

RAM-AIR HISTORY

BLM SMOKEJUMPER PROGRAM

The following is a year-by-year chronology of how the Bureau of Land Management developed the ram-air parachute for utilization in the smokejumper program. Of particular note to historians, the experimentation with early HALO equipment, the use of "parascension" as a training technique and the utilization of the Russian drogue to successfully deploy ram-airs are of interest. Key individuals that made the program fly were Jim Veitch, loft manager and Al Dunton, base manager of the BLM smokejumper program in Fairbanks, Alaska. The report covers the time frame from the time of initial research and development until full implementation by the BLM in 1990.

1977

In 1977, the Bureau of Land Management and the U.S. Forest Service recognized the need to replace the FS-10 round parachute system used by both branches of the U.S. smokejumper program.

The FS-10 was a steerable variant of a U.S. Army canopy developed circa 1953 and had been used in smokejumper operations since about 1970. Some bases had resisted the move to the round parabolic FS-10 and were still using the flat circular FS-5A as late as 1977.

The Forest Service concentrated research on developing an improved round canopy while the BLM smokejumper program based at Ft. Wainwright, Alaska, began investigating the potential of the Ram Air parachute.

1978

The key managers in the BLM program that supported and pioneered the initial effort were Jim Veitch, Alaska Spotter, assisted by Ron Lund, loft shift supervisor, and approved by Alan Dunton, Alaska base manager.

In 1978, Veitch engaged in a fact finding trip to Lake Elsinore, California to observe skydiving sport canopies and interview developers of Ram Air parachutes. Veitch recommended that the BLM investigate the use of the Ram Air in smokejumper operations.

In the Fall of 1978, Veitch made an off-duty jump using a HALO (high altitude, low opening) system provided by Paraflite, Inc. The system utilized an MT-1 canopy (XL Cloud).

1979

In the spring of 1979, four tandem "piggyback" systems (main and reserve parachute worn on back) were purchased by the BLM from North American Aerodynamics (NAA). These systems were modeled after the HALO system, but utilized a static line. The static line was used to open the main parachute container, releasing a spring coiled pilot chute. The main canopy utilized was the Jalbert 252 "heavy" built by NAA. Mike Shultz, an NAA representative, trained the first group of four BLM jumpers how to use and rig the system.

The first official BLM experimental Ram Air jumps were made on May 22, 1979 by Veitch, Eric Schoenfeld, Matt Kelly and Jim McGehee at Lester Field Parade Ground, Ft. Wainwright, AK, using the Jalbert 252 canopies. The spotter was Mike Schultz and the aircraft was Grumman Goose N642.

The following month, Al Dunton, Ron Lund, Tom Hilliard, Mike Clarkson, Steve Nemore and Rick Blanton were also trained to jump the experimental Ram Air system.

A total of 164 Ram Air jumps were made by the test jumpers in 1979.

The speed of the canopy in full flight surprised most of the first time jumpers. Overshooting the jump spot was common during the first jumps as were hot landings. Most of the jumpers reported improved glide slope judgement,

accuracy and landings by their fourth jump.

The HALO system, designed to be used for military special operations and deployed from free fall, proved to be unsatisfactory for smokejumper use. When used with a static line, opening shocks were inconsistent. The hard opening and lack of control of body position sometimes caused the jumper to flip completely through the risers.

During the first series of test jumps, Veitch reported one "violent opening" that he thought had caused a right shoulder separation. "Canopy opens quick and sure--and will hammer you if in a bad position," Veitch wrote.

McGehee reported an exit that was "Atrocious, like a rag doll tumble thru lines w/left riser group around left leg." He was tangled upside down while making his opening checks but was able to free himself for landing.

Tom Hilliard reported on one of his early exits: "Nearly upside down. Terrible position. Heavy, hard opening shock. Saw stars."

The "free-packing" rigging procedure was to coil the suspension lines in the bottom of the container and stack the folded canopy on top of the lines. The pilot chute was then compressed on top of the canopy and the container closed. The deployment sequence did not employ a deployment bag or line stows so resulting "canopy first" non-staged deployment caused hard openings.

In an effort to obtain "lines first" deployment, a static line attached deployment bag system was devised and dummy drop tested. The opening shock damaged the canopy, broke a brake line and ripped the stitching at the main ring attachment on the harness. Aircraft speed for smokejumper operations was too high and body position was not consistent for static line deployment of the jury-rigged HALO-type system.

Veitch began investigating the drogue deployment system used by Russian Smokejumpers. The Russians used a drogue system to deploy their round canopies, the result being consistently stable body position during aircraft exit.

A Russian parachute system, obtained by the U.S. Forest Service during cultural exchanges in 1976, was borrowed and evaluated to determine if a Ram Air canopy could be deployed using a drogue.

Two prototype systems were designed and built. Initial jumps were made in August 1979 by Veitch and Lund.

A total of 26 live drogue jumps were made between August 16 and October 6, 1979. Several drogues were tested ranging in design from available spring mounted pilots chutes to a large version of the type used as a hand deployed pilot chute by sport jumpers.

During this phase of testing, Lund, Veitch and McGehee each experienced malfunctions requiring cutaways and reserve deployment. As the problems were identified, the equipment was modified. Continued refinements began to show the potential of a drogue system.

The most successful drogue tested was a copy of the Russian system. A contract was awarded to NAA for the manufacture of eight complete Ram Air systems: Harness, reserve and main parachute, utilizing the Russian style drogue deployment system.

1980

Developmental work was slow during the 1980 season. No live jumping was conducted because the eight drogue equipped systems were not delivered by North American Aerodynamics.

Extensive dummy drop tests were made using the the drogue and studied on high speed film.

While the deployment system was being developed, information and techniques for Ram Air flight control was being gathered. A "parascension" program was initiated to teach cadre jumpers basic control and landing techniques on a Ram Air canopy. The system involved towing a jumper at the end of a 1,000-ft line by vehicle. When the Ram Air was sufficiently inflated, the jumper ascended like a kite. At maximum altitude, the jumper released the towing line and descended to the ground.

The parascension training technique was useful in gaining the experience of landing the canopy without incurring the cost of aircraft flight time (or the risk of deployment). Landing techniques of students could be closely observed by instructors.

In 1980, the detail to Grand Junction, Colorado, was initiated to evaluate smokejumper effectiveness in the Great Basin. The jumpers in the detail were round parachute equipped. The incidence of injury for round equipped smokejumpers was very high.

1981

The 1981 season was begun with a renewed effort to refine the drogue system. Eight drogues were manufactured in the Alaska smokejumper loft. Jerry Waters was trained and joined test jump cadre in the Spring.

Tests were conducted using round reserves to determine if the reserve would deploy properly in the event of a drogue-in-tow malfunction.

During the test jumps, Matt Kelly became entangled with the drogue bridle during a spinning exit. It was determined that the drogue apex should not be break-tied to the drogue deployment bag. The sail bridle on the Russian drogue was adopted to facilitate keeping the bridle from entangling the jumper.

The equipment ordered from North American Aerodynamics arrived late during the 1981 season. It was found to be unsuitable for its intended use.

Sixteen main canopies received were Jalbert 252 "lights", made with one of the first runs of F-111 nylon.

Veitch and Lund attended a rigger's conference in Muskogee, Oklahoma to meet with parachute equipment manufacturers. Lund was the primary designer and lead manufacturer of the first BLM Ram Air harness.

Four additional jumpers were trained in August of 1981 to be the core group of trainers for the Ram Air program: Craig Irvine, Bob Mauck, Ed Strong and Jack Firestone.

1982

In 1982, the Ram Air program procured six prototype reserve containers from Paraflite, six XL Cloud main canopies, and six MT-1 reserve canopies. Sixteen drogue canopies were manufactured in the loft.

A long sail bridle for the drogue was designed when it was determined on dummy drop tests that during a drogue-in-tow malfunction, the burble above the drogue could prevent the reserve from opening properly.

Trained in June of 1982 were Eric Brundige, Lynn Flock, Doug Certain and Bert Mitman. This group had significant previous sky-diving experience with Ram Air canopies. Flock would later become the focal point for Ram Air research and development.

The Ram Air system development had progressed to a point where it was ready for field evaluations by the test jump cadre. The Jalbert 252 and the Paraflite XL Cloud were the primary main canopies and the drogue deployment system had reached a reliable level of performance.

On June 21, 1982 the first Ram Air fire jump was made on fire #8524 near Selawick Lake, Alaska. The eight man stick exited the aircraft on a single pass. The spotter was Jim Veitch and the jumpers were Matt Kelley, Ed Strong, Eric Brundage, Craig Irvine, Jerry Waters, Jack Firestone, Bob Mauck and Lynn Flock.

A concussion-type head injury occurred to Hilliard on a fire jump when loose diagonal back straps allowed the drogue attachment yoke of the harness to strike the back of the jumper's helmet on drogue opening. A design change required the removal of a fiberglass stiffener that was determined to be unnecessary to stabilize the drogue attachment point. Greater emphasis was placed on adjusting the harness to the jumper and prejump equipment checks.

In August of 1982 the first regular Alaska smokejumpers were trained on the Ram Air system. Parascension continued to be utilized to maximize Ram Air landing experience. The first regular Ram Air rookie class was Scott

Dewitz, Mark Kroger, Ken Coe, Rodger Vorce, John LeClair, Bruce Nelson. A second class trained included Brian Lovett, Jim Kelton, Chris Palmer, Gary Schneeegas, Mike August and Steve Norrod.

Certain and Kelley made evaluation jumps using Ram Airs in Colorado to determine effectiveness in Great Basin smokejumpers operations. Jumps were made at elevations above 10,000 MSL and on steep sidehills. The evaluations were successful and recommendations were made for future smokejumper details to Great Basin to come Ram Air equipped.

Veitch and Kelley made demonstration jumps for the Forest Service in Missoula, Montana at a spot near the MSO training units. Two of the jumps were made in winds of about 20 mph.

Following the successful field evaluations, the decision was made to make the Ram Air system fully operational for fire jumps. One hundred and thirty MT-1S Paraflite Ram Air canopies were procured for delivery in 1983 for use as mains and reserves. The drogue parachutes were contracted to Strong Enterprises to build and were equipped with a long sail bridle.

1983

The spring of 1983 saw expanded Ram Air training, procurement of canopies and development work. The major projects in the AK loft involved mass production of components such as main and drogue deployment bags, as well as main and reserve containers to keep up with the canopy inventory.

The Ram Air rookie class held in May of 1983 trained Russ Little, Gary Johnson, Willy Lowden, Bob Quillin, Mike Fitzpatrick and Dave Stephens.

A second class held in August included George Steele, Larry Vanderlinden, Mark Klinger, Zeke Reister, John Olson, John Dube, Andy Anderson, Jeff Bass, Eric Pyne and Ray Brown.

A third class contained Tony Beltran, Tim Pettitt, Emmet Grijalva, Tony Pastro, Tom Emonds, Rod Dow, Greg Martin, Paul Sulinski and Jed Clark.

A brief rookie class took place in Grand Junction that involved Mike Durtschi, Jim Olson, Chris Farinetti, Davis Perkins and Tom Boatner.

Evaluation jumps were conducted using the MT-1X (Goliath), a large (375 sq-ft) Ram Air canopy built by Paraflite designed to handle heavy jump weights of U.S. military special forces units. The results were favorable.

The Ram Airs were used extensively on fire jumps in Alaska. The MT-1S was the primary operational canopy. Mixed loads with round and Ram Air equipped became the norm for smokejumper operations in Alaska. About one-third of the Alaska smokejumpers were Ram Air operators. A large contingent of Forest Service jumpers boosted AK that season and mixed loads were not a problem.

The first Ram Air fire jump in the continental United States occurred on July 23, 1983, in Utah on the Dixie National Forest. Jumpers were Irvine, Little, Lowden and August. The spotter was Blanton, the aircraft was King Air 555N. The same jumpers made the first Colorado Ram Air fire jump on the White River National Forest on July 30.

The first Nevada fire jump was made on Las Vegas district BLM on 7-31-83 by Palmer, Nelson, Brundige and Fitzpatrick. Brundige made the first fire jump using a Goliath canopy.

During the first operational year, some problems were encountered, identified and corrected:

The number 5 grommets in the sliders of the MT-1S canopies were replaced with number 8 grommets when slow openings occurred because of slow slider descent down the lines. Hard pulls on the drogue release resulted in the replacement of the drogue release rings with smaller rings to prevent binding the rings. Bob Quillin experienced a drogue-in-tow malfunction when an unwaged cable became separated from on a drogue release handle. The reserve deployment was clean.

The fire jumps in Alaska and the Great Basin in 1983 involved mixed loads of rounds and Ram Airs. All jumps continued to be documented and analyzed. The documentation was decidedly in favor of expanding the Ram Air

utilization. The hazards of higher winds, rocky terrain and higher elevations were greatly reduced by the use of the Ram Air parachute.

1984

The 1984 season resulted in further development and improvements to the Ram Air system. Dummy drop tests revealed a short bridled drogue was now feasible because the longer lines of the MT-1S reserve would allow the canopy to deploy and inflate properly above a drogue-in-tow without the burble problem. Two bridle lengths were evaluated to determine the optimum length.

The MT-1X (Goliath) canopy was adopted as a main canopy.

Ram Air rookies in May of 1984 were Pat Davis, Dean Hovdey, Rick Jensen, Lee Englesby, Tim Pettitt, Scott Lusk, Joe Buck, Jon Curd, and Alan Biller. The fall class consisted of Ken Franz, C.R. Holder, Randy Webb, Jim Raudenbush, Murray Lawson and Paul Naman.

The 3rd class of 1984 included jumpers Sean Cross, Everett Rubel, Micky Nelson, Clay Dalen, Walt Folker, Dennis Peleshuck, Mike Hardy, Rob Bowles, John Gould and Dalen Romero.

In the fall of 1984 it was decided to discontinue parascension as a training technique.

Malfunctions in 1984 resulted in changes in procedures and equipment design:

Buddy check procedures were improved after an Andy Anderson malfunction resulting from an improperly connected riser was not discovered during the buddy check. The main canopy containers were redesigned and retrofitted to securely hold the closing pin in place after a premature opening of the container resulted in a Davis Perkins entanglement of the main canopy lines with the drogue.

The drogue release handle separating from the cable reoccurred when Al Biller pulled and found a handle with no cable. Aluminum nicopress sleeves used in place of zinc coated sleeves were found to be inadequate for attaching the cable to the handle. It was determined that swaging over the plastic coating of the cable was also insufficient to secure the cable to the handle.

The Great Basin smokejumper detail to Grand Junction began using the Ram Air system exclusively in 1984. The first Ram Air fire jump was made in Oregon on BLM Vale District from a mission originating in Winnemucca.

1985

Equipment development continued to improve the capability and reliability of the Ram Air system.

In 1985, the Ram Air system was further introduced to Forest Service personnel. Forest Service smokejumper base managers and Dave Pierce, MEDC representative, were trained in Alaska in Spring.

In the Spring, a series of 47 dummy drop tests were successfully made using the short bridled drogue in a drogue-in-tow malfunction. All drogues were then retro-fitted with the short sail.

The drogue release handle was redesigned to prevent failure of the cable handle joint. No further problem was experienced with the handle coming loose from the cable.

A prototype static line system for direct deployment of the main canopy was dummy dropped with encouraging initial results. The prototype incorporated a sleeve to aid in the down wind deployment of the canopy.

In July of 1985 seventeen Alaska smokejumpers were transferred to the BLM in Redding, California. This group was responsible for coverage of BLM lands in the Great Basin states and also boosted the Forest Service during high fire

activity.

The policy at that time was the BLM jumpers used Ram Air parachutes on BLM operations and used round parachutes on Forest Service operations.

Dummy drops of Ram Air canopies into timber were conducted at Redding to evaluate the ability of the canopy to hang up during timber landings.

In September, live timber jumps were conducted at Redding practice jump spots to determine techniques and training for jumping ram-air canopies into timbered mountainous terrain.

1986

By the end of 1986, all experienced Alaska jumpers were trained on the Ram Air system. First year rookies continued to train on the round parachute for use during their first season, then made the transition to the Ram Air after gaining experience.

The Redding, California BLM smokejumpers continued making timber jumps in their spring training. The ability of the Ram Air parachute to securely hang up during timber landings was thoroughly established.

The BLM Redding jumpers became a detail to Alaska and brought their Ram Air Rookies to AK for training in the Spring of 1986. Among them, Diane Pryce became the first woman smokejumper to train on the Ram Air system.

Dave Hade executed a cutaway when a malfunction resulted from a suspected misrouted cable hookup causing a drogue-in-tow malfunction. The drogue-in-tow was released when the jumper activated the cutaway. Buddy check procedures were enhanced and design of a new Ram Air harness began which would prevent misrouting.

Tests were continued on a direct deployment static line system.

A hot fire season in Alaska saw a long season of mixed load fire jumps and no significant operational problems.

In August of 1986, twenty six Alaska smokejumpers were transferred to the Boise Interagency Fire Center to establish a permanent BLM Great Basin smokejumper operation. Ram air fire jumps were made in Nevada, Colorado, Utah and Oregon.

Lynn Flock became the Loft Manager of the Boise base. Ed Strong became the AK Loft Manager.

Redmond Air Center/Region 6 initiated the first Ram Air fire jumps from a Forest Service base in August. The Forest Service policy at that time was no mixed loads from USFS bases, so the BLM jumpers were bunched up on the list to make all Ram Air loads. On August 11, Volpar 800TH with Mark Kroger spotting launched from RAC and manned three two-manners on the Umatilla National Forest. The jumpers were Scott Lusk, Rod Orr, Mark Klinger, Jeff Courtway, Zeke Reister and Kent Aldridge.

Over a two week period, forty-six Ram Air fire jumps were made out of RAC on seven National Forests: The Wallowa-Whitman, Rogue River, Deschutes, Wilamette, Ochoco, Malhuer and Fremont National Forests.

1987

In the spring of 1987, the BLM smokejumpers in Redding were transferred to BIFC to be part of the Great Basin operation.

The Forest Service continued to show interest in the Ram Air system, allowing a few spotters and other key personnel to participate in rookie and refresher classes at Boise. Region Six personnel were particularly pro-active, with Ram Air rigging certification obtained by several USFS smokejumpers and facilities built at RAC.

In June of 1987 performance criteria for a smokejumper parachute were established by loft and training personnel from the Alaska and Boise bases. While the Goliath canopy could adequately handle the heavy load required in

smokejumper operations, some of its flight characteristics were not optimal. It was felt a canopy should have, among other things, excellent controls in deep brake mode to allow a superior accuracy approach into small timber spots.

Using the criteria, a development contract was advertised and awarded to Quantum Parachutes, Inc.

Direct deployment bag static line tests were discontinued when it was determined that the benefits of static line simplicity did not outweigh the safety of body position control the drogue system offered. Inadvertent toggle releases and broken brake lines were also experienced during the tests. In the last series of tests, George Stevens experienced broken lines resulting in a cutaway and clean reserve deployment.

Ram Air fire and training jumps were made in Region 6 and Region 1.

Total BLM Ram Air jumps to date passed the five thousand mark.

Jim Olson became the primary Ram Air trainer for the Alaska base and Craig Irvine became the primary trainer for Boise operations.

1988

The 1988 season was active with equipment development. A prototype Ram Air harness designed by Flock was put into field evaluation. The prototype main canopy (model Q5) developed by Quantum Parachutes, Inc. was test jumped and moved into the field evaluation phase. An improved reserve container designed by Flock was completed and dummy drop tested. The squarex drogue was jumped during the season with mixed results.

During a Ram Air rookie class in Boise, Dennis Cleary unintentionally activated the reserve instead of the main parachute during his first Ram Air jump. The reserve deployment was clean and the remainder of the jump was uneventful with all the required maneuvers accomplished. The new reserve container would alleviate this problem.

Forest Service interest in Ram Air system continued with shared training at Boise and operational use allowed program-wide.

Stead AFB near Reno became an operational BLM smokejumpers sub-base. Ram Air equipped jumpers dispatched out of Stead manned multiple fires throughout Nevada and on the Toiyabe National Forest of Region 4.

With the assistance of Bill Gargano of Quantum Parachutes, Inc. test jumps of various suspension line trims by Alaska and Boise smokejumpers were made in the Fall of 1988 in McCall, Idaho to refine the performance of the prototype canopy. The Q5 model Ram Air (330 Sq. ft, 7 cell) utilized a distinctive tri-cell configuration near each side of the canopy to provide stability in deep brakes.

1989

In 1989 a number of equipment issues were furthered. A contract was awarded to provide technical drawings of the Ram Air system. Additional prototype canopies were procured for further field evaluation of the Quantum canopy. The Flock-designed Ram Air harness was strength test dropped and approved as the new standard harness.

George Steele experienced a malfunction with cutaway due to a steering line problem. The reserve deployment was clean.

A prototype automatic drogue release acquired and modified by Jim Olson of the Alaska Smokejumpers for use on first-jump Ram Air smokejumpers was test jumped successfully.

A group of Forest Service spotters were trained on the Ram Air system in Redmond, Oregon. Other refresher training continues at Boise.

BLM Smokejumpers from Alaska and Boise made Ram Air fire jumps out of Redmond and La Grande in Region 6.

A value analysis involving base managers and Forest Service Officials was accomplished in Missoula, Montana to determine the merits of the Ram Air system as a candidate Forest Service smokejumper canopy.

1990

In 1990 a contract to supply 134 drogues was awarded to Para-Flite, Inc.

The Quantum designed Q5 Ram Air (to become known as "Tri-Lobe") was finalized as a main canopy for smokejumper operations. In January a contract to supply 60 main canopies was awarded to Guardian Parachute. In August a contract for 100 main canopies was awarded to Quantum Parachutes, Inc.

Hard openings on Guardian canopies were experienced during the fire season. A survey of all BLM ram-air jumpers was conducted to determine the extent of the hard openings.

Three cutaway malfunctions occurred on ram-air during the fire season. These were thought to be "tension knots" which are a tangle of suspension lines held together by tension during the deployment. High speed videotape of the deployment sequence revealed some slack in the control lines that may have contributed to this problem. Adjustments were made to all Trilobes by adjusting the brake setting used during deployment.

Ram Air fire jumps were made for the first time on the Colorado Rockies front range in July of 1990 with several National Forests using smokejumpers for the first time. Temporary smokejumper operations were set up at Jefferson County airport near Denver.