened in lukewarm water with soap or cleaning detergents. After such cleaning the container with the harness are to be dried on a place designated for such purposes.

3. The manufacturer warns the user that using a larger amount of water with detergents may cause the occurrence of stains of various colours or soaking of colours from the inside layer of material into the outside layer of material, in particular with containers of light colours. The warranty does not apply to such cases.

4. Washing of containers/harnesses manually or in any washing machines **is forbidden**.

5. Cleaning of containers/harnesses using chemical agents containing chlorine or organic solvents **is forbidden**.