NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, D.C. 20594

AIRWORTHINESS GROUP CHAIRMAN'S FACTUAL REPORT

February 6, 2019

A. ACCIDENT WPR18FA247

Location:	New Washoe City, NV
Date:	September 2, 2018
Time:	1335 Pacific Daylight Time (PDT)
Operator:	Private
Aircraft:	Schempp-Hirth Duo Discus T
Registration:	N22XC

B. AIRWORTHINESS GROUP

Chairman: Clinton R. Crookshanks
National Transportation Safety Board
Denver, Colorado

Member: Christoph Wannenmacher
Schempp-Hirth
Kircheim, Germany

Member: Eliott Simpson
National Transportation Safety Board
Los Angeles, California

C. SUMMARY

On September 2, 2018, about 1335 Pacific daylight time, a Schempp-Hirth Duo Discus T motorized glider, N22XC (callsign XC), experienced an in-flight breakup while maneuvering near New Washoe City, Nevada. The two private pilots sustained fatal injuries, and the glider was destroyed. The glider was registered to one of the pilots and operated under the provisions of Title 14 *Code of Federal Regulations* Part 91 as a personal flight. The glider departed Truckee-Tahoe Airport (TRK), Truckee, California at 1258. Visual meteorological conditions prevailed, and no flight plan had been filed for the cross-country soaring flight.

D. DETAILS OF THE INVESTIGATION

1.0 Glider

The Schempp-Hirth Duo Discus T is a high-performance, two-seat, T-tail glider designed primarily for cross country flying and advanced training. The glider is constructed primarily of carbon fiber and glass fiber reinforced composite materials with a tubular steel fuselage center section truss. The glider is 28 feet, 3 inches long, has a tail height of 5 feet, 3 inches, and a wing span of 65 feet, 7 inches. The glider is equipped with fixed nose and tail landing gear and a retractable main landing gear and a retractable sustainer engine. The glider empty weight is 900 pounds and the maximum gross weight is 1,540 pounds. The glider has a maximum speed of 142 knots and a maneuvering speed of 100 knots.

2.0 Wreckage Examination

The group examined the glider wreckage at the Plain Parts facility in Sacramento, California, on February 5, 2019. The glider suffered extensive fire damage and most of the composite structure was consumed by fire. The left outboard wing, the left inboard wing, a portion of the left aileron, and two small pieces of the horizontal stabilizer were recovered away from the main wreckage with no fire damage. All components of the glider not discussed below were not identified in the wreckage and likely consumed by fire or not recovered. All metal fractures examined had a dull, grainy appearance consistent with overstress failure.

Left Outboard Wing

The left outboard wing separated at its attach point located about wing station (WS) 318[1]. The left outboard wing was intact and mostly undamaged. The outrigger wheel on the lower surface remained attached. The left outboard aileron was separated from the wing section and not identified in the recovered wreckage. The three outboard aileron hinge pins remained attached to the wing and their associated aileron bushings remained attached to the pins. The bushings were fractured from the aileron. The cylindrical spar splice was intact but the carbon fiber reinforced plastic (CFRP) was split vertically at the locating pin location. The left outboard wing was placarded with SN 72. The aileron return spring was intact and remained attached.

Left Inboard Wing

The left inboard aileron was separated from the wing. A section of the inboard portion of the aileron about 5 feet long was recovered with no fire damage. The two inboard hinges were pulled off the aileron. The actuator hinge remained attached to the aileron and the hinge pin was intact and bent. One of the two wing hinge mounting blocks remained attached to the hinge pin and was pulled from the wing. The aileron actuator rod end remained attached to the actuator hinge and was fractured from the control rod in the threaded portion. The aileron trailing edge was separated between about 38 and 45 inches from the aileron inboard end. There was buckling of the lower skin noted in the same area.

The left wing was mostly intact with no fire damage. The main spar caps were manufactured from CFRP, the main spar webs were manufactured from glass fiber reinforced plastic (GFRP), and the wing skins were manufactured from foam core GFRP. The left wing main spar lower cap was fractured about WS 18. The lower cap fracture occurred on multiple planes and exhibited a broomstraw appearance. The left wing main spar upper cap was fractured about WS 74. The upper

[1] Wing stations are measured in inches outboard of the glider centerline.

cap fracture occurred on a single plane and the fibers remained bonded together. The spar web was separated from the upper cap and damaged between the upper and lower cap fracture points with most of the upper portion missing. The spar web was missing from WS 28 inboard. The spar web was fractured near WS 112, with the upper cap separated from the web inboard of the web fracture. The web remained bonded to the lower spar cap inboard of the web fracture but there were visible areas where the bond was failed. The upper and lower wing skins were peeled away from the spar, damaged, and fractured diagonally at the inboard end of the wing section between about WS 42 and WS 100. The lower wing skin was delaminated inboard of the aileron actuator rod location. The upper and lower wing skins inboard of about WS 42 were not identified in the recovered wreckage. The wing upper and lower skin trailing edges were separated inboard of the aileron cut out.

The aileron pushrod was intact between the outboard and inboard bell cranks inside the left wing. The actuating rod remained connected to the outboard bell crank and the aft rod end was fractured in the threaded area. The inboard leg of the inboard aileron bell crank was fractured.

The left air brake was not identified in the recovered wreckage. The outboard short push rod was separated from the inboard long push rod at the inboard end and separated from the inboard air brake bell crank at the outboard end but remained in the air brake well. The air brake slave rod remained attached to the inboard bell crank and was fractured at the outboard rod end. The inboard and outboard air brake bell cranks remained installed in the well. The two air brake lever arms were fractured at their respective bellcrank weldments with corresponding damage to the aft edge of the air brake well consistent with brake separation in an aft direction when extended.

The left wing ballast tank appeared intact and the actuating rod was detached.

The outboard wing locating pins were intact on the inboard wing end rib at WS 318. The forward pin exhibited slight forward and upward bending. The aft pin appeared undamaged. The outboard wing spar receiver hole exhibited damage to its upper surface, with more significant damage and gouging to its lower surface along with skin delamination.

All of the aileron hinge pins remained intact except for the pin at the actuating rod location (which remained attached to the aileron). All aileron bushings, except for the one at the actuating rod location were detached from the aileron but remained attached to their respective pins on the wing.

Center Wing

The center portion of the wing spars were somewhat intact but sustained extensive fire damage. The spar pin at the glider centerline remined installed through the left and right wing spars. The right forward and aft wing pins were intact but the surrounding composite structure was consumed by fire. The left forward and aft wing pins were not identified in the recovered wreckage. The wing spar end pins were present in the inboard ends of the left and right wing main spars and the fuselage bushings were installed on the pins. The composite structure around the bushings was consumed by fire.

The right aileron and airbrake bell cranks were inside the right drive funnels. The control rods were attached to the right drive funnels. The brass followers and the aft pivot rivet were consumed by fire. The forward pivot rivet remained attached to one side of the bell crank bracket. The left drive funnels were intact with the control rods attached. The left aileron and airbrake bell cranks were separated

from the bell crank brackets. The pivot rivets and brass followers were consumed by fire.

The steel fuselage truss was deformed and bent with extensive fire damage. The truss section containing the forward wing pin receivers was fractured from the fuselage truss.

Horizontal stabilizer

Two small pieces of the horizontal stabilizer were recovered with no fire damage.

Flight Controls

Elevator

The elevator controls were continuous and connected from the forward control stick to a fracture in the aft long push rod (about 20 inches from aft end) except for a fracture in the center push rod between the forward and aft control sticks. The steel elevator control push rods were bent and deformed in several places with extensive fire damage. The aft 20 inches of the aft long push rod was fractured from the aft long push rod. A rod end remined installed in the aft end of the aft long push rod section. The aft short push rod was intact with the forward rod end fractured through the threaded area. The aft aluminum elevator bell crank normally installed at the base of the vertical stabilizer was consumed by fire, but the steel bell crank mount was identified. The vertical elevator push rod was intact and remained connected to the elevator control arm at the rear horizontal stabilizer attachment point. The elevator control arm assembly remained connected to the elevator torque tube. The forward horizontal stabilizer mounting pin was intact and engaged in its respective socket assembly. The elevator inertia weight bracket was intact at the forward end of the elevator controls along with the weight mounting bolts, but the weight had melted away.

The elevator trim locking control rod was at the midrange position. The bias springs remained attached to the elevator rod, and were cut off during examination.

Aileron

The aileron controls were continuous and connected from the forward control stick through to the aft end of the aft aileron push rod. The steel push rods were bent and deformed in several places with extensive fire damage. The aluminum aileron bell cranks normally installed aft of the cockpit were consumed by fire. The vertical aileron push rods remained attached to the left and right drive funnels. The inboard aileron push rods for both wings were identified loose in the wreckage. The right inboard aileron push rod was intact from end to end and the funnel bell crank remained installed at the inboard end. The left inboard aileron push rod was intact from end to end but the inboard rod end was fractured through the threaded area. The fractured rod end remined installed in the left aileron funnel bell crank. The right outboard aileron push rod, bell crank and actuating rod were not identified in the recovered wreckage.

Air Brakes

The air brake controls were continuous from the forward pilot position to the aft end of the aft push rod. The aluminum air brake bell cranks normally installed aft of the cockpit were consumed by fire. The vertical air brake push rods remained attached to the left and right drive funnels. The left air brake push rod was continuous from the funnel bell crank to the outboard end where it separated from the outboard airbrake push rod. The remainder of the left air brake controls remained installed in the left

wing as described earlier. The right air brake control push rods were continuous from the funnel bell crank to the airbrake lever arms. The rods were bent and deformed in several places with extensive fire damage. The aluminum air brake was consumed by fire. AD 2015-20-11 appeared to have been complied with based on the design of funnel bell cranks.

Rudder
The forward and aft rudder pedals remained attached to their respective steel mounting structure. All cables were identified from the pedals to the rudder control horn. The cables for the entire system were cut in multiple locations during recovery.

The upper rudder hinge assembly, lower hinge assembly, and control horn were intact with extensive fire damage.

Canopy
Burnt remnants of the canopy frame were identified in the wreckage. The canopy hinge rods and locking assembly were identified but were bent in several locations.

Engine
The engine remained attached to its mounting pivot and to the steel fuselage truss. The engine sustained heavy fire damage. The engine spindle drive was in the retracted position, consistent with the engine being retracted into the fuselage.

The propeller hub was separated from the engine with the burnt remains of the propeller blades still installed.

Landing Gear
All three landing gear wheel hubs were identified with extensive fire damage. The tires were consumed by fire. The center wheel hub was consumed by fire with only its brake rotor and mounting bolts remaining.

Cabin
No discernable cabin components were present beyond fire damaged electrical wires and a few instruments. Both seat buckles were identified. Two belt latches for one buckle remained attached to the locking hub, and four latches remained attached to the other hub.

Remnants of two parachutes (springs and three locked belt buckles) were identified.