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MILITARY CYPRES ACTIVATION ALTITUDE RECOMMENDATIONS 14 March 2006

TO: United States Military User Groups
SUBJ: Considerations about the Military CYPRES activation altitude in regards to canopy choice.

Ref: (1) SSK, Inc letter dated 02 March 2006
(2) SSK, Inc letter dated 08 March 2006
(3) Performance Designs letter dated 02 March 2006

1. Recently there have been many inquiries regarding Military CYPRES activation altitudes in regards to canopy choice. The following is recommended by CPS based on information provided by SSK Inc and Performance Designs. References (1), (2) and (3) are enclosed as supporting documentation.

Reserve Canopy	Application (Applicable container)	Military Cypres Activation Altitude
TR Series	Solo Jumper (MJ, HH or *MM)	No lower than 1500' AGL
HR-360	Solo Jumper (MJ, HH or *MM)	No lower than 2000' AGL
HR-360	Tandem (*MM or TS)	No lower than 2500' AGL
HR-400	Tandem (TS)	No lower than 2500' AGL

* With or without drogue

2. Thorough understanding of the Military CYPRES and proper use is paramount to the success of the mission and safety of the jumper. Adjusting the CYPRES to meet these activation altitudes (virtual DZ) is acceptable but knowledge of "the bottom of the activation window" must be understood and disseminated to all jumpers.

3. POC: Tim Perkins at 386-736-3862

Regards,

Tim Perkins

SSK MILITARY INDUSTRIES, INC.

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Serving Military Parachutists

March 2, 2006

Complete Parachute Solutions
Attention: Fred Williams
fred@cpsworld.com

Re: Considerations about the choice of Military CYPRES activation altitude

Dear Fred:

Background

The selection of activation altitude for an Automatic Activation Device (AAD) is generally driven by two criteria that are sometimes in conflict with each other:

1. The activation altitude must be high enough to allow full reserve canopy deployment, and there needs to be sufficient altitude to execute a safe landing. This criteria depends both on the specifications and testing results of the specific Reserve Canopy / Parachute Container / Deployment System, and on the free fall speed and total suspended weight (parachutist plus equipment plus cargo). These parameters, at least their ranges, are generally defined or obtainable, however it is also known that non-perfect freefall position prior to and during reserve deployment can lead to additional altitude loss. It is therefore common to use a conservative value for the altitude needed to ensure proper reserve deployment.

2. The activation altitude must be low enough in order to avoid interference with the intended (and possibly lower than intended) main canopy fully deployed altitude. This criteria is related to, but should not be confused with the intended jumper initiated deployment ("pull") altitude. Factors include accuracy of jumper-initiated deployment sequence, and altitude loss during main deployment (which is influenced by body position, main canopy type, deployment system, freefall speed, etc.).

Naturally, the precision and accuracy of the AAD also needs to be considered and factored into both of these criteria.

Military CYPRES considerations

The influence of the AAD in the choice of an activation altitude is generally limited to the precision of the AAD. With the advent of CYPRES, AAD activation accuracy is such that this factor is insignificant as compared to parameters such as canopy deployment time and precision of the jumper's pull altitude. However, like any other device, it is only as precise as the information supplied (DZ elevation, weather) and the conditions it is subjected to.

The lowest AAD activation altitude should always take into account the parachute manufacturer's advice. Our experience indicates that the parachute manufacturer's data has to be taken seriously, and we recommend to always choose an activation altitude on the high side to account for all of the variables involved.

Concerning the conflict between main canopy deployment and CYPRES activation altitude, we must consider that because of CYPRES's precision and reliability, the distance between main deployment and set AAD activation altitude can be much smaller than what was generally considered safe and has been in use with other AAD's. During tests performed by NAVSPECWARDEVGROUP and MARCORSYSCOM, there were numerous cases where the main canopy was fully deployed less than 450 ft. from the Military CYPRES activation altitude, with no resultant AAD activation.

Conclusions

In general, Military CYPRES settings below 1500 ft. should be used with caution with Military-class parachutes, and then only if the reserve canopy type / size, and the parachutist weight are more like those of a sport jumper, than of a military jumper.

After reviewing test data supplied by the parachute manufacturer, and speaking with them at length, it is our recommendation that no lower than the 1500 ft. setting version of the Military CYPRES be used with the Performance Designs TR-375 reserve, and that no lower than the 2500 ft. (or 1900 ft. depending on specifics of the application) setting version of the Military CYPRES be used with the Performance Designs HR-360-1 reserve.

In the event that a lower activation altitude is warranted during actual (wartime) usage because of operational considerations, the user can easily override the Military CYPRES default setting, by choosing a "virtual DZ" with elevation less than that of the physical dropzone.

Sincerely,

Cliff Schmucker
Vice President, Product Engineer

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March 8, 2006

Complete Parachute Solutions
Attention: Tim Perkins
tim@cpsworld.com

Re: March 2, 2006 SSK letter – Further considerations about the choice of Military CYPRES activation altitude

Dear Tim:

The following is a further clarification of our March 2, 2006 letter.

Based on information provided to us by John Leblanc of Performance Designs, and by Gary Thibault of U.S. Army Natick Soldier Center, we recommend the following versions of the Military CYPRES for the following PD reserve canopies and applications:

Reserve Canopy	Application	Military CYPRES version
TR-series	solo jumper (pilot chute or drogue)	1500 35 A
HR-360	solo jumper 450 # max (pilot chute or drogue)	1900 35 A
HR-360	tandem (personnel)	2500 29 A
HR-400	tandem (personnel or tethered bundle)	2500 29 A

It is our opinion that the above Military CYPRES versions are the best fit for these reserve canopies and applications, keeping in mind the supplied altitude loss information, and the two (sometimes conflicting) criteria described in our previous letter.

Of course, any version Military CYPRES can easily be adjusted for any desired AGL activation altitude by utilizing the "virtual DZ" concept. For example, MARCOR is presently using the 1500 35 A Military CYPRES with the HR-360 reserve in a solo jumper application with a 2000 ft. AGL activation altitude by adjusting it to a "Virtual DZ" that is 500 ft. above the physical DZ (or highest land-mass obstacle).

Please keep in mind that the bottom of the activation window is always approx 120 ft. above the "Virtual DZ", regardless of Military CYPRES version. (For example, utilizing and setting a 1000 35 A Military CYPRES for a 2000 ft. AGL activation application will result with the bottom of the activation window being at approx 1120 ft. AGL.)

Using the proper setting version CYPRES is always preferred, as the bottom of the activation window remains at 120 ft. AGL (or 120 ft. above the "virtual DZ" if applicable), use of "Training Mode" is possible when warranted, and all of the Military CYPRES will have the identical "Operational Mode" setting for a given drop zone. For example: a solo jumper using a TR-375 reserve with a 1500 35A Military CYPRES, a solo jumper using a HR-360 reserve with a 1900 35A Military CYPRES, and a tandem jumper using a HR-400 reserve with a 2500 29A Military CYPRES with a tethered bundle parachute using a 1000 35 A Military CYPRES will ALL utilize the same "Operational Mode" MBAR setting, and ALL have the same AGL bottom of activation window location. Additionally, in this scenario, if taking off and landing at the same DZ, "Training Mode" can be used on all of the various Military CYPRES if desired and appropriate.

Hopefully the above information, along with our previous letter, as well as the altitude loss data from PD and Natick, will provide CPS the basis for appropriate minimum AGL reserve activation recommendations, and corresponding AAD activation setting recommendations for your various parachute systems / user's applications for non-wartime purposes.

Regards,

Cliff Schmucker
Vice President, Product Engineer

REF: (3)

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SSK Industries, Inc.
1008 Monroe Road
Lebanon, Ohio 45036

Attn: Cliff Schmucker
Re: Reserve deployment altitude loss/Cypres activation parameters

Thursday, March 02, 2006

Dear Cliff,

This letter involves performance characteristics of two specific models of reserves designed for military/government use at high loads, and how that relates to setting of viable AAD activation altitudes. The two models, the seven cell TR-375 and the nine cell HR-360-R1, are designed with different missions in mind.

The TR-375 is designed for the mission profile typically handled by standard seven cell tactical parachutes, though with a greater weight capability. The TR-375 was originally certified under TSO C23d with an original maximum weight of 425 pounds. Further TSO testing has since been completed to allow for maximum weights of up to 475 pounds.

The altitude loss during all testing was within the limits prescribed by the TSO. The highest altitude loss was experienced on the breakaway tests. The range of altitude loss on the TR-375 was from 360 feet to 440 feet, with the average being 407.5 feet.

The HR-360-R1 reserve is not certified under any TSO. It is the smallest size of a family of canopies designed to perform at extremely high weights, speeds and altitudes. One of our primary objectives for this parachute was to insure that the opening characteristics would not cause excessive loads at high speeds and weights. Another objective was to insure that the opening characteristics would not cause excessive G-forces at high airspeeds but low weights, such as might occur during either a lightly loaded jumper having an immediate deployment on exit at high altitude, or during the jettisoning of a heavy load combined with a simultaneous deployment of the reserve.

To safely accomplish these two primary goals, we made sure to build into the HR canopy design a sufficient "snivel" at line stretch, as well as a reasonably slow inflation speed. We felt this was the best way to insure the safety of the jumper and suspended

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load while maintaining performance in the regimes we felt were most important, based on customer feedback on the previous products.

While the HR series is not certified under any TSO, we did perform a complete series of tests according to TSO C23d. The altitude loss on breakaway test for the HR-360-R1 ranged from 655 to 889 feet, with the average loss being 754.0 feet. The highest altitude losses during testing occurred on the 110 knot tests, with altitude losses ranging from 1100 feet to 1250 feet. These altitude losses are reasonable in light of the primary goals on this product.

A few more points about the test results:

First, we used highly experienced test jumpers to make all the live jumps, using new equipment. Inexperienced jumpers with worn equipment may yield different results.

Second the TSO standard requires that the parachute be "functionally open" within a certain time or altitude loss, but does not state what "functionally open" means. We needed to have some objective method to define "functionally open," and therefore chose descent rate as the most logical parameter that is specific and measurable. Since the TSO standard for maximum allowable descent rate is 24 fps at maximum weight, we chose a more stringent rate of descent by making it proportional to the actual test weight for that breakaway. For example, if breakaway tests were performed at 80% of maximum weight, we would require a descent rate of 80% of 24 feet per second, or only 19.2 feet per second, to be considered functionally open.

Third, when setting actual Cypres activation altitudes, consideration should be made for allowing sufficient safety margin to allow for unplanned situations, maneuvering for landing, or variances in openings due to body position, rigging issues, equipment age, etc.

Sincerely,

Performance Designs, Inc.

John LeBlanc
Vice President