

# User Manual Automatic Securing Device

# MPAAD



**4<sup>th</sup> Edition**

In Jevíčko, in 10/2004

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# HEAD I

## 1. Introduction

MPAAD is a result of several years of development, research, and tests. This device combines in itself the latest electronic technologies and components. Its development prioritized higher reliability and resistance as well as the satisfaction of current parachuting requirements. It also aimed at setting standards for the third generation of securing devices. The location of the entire device in a compact, duralumin case without outer connecting cables principally excludes any possible mechanical damage and simultaneously markedly enhances resistance against electromagnetic interferences. MPAAD is a modern, electronic, micro processor-controlled securing device that does not require any special maintenance and that features several additional functions. The device can be arbitrarily set as EXPERT, BEGINNER or TANDEM.

## 2. Designation

The device is designed for all types of parachute jumps, including the following:

RW, CRW, FREEFLY, FREESTYLE, SIT-FLYING, SKYSURFING, jumps with a CAMERA, PRECISION LANDING, INDIVIDUAL ACROBATICS, AFF, TANDEMS and BEGINNERS.

### CAUTION:

- The device is not designed for jumps from firm structures – BASE JUMPS!
- The device is not designed for PARAGLIDING, PARASCENDING Or PARASAILING!
- The device is not designed for the primary opening of the parachute!
- The device is not designed for jumps into water!

## HEAD II

### *Description*

#### 1. Function

The primary function of this device is to activate a reserve parachute when a parachutist free-falls at a dangerous height and thus to prevent the parachutist's direct fall on the ground. The limit values of activation differ depending on the specific adjustment of the device; i.e. EXPERT, BEGINNER, and TANDEM. The height of activation means the highest admissible height when activation can take place. The device can be started at any height between the activation height and the ground, if a fall rate has been exceeded. Activation at a lower height than the activation height is possible, for instance, after a low release. A height lock indicates the height that has to be overcome in order to unlock the device. If this height has not been reached, but activation conditions have been met, the device will not be activated.

#### EXPERT

Activation takes place if the height above the ground is less than 270m and the fall rate is greater than  $35 \text{ m}\cdot\text{s}^{-1}$ . The height lock is 450m.

#### BEGINNER

Activation takes place if the height above the ground is less than 270m and the fall rate is greater than  $20 \text{ m}\cdot\text{s}^{-1}$ . The height lock is 450m.

#### TANDEM

Activation takes place if the height above the ground is less than 560m and the fall rate is greater than  $35 \text{ m}\cdot\text{s}^{-1}$ . The height lock is 900m.

#### 2. Additional functions

The device has a built-in real-time clock that runs continuously if there is a battery in the device. When starting the device, the condition of the battery is indicated in percents of remaining capacity. No other adjustment procedures apart from the device's start-up have to be made prior to the first jump. If a landing surface is situated lower or higher than a start point, this difference can be set on the device ( $\pm 600 \text{ m}$ ). A qualified person may change the adjustment of the device to the TANDEM, EXPERT or BEGINNER setting according to the user's requirements. The qualified person can also set the time of the standby mode to 1 to 19 hours. Detailed data from the previous jump are stored in the device memory. The device operates as a 'black box'. Such details can be retrieved if needed by the qualified person. The data are automatically rewritten after each jump.

### **3. User Menu**

The user can access a simple menu where he can view the following data:

- The height of opening during the previous jump
- Total number of jumps
- Remaining battery capacity in percents
- Battery voltage in volts
- Device manufacturing number
- Controlling firmware version

### **4. Main parts**

All of the device parts are contained in a flat, metal case that is divided in three compartments. The upper one contains a microprocessor, a real-time clock, supporting electric circuits, a barometric pressure sensor with a display and two buttons. The lower compartment contains a battery. The middle compartment contains a pyrotechnic chopping mechanism. The battery and the chopping mechanism can be replaced.

### **5. Location of the device**

The device is located under the lower part of the packing bag of the reserve parachute. Its control buttons and display can be accessed through a window on the rear side of the packing. The closing loop of the reserve parachute runs through the opening in the central device part where the chopping mechanism is placed as well. MPAAD fills up the area that is naturally created in the between-the-blade part of the packing of the reserve parachute by pulling the closing loop through a padding plate.

## HEAD III

### *Technical data*

Size (mm):	100 x 62 x 20
Weight (g):	ca 250 g
Volume (ccm)	124 ccm
Battery:	Special lithium batteries
Battery service life	Up to 4 years or 300 flying hours
Range of application (m)	- 600 up to + 10000 m (above sea level AGL)
Activation height (m)	< 270 m Expert < 270 m Beginner < 560 m Tandem
Activation rate (m/s)	> 35 m.s <sup>-1</sup> Expert > 20 m.s <sup>-1</sup> Beginner > 35 m.s <sup>-1</sup> Tandem
Height lock (m)	450 m Expert 450 m Beginner 900 m Tandem
Accuracy: (%)	± 7 %
Temperature range ( °C )	- 20 °C up to +60 °C
Stand-by mode (h)	Can be set to 1-19 hours at hourly intervals
Landing outside airport	Can be set to ±600 m
Device service life	15 years

## HEAD IV

### *Maintenance*

#### 1. Deactivated device

The display is empty and whenever the left or right button is pressed, intentionally or by accident, the display indicates [ **OFF** ] .

#### 2. Device activation

The device is started by pressing the buttons of the so-called activation sequence several times. First release both buttons. Press the left button and keep it pressed ( **o** ). After three seconds, the display will show number one [ **1** ]. Press the right button ( **>** ) three times in a row and release it. After each pressing the display will show a growing row of numbers [ **12** ], [ **123** ] and [ **1234** ]. Once numeral 4 has appeared on the display, release the left control button ( **o** ). This activation sequence is then complete. The whole sequence must not last longer than ten seconds. If a mistake is made the whole procedure must be repeated.

The display shows [ **ON** ] briefly and then it images the remaining capacity of the battery ranging from [ **100%** ] to [ **0%** ]. Subsequently, automatic calibration takes place and [ **CAL** ] appears on the display. Afterwards, the machine switches to a stand-by mode.

During the activation procedure, MPAAD checks the battery, chopping mechanism and electronics.

#### 3. Machine deactivation

Turn off the device in the same way in which you activated it – i.e. by means of the activation sequence. The display shows [ **OFF** ]. If you forget to turn the device off, it turns off automatically once the time of the stand-by mode has been fulfilled. The device can be turned off during the stand-by and jump modes.

#### 4. Calibration

Calibration is carried out to set a zero height for the landing surface. It is started when activating the device and then automatically after each jump. When [ **CAL** ] appears on the display, the device measures a current pressure and sets it as a height zero value. Therefore, you should always activate the device only in the area of the landing surface. If the values fluctuate badly during the measurement of pressure, an error is shown on the display. The device has to be deactivated.



If you land outside an airport unintentionally and find yourself at a markedly lower or higher height on your way back ( $\pm 10$  m), turn the device off manually after arrival and then turn it on again! If you are in doubt, proceed in the same way to be on the safe side! This will secure the proper re-calibration of the device prior to the next jump.

## 5. Stand-by mode

When in the stand-by mode, the device is on the ground. Pressure and a possible airplane start are checked regularly. This mode starts as soon as the calibration is completed. The display shows a time countdown until the automatic turning off of the machine. For instance, the display shows time information [ **14:00** ] with a flickering second-indicating colon in the middle. This indicates the introduction of the device into the stand-by mode for fourteen hours after which the device turns off automatically. All the time the display will continue to show the time remaining to the turn off, for instance, [ **14:00** ], [ **13:59** ], [ **13:58** ], ....., [ **00:01** ], [ **00:00** ].

If the device is set to a different mode than EXPERT, this is indicated on the display. The TANDEM adjustment is indicated by letter ,**t**' in the far-right display field, for instance, [ **14:00t** ]. The BEGINNER adjustment is indicated by letter ,**b**', for instance, [ **14:00b** ]. When the EXPERT adjustment is used, the far-right display field is empty.

## 6. Jump mode

Just a while after an airplane's start the device automatically changes to a jump mode. The display stops imaging time and shows a current reached height above the ground (AGL). After landing a calibration sequence takes place and the device automatically switches back to a standby mode.

Note:

Just a look at the display can check not only the mode in which the device is operating but also the time remaining to an automatic turn off as well as the proper function of the device.

## 7. Adjustment during a jump outside an airport

If the landing surface is located higher or lower than the starting place, the device has to be adjusted to a correct value as follows:

If the device is on, turn it off. Activate the device by means of the activation sequence. As soon as the display begins to read [ **ON** ], press the right button ( **>** ) and keep it pressed until the display starts to show [ **SEt** ]. By pressing the right button or keeping it pressed adjust the required height of the landing ground ( $\pm 600$  m). Confirm your selection by pressing the left button ( **o** ). Once the calibration has been completed, the device switches to a stand-by mode. The display shows, in turns, a time countdown and a set height, for instance, [ **14:00** ] ... [ **+ 120** ] ... [ **14:00** ].

After planned landing on the landing ground outside an airport using the re-calibration of the landing ground height, the device turns off automatically! The display is empty and when pressing on the button the [ **OFF** ] sign becomes displayed. Prior to the next jump, be it on the original or a new landing ground, turn on the device again.

## 8. User Menu

To enter the User Menu press the right button ( > ) and keep it pressed for about 4 seconds. The display will show [ **-01-** ]. Release the button and the display will show the height of opening. If you keep on pressing the button, you will start going through the menu. Press the left button ( o ) to leave the menu. After a while the menu will deactivate itself.

Menu beginning

[ <b>-01-</b> ]	[ <b>888o</b> ]	opening height during the last jump
[ <b>-02-</b> ]	[ <b>888J</b> ]	total number of jumps
[ <b>-03-</b> ]	[ <b>88%</b> ]	remaining battery capacity in percents
[ <b>-04-</b> ]	[ <b>3.65v</b> ]	battery voltage in volts
[ <b>-05-</b> ]	[ <b>888d</b> ]	battery age in days
[ <b>-06-</b> ]	[ <b>41b8</b> ]	device manufacturing number
[ <b>-07-</b> ]	[ <b>01.00</b> ]	controlling firmware version

Menu end

## 9. Error statuses

If [ **Exxx** ] (error) appears on the display during automatic control or at any time, it is necessary to replace either the battery or the chopping mechanism, or to restart the device. If [ **Fxx** ] (failure) appears on the display, the device must be sent to the manufacturer for inspection. In this case the device becomes blocked and cannot be turned off.

- E001, E010 Range error during calibration. The scatter of pressure samples is too large.
- E002, E020 Chopping mechanism error. Pyro cartridge is faulty or activated.
- E004, E040 Battery error. Battery voltage is low.

## **HEAD V**

### ***Assembly***

The structure of MPAAD is new and differs from the structure applied to the most frequently used devices. Therefore, it does not allow for the use of available assembly components built in a majority of currently used parachute sets. However, completed tests proved that minor adjustments make MPAAD suitable for mounting into most currently used parachute sets.

Note:

The presentation of the MPAAD device for the leading foreign manufacturer of parachute equipment has not yet taken place. The manufacturer's agreement is required for the mounting of a MPAAD device into a parachute system.

## **HEAD VI**

### ***Maintenance***

#### **1. Special maintenance**

The device does not require any special maintenance. The device performs continual automatic checks (battery, internal circuits, chopping cartridge).

#### **2. Proper function check**

The user can easily check the proper operation of the MPAAD device by looking at the display.

- The real-time clock must correctly count down the time (stand-by mode).
- The height on the device display must correspond with the height at the altimeter (jump-down mode).

Note:

Even a more thorough device check is relatively simple. However, it requires a certain level of knowledge. Therefore, it can be completed only by a person trained by the manufacturer.

### 3. Battery replacement

The battery can be replaced only by a duly informed parachute technician or by a technician trained by the manufacturer!

The disconnecting and connecting of connectors should be limited only to the necessary replacement of the battery! Unnecessary repeated disconnecting may result in the deterioration of the electrical parameters of the connectors.

Battery assembly procedure:

- Gently press the battery contact among the contacts in the device.



- Fold the cable so that it makes a right angle.



- Turn the battery cells by 90° to insert the battery into the device body, the inscriptions on the battery facing up. Once the battery has been installed, accommodate the cable in the through on the right, in the central part of the body.



- Attach a lid and tighten the screws gently so as not to damage the thread or the bolt. For the mounting of the cap onto the instrument body are used special screws that must be tightened by means of the socket spanner No. 2 – the spanner will be plugged with its longer side into the hole in the screw head. The shorter side of the spanner No. 2 made by the producer purposely squashed flat so that the use of this side of the spanner for the screw tightening would be avoided.

Note: Valid for the product dispatched from 08/2004.

- Check the device by turning it on.

#### 4. Chopping mechanism replacement

Its replacement can be carried out only by a duly informed parachute technician or by a technician trained by the manufacturer!

If activated, a new spare pyrotechnic chopping mechanism will be provided free of charge (only postage will be charged). This will apply only if the manufacturer is then sent a report (FAX, mail, post) giving details about the respective circumstances (see the form).

Chopping mechanism replacement procedure:

- Carefully remove the pyro cartridge from the central part of the body and disconnect its connector.



- Gently press the connector of the new pyro cartridge into the counterpart piece placed in the upper left part of the device body.



- Place the pyro cartridge into the central part of the device so that its whole height sinks in the groove.



- Lead the cable to the groove on the partition. The surface under the conductor is provided with glued on elastic rubber to insulate the cable.



- Once the pyro cartridge has been replaced, check the operation of the device by turning it on.

## 5. Device adjustment changes

A qualified person may change the adjustment of the device to TANDEM, EXPERT or BEGINNER and to set the time of the stand-by mode from 1 to 19 hours.

### HEAD VII

#### *Principles*

- Always turn on the device only in the area of the landing ground, i.e. not in the airplane.
- If you land outside an airport unintentionally and find yourself at a markedly lower or higher height on your way back ( $\pm 10$  m), turn the device off manually after arrival and then turn it on again! If you are in doubt, proceed in the same way to be on the safe side!
- The cabin of the parachute airplane must be connected to the surrounding pressure.
- After taking off, the parachute airplane must not descend below the height of the landing ground.
- If the positive re-calibration of the landing ground is applied, the airplane must not descend below the height of the landing ground if it has already overcome the same height.
- When re-calibration is used, the height lock is used with regard to the height of the landing ground, not of the start-up ground.
- If parachute jumps are interrupted, it is necessary to observe a descent speed lower than an activation speed or to turn off the device while landing.
- When replacing the batteries and activating the securing device repeatedly, it is always necessary to check the proper adjustment of the device; i.e. Expert, Beginner or Tandem. If the respective adjustment does not correspond with a requirement, it must be re-selected.



## HEAD VII

### ***Service life and warranty terms and conditions***

The anticipated service life of the device is 15 years.

Damage or shortcomings that have been demonstrably caused by the manufacturer will be repaired free of charge within a period of two years from the date of sale.

A warranty-covered repair, if any, does not extend the time of the warranty period.

Warranty does not apply to damage caused by force majeure or other causes, including but not limited to an accident, impact, improper use, unauthorized modifications, handling, misuse, etc.

#### CAUTION

MPAAD is a securing device! It is not designed to be used as a primary means for parachute opening.

The different use of the MPAAD device than is described in the operation manual may lead to its wrong function.

Considering a certain risk level that is an integral part of sport parachuting, no other requirements – especially, in particular those concerning breakdown after parachutist accidents – cannot be accepted.

## HEAD VIII

### ***Caution***

**The proper function of the packing bag is secured only by the PV – 038 pilot parachutes. The minimal buoyancy force of this pilot parachute is 170 N. The upper diameter of the firm part of the pilot parachute is 70 mm, while the lower diameter of the conical spring is 140 mm.**

**The application of other types of pilot parachutes is subject to the approval of the manufacturer of the packing bag.**



Pilot parachute PV – 038

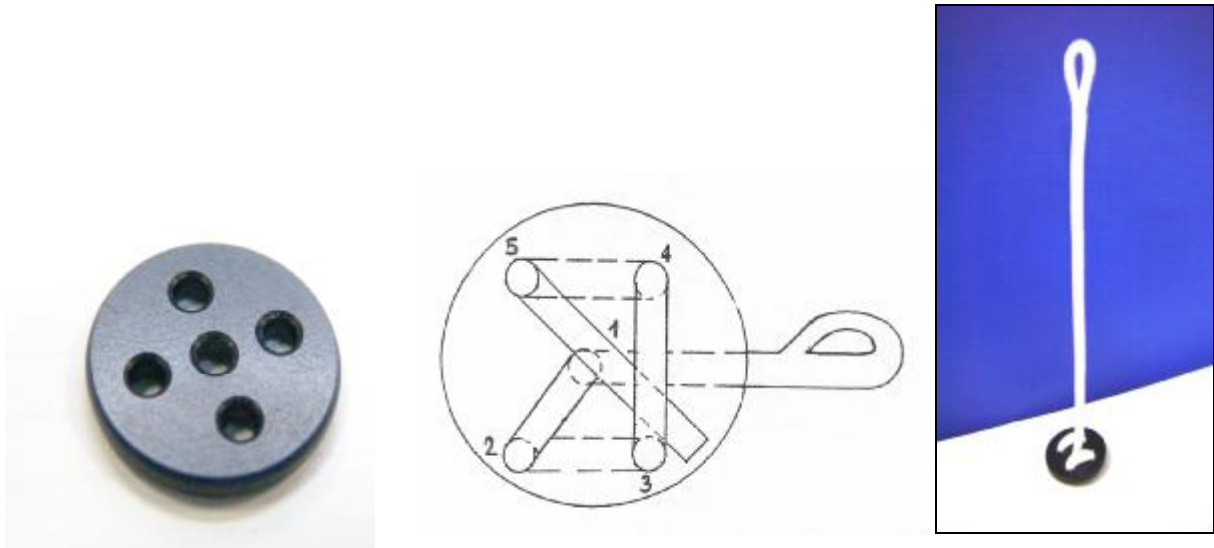


The size of the device is 100 x 62 x 20 mm.

## Placing the MPAAD securing device into a packing bag

The MPAAD securing device can be stored only in a packing bag designed for this purpose.

### Leading the cord through the pad:



1. Lead the cord through the pad center (1).
2. Then lead the cord to the openings marked with numbers 2, 3, 4, 5.
3. Lead the cord running through the center to a sign that informs the packing staff about the precise length.
4. Take the end of the cord pulled from the opening No. 5 and needle it in between the cord running between the openings No. 3 and 4.
5. Let the cord end stick out by ca 15 mm.
6. The cord that has been led along its entire length as described above is fixed by friction, which prevents its shifting.
7. In the area between the openings 2 – 3 and 4 – 5 the cord creates the surface with which the pad aligns onto the body of the pyro cartridge.

### Completing

The device must be completed by an authorized person. First, insert the cord and the pad into the device. The cord is inserted into the pad in a unique way and therefore it is not necessary to secure its ends with a knot. (Cord installation procedure – picture 1).

Put the device into the pocket sown onto the back padded piece, the display facing the translucent plastic plate. Lead the cord through the opening in the pocket and then take it through the bushing pressed onto the bottom of the packing bag of the reserve parachute. Stabilise the device inside the pocket and the packing bag is then ready for packing.

The reserve parachute can be packed only by a person with valid authorization. Once the reserve parachute has been packed, the function of the device has to be checked.

## MPAAD – Activation Report

1. Date of making the Activation Report: \_\_\_\_\_

Person who recorded the report: \_\_\_\_\_

Telephone number: \_\_\_\_\_

2. Details about the sportsman for whom the activation was completed.

Name: \_\_\_\_\_ Telephone number: \_\_\_\_\_

Height / weight: \_\_\_\_\_ Number of jumps: \_\_\_\_\_

Parachuting practice in years: \_\_\_\_\_ Number of jumps in the last 12 months:  
\_\_\_\_\_

3. Equipment details:

Bag type: \_\_\_\_\_ Production date: \_\_\_\_\_

Bag material:

(Cross out the appropriate) Cordura / Parapack / Uzaron / Patrik /  
Padnis

Main parachute type and size / number of jumps: \_\_\_\_\_

Production date: \_\_\_\_\_

Reserve parachute type and size: \_\_\_\_\_

Production date: \_\_\_\_\_

Applied system of main parachute opening:  hand-held parachute  manual  
control

parachute lanyard  other

4. MPAAD

Adjustment:  Expert  Beginner  Tandem

Production date: \_\_\_\_\_

Production number: \_\_\_\_\_

Date of installation in a bag: \_\_\_\_\_

Place of installation: \_\_\_\_\_

Installed by: \_\_\_\_\_

Pyro cartridge production number: \_\_\_\_\_

Was the loop cut through?:                      yes                      no  
(cross out the appropriate)

5. Airplane details:

Airplane type: \_\_\_\_\_ With or without doors: \_\_\_\_\_

Did the airplane have a pressure cabin and was it used? \_\_\_\_\_

Did the airplane descend before ascending from the departure aerodrome? \_\_\_\_\_

Did the airplane ascend slowly after the start? \_\_\_\_\_

Maximal reached height before the respective parachutist's drop \_\_\_\_\_

Jump height: \_\_\_\_\_

Pilot's name and telephone number:  
\_\_\_\_\_

#### 6. Activation details:

Date and time: \_\_\_\_\_

Airport (country / city): \_\_\_\_\_

Where was MPAAD activated:

- |  |                                     |  |
|--|-------------------------------------|--|
| <input type="radio"/> On the ground    | <input type="radio"/> During flight | <input type="radio"/> During main parachute opening    |
| <input type="radio"/> During free fall | <input type="radio"/> In ascend     | <input type="radio"/> After main parachute opening     |
| <input type="radio"/> In airplane      | <input type="radio"/> In descend    | <input type="radio"/> During reserve parachute opening |

Parachutist's position in the airplane: \_\_\_\_\_

Estimated activation height: \_\_\_\_\_

Air temperature on the ground: \_\_\_\_\_

How much time did MPAAD need to activate? \_\_\_\_\_

How many jumps with MPAAD were completed before MPAAD was activated? \_\_\_\_\_

Was it switched on at the airport? \_\_\_\_\_

If not, where was it turned on? \_\_\_\_\_

Has the MPAAD been outside the airport - except for the time when it was in the airplane or under the canopy - since the time of its activation?  
\_\_\_\_\_

The main parachute opened:

- Quickly       normally       slowly       very slowly  
 No, the main parachute did not open

When the main parachute open, the parachutist was

- In a stable position       In start       Flying headlong  
 On his back       On his side       Was rotating  
 Was not stable       Combination of all of the above

Please describe the accident in your own words, giving as many details as possible:  
\_\_\_\_\_

