

No: 6/91 Ref: EW/C91/3/2 Category: 1c

**Aircraft Type and Registration:** Cessna 175C, G-ARWM  
**No & Type of Engines:** 1 Continental GO-300-E piston engine  
**Year of Manufacture:** 1962  
**Date & Time (UTC):** 10 March 1991 at 1025 hrs  
**Location:** Near Chilgrove, West Sussex  
**Type of Flight:** Private  
**Persons on Board:** Crew - 1 Passengers - None  
**Injuries:** Crew - Fatal Passengers - N/A  
**Nature of Damage:** Aircraft destroyed  
**Commander's Licence:** Private Pilot's Licence with IMC rating and a USA Commercial Pilot's Licence with Instrument rating  
**Commander's Age:** 39 years  
**Commander's Flying Experience:** 794 hours (of which 278 were on micro-light aircraft and 76 hours on single engine Cessna aircraft. 6 hours were on type)  
**Information Source:** AAIB Field Investigation

### History of the Flight

On 28 February 1991 the pilot booked out at Henstridge aerodrome for a flight to East Midlands Airport. However, he did not land at East Midlands but instead arrived at Tatenhill aerodrome. His arrival there had not been advised and was unexpected. He 'booked the aircraft in' at 1500 hrs and is reported to have stated that he was staying for two or three days. He subsequently visited the aerodrome on 1 March 1991, when he refuelled the aircraft to capacity, and thereafter was not seen by any of the aerodrome staff who were unaware of both his location and intentions.

At about 0755 hrs on Sunday 10 March 1991 the pilot returned to Tatenhill aerodrome. The aerodrome was unattended and all buildings were shut and locked. The pilot did not book out or file a flight plan, however an aeronautical chart which was subsequently recovered from the aircraft wreckage showed a track drawn from Tatenhill to Compton VOR via Daventry. At Compton VOR the track divided with both Henstridge and Goodwood as destinations. The map also had two wind direction arrows drawn on it indicating a wind from the northwest at 10 knots. At about 0850 hrs a

local resident reports hearing an aircraft take off from Tatenhill aerodrome and he expressed some surprise since the weather was not good, consisting of low cloud and poor visibility.

There are no recordings of any radio transmissions from G-ARWM to an ATC unit until 0950 hrs when the pilot contacted Southampton ATC and reported that he was close to Compton and heading towards Goodwood. The message continued "I HAVE A BIT OF A PROBLEM UP HERE - I AM IMC WITHOUT FLIGHT INFORMATION". The Southampton ATC Controller confirmed that he would provide a Flight Information Service and subsequently reported the Southampton Airport weather conditions as "150°/12 knots - 3500 metres in rain - 5 okta 600 feet, 8 okta 800 feet". At 1004 hrs the pilot informed Southampton ATC that his position was the Compton VOR 160° radial DME readout 31 miles and he wished to change to Goodwood Control.

On his first radio message to Goodwood ATC the pilot reported his flight details and requested a VOR procedural approach. This was approved and he was cleared to the VOR beacon at 2400 feet. The Goodwood weather was reported as "150°/12 knots - 3000 metres in moderate rain - 5 okta 600 feet, 8 okta 800 feet, (both estimated) - temperature 9°/dew point 8° - QFE 1001 mb - runway in use 14 with a left hand circuit". The pilot acknowledged this information and at 1015 hrs reported "GOLF WHISKY MIKE BEACON OUTBOUND". At 1018 hrs the pilot reported that the base turn was complete and he was requested to report when he had the airfield in sight and to break off to join downwind for runway 14. The pilot acknowledged this request. There was no other traffic flying in the Goodwood aerodrome zone at this time, and the Goodwood ATCO confirms that VDF bearing indications showed the aircraft was on, or close to, the outbound bearing required for the VOR procedure.

At 1020.30 hrs the Goodwood ATCO informed the pilot of a revised cloud base estimate of 8 okta at 600 feet. The pilot replied, "YES SIR I CAN SEE THE GROUND BUT NOT THE AIRFIELD, I'M AT 500 FEET". At the same time an eye-witness, a qualified pilot, reported sighting the aircraft northwest of the aerodrome between gaps in the cloud at an estimated height of between 200 and 300 feet. The Goodwood ATCO controller advised the pilot that the VDF bearing indicated that the aircraft was northwest of the aerodrome and heading towards high ground. The pilot replied "THAT'S COPIED, THEN MISSED APPROACH PROCEDURE FOR GOLF WHISKY MIKE" and later reported passing 800 feet and climbing. At 1023 hrs the Goodwood ATCO asked the pilot to report his intentions. The reply was "GOLF WHISKY MIKE I'VE A MAJOR PROBLEM.....I'M SUFFERING MAJOR SPATIAL DISORIENTATION...I'M IN A LOOP.....". This was the last radio transmission from the aircraft.

The Goodwood ATCO immediately alerted the emergency services. At 1030 hrs a Sussex Police helicopter was tasked with carrying out a search and, having been advised by the Goodwood ATCO of the last known bearing of the aircraft from the aerodrome, the helicopter crew reported locating the wreckage at 1041 hrs. They reported that the remains of a Cessna had been located in a field on Heathbarn Down, near Chilgrove, and that there was no sign of life from the occupant.

### **VOR 32 Procedure - Goodwood aerodrome**

The VOR 32 procedure for Goodwood aerodrome is reproduced at Figure 1. The procedure requires a pilot to position his aircraft overhead the beacon at a minimum altitude of 2300 feet above aerodrome datum, and thereafter to descend, on the 160° radial, for 2 minutes and 30 seconds (still air conditions) to 1400 feet. At that point a left turn should be completed to establish inbound on the 145° radial when the aircraft may be descended to the appropriate speed related Minimum Descent Height (MDH). In this case the MDH was 550 feet above aerodrome datum or 650 feet amsl.

### **Meteorological Information**

An aftercast of the weather conditions prevailing at the time of the accident was prepared by the Meteorological Office, Bracknell. This states that the synoptic situation at 1000 hrs (UTC) was a low pressure system of 996mb in the St Georges Channel which was moving steadily east with an occlusion swinging eastwards from the centre to Portland Bill moving steadily northeast. This produced weather conditions of continuous moderate rain, at times with hill fog. Visibility was generally 7 kilometres deteriorating to 3 kilometres, but 800 metres or less in hill fog. Cloud cover was an overcast layer of altostratus base 8000 feet, broken stratocumulus base 2000 feet, broken stratus base 500 feet with patches base 300 feet covering the hills. The 2000 feet wind was 170°/35 knots.

There is no instrumentation for automatic measurement of the cloud base or visibility at Goodwood aerodrome. On the accident flight the weather conditions passed to the pilot were estimates by the Goodwood ATCO, who was a qualified meteorological observer. The cloud and visibility estimates passed by the ATCO were 5 okta 600 feet, 8 okta 800 feet, visibility 3000 metres in moderate rain. In a subsequent radio transmission the cloud estimate was reviewed as 8 okta at 600 feet. The aftercast indicates that these weather estimates were probably accurate.

## **Radar recording**

A radar recording of the aircraft's progress during the latter stages of the flight was available for examination and is included at Figure 2. Recorded altitudes are included and these have been converted to heights amsl. The recording shows that although the aircraft was flown to overhead the Goodwood VOR, the laid down procedure was not carried out accurately either in azimuth or altitude. The aircraft disappeared from radar coverage at 450 feet at a position slightly to the northwest of the aerodrome, and reappeared at 750 feet a further two nautical miles northwest. Thereafter it followed an erratic flight path with rapid changes in altitude that are consistent with the pilot's final R/T message that he was suffering spatial disorientation and believed that the aircraft was in a loop.

## **Examination of the wreckage**

The aircraft had struck the ground on a heading of 340°M at high speed and from a direction close to the vertical. The wings had separated from the fuselage on impact, and the aircraft was completely destroyed. The scale of the damage to the aircraft severely limited the information that could be obtained with confidence from the aircraft systems and instruments, however no evidence was found of pre-impact damage to the engine or flying controls.

The aircraft had a history of VOR defects and the VOR wiring had rectification carried out on it in January 1991 because the VOR deviation pointer was reported as not going to the left of the compass card. This was traced to a defective pin in a connector between the receiver and the indicator and, after rectification, a ground test and a subsequent air check are reported to have confirmed that the problem had been cured. The VOR system was too badly damaged in the accident to allow confirmation of its pre-crash serviceability.

## **Spatial disorientation**

Following an accident to a light aircraft in 1987, the AAIB requested the Flight Skills Section of the RAF Institute of Aviation Medicine to provide a description of some of the causes of disorientation that are frequently experienced by pilots. Extracts from this description, which was originally published in the AAIB Aircraft Accident Bulletin 4/88, and repeated in the AAIB Bulletin 10/89, are included below.

"Spatial disorientation is a well known phenomenon during which a person loses their sense of balance, attitude, and direction in space relative to the surface of the earth.

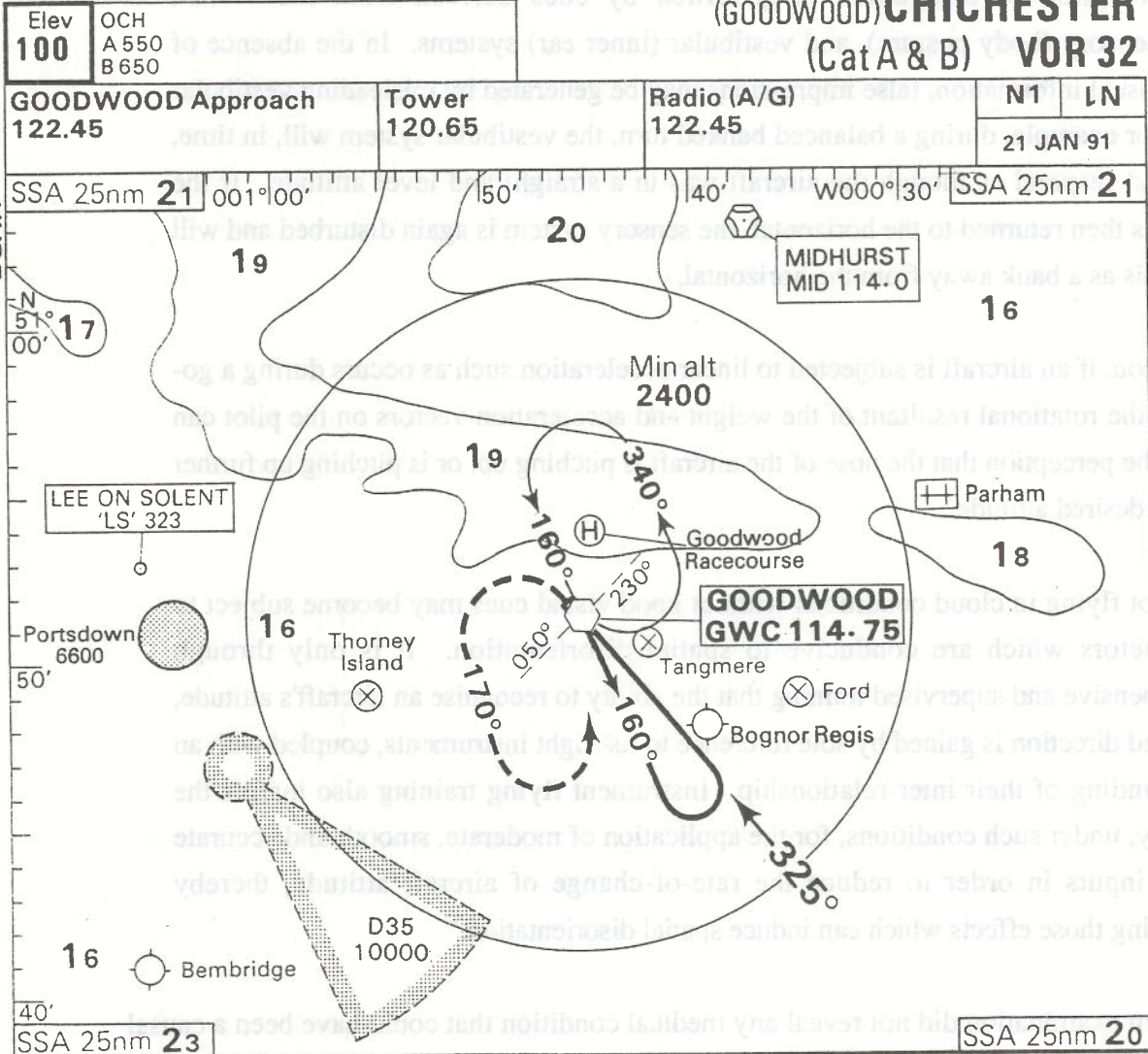
The perception of orientation is governed by cues derived from the visual, somatasensory (body posture), and vestibular (inner ear) systems. In the absence of strong visual information, false impressions may be generated by misleading vestibular cues. For example, during a balanced banked turn, the vestibular system will, in time, settle and respond as though the aircraft was in a straight and level attitude. If the aircraft is then returned to the horizontal, the sensory system is again disturbed and will signal this as a bank away from the horizontal.

In addition, if an aircraft is subjected to linear acceleration such as occurs during a go-around, the rotational resultant of the weight and acceleration vectors on the pilot can induce the perception that the nose of the aircraft is pitching up, or is pitching up further than the desired attitude.

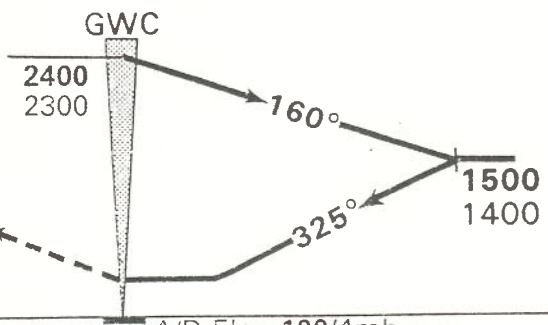
Any pilot flying in cloud conditions without good visual cues may become subject to these factors which are conducive to spatial disorientation. It is only through comprehensive and supervised training that the ability to recognise an aircraft's attitude, speed and direction is gained by sole reference to its flight instruments, coupled with an understanding of their inter-relationship. Instrument flying training also instills the necessity, under such conditions, for the application of moderate, smooth and accurate control inputs in order to reduce the rate-of-change of aircraft attitude, thereby minimising those effects which can induce spatial disorientation."

The post-mortem examination did not reveal any medical condition that could have been a causal factor to this accident.

(GOODWOOD) **CHICHESTER**  
(Cat A & B) **VOR 32**

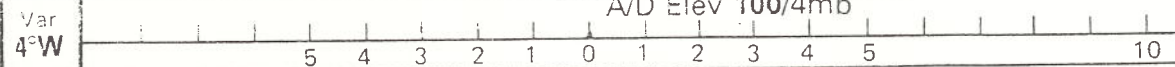


Left onto Tr170M to 2400 2300 then left & return to GWC. (Turn onto Tr170M prior to level accel.)



MAP at GWC

A/D Elev 100/4mb



turn	T.Lev ATC		T.Alt 3000
	kt	fpm	
2:30	200		
2:30	180		
2:30	160		
2:30	140		
2:30	120		
2:30	100		
2:30	80		

1. QFE height above A/D elevation.  
2. Tangmere disused A/D lies approximately 2nm to the SE. Ensure correct identification of A/D.

Rev: Variation, Note 1

EGHR

Figure 1

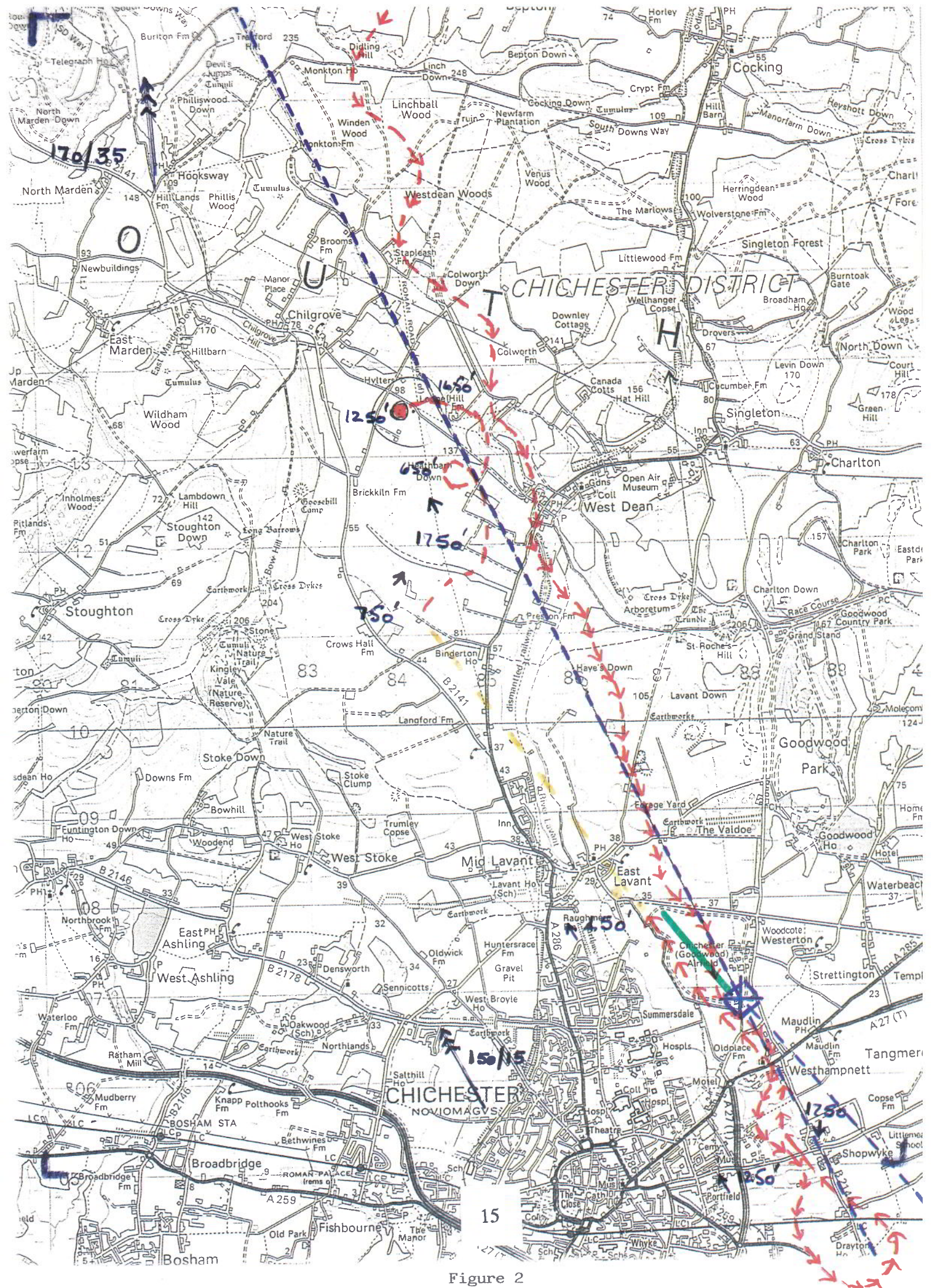


Figure 2