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ARGUS AAD

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By Jo Chitty APF Deputy Director Rigging and PIA delegate.

This report on the history of events is made without prejudice and details events leading to APF actions on the use of the ARGUS AAD in relation to the safety of our members and other users of the device in Australia.

The ARGUS AAD is manufactured by AVIACOM SA in Belgium. It is assembled to their proprietary design using components manufactured by other specialist companies. It operates using a complex program that Aviacom has determined to be the optimum mode for the AAD to function in a narrow window of opportunity to activate the deployment sequence of a reserve parachute to save the life of a skydiver at a point where the skydiver has not instigated a lifesaving pull on the ripcord. It functions by sensing data such as vertical velocity and air pressure continuously throughout the aircraft ascent and subsequent freefall and if the parameters of speed and pressure / altitude are such that an activation is required to save the life of the jumper an electrical pulse is used to fire a pyrotechnic cutter to sever the fibre loop that is used to close the reserve container. This starts the deployment sequence of the reserve parachute without the ripcord having been pulled. This is an independent activation method that should not interfere with the natural opening method of the manually pulled ripcord.

On 25 July 2009, in Chrcynno, Poland a female skydiver died on her 18th jump. The jump was made from 12500 ft and she failed to open either her main or reserve parachute. She had her main pilot-chute in her hand at impact. Her equipment was fitted with an ARGUS AAD that had fired and subsequent investigation showed this to have occurred at 1000ft (300m).

The reserve parachute was found deployed to full line stretch and partly out of the deployment bag with a turn of the pilot-chute bridle around the lines. The reserve canopy was still neatly folded, an indication that it had not been exposed to the airflow of freefall. There were reserve closing loop fibres in the ARGUS cutter indicating that there was not a clean cut of the loop. The Polish Aviation Authority investigator determined that the loop had not been cut and that the reserve was locked closed by the partially cut loop. If the ripcord had been pulled after the cutter firing it would not have opened her reserve parachute as it was locked closed by the trapped fibres in the cutter.

The full report in polish is available as report No. 562/09 on web site:

<http://www.mi.gov.pl/files/0/1792017/2009562RP1.pdf>.

The report was issued 9 Mar 2010.

Subsequently the Polish Civil Aviation Office issued an Airworthiness Directive Nr. SP-0002-2010-D on 19 Mar2010. This directive grounded all ARGUS AADs in Poland for “Device malfunction. The device does not fulfil its assignment and possibly blocking or delaying the opening of reserve parachute –also after pulling the handle ripcord by the jumper.” The AD to remain in force until Aviacom has initiated appropriate preventative actions.

This AD was posted on the PIA (Parachute Industry Association) website that I regularly visit as APF PIA delegate and at the time Director Rigging.

I then sent an email to Mr Karel Goorts at Aviacom SA on 3 April 2010 requesting background information on the AD issuance by Poland.

Mr. Goorts responded on 7 April 2010 and stated that this issuance “had created a big problem for them and that the investigation appeared to have focussed on the AAD cutter and disregarded all other factors”. He attached several reports on cutter design and reliability as well as the in-house investigation of the ARGUS unit involved in the fatal jump. This investigation was conducted under the direction of the Polish Aviation Investigator and indicated that all the parameters of the cutter firing had been met and initiated at 1000ft (300m). Aviacom’s report also indicates that the descent speed was not slowed by the opening of the reserve and a second electrical pulse was initiated to ensure the cutter firing (there is no indication that the first pulse did not fire the cutter). According to the data logged, impact occurred 7 seconds later.

There can be several causes for a failure of the reserve to deploy after the reserve is activated: e.g. a tight container that restricts the launch of the pilot-chute, a stable body position that traps the pilot-chute in a ‘burble’ of shielded airflow, entanglement with an unstable jumper, low activation of the cutter or ripcord especially after cutting away from a malfunctioned main parachute or the failure of the cutter to fully cut the reserve closing loop.

I read all the reports presented and also accessed the Polish report via the internet and studied them critically.

I found that the Aviacom reports indicated that under certain circumstances the cutter may not sever the loop. This occurs in a no load on the loop situation and is why the requirement for a 5kg (10lb) load on the loop/compressed pilot-chute spring is a critical requirement for the clean cut of the loop as is specified in the user manual. I note that the Aviacom testing of 5% of production batches of the cutters are made using tensioned loops and some no load situation are carried out using a simple jig that does not take into account other factors that are introduced into the equation of cutter efficiency / reliability such as the effect of the container flap grommets and the pilot-chute spring effect of locking the closing loop diagonally through the cutter. This should be a requirement in the mechanical elements of the cutter tests.

After reviewing all the reports I concluded that in the Polish fatality the most probable cause was, as the Polish investigator found, the failure of the cutter to sever the loop and that the strands that were trapped in the cutter broke on impact.

I presented my thoughts and concerns on the ARGUS cutter in my presentation to the APF members at the APF annual conference in Sydney in May 2010 and as part of my report to the APF Board.

At the board meeting I presented the Polish Reports and Aviacom’s reports to Paul Osborne, APF National Safety Director, for his information along with my recommendation that the APF restricts the use of the ARGUS from use by students and tandem as the APF has a direct duty of care for these members as their experience in deciding on safe equipment/ risk is beyond their skill level to assess.

This resulted in the TAG (Technical Advisory Group) concurring with my concerns on the safe use of the ARGUS and resulted in the promulgation of APF Technical Directive TD03/2010 issued July 2010, restricting its use.

Aviacom has also issued a Mandatory Service Bulletin SB05-09-2010 for the replacement of cutters manufactured before Aug 07. The new cutters have a hardened blade.

I wrote “ARGUS Cutter Review” paper in June 2010 outlining my theory on the Polish Fatality that was sent to PIA Technical committee and circulated to all the members by Dave Singer, Chair PIA Technical Committee, as a discussion paper on 30 Sept 2010.

The report was also sent to Aviacom on 29 Sept 2010. In my attached email I requested what the course of action would be in light of the second incident that occurred in Portugal. As yet there has been no response.

On 28 Sept 2010 Aviacom issued a Letter of Demand to the APF that it lifts all restrictions on the use of the Argus and cites that our Director Rigging Mr. Rory Hatchett has a vested interest in suppressing the use of the ARGUS AAD and that the APF has previously supported the sale and use of Airtec’s CYPRES AAD.

Mr. Groots also states that the issue of their Service Bulletin SB AMM0050910/2 removes any excuse the APF may have to discriminate the ARGUS.

In this matter Mr. Hatchett was relying completely on my initial report and information supplied to me by Aviacom and the Polish Aviation Office report and AD. The decision to restrict the use was not made by an individual as in this case we are aware of the commercial implications it may have for Aviacom and as the APF has a TAG (Technical Advisory Group) comprised of experts in the field of instruction, rigging, safety and APF executive members to protect the safety of our members.

The APF has long ago divested itself of any interest in the sale of any particular AAD. The APF initial response at the introduction of the first electronic AAD that could be turned on and forgotten about for the rest of the day's jumping was intensive support for the massive leap in overall safety it presented to its members and initially sold to its members at virtual cost to encourage its use. The benefits to safety were soon appreciated and adopted by our members. When other manufacturers also produced comparable types of AADs and local dealers established, the APF relinquished its commercial interests and remains supportive of all viable safety technology.

The Aviacom SB on cutter replacement has not as yet demonstrated that it is superior to the cutter involved in the Polish fatality. The APF and TAG await more detail to review its initial Technical Directive.

At this time the APF and its Technical Directors have become aware of a second incident that occurred on or about 3 Sept 2010 in Evora, Portugal, where a student parachutist was being taken for a jump under the direct supervision of an instructor. The student's equipment was checked prior to emplaning and during approach to the exit point the instructor carried out a final gear check and noted that the ARGUS AAD control screen was blank. The instructor then advised the student that this was a no jump situation as directed in the owner manual for the ARGUS that states to never jump with a blank screen. After landing the instructor noticed that the reserve pilot-chute appeared to be sitting excessively high and presumed that the closing loop was too long and took the gear to the packing area where on close inspection it was obvious that the AAD had fired and FAILED to cut the loop. It was photographed and report sent to Aviacom.

Aviacom would have become aware of this incident by Monday 6 Sept 2010 as the first working day after the event. This well documented event removes all doubt about the possibility of the cutter failing to sever the closing loop.

The Aviacom website states that 24 lives have been saved to date but two failures to cut the loop in 26 firings in actual in the field use is below that demanded of a safety device especially where as in the Polish fatality it locked the reserve closed making the ripcord inoperable.

This violates the statement of FAA Advisory Circular 105-2C part 11b that "assembled components must function properly and may not interfere with the operation of other components". Clearly a reserve container locked closed by a part cut closing loop is in gross violation as the ripcord is totally ineffective and the reserve cannot then be opened manually.

With this second incident in Portugal highlighting the possible outcome of a failed cut of the reserve closing loop as occurred in Poland it is my recommendation that all ARGUS AADs be grounded until Aviacom is able to replace the cutters in the ARGUS AAD with a demonstratively superior and reliable cutter. Reliability testing to include tests in packed parachutes representative of common general pack designs to ensure that mechanical interaction between pack flap grommets and spring pilot-chutes is taken into account.

This should be a standard test requirement of all AAD manufacturers and equipment manufacturer who approve their fitting to their equipment.

Jo Chitty