ACCIDENT

Aircraft Type and Registration:	Flight Design CTSW, G-KUPP	
No & Type of Engines:	1 Rotax 912ULS piston engine	
Year of Manufacture:	2006 (Serial no: 8227)	
Date & Time (UTC):	19 July 2018 at 1140 hrs	
Location:	Redhill Aerodrome, Surrey	
Type of Flight:	Training	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Fire damage to cockpit instrument console	
Commander's Licence:	National Private Pilot's Licence	
Commander's Age:	65 years	
Commander's Flying Experience:	4,870 hours (of which 2,069 were on type) Last 90 days - 47 hours Last 28 days - 24 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

An electrical fire in the instrument console developed shortly after takeoff and the pilot returned to land on the active runway. An electrical short circuit with the composite instrument console, resulting in a resin fire, was traced to a damaged wire. The wiring had been previously modified and a Service Bulletin has been released to reduce the risk of electrical and fuel fires.

History of the flight

The aircraft took off from Runway 08R at Redhill Aerodrome, on the second training flight of the day at 1138 hrs. The northerly wind was 3 kt and the pilot in command was in the right seat. As the aircraft climbed through 500 ft the pilot noticed an electrical burning smell and smoke coming from the instrument console. He declared a MAYDAY, immediately turned the aircraft left and could feel heat coming from the central instrument console onto his left leg. The pilot continued a tight left-hand circuit to land back on Runway 08R and selected 40° of flap. With the smoke making it difficult to the read the ASI on final approach, the pilot landed the aircraft about halfway along the runway. The airport RFFS met the aircraft as it stopped and used carbon dioxide fire extinguishers to put the fire out. The total flight time was less than two minutes. It was noted by the pilot, after exiting the aircraft, that the flaps were in the takeoff configuration (15°).

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Aircraft examination

The aircraft was recovered to a repair organisation for examination and the instrument console was disassembled. There was evidence that the console had been modified previously to fit new avionics equipment and the charge indicator lamp had been moved. The original location was the upper right of the panel, but it had been moved to the lower central section (Figure 1). The repair organisation's assessment was that the standard of wiring was very poor. Wires were over length, had insufficient support, there was a risk of entrapment or chafing and improper terminals had been used.

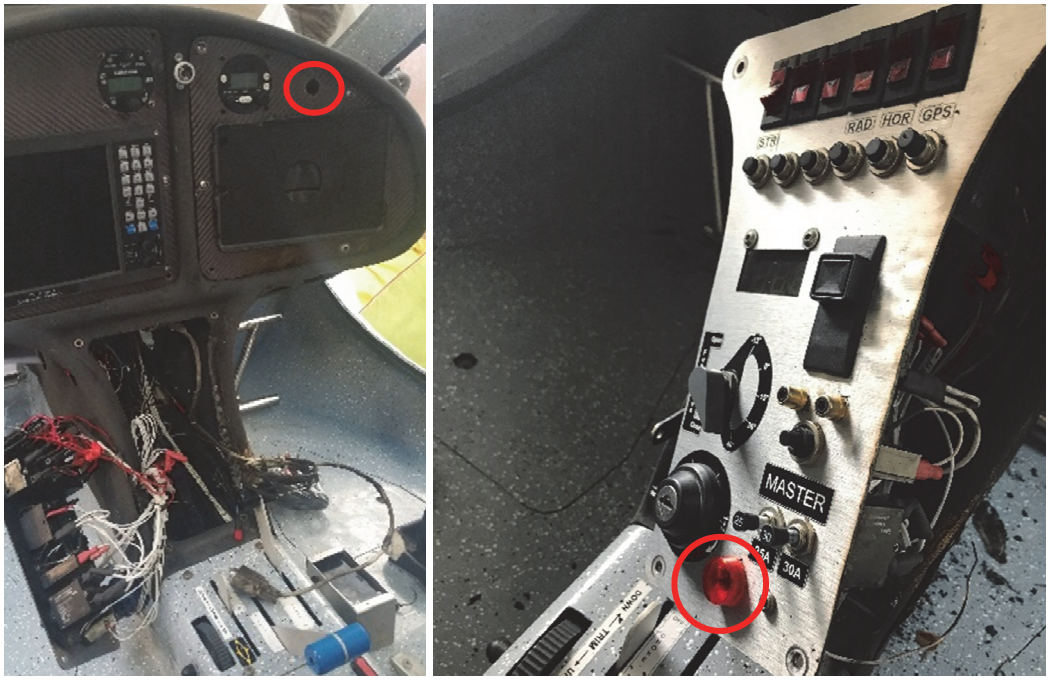

Figure 1
Instrument console

The charge indicator lamp is connected to the voltage regulator through a 22AWG (0.64 mm) wire which is nominally sized for current up to 3 amps. Should the lamp supply wire short to earth, the current could be up to 50 amps; the full regulator output of 20 amps and up to 30 amps from the battery. The wire to this lamp had burned through and several adjacent wires showed evidence of heat damage. The structure of the instrument console is a woven carbon / resin composite which showed evidence of fire damage. The damage showed that in some places, the resin had been totally consumed and only the carbon mat remained (Figure 2).

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Figure 2

Fire damage to the instrument console

Located in the rear of the instrumnt console (Figure 3) was the engine fuel supply pipe, and the fuel filter, from the wing fuel tanks to the engine.

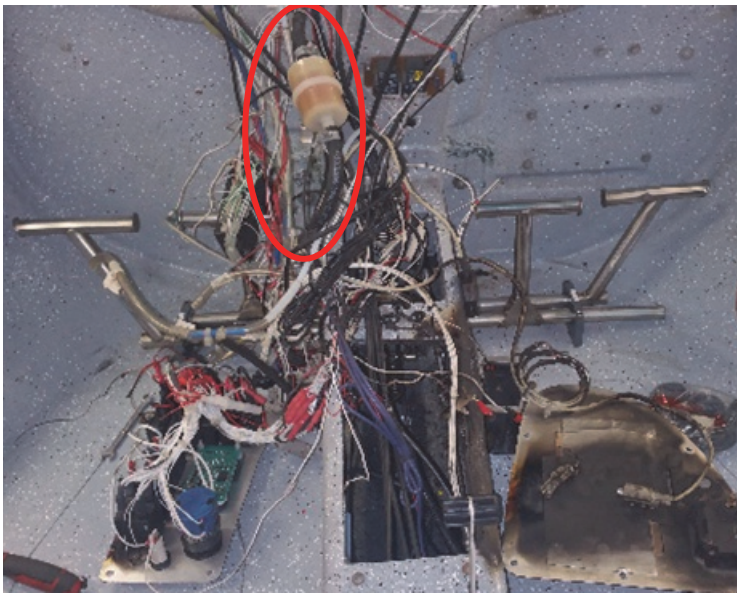

Figure 3

Fuel supply and filter location (Instrument console removed)

Analysis

The repair organisation assessed that the modification to the charge warning lamp, without shortening the wires, was a causal factor in initiating the fire. The length of wire for the modified position was significantly less compared to the original location. The insulation

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on this excess wire was damaged and this resulted in a short circuit to the structure of the composite instrument console. The cause of the insulation damage could not be determined but could have been from chafing or pinching in a panel joint. The composite material is electrically resistive and the current of up to 50 amps generated sufficient heat for the resin to ignite and produce smoke as it burned.

The UK type approval holder (also the repair organisation) has subsequently issued Service Bulletin 150 for Flight Design CTSL, CTSW and CT2K aircraft. The Service Bulletin recommends a 1 amp fuse to be fitted to the charge warning lamp supply wire and to:

> *'ensure the wiring is tidy with tight connections and is well secured and protected. Be sure the wiring cannot be trapped in panel joints and has adequate strain relief. Ensure it cannot short against anything including control runs, at all extremes of movement.'*

Further, it states that any fuel filter inside the instrument console must be of a fire-resistant type.

Conclusion

Due to a modification to the charge warning lamp in the instrument console, an over-length wire was damaged and short circuited to the composite structure. The heat generated from the short circuit resulted in the resin igniting shortly after takeoff. The pilot managed to land the aircraft on the active runway despite reduced visibility and system failures.

Safety Actions

Following the accident, the following Safety Action was taken:

> The UK type approval organisation has issued a Service Bulletin No 150 to modify Flight Design CTSL, CTSW and CT2K aircraft, to reduce the risk of electrical and fuel fires.

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