

THE POWER OF INTEGRATION

WIRE STRIKE PROTECTION SYSTEM

REDUCING RISKS

Bristol Aerospace Limited's Wire Strike Protection System (WSPS®) helps reduce helicopter accidents and fatalities caused by wire strikes. A single system of deflectors and cutters protects the windshield, landing gear, rotors and control linkages. WSPS provides a low-cost, low-maintenance answer to improved helicopter safety.







A WORLD LEADER IN AEROSPACE TECHNOLOGY

For almost 80 years, Bristol Aerospace has been a leader in the aviation and aerospace industry. Our commitment to innovation in design and manufacture has earned us a reputation for excellence in a highly competitive global marketplace. This reputation has won the loyalty of military and commercial customers worldwide.

WIRE STRIKE PROTECTION SYSTEM

As helicopters are operating in increasingly demanding roles, pilots are asking more from their equipment. Helicopters flying firefighting, law enforcement, emergency medical service and military missions often have to fly in low altitudes and unfamilar locations. The WSPS® is designed to reduce the vulnerability of helicopters to the potentially devastating consequences of an in-flight encounter with horizontally strung wires and cables.

The WSPS is a Bristol Aerospace proprietary product, originally co-developed with the Canadian Forces. It is now available for most military and commercial helicopters worldwide and continues to be designed for new models.



REDUCING THE RISK

The basic WSPS consists of three components: a roof-mounted cutter-deflector, a lower cutter-deflector, and a windshield deflector. Each cutter has a high tensile steel cutting blade, which can be easily replaced. The deflector guides wires over the windshield and other front surfaces to the upper cutter. The lower cutter can be mounted on the fuselage or landing gear. Additional cutters or deflectors can be installed to protect specific equipment or deflect wires over other obstacles.

The WSPS reduces several risks to operators and equipment by:

- Reducing the chance of wires penetrating the cockpit through the windshield
- Reducing the possibility of wires contacting the rotors or control linkages to cause flight control damage
- Reducing the possibility of wires becoming ensnared in the landing gear or other equipment





Basic WSPS Components



WSPS AT WORK

Examples of actual wire strike incidents

• A Bell 206, on a late afternoon survey, struck several ½" diameter, 7 strand electrical cables while flying in a shaded mountain pass. The lower cutter cut two cables and one or more cables were cut by the upper cutter. Damage was limited to the OAT gauge and an HF antenna. Windshields were slighty scratched but not broken or cracked. The aircraft made a normal landing and **no injuries** occurred.

• A Bell 206L was participating in a police search for a stolen car near Campbellton, New Brunswick. It struck an aluminum ground wire at 250 feet and 60 MPH. The pilot saw the wire when it was approximately 10 feet away. The wire was cut by the lower WSPS cutter. The pilot made a normal landing to inspect for damage. There was no damage to the aircraft and **no injuries**. The wire was unmarked and was not shown on the hazard maps of the area.

• A CH-146 was operating at 75 feet and 80 knots flying along a valley when the aircraft nose struck three wires. The first two wires slid up the windshield and were cut by the upper cutter, and the lower cutter cut the third wire which slid down the nose. The aircraft continued flight for 2 km and then landed in a suitable emergency landing site without further incident. The first two wires damaged the right hand wiper blade, OAT probe, and skylight, and arcing occurred on the FLIR from the third wire. There where **no injuries.**

• An AH-64 helicopter was flying at 500 feet when it contacted a 5/8" cable. The wire slid up the windshield shattering the Plexiglas panel over the pilot's head before engaging the upper cutter. The cut cable hit the main rotor blade at the swept tip while clearing the helicopter. There were **no reported injuries** to the two passengers on board.

WSPS® PUT TO THE TEST

The WSPS demonstrated its effectiveness in a variety of tests.

BRISTOL AEROSPACE TESTS

Bristol Aerospace conducted ground tests using a truck-mounted Kiowa (Jet Ranger) fuselage in runs against various wires and cables and at speeds varying from 5 mph up to 60 mph. The system was tested on single span 10M cable (minimum 10,000 lbs breaking strength) and a combination of a 10M and a polyethylene shielded communications cable (100 pair, 24 gauge insulated copper wire). The tests demonstrated the WSPS to be capable of severing single span cable with minimum breaking strength of 12,500 lbs (60 kilonewtons) and multiple span cables with combined breaking strength in excess of 23,000 lbs (102 kilonewtons).

Using these tests and state-of-the-art CAD/CAM capabilities, Bristol Aerospace developed a proprietary computer program to project wire sliding and cutting loads. These projections from the criteria for WSPS designs.

U.S. ARMY TESTS

The U.S. Army verified the WSPS effectiveness against North American wires. Using a pendulum swing test on a Bell OH-58A at the NASA Impact Dynamic Test Facility in Langley, the system proved effective against multiple spans of electrical and communictions cables with combined strength in excess of 23,000 lbs. The U.S. Army has subsequently adopted the WSPS for their OH-58, OH-6, UH-1, AH-1, UH-60 and AH-64 fleets.

AEROSPATIALE / FRENCH ARMY TESTS

Ground wire strike tests at the French Army Test Facility verified the WSPS effectiveness against European wires. A truck-mounted WSPS equipped Gazelle helicopter was driven into three spans of Aster 147 cables (.625" diameter, 19 strand aluminum electrical conductor) with combined tensile strength of 32,100 lbs. The French Army subsequently adopted the WSPS for their Gazelle, Puma/Super Puma and Ecureuil fleets. Wire Strike Protection Systems are available and FAA certified for many popular civil helicopters. As well, WSPS® is available for a wide variety of military helicopters.

AgustaWestland: A109C, A109E Power, A109SP, A119 Koala, AW129, AB139, EH101/Cormorant, Super Lynx 300, Future Lynx

Bell: 204, 205, 206 Jet Ranger, 206 Long Ranger, 206B-1 (Hi-Skid), 210, 212, 222, 230, 430, 407, 412, 412EP, 412CF, 427, 429, CH135, UH-1D, UH-1H/V, AH-1J Cobra, AH-1S Cobra, AH-1S (MOD) Cobra, AH-1T Cobra, AH-1W Super Cobra, AH-1W Super Cobra (NTS), OH-58A, OH-58C

Boeing: AH-64 Apache, CH-46E

Denel Aviation: Rooivalk CSH

Eurocopter: AS330 Puma, AS332 Super Puma/Cougar, SA341 Gazelle, AS350 Astar, AS355 TwinStar, AS365 N3 Dauphin, BK117, BK117 (w/FLIR), BO-105 ATH, BO-105 CB, CBS, LS, Tiger, EC135, EC120 Colibri, EC145 (BK117C2), EC155, NH90

Kawasaki: OH-1

Kazan: Mi-172

MD Helicopters: OH-6A, MD500 C & D, MD500E, 530F, 500N, MD500MDI, MD500M, MD600, MD900 Explorer

Sikorsky: UH-60A Blackhawk, HH-60H (USN), CH148, S-76, S-92, S-92(w/FLIR)

Kamov: Ka-32/II/B/C

Forward speed, cable tension, cable angle, strike angle and pilot reaction are all factors that affect the protection the system provides. Due to these factors and other variables in actual flight conditions, Bristol Aerospace Limited cannot warrant the performance of the system. Please refer to system specification sheet for more information.

SIMPLE DESIGN, SIMPLE INSTALLATION



The key advantage of the WSPS® is its simplicity. The design is straightforward, and installation and maintenance are simple.

The system has minimal effect on the flying characteristics of helicopters and it cuts wires with negligible pitch changes, minimal deceleration and minimal strain on the airframe. The basic kit weighs as little as 15 lbs. (7.3 kg).

The cutting edges are easily replaced in the event of a wire strike, and are rubber coated to minimize injury risk to service personnel.

Kits come complete with all components and fairings ready for installation. Replacement parts are available for most major components.

IMPROVING OPERATIONAL SAFETY

WSPS may provide a last line of defence against wire strikes, but the best protection against wire strikes is PREVENTION.

- Never fly lower than surrounding obstructions until you determine what cables or wires are present, and then such flight should only be during takeoff and landing.
- Always conduct a high and low recon when you land in unfamiliar territory. Always presume it has a wire running across.
- · Don't just look for wires supporting poles and structures are easier to spot.
- Constantly scan the area in front of you 180° from left to right.
- · When you spot one pole, look for more.
- After you've spotted poles and wires, always cross at the pole or structure. Check
 if adjacent poles are on higher terrain and, if so, be alert to the possibility there
 may be a wire above the pole where you are crossing.
- Always keep alert even after you've spotted a set of wires or poles. Another set may be directly behind or in front of them.

These suggestions are very basic, but the bottom line is: THE PILOT IS RESPONSIBLE.

For Information, contact Christian Robins:

Bristol Aerospace Limited • PO Box 874, 660 Berry St • Winnipeg, Manitoba R3C 2S4 • Canada

Phone: (204) 775-8331 Fax: (204) 783-2042 e-mail: balwsps@magellan.aero

www.magellan.aero

Printed in Canada January 2009

Magellan Aerospace Corporation is a publicly traded company listed on the Toronto Stock Exchange under the symbol MAL.

www.magellan.aero