
Butler Parachute Systems Group, Inc.

STATEMENT OF CAPABILITIES

GENERAL

The Butler Parachute Systems Group specializes in the design, engineering, manufacture and testing of parachutes, recovery systems and related items. The company also provides recovery systems design, consulting, manufacturing and testing services to government agencies, aerospace firms and other parachute companies. We are particularly adept at the rapid development of new parachute and recovery systems for unusual applications. Butler Parachute Systems Group is a small business concern owned by a Vietnam-era service disabled veteran.

CORPORATE STRUCTURE

Butler Parachute Systems Group, Inc. is the holding company for its subsidiaries according to the product line in which they specialize. They include:

Butler Unmanned Parachute Systems, LLC. Specializes in complete recovery systems for unmanned applications, such as Unmanned Air Systems (UAS/UAV), target drones, rockets and munitions.

Butler Tactical Parachute Systems, LLC. Specializes in the design, engineering and manufacturing of parachute systems for use by special operations forces worldwide. Tactical applications include mass-assault troop delivery, war-fighting and re-supply equipment, and general cargo delivery for rescue operations.

Butler Personnel Parachute Systems, LLC. BPPS is the world leader in the development of aircrew emergency equipment. BPPS provides equipment for aerobatic and flight test pilots, smoke-jumpers and any kind of aircrew personnel. Most designs are custom-made to fit the individual user.

Flight Test Support Services, LLC. A service company that provides flight test support for parachute and aircraft test/certification programs. It conducts parachute drop tests of our customer products as well as assistance in Spin/Stall aircraft flight test programs.

Butler Aerospace Technologies, Inc. Legally, BAT is not part of the holding company but it cooperates closely with BPSG on product development. All divisions offer canopies which utilize the *BAT Sombrero Slider* (US Patent #5,890,678) and its variants. The basic concept is that immediately upon line stretch, the skirt of the canopy is symmetrically forced open, and then the air flow is metered into the canopy at a controllable, predictable and tunable rate. In well over 1,000 test drops with canopies from 16-foot D₀ to 88-foot D₀, there have been no random failures or malfunctions.

FACILITIES & EQUIPMENT

Butler Parachute Systems was established in 1979 by founder Manley C. Butler Jr. It was moved from California City, California, to Roanoke, Virginia in early 1995. Our facility was completely gutted and remodeled on our behalf, just prior to our move. BPS occupies 21,000 SF with additional space that will be made available for expansion in the future as needed.

For most design work (parachute and mechanical), we use AutoCAD and Pro-Engineer with an E-size roll-feed color plotter (to plot full-size patterns for most parts), two B-size Post-Script Laser Printers (one color) and two very large format plotter-cutters (see below). We have numerous Pentium (2000/XP) computers running on a Windows 2003 network with associated printers as well as the other usual office equipment.

We have over 70 sewing machines of various types, an 80-foot manual cutting table, two CNC single-ply hot-knife cutting, plotting and marking tables (76' x 8' & 64' x 7'), a 72-foot line table with tensioning/marking devices, three long packing tables, a 5-ton Dillon tensile tester, a 5-ton and a 20-ton electronic load cell/computer tensile tester. A 50-ton press for packing and a 20 cubic foot computer controlled oven with a vacuum pump for temperature setting of high density packs.

We also have a complete manual machine shop (lathe, mill, surface grinder, band saws, 50-ton press, etc.), equipment for TiG, MiG, arc and gas welding, a hand-held 1" capacity plasma cutter, and a CNC plasma cutter (1" capacity mild-steel; 3/4" stainless, 1/2" aluminum) as well as basic sheet metal equipment (brake, shear, roll). Please ask if you need more details.

DESIGN & MANUFACTURING CAPABILITY

Butler Parachute Systems has the experience, the personnel and the facilities to design and manufacture a wide variety of parachutes and recovery system components and equipment ranging from small sub-munitions decelerators (8-inch) to solid cloth canopies up to 154 feet in diameter. We do not manufacture or service any equipment for skydiving.

QUALITY CONTROL PROCEDURES

All personnel parachute products are FAA Approved and manufactured under TSO C23. The Quality Control System is FAA Approved under FAR 21.601 as applied to parachute products. All Invoice, Purchasing, Inspection and Quality Control materials tracking information is maintained in a database. The Quality Control system exceeds the requirements of MIL-I-45208. BPS is proceeding with an implementation program designed to achieve ISO-9001-2000 registration.

KEY PERSONNEL

Manley C. Butler, Jr. is the President and Chairman of the Board of Butler Parachute Systems Group, Inc. He serves as the Manager of all subsidiaries owned by Butler Parachute Systems Group, Inc. He has a B.S. Degree in Aerospace Engineering from the University of Texas at Austin; over thirty years of experience in parachute systems use, design, testing and manufacturing; three years as a combat aircrewman in the US Navy on the S3A Viking and an FAA Master Parachute Rigger license with all ratings. He also worked for four years as a Project Engineer/Program Manager in the Recovery Systems Design Branch at the Naval Weapons Center at China Lake, California, and worked for one year as Director of Engineering at ParaFlite, Inc. in Pennsauken, New Jersey. He is a licensed private pilot and an experienced parachutist with over 1,200 jumps. Note that Mr. Butler is a Vietnam-era service disabled veteran.

Roberto Montañez is the Vice-President of Operations. He is in charge of the day to day operations of the company. Roberto has a B.S. in Aerospace Engineering from Parks College of Saint Louis University. He has worked in the parachute industry since 1997 and has experience in the design and integration of parachute and electronic control systems, testing and instrumentation, and computer modeling and simulations. He also holds a private pilot license.

Patrick Sims is a Master Parachute Rigger and serves as the Chief Parachute Rigger, Test Operation Manager, and Harness/Container Production Supervisor. He retired from the U.S. Air Force in 1994 as a C-141B Instructor Loadmaster with 7500 flying hours and is experienced in all aspects of combat airdrop operations, including Heavy Equipment, Personnel, Container Delivery Systems, and Special Operations Low Level. His knowledge of airdrop operations and recovery systems led to his involvement in the development of numerous airdrop systems currently used worldwide.

Tom Fowler is the Technical Support and Sales Manger for Butler Personnel Parachute Systems, LLC. Tom holds a B.S. degree in English from Radford University. He has worked in the parachute industry for twenty-four years, including ten years with Strong Enterprises. Tom has experience in every aspect of the parachute industry including thirteen years in the research and development of emergency bailout systems for pilots. He is an FAA Master Parachute Rigger with all ratings and has serviced and packed over 8,000 emergency systems. Tom has 3,800 jumps including 748 test jumps. Thirty-seven of these live tests were jumps on round canopies designed for pilot emergency bailout systems.

Bruce Fulcher is the production manager for Butler Parachutes Systems Group. He has been with Butler Parachutes since early 1995 and has over fifteen years of other experience in the sewn products industry.

TEST CAPABILITY & SERVICES

Our subsidiary, Flight Test Support Services, LLC has the capability to test parachutes and recovery systems from sub-munitions size up to approximately 4,000 lb. at speeds up to 850 knots. We have established working relationships with several companies that provide aircraft support for various test program requirements. Available aircraft include a Cessna 182, CASA-212-200, DeHavilland DHC-6-200 Twin Otter; Beech King Air A90, SAAB Draken, Aermacchi 326, and others. We normally use the drop zone facilities of various existing parachute centers, but on occasion make arrangements for other areas.

We maintain an inventory of drop test devices such as bomb casings, cylindrical test vehicles, drop test dummies and various other test vehicles. We can also manufacture test vehicles as required for a particular test program. We have substantial in-house metal working capabilities for manufacturing and setting up of drop test vehicles. In addition, we have established close working relationships with several very good machine shops and various other metal and composite shops that we can call on if needed.

Still and video coverage is available from the ground, chase aircraft (if required) and in many cases, onboard the test vehicle. We have designed and built (in-house) a small, rugged computer data collection system with the capability of collecting up to 11 channels of data for riser loads, accelerations, static and dynamic pressure, etc. Please ask for our separate information sheet on our variations of the PDAS.

We occasionally drop test items from above 25,000' and allow them to freefall before beginning the recovery process using timers or altitude sensors. In order to do this from unpressurized aircraft, we maintain oxygen equipment for aircrew and jumpmaster use for high-altitude drops (above 15,000' MSL). We also have qualified personnel on a contract basis available for flight crew, jumpmasters and test jumpers from these as well as lower altitudes. We are continually adding to our test capability for our own use and that of our customers.

REPRESENTATIVE PROJECT HISTORY

(non-sensitive projects only)

AAI Corporation

Recovery System for the Shadow 200 TUAV: BPS designed and built a recovery system for the Shadow 200 TUAV widely used by the US Army. The main canopy (HX-200 – 16' D₀) is housed in a BPS designed/manufactured container with a vacuum formed shell, stainless steel stiffener and nylon flaps. The recovery system can be installed/removed in 20 minutes and the entire system weighs less than 7 lb. As of 2005, we have delivered over 600 recovery systems to the customer.

Aurora Flight Sciences

Recovery System for the Theseus UAV: BPS designed, built, and delivered a complete recovery system in 67 days. A rocket deployed 47' ringslot drogue canopy is used to stabilize the vehicle for descent and to deploy the 130' main canopy.

Amelia Earhart World Flight Re-enactment

Aircrew Parachutes: BPS provided two complete Quick Attachable Chest (QAC) Parachutes for Linda Finch on the successful re-enactment of Amelia Earhart's 1937 flight.

BAT Sombrero Slider

The BAT Sombrero Slider (US Patent 5,890,678) provides self-modulating, continuous control of the inflation process of any axis-symmetric parachute canopy. It also prevents the occurrence of inversion type malfunctions, thereby improving the reliability by several orders of magnitude. Please see our web site for further technical details on the device.

BPS H-X Series Canopies

The H-X Series™ Canopies are the most thoroughly tested canopies ever introduced into service and have proven to be the most reliable emergency parachutes ever built. The H-X Series Canopies utilize the BAT Sombrero Slider™ (US Patent 5,890,678), which is the most important new parachute technology in decades. Please see our web site for technical details on the HX Series Canopies or ask for a copy of AIAA 99-1707.

BPS SMART Chute System

The Small-unit Modular Aerial Re-supply Technology Chute System is a family of modular components (canopies, cargo containers, slings, risers, d-bags, containers, etc.) that are designed for mix/match operations to handle any cargo requirement from under 20 lb. to over 750 lb. More details are available on our web site and in the BPS SMART Chute Catalog.

Carter Copters, LLC

Recovery System for a High-Speed Gyroplane: BPS designed and built a rocket deployed parachute recovery system for the Carter Copters high speed prototype gyroplane which has a gross weight of 2,000 lb. and maximum parachute deployment speed of approximately 200 knots.

Cessna Aircraft Experimental Flight Test

Aircrew Parachutes (Business Jets): BPS designed and built emergency back type parachutes with HX-500/24 canopies, automatic ripcord releases, bailout oxygen and Capewell releases. Cessna traded in all of their existing equipment in order to have a single common configuration for their bailout rigs.

Cirrus Design Corporation

Spin Recovery Parachute System for SR-20 Aircraft: BPS designed and built a spin recovery parachute system for the SR-20 aircraft for FAA certification. BPS and Cirrus conducted one ground deployment test and one in-flight deployment test.

Commander Aircraft Company

Spin Recovery Parachute System for the 114-TC Aircraft: BPS designed and built a spin recovery parachute system for the 114-TC aircraft for FAA certification. BPS and Commander conducted one ground deployment test and one in-flight deployment test.

Eclipse Aviation Corporation

Deep-Stall Recovery System for the Eclipse 500 VLJ: BPS designed and built an emergency deep-stall recovery system for the Eclipse 500 Very Light Jet during its flight test program. Services included mounting fixture manufacturing, FEA analysis and on-site support during runway ground deployments.

FMV Swedish Defense Materiel Administration

Emergency Bailout and Tactical Equipment: BPS is a supplier of emergency and tactical parachute systems for FMV, including QAC parachutes for use in C-130 operations and Tandem Bundle Delivery Systems.

Fuji Heavy Industries (Japan)

Recovery System for a VTOL UAV: BPS designed, built and tested a rocket-deployed recovery system for a 900 lb. VTOL UAV. The main canopy was a BPS HX-2200 (53' D₀) in a deployment bag.

General Aviation Technical Services (GATS)

Spin Recovery System for "El Gavilan" Utility Aircraft: BPS designed, manufactured and assisted with the installation of our lightweight/remote spin recovery system.

General Atomics Aeronautical Systems Division

Recovery System for the Predator™ UAV: BPS designed, built and tested a recovery system for the 2,300 lb. Predator unmanned air vehicle. The system utilizes a rocket extraction system to deploy a 70.5 ft main canopy.

Recovery Systems for the Gnat & Altus UAV's: BPS designed and built a common recovery system for these 1,300 to 1,800 lb. UAV's. Both aircraft utilize the same parachute components but have separate conformal canisters peculiar to each aircraft type. The recovery system utilizes a rocket extracted 15.5' ringslot drogue and a 47' main parachute canopy.

Global Hilton World Flight Balloon

Aircrew Parachutes: On January 10, 1998, Dick Rutan and Dave Melton were forced to abandon their around-the-world balloon flight due to a tear in their inner helium balloon. They successfully parachuted to safety using "mission specific" emergency equipment designed and manufactured by Butler Parachute Systems. The ensembles included a harness with parachute riser releases (to release the canopy in high winds or in case of water landings); a backpack parachute container with an integrated life raft pack; an integrated survival equipment vest with flotation and survival items suitable for use worldwide and four days of rations and an oxygen bailout bottle.

Hybrid Dynamics Corporation

Recovery System for Sounding Rocket Prototype: BPS designed, built and assembled a recovery system for the HD test rocket from off the shelf components in less than a week. The main canopy is essentially an HX-600 personnel parachute with a specialized deployment bag. The system also uses a stabilization chute deployed from the side of the rocket body to prevent tumbling and spinning as the vehicle descends from over 100,000 feet.

L3 Titan Group

Recovery System for the Affordable Weapon System: BPS designed and produces the parachute recovery system in use on the Affordable Weapon System.

Meteor CAE (Italy)

Recovery System for the Mirach 100/5 Target Drone: BPS was awarded a substantial contract to design, develop and test a complete recovery system for the Mirach 100/5 target drone. This is a two stage system with a 8' D_o reefed drogue parachute and a 37' D_o main parachute canopy and can recover up to 660 lb. at Mach .9 at up to 15,000' MSL. The system has been tested and qualified at up to 468 KEAS at 695 lb.

NASA/Edwards Air Force Base

Aircrew Parachutes: BPS designed and manufactured a special, low profile, emergency back parachute for use in a modified F-104 ejection seat system. In addition, BPS has made numerous commercial sales of emergency back parachutes for use in bailout situations in non-ejection seat aircraft.

NASA/National Scientific Balloon Facility

Parachute Systems for Scientific Payloads: BPS has built (to print) two each 120 ft. diameter, two each 130 ft. diameter and two each 154 ft. diameter canopies for use on high altitude research flights with gas balloon systems.

North Carolina State University

Recovery System for a 17% F/A-18E/F RPV: BPS designed and developed a very low-cost, lightweight rocket deployed parachute system as an emergency backup for a powered model of the F/A-18E/F. The total system weight is about 7 lb. including the rocket. The rate of descent is approximately 17 f/s at 125 lb. gross weight.

Raytheon Aircraft

Aircrew Parachutes for the Premier Flight Test Program: BPS designed and built emergency back type parachutes with HX-500/24 canopies, automatic ripcord releases, bailout oxygen and Capewell riser releases.

Scaled Composites:

Butler and Scaled Composites have had a close relationship for many years (dating to the Voyager World Flight). In 2004 **SpaceShip One** went into space with the crewmembers wearing parachutes manufactured by Butler. Interestingly, the parachutes chosen were the same that Scaled had been using for a number of years for their ordinary flight test duties.

U.S. Air Force Air Education and Training Command

Aircrew Parachutes: BPS responded to an RFI/RFQ for a parachute system for use in the T-3A Firefly aircraft which was used in the USAF Enhanced Flight Screening Program. The requirements included the ability to fit 5% female to 90% male pilot candidates. Out of four sample parachutes submitted by bidders, BPS had the only acceptable form, fit and function. A contract to produce 300 parachutes was awarded in February 1996 and completed by the end of July.

U.S. Bureau of Land Management (Dept of Interior)

Aircrew Parachutes: BLM has purchased several different personnel parachutes for their aircrew and loadmasters, as well as SMARTChute systems and components.

U.S. Coast Guard

Aircrew Parachutes: BPS funded design, development and testing of a special back parachute with integrated flotation and survival equipment for the RG-8A aircraft and a special QAC chest parachute with integrated flotation and survival equipment for the E-2C aircraft. BPS has also provided the same parachute system to other operators of the RG-8A aircraft. USCG also has designated several BPS proprietary products for use in their aerial re-supply and rescue missions.

U.S. Forest Service (Dept of Agriculture).

Aircrew Parachutes: The smoke jumpers have purchased several different personnel parachutes for their aircrew and loadmasters, as well as SMARTChute systems and components. Furthermore in FY 2001-2002, the FS purchased over 700 chest reserve parachutes using the BPS LoPo 550 canopy.

U.S. Navy/China Lake

Aircrew Gliding Escape System (AGES): Manley Butler was the project engineer, designer and parachute rigger for the first-ever in-flight ejection seat test utilizing a ram-air inflated, gliding parachute wing for the main recovery chute (with an anthropomorphic dummy in the seat). This was the culmination of the AGES Program and conclusively proved that the use of high performance parachutes in ejection seats is feasible.

U.S. NAVY Special Warfare Development Group Two

Air Equipment Bag: BPS responded to a CBD announcement, then redesigned their concept and submitted samples, which were enthusiastically approved. BPS built 200 bags for the DevGrp and Seal Teams on the east coast.

Tethered Bundle Parachute Canopy: After numerous failures on the original equipment canopy for this application, the DevGrp tried the HX-500/600 canopies with 100% success rate. Larger quantities are now entering service.

Voyager World Flight

Aircrew Parachutes and Survival Equipment: During 1985-86 Manley Butler worked extensively with Dick Rutan and Jeanna Yeager on the design of the emergency parachute systems and related survival equipment for the Voyager World Flight. He personally manufactured the parachute components.

Worldwide

Special Operations Forces: The Butler Tactical Parachutes tethered tandem bundle system, the TT-600 has been adopted by the USAF, USN, Sweden, Norway and others. The SMARTChute system and its components are also widely used.