Aircraft Type and Registration:	(i) Piper PA-28-140 Cherokee, G-AVFP (ii) Thruster T600N, G-BZBG
No & Type of Engines:	(i) 1 Lycoming O-320-E2A piston engine (ii) 1 Rotax 582 UL-DCDI piston engine
Year of Manufacture:	(i) 1967 (ii) 2000
Date & Time (UTC):	21 June 2002 at 1450 hrs
Location:	Manchester (Barton) Airfield
Type of Flight:	(i) Training (ii) Training
Persons on Board:	(i) Crew - 2 Passengers - None (ii) Crew - 1 Passengers - None
Injuries:	(i) Crew - None Passengers - N/A (ii) Crew - 1(Serious) Passengers - N/A
Nature of Damage:	(i) Damage to fin and rudder (ii) Aircraft destroyed
Commander's Licence:	(i) Basic Commercial Pilot's Licence with Instructor Rating (ii) Student Pilot
Commander's Age:	(i) 55 years (ii) 35 years
Commander's Flying Experience:	(i) 13,350 hours (of which 1,300 were on type) Last 90 days - 243 hours Last 28 days - 75 hours (ii) 36 hours (all on type) Last 90 days - 19 hours Last 28 days - 5 hours
Information Source:	AAIB Field Investigation

Synopsis

A PA28 and a Thruster microlight were flying visual circuits at Barton Airfield when they collided on short finals. The instructor in the PA28 was able to make a successful landing but the microlight pilot suffered serious injuries and his aircraft was destroyed.

History of flight - Thruster T600N, G-BZBG ('BG')

The pilot of the microlight ('BG') was flying his second flight of the day and planning to remain in the circuit at Barton airfield. Circuits on Runway 20 at Barton are flown right hand at 800 feet for both microlights and light aircraft and the Thruster T600 microlight flies the circuit at a speed between 50 and 60 kt, reducing to approximately 40 kt over the threshold. During the first circuit, the pilot remembers seeing a PA28 ('FP') behind and outside of him as he completed the downwind leg. A normal touch and go was flown onto Runway 20 and a second circuit commenced. As the pilot levelled at 800 feet on the crosswind leg, he recalled seeing 'FP' in his 8 o'clock position at a range of approximately 1,000 metres. He continued onto the downwind leg making the downwind position radio call when abeam the centre of the runway. At the end of the downwind leg, the pilot heard 'FP' make a downwind position report and saw a PA28, that he believed was 'FP', in his 7-8 o'clock position at a range of 1 to 2 km. This was the last time he saw the other aircraft. The microlight pilot continued onto finals and approached the runway with no drift. His radio transmission of 'GOLF BRAVO GOLF FINAL TOUCH AND GO' was made later than usual due to congestion on the radio and he estimated his height to be approximately 100 feet at the time. Approximately five seconds later, he recalled hearing a thud, being violently thrown around and falling vertically towards the ground. The microlight impacted the ground on the threshold numbers of Runway 20.

History of flight - Piper PA28, G-AVFP ('FP')

The instructor of 'FP' was sitting in the righthand seat carrying out a currency check on another pilot who was the handling pilot until the collision. They commenced their second normal circuit aware that there was a microlight ahead of them. When the microlight pilot made his downwind position call, the instructor of 'FP' recalled seeing the microlight in his 2 o'clock position. This was the last time he remembered seeing the microlight and with 'FP' flying downwind at 90 kt, he believed they had overtaken the microlight by the time they reached the base leg turn. As 'FP' turned base, the instructor reported that he visually checked inside the turn in case the microlight, which usually flies a tighter circuit, had turned inside them. He saw nothing there or ahead of them and thus 'FP' continued on a normal circuit pattern. 'FP' was the first of the two aircraft to make a finals radio call, which reinforced the instructor's belief that 'FP' was ahead of the microlight in the circuit. Shortly after this call, the instructor recalled hearing and feeling a bang and seeing a flash of yellow above him. He took control of the aircraft and landed the aircraft straight ahead on Runway 20.

Rescue and recovery

The airfield rescue team responded immediately to the crash alarm and, with the aid of a doctor who had witnessed the accident, rescued the microlight pilot from the wreckage. Shortly afterwards the local fire and police service arrived and were directed to the scene across a live runway. The runway had reopened to allow a solo student to land but this information had not been passed to the rescue services. The airfield management team, consulting with the Police and Fire Brigade, discussed this issue and have subsequently made several changes to the airfield's 'incident plan'. One of the most significant changes has been the introduction of a direct UHF communication link between the airfield officer in charge and attending rescue vehicles.

Radar recording

Most of the circuit activity at Barton was detected and recorded by the radar situated at Manchester Airport. Due to limitations of the radar there are no radar returns recorded when aircraft, flying at Barton, are operating below approximately 300 feet agl. The relative positions of the two subject aircraft however were shown when above that altitude. The photographs at figures 1 to 4 were taken from the radar recording. At the time the microlight pilot made his downwind position call, the radar shows two aircraft on the downwind leg following the same ground track and separated by approximately 1.5nm, (figure 1). When 'FP' made its downwind position report, (figure 2), the microlight can be seen on a base leg where the separation between the two aircraft has reduced to 0.8nm. From this position, both aircraft follow the same ground track as they fly a base leg (figure 3) and onto final approach; their separation however is reducing all the time. They were last detected by the radar approximately one minute before the collision, (figure 4).

Damage to aircraft

Photographic evidence and the airfield's chief engineer's report showed that the damage to 'BG' was extensive with the engine detached from its mountings. The wing fabric showed signs of major damage in two sections with failure of the main spar tube along with separation of the control cables. 'FP' had impact damage to the tail fin and rudder and its propeller had some deformation and scoring marks on the tips. There were also paint scrape marks on the lower surface of the left wing and the left landing gear oleo leg. The conclusion was that 'FP' had 'landed' on top of 'BG'.

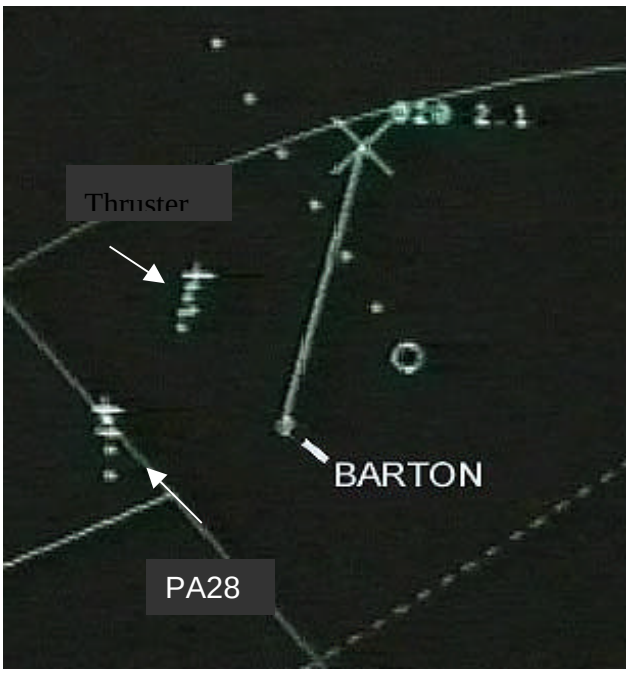

Figure 1 "G-BG DOWNWIND" 1447:17 hrs

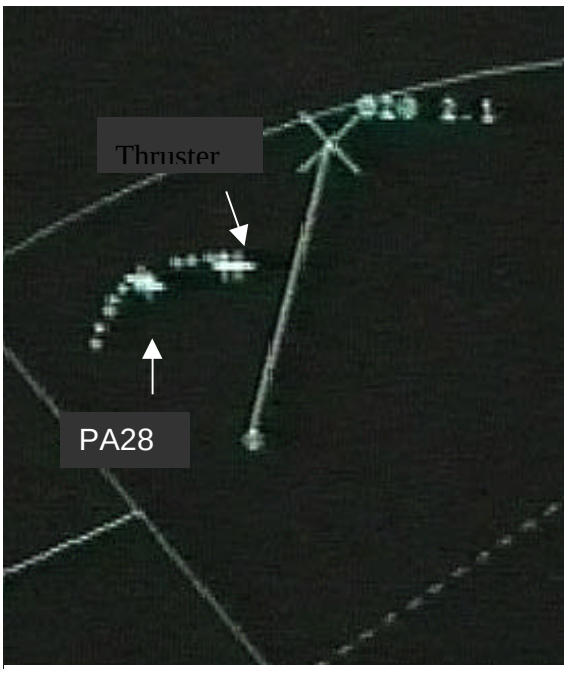

Figure 2 "G-FP DOWNWIND" 1447:58

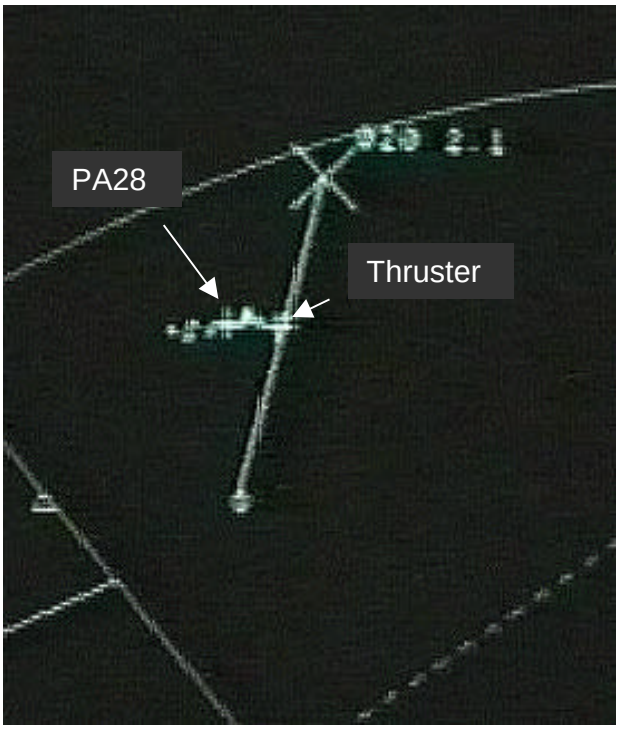

Figure 3 Both aircraft on base leg 1448:25

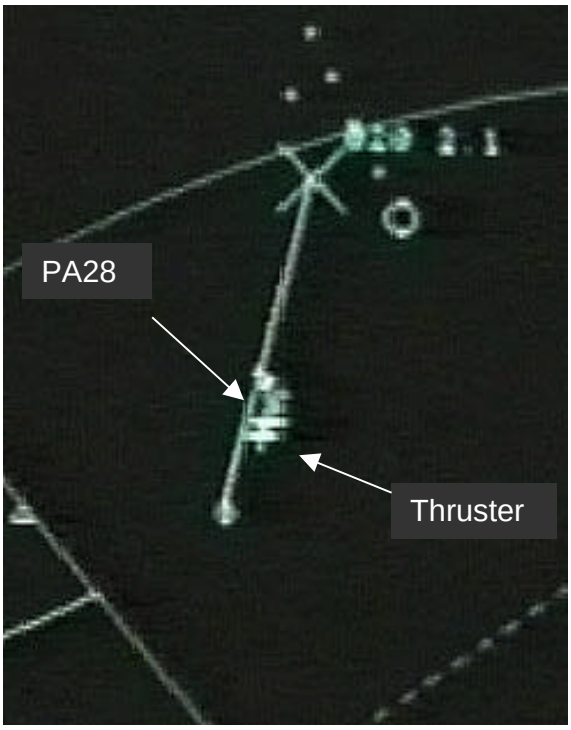

Figure 4 Last Contact 1449:15

Air Traffic Control

Barton Airfield operates a Flight Information Service (FIS) that is described in Civil Aviation Publication (CAP) 410 (Manual of Air Traffic Services) as:

> *'a service provided to give information useful for the safe and efficient conduct of flights in the Aerodrome Traffic Zone. From the information received, pilots decide the appropriate course of action to be taken to ensure the safety of flight whilst taking off or landing or flying in the aerodrome traffic zone. The service is provided by the holder of a Flight Information Service Officer's Licence which is valid for use at that airport'.*

One of the responsibilities of a Flight Information Service Officer (FISO) is to assist pilots in preventing collisions. CAP 410 states that:

> *'although FIS is an information service only, it must be emphasised that the immediate and accurate passing of information could be a vital safety factor when the FISO becomes aware of a dangerous situation developing within his area of responsibility. However FISOs must remember that under no circumstances can they issue instructions of their own volition or exercise any form of 'control' over aircraft'.*

The Barton FISO was working single handed in the tower at the time of the accident and much of his attention was directed towards a visiting aircraft taxiing to the refuelling area. He recalled being aware of the circuit traffic but not necessarily of their order when on finals. Barton operates a flight progress strip system but the FISO reported that under high workload conditions it was not always possible to keep it updated. On this occasion, he cannot recall if this was the case.

When 'BG' made his finals call, the FISO saw two aircraft in close proximity on short finals. He was unable to determine their relative positions and believed there was not enough time to issue any warning. He stated that he expected the instructor in the PA28 to initiate a go-around.

The Air Traffic Services Investigation (ATSI) department of the CAA Safety Regulation Group conducted their own investigation into the Flight Information Services aspect of this accident. Their report reached the conclusion that the provision of a FIS at Barton is adequate but the movement rate, together with any increase in operational complexity, should be monitored on a regular basis by the CAA. They recommended that if there were a significant increase of either, an upgrade to a full ATC service should be considered.

Discussion

A FIS, in operation at Barton at the time of the accident, relies upon pilots seeing and avoiding other traffic in the circuit. Obviously if traffic is not seen, it cannot be avoided so the emphasis has to be on pilots locating and then maintaining an awareness of the position of other traffic. It would appear that during the downwind portion of their second circuit, the pilots in 'FP' lost track of the relative position of the microlight. This situation was probably exacerbated by the FISO not being able to advise on circuit order and the protracted radio transmissions preventing the microlight pilot from making a timely finals position call. Working by himself in the tower, the FISO spent much of the critical time leading up to the collision, concentrating on ground movements. When he finally observed both aircraft in close proximity, he believed the experienced PA28 instructor would take the necessary avoiding action, not realising that neither of the pilots was in visual contact with the other aircraft. Although the FISO is prevented by regulation from issuing any controlling instructions, a general broadcast to both aircraft however may have reduced the possibility of an accident occurring. FISOs at Barton stated that on occasions, during single working, the workload in the tower is demanding enough to reduce their ability to assist pilots operating under a FIS. In addition to passing information to aircraft on the ground and in the air, they are also required to answer the telephone and update the movements log. As a result of this accident, it is now the policy of the airfield to provide an assistant to the FISO during periods of known heavy workload.

It is also of note that the PA28 instructor, believing that he had overtaken the microlight, chose not to make a radio transmission to that effect. He stated that he wished to keep radio transmissions to a minimum and that vigilant lookout by both aircraft would have resolved any confliction. Whilst overtaking calls are not mandatory, they are occasionally made at Barton where mixed circuit flying occurs. The Rules of the Air Regulations, Rule 17 (4) states that:

> *'an aircraft which is being overtaken in the air shall have the right of way and the overtaking aircraft whether climbing, descending or in level flight shall keep out of the way of the other aircraft and shall not cease to keep out of the way of the other aircraft until that other aircraft has been passed and is clear, notwithstanding any change in the relative positions of the two aircraft'.*

Comment

This accident emphasises the need for pilots to maintain lookout and awareness in the circuit and serves as a reminder that the prime responsibility for the prevention of collisions rests with the pilot. Techniques to improve lookout and avoid collisions, particularly for pilots doing most of their flying under VFR, are described in the CAA's General Aviation Safety Sense leaflet 13A.