INCIDENT

Aircraft Type and Registration:	1) Extra 300, G-OFFO 2) Extra 300, G-ZEXL
No & Type of Engines:	1) 1 Lycoming AEIO-540-L1B5 piston engine 2) 1 Lycoming AEIO-540-L1B5 piston engine
Year of Manufacture:	2006
Date & Time (UTC):	26 March 2006 at 1110 hrs
Location:	15 miles NW of North Weald
Type of Flight:	Private
Persons on Board:	1) Crew - 1 Passengers - 1 2) Crew - 1 Passengers - None
Injuries:	1) Crew - None Passengers - None 2) Crew - None Passengers - None
Nature of Damage:	1) G-OFFO Propeller tip damage 2) G-ZEXL Propeller impact to right wing
Commander's Licence:	1) Private Pilot's Licence 2) Private Pilot's Licence
Commander's Age:	1) 40 years 2) 34 years
Commander's Flying Experience:	1) 4,300 hours (of which 15 were on type) Last 90 days - 40 hours Last 28 days - 20 hours 2) 3,000 hours (of which 5 were on type) Last 90 days - 37 hours Last 28 days - 19 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

The pilots of the two aircraft were carrying out formation flying training. With the two aircraft in an echelon right formation the pilot of the lead aircraft initiated a turn to the right. The propeller of the formating aircraft and the right wing of the lead aircraft made contact, causing damage to the propeller and the wing structure. Both aircraft remained in a safe flying condition and precautionary landings were made at North Weald.

General

It was intended to carry out a 'photo shoot' of a formation of four aircraft on the afternoon of the day of the incident. This would involve close formation flying, using four Extra 300 aircraft, flown by pilots experienced in formation aerobatics. The formation flying would include a position described as a 'deep echelon'. This involved the formating aircraft flying approximately 10 ft below the lead aircraft, slightly out to one side and

stepped back; in this formation position the structure of the formating aircraft overlaped that of the lead aircraft.

In order to establish the correct visual references for the 'deep echelon' position the pilot who was to be the leader of the four aircraft formation, flying G-OFFO ('FO'), elected to carry out a training flight. During this flight he would formate his aircraft on another aircraft, G-ZEXL ('XL'), and when in the correct position he would record the references for the other pilots.

A Harvard aircraft located at North Weald Airfield was to be used as the photographic platform. 'FO' and 'XL' were flown from Sywell Airfield to North Weald and their pilots conducted formation training en-route, before landing and briefing the Harvard pilots. Because of the limited flying time available to the pilots they decided to record the references required for the 'deep echelon' position during the return flight to Sywell.

History of the flight

Prior to departing Sywell, the two pilots had carried out a comprehensive brief for the conduct of the sortie to North Weald and the simulated 'photo shoot' on the return flight to Sywell. Both pilots were wearing parachutes in accordance with their normal practice.

The weather was good with the surface wind from 220º at 15 kt gusting to 20 kt, and the 2,000 ft wind from 250º at 40 kt. Visibility was in excess of 10 km, there was no significant weather and the cloud was scattered at 2,500 ft. Moderate to severe turbulence was associated with the strong and gusting winds at the lower levels.

The outbound sector to North Weald was uneventful and various formation manoeuvres were practised. The aircraft transited at an altitude of 1,500 ft where they encountered moderate turbulence, but this did not create any significant difficulties during the formation flying. The aircraft made a normal arrival and landing at North Weald.

The pilots of the Extra 300 aircraft conducted a briefing for the return flight with the two pilots who were to fly the Harvard. The transit would again be at 1,500 ft with the Harvard leading the formation. The Harvard pilots would be responsible for navigation and radio communication. This would leave the Extra 300 pilots free to rehearse the positioning for the simulated photo shoot and allow the pilot of 'FO' to establish the visual references required for the 'deep echelon' position.

The three aircraft departed North Weald with the Harvard leading. 'FO' was in loose 'echelon right' and 'XL' was in loose 'echelon left'. When the formation was level at 1,500 ft and clear of built up areas, the pilot of 'FO' transmitted that he would re-position on the left side of the Harvard with 'XL'. He initially moved into long line astern behind that aircraft, at approximately 100 m, before moving into close line astern and then 'deep echelon right'. As he moved into position, the pilot of 'FO' believed that the pilot of 'XL' was aware that he was in the 'deep echelon right' position; however, this belief was erroneous. Meanwhile, the moderate turbulence generated a certain amount of wing rocking which required constant control inputs in an attempt to maintain the required flight path.

The pilot of 'XL' needed to move closer to the Harvard in order to reduce the distance between the aircraft for the simulated photo shoot and he banked his aircraft to the right. The pilot of 'FO' did not detect the initiation of this movement, which was masked by the turbulent conditions. When the pilot of 'FO' realised that 'XL' was turning to the right, he immediately pushed the control column forward in an attempt to avoid the

other aircraft. The propeller of 'FO' contacted the right wing tip of 'XL', just forward of the aileron leading edge, penetrating the full depth of the wing structure (Figure 1). Both aircraft turned back to North Weald and, having confirmed that no damage had been sustained to the flight controls, completed a precautionary landing.

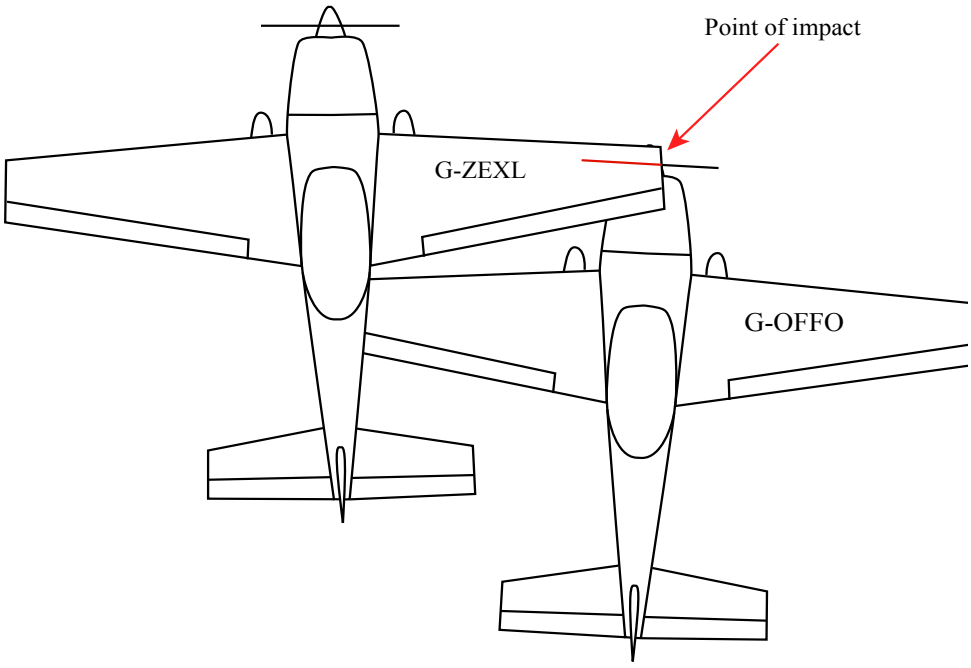

Figure 1

Analysis

Whilst both pilots were very experienced in formation flying they had only recently converted to the Extra 300 and were still becoming accustomed to its characteristics. They had considered each of the manoeuvres that they were to carry out and had briefed how they would conduct the sortie. However, the particular exercise of 'FO' moving into the 'deep echelon right' position had not been specifically briefed. The pilot of 'XL' had expected to take up his position relative to the Harvard prior to 'FO' adopting the 'deep echelon right' position. He was therefore unaware of the close proximity of the other aircraft below and to his right when he initiated the turn towards the Harvard.

Both pilots agreed that the primary cause of the incident was a breakdown in communication. The pilot of 'XL' was not aware of the position of the other aircraft and thought that he was clear to turn to the right. This situation occurred because the pilot of 'FO' had not fully communicated his intention to take up the 'deep echelon right' position, merely that he would reposition to the left of the Harvard; furthermore, the sequence of this re-positioning had not been briefed. The pilot of 'FO' was conscious of the need to maintain good RT discipline and had attempted to keep his transmissions to a minimum.

The two pilots believed that other contributory factors included the gusty wind conditions causing the wing rocking motion, which masked the initial turn to the right, and the need to complete the sortie objectives within the limited flying time available, which may have introduced an expeditious approach to the formation change to the 'deep echelon' position.

Having considered all the factors of this accident the operator has introduced safety actions to improve the briefing process and RT procedures, as well as adopting a more measured approach to formation training.