Cessna 340, G-KINK, 30 May 1996

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Aircraft Type and Registration:	Cessna 340, G-KINK
No & Type of Engines:	2 Continental TSIO-520-K piston engines
Year of Manufacture:	1972
Date & Time (UTC):	30 May 1996 at 1603 hours
Location:	1/2 nm north of Halfpenny Green Airport
Type of Flight:	Private
Persons on Board:	Crew - 1
	Passengers - 2
Injuries:	Crew - Minor
	Passengers - Minor
Nature of Damage:	Aircraft destroyed
Commander's Licence:	Private Pilot's Licence with IMC and Night Rating
Commander's Age:	46 years
Commander's Flying Experience:	605 hours (of which 289 were on type)
	Last 90 days - 2 hours
	Last 28 days - 2 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot plus CAA Occurrence Report, video recording and telephone calls

Background

On the Cessna 340, fuel for each engine may be supplied by oneof three different tanks per side: a main tank on each wing tip;an auxiliary tank in each wing and a locker tank in the rear ofeach engine nacelle. The locker tanks contain electric pumpswhich have to be switched by the pilot to transfer their contentsinto the main tanks when there is sufficient space in the maintanks for the additional fuel. Normally each engine is suppliedby fuel from either the aux or the main tank on the same sidebut cross-feeding from a main tank is available if required.

The fuel valves are remote from the selectors and are actuatedby cables. There is no separate cross-feed valve; each enginehas its own rotary fuel valve selector on the cabin floor betweenthe pilots' seats which may be set to a number of positions. The design of the valve selectors is such that there is a springloaded detent at each of four positions which are: LEFT MAIN TANK,AUX TANK, RIGHT MAIN TANK AND ENGINE OFF. A diagram of the fuelvalve selectors is shown below.

Figure 1

Main or auxiliary tank contents can be shown on a twin (left-right)fuel quantity gauge on the instrument panel. A microswitch operatedby each fuel selector causes the respective side of the fuel gaugeto display the contents of the selected tanks, except in the caseof cross-feed, when the contents of the main tank on the sameside as the cross-feeding engine is displayed on the respectiveside of the gauge. Thus, for example, if the right fuel selectoris positioned to the left main tank, the right needle of the fuelgauge will still display the contents of the right main tank. Each main tank is also fitted with a float operated switch thatis intended to illuminate a 'low fuel' caution light on an annunciatorpanel when the fuel level is below approximately 160 lb (27 USgallons). Fuel is normally supplied to the engines by enginedriven pumps backed-up by electrical fuel pumps in each of themain tanks. There are no back-up pumps in the auxiliary tanks;for that reason the fuel selector valves must be set to main tanksfor take off and landing.

History of the flight

The pilot carried out extensive pre-flight checks of G-KINK whichhad been little used during the preceding six months. Duringthese checks he established visually that the left main (tip)fuel tank was 30% full and the right main fuel tank was 40% full(the tanks can each hold 51 US gallons which equates to approximately306 lb per side). Both wing (auxiliary) tanks were full but thelocker tanks were empty.

At 1539 hrs the aircraft departed Halfpenny Green in CAVOK weatherconditions for a brief local flight to the west of the airfield. After climbing to an altitude of 2,500 feet and establishingcruise power conditions, the pilot changed the fuel valve selectorsfrom main to auxiliary tanks on both engines. A few minutes later,he set course for a return to Halfpenny Green and changed thefuel selectors back to main tanks on both engines. At this stagethe left tank indicated 50 lb remaining and the right tank indicated70 lb remaining but the pilot had established during his pre-flightchecks that these tank gauges were over-reading.

About 13 nm from the airport the pilot lowered one stage of flapand obtained 'clearance' from Halfpenny Green Information foran overhead join for landing on Runway 16 from a left-hand circuit. The aircraft overflew the airport and after reducing enginepower to 20 inches manifold pressure and 2,200 RPM, the pilotmanoeuvred to the west of Runway 16 where he descended on the'dead side' in preparation for the downwind leg.

In his report to the AAIB, the pilot stated that on throttlingback, both engines faltered whereupon he checked that all thethrottle, pitch and mixture levers were fully forward, the fuelpumps were switched on and that main tanks were selected on bothengines. He then declared an emergency on the AFIS frequencyand requested an immediate left orbit with the intention of landingon Runway 16. Initially power was restored on both engines andthe pilot lowered the landing gear in preparation for a shortfield landing on Runway 16. However, at approximately 300 ftagl, whilst still travelling downwind, the left engine stopped. There was no time to feather the propeller but the pilot appliedright rudder and, with the aircraft descending rapidly, he decidedto force-land straight

ahead into a field of standing crop tothe north west of the airfield. Unfortunately, whilst manoeuvringto avoid farm buildings, the aircraft's left wing tip struck electricitypower lines. During the subsequent crash landing the aircraftslid about 50 yards and latterly it 'cartwheeled' in the standingcrop and came to rest upside down. There was no fire and allthree occupants remained suspended by their seat harnesses. Thepilot noticed a strong smell of fuel which was dripping from theregion of the fuel valve selectors. He switched off the batterymaster and engine magneto switches; he also attempted to selectboth fuel valves to the OFF position but initially he was unsuccessful.

After some difficulty, probably due to the weight of the now invertedboarding steps, the pilot succeeded in opening the main cabindoor and together with his passengers, he vacated the aircraftand moved to a safe distance to await the arrival of the emergencyservices. However, before long, when he was convinced there wasno longer any danger of fire, he returned to the aircraft to recoverdocuments and valuables. At the same time he confirmed that theelectrical switches were off and he succeeded in turning the leftengine fuel valve selector to OFF. However, the right fuel valveselector could not be moved to the OFF position.

Examination of the Wreckage

Post accident checks of the wreckage revealed that both propellerswere bent rearwards in a manner consistent with low power or windmilling. All the fuel tanks were disrupted and it was not possible toreconstruct the disposition of fuel in the various tanks. Nevertheless,there was fuel between the flow divider and the fuel injectorsof the right engine but no fuel in the corresponding locationson the left engine indicating that it had stopped due to fuelstarvation.

The aircraft maintenance organisation which recovered the wreckagestated that the fuel valves on the Cessna 340 must be operatedwith great care. The selectors have indicating bands which maybe wider than the selectable range and the valves must be carefullyplaced in the correct detent by feel as well as by sight. Moreover,during an investigation into a similar accident to Cessna 340A,G-XGBE reported in AAIB Bulletin 11/93, it was noted that bothvalve selectors are positioned athwartships whichever of the twomain tanks is selected. Therefore, it is possible inadvertentlyto run both engines off the same main fuel tank resulting in nearsimultaneous engine failure when the fuel in the tank is exhausted.

The senior fireman who attended the accident scene also attemptedto move the right engine fuel valve selector to the OFF positionwithout success. He reported that the selector was stuck andwould not move in either direction. He remembered, although hecould not be absolutely certain, that the selector was pointingto the "9 o'clock" position when viewed from the normalaspect which corresponds to selecting the right engine to feedfrom the left main tank. If this was indeed the case, and theleft main tank ran dry, it is likely that the left engine wouldstop slightly before the right engine because its fuel lines fromthe left tank are shorter. This sequence of events is consistentwith the sum of the evidence.