AAIB Bulletin No: 2/95 **Ref: EW/C94/10/3** **Category: 1.3**

Aircraft Type and Registration:	Cessna 175A, EI-AND
No & Type of Engines:	1 Continental GO-300-C piston engine
Year of Manufacture:	1960
Date & Time (UTC):	30 October 1994 at 1959 hrs
Location:	Irish Sea about 15 nm north east of Anglesey
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - Fatal (presumed) Passengers - Fatal
Nature of Damage:	Aircraft lost at sea
Commander's Licence:	Private Pilot's Licence (UK) without RT, IMC or Night Ratings
Commander's Age:	56 years
Commander's Flying Experience:	Approximately 350 hours
Information Source:	AAIB Field Investigation

Synopsis

The pilot/owner of the aircraft had planned to fly with his passenger from Guernsey to Ronaldsway, in the Isle of Man. During the course of the flight, which was at night, following a truncated 'MAYDAY' call made by the pilot, the aircraft was lost. Eight days later the body of the passenger, which was not supported by a life jacket, was recovered from the sea, but neither the pilot nor any significant quantity of wreckage has since been recovered.

Aircraft description

Cessna 175/Skylark aircraft are similar to Cessna 172s but they are powered by a normally aspirated Continental G0-300-C engine. They may be fitted with either a constant speed or a fixed pitch propeller driven through an integral propeller reduction gearbox which results in a maximum power of 175 hp being generated at 3,200 engine RPM and a propeller speed of 2,400 RPM. The increase in power over the similar Cessna 172 Skyhawk (145 hp) is achieved by running the engine at a higher speed. The two aircraft use a similar fuel system except that the Cessna 175 has a capacity of 52 US gallons (43 usable), which is some 10 US gallons more than the Cessna 172. Cessna 175/Skylark models were manufactured between 1958 and 1963.

History of the flight

The pilot had re-fuelled his aircraft on 25 October 1994 to what is believed to have been full tanks. Since it was subsequently parked on a slope of about 10°, left wing low, a considerable quantity of fuel, thought to be about 5 US gallons, drained out of the left fuel vent onto the grass. Thereafter, following some 15 minutes of full power ground running, the aircraft departed for Ronaldsway, but the flight was terminated after 20 minutes when the aircraft returned to Guernsey with a rough running engine. The pilot then asked a local maintenance organisation to carry out the required rectification, which necessitated running the engine at mostly full power for another 15 minutes. These events are estimated to have consumed about 15 US gallons which, together with about 1 US gallon consumed during the subsequent start-up, run-up and taxi phase of the accident flight, left about 27 US gallons of usable fuel for the accident flight.

On 30 October 1994 the pilot filed a VFR flight plan from Guernsey, via Berry Head, Brecon and Wallasey, to Ronaldsway. An endurance of 4 hours and 30 minutes, which approximately equates to full fuel tanks, was entered on the flight plan. The planned time en route was 2 hours 30 minutes. A likely fuel consumption rate of about 10 US gallons per hour was calculated, deducing the airspeed from the wind and (radar) ground speed and making certain assumptions based on the age and general condition of the aircraft. Although the fuel records indicate that the pilot did purchase fuel for another aircraft, in which he flew on the 29 October 1994, the fuel supply company states that no fuel was uplifted for EI-AND after 25 October 1994.

The synoptic chart for the weather forecast, valid from 1500 to 2400 hrs on 30 October 1994, showed two occluded parallel fronts lying west to east across the south coast and across south Wales respectively, both moving northeastwards at 35 kt. The forecast weather was:

'Sector 5' (Channel Isles northwards to Wrexham):

GEN	5,000 m	RA/DZ	8/8 STSC 700 / 5,000, 4-8/8 LYR 5,000 / 25,000
OCNL FRONTS & SEA AREAS	1,200 m	RA/DZ	8/8 STSC 200 / 5,000, 5-8/8 LYR 5,000 / 25,000
ISOL	20 km	NIL/ RA	5-8/8 SC 1,500 / 5,000, 2-6/8 LYR 8,000 / 18,000
ISOL, MAINLY FRONTS	3,000 m	HEAVY RA	8/8 NS 500 / 25,000 CLD ON HILLS. MOD ICE AND MOD TURB IN CLD. ISOL SEV TURB IN NS. MTW, MAX VSP 600 FPM NEAR 6,000. SEV TURB BLW 6,000 OVER LAND.

The 2,000 feet wind in this area was forecast as 230°/50 kt and later reported as 250°/50 kt.

'Sector 4' (Wrexham north westwards to IOM):

GEN	25 km	NIL/RA	3-5/8 SC 2,500 / 5,000, 7/8 LYR 10,000 / 18,000
OCNL	15 km	RA	6/8 SC 1,500 / 6.000, 8/8 LYR 9,000 / 20,000
ISOL	7 km	RA	7/8 STSC 800 / 6,000, 8/8 LYR 8,000 / 20,000
			CLD ON HILLS. MOD ICE AND MOD TURB IN CLD. MTW, MAX VSP 450 FPM NEAR 6,000.

The 2,000 feet wind in this area was forecast as 230°/25 kt and later reported as 260°/30 to 35 kt.

The aircraft took off from Guernsey at 1716 hrs and climbed to 3,000 feet. It coasted in 10 nm east of Berry Head, then climbed to 3,500 feet en route to Brecon. For this portion of the flight, the reporting times transmitted by the pilot show the ground speed of the aircraft to have been about 100 kt. The aircraft then climbed to FL50 and proceeded north to Wrexham, arriving there at 1930 hrs, then descending to 2,500 feet and turning left to parallel the south coast of the Dee estuary. The calculated ground speed from Brecon to Wrexham was 105 kt.

Radar stations at Clee Hill and St Anne's tracked the aircraft as shown on the attached map, but radar contact with the aircraft was intermittently lost amongst radar returns from a considerable amount of cloud in the area. However, during the time that the aircraft was able to be tracked, it appears to have been slowing down eventually to about 54 kt ground speed as it turned, for an unknown reason, onto a more westerly track.

At 1940 hrs, the pilot changed from Liverpool Approach to Ronaldsway Approach, on 120.85 MHz, informing the controller that he had 60 nm to run to Ronaldsway, and giving an ETA of 2020 hrs. He was told to call again when he had 25 nm to run. At 1759:28 hrs, the pilot transmitted the single word "MAYDAY", followed by a short pause and then "MAYDAY, MAYDAY...". The latter transmission sounds as if it was suddenly cut off and it may have been the time of impact with the sea.

Ronaldsway Air Traffic Control

At Ronaldsway, Isle of Man, there are two RT channels operating on 120.85 MHz, 'Channel A' and 'Channel B', each comprising entirely separate equipment and each is recorded. The ATC controller, who can use either channel but not both, states that he was operating Channel B. Subsequent playback of this channel reveals that, at the time of the 'MAYDAY' call, only a brief burst of carrier wave was heard, followed by a very brief sound which might have been part of a syllable of speech. The controller states that this 'burst' of carrier wave meant nothing to him at the time. For this reason it was not immediately apparent to the controller that the aircraft had transmitted a distress message and it was only when he replayed the recording of Channel A, as a result of recalling these sounds, that he heard the 'MAYDAY' call.

The controller was expecting inbound IFR traffic at 2007 hrs so, at 2005 hrs, he called EI-AND to ascertain its position. He made several further calls to EI-AND between then and 2024 hrs, and also a request to another aircraft to attempt radio contact, but no response was received. Therefore, at 2025 hrs, he checked that Liverpool, Manchester and Blackpool did not have contact with EI-AND and then initiated full 'Overdue' action.

Search and recovery

The Distress and Diversion cell at LATCC was alerted at 2026 hrs, HM Coastguard at 2027 hrs and the Edinburgh RCC at 2034 hrs. The military assets employed in the search were a Sea King helicopter from RAF Leconfield, a Wessex helicopter from RAF Valley and a Nimrod aircraft from RAF Kinloss. Lifeboats were launched from Port St Mary, Rhyl, Hoylake, Castletown and Douglas. The search area was also attended by five vessels which had volunteered to take part in the search. The first helicopter arrived on the scene at 2122 hrs and the first lifeboat at 2127 hrs. The search was continued until the endurance capability of the assets was reached and then resumed at first light on 31 October. Nothing was found and the search was terminated at 1655 hrs that day.

On 9 November 1994, the body of the passenger was recovered off the east coast of the Isle of Man, near Laxey and, on 22 November 1994, pieces of aircraft wreckage were recovered by a fishing vessel in the area where the search had been conducted. Subsequently, further wreckage has been recovered. A post-mortem investigation of the body of the passenger revealed injuries consistent with those resulting from a fairly high speed impact.

Wreckage examination

In the absence of the complete wreckage only general conclusions could be drawn from those parts which were recovered. Their condition suggested that the aircraft had entered the water at high speed, rather than the low speed which might be associated with a controlled forced alighting.

Aircraft history

This aircraft was constructed in 1960 and was originally registered in the UK as G-APYA. In 1963 it was transferred to the Irish register as EI-AND and, in 1988, it was registered to the owner who was also the pilot on the accident flight. Enquiries suggested that the engine and airframe log books were lost with the aircraft at the time of the accident and so its recent maintenance history has been derived, as far as possible, from the records of various maintenance organisations. As at December 1993, it has been estimated that the aircraft had accumulated 2,640 hours.

Maintenance history

The Republic of Ireland airworthiness authorities required maintenance to be carried out on this aircraft in accordance with their Light Aircraft Maintenance Schedule (LAMS), a schedule which is essentially the same as that specified by the UK CAA. The only major difference is that the Irish Certificate of Airworthiness (C of A) is renewable every 2 years, not every 3 years as in the UK. The aircraft was registered in the Private Category which enabled a licensed pilot, as owner or operator, to certify the 50 hour checks as specified in the LAMS.

Late in 1989, the aircraft was flown to a maintenance organisation at Blackpool Airport where the owner requested that the brakes be repaired. This organisation reported that at that time, from a maintenance point of view, the aircraft was in very poor condition with instruments missing and few working. During a 50 hour inspection it was discovered that the engine oil filter was heavily contaminated with metal. The owner at first asked for the aircraft to be re-assembled so that he could take it away but when this was refused he arranged for the engine to be removed so that he could send it for overhaul. Some months later, following its return from a US maintenance company, it was refitted to the aircraft. After rectification of all the significant defects, the aircraft was deemed to be in an acceptable condition when released by the maintenance organisation. Subsequently, in late 1990, a full Irish C of A was issued for the aircraft. The next C of A inspection on the aircraft was carried out at an Irish maintenance organisation based at Abbeyshrule, west of Dublin, in November 1992, followed by a 50 hour check in May 1993 and an annual check in December 1993. At that time all cylinder compressions were recorded as being satisfactory and, since that time, it is assumed that the 50 hour checks, should any have been due, were carried out and certified by the aircraft owner.

Following the aborted flight to the Isle of Man on 25 October 1994 the owner took his aircraft to a maintenance organisation on the airfield at Guernsey. After a run-up, it was discovered that the engine was operating on five instead of six cylinders. Despite his stated anxiety to return to his home airfield before nightfall, the owner was persuaded to allow a full assessment of the problem by the maintenance organisation who discovered the following engine faults:

a) Cracked insulation on one sparking plug.
b) A blanking plug missing from the inlet to No 2 cylinder, which was allowing additional air to be drawn in and weaken the mixture.
c) No compression at all on No 1 cylinder. This was traced to burnt oil deposits on the exhaust valve stem jamming it in the open position. Upon re-assembly, it was also discovered that rockers in the cylinder head for the inlet and exhaust valves had been interchanged. This had resulted in the valve mechanism not being sufficiently lubricated.
d) The hot air hose to the carburettor was found to be collapsed.
e) Slight fuel leak from the belly area.

Upon receiving this appraisal the owner reportedly stated that he was aware of the low compression on one cylinder and the fuel leak, and asked if he could take the aircraft in that condition. The maintenance organisation declared that it would be unsafe to do so and it was agreed that the necessary repairs be carried out. Several days later the work had been completed and, following a prolonged ground run at high power, the aircraft was considered to be in an airworthy condition. After confirming with the Irish airworthiness authorities that a UK Certificate of Release to Service, issued in accordance the Air Navigation Order, would be acceptable, copies of the appropriate documents were given to the pilot but the aircraft log books were not made available at this time. The engineer later expressed an opinion that, although fit to fly, the aircraft was in a poor, tatty condition, extremely dirty and generally in need of attention. The cockpit equipment was basic and it was noted that no transponder was fitted. Although a VHF radio was fitted the engineer also noted that the transmit switch on the left control wheel was broken and, when conducting engine runs after the repair, he was obliged to key the transmitter using the hand microphone and to listen out on a headset.

Additional information

The last known position of EI-AND, taken from the radar recordings, was timed at 1954:43 hrs but the 'MAYDAY' call recorded at Ronaldsway was timed some 5 minutes later at 1959:25 hrs. It is assumed that the aircraft was airborne during this time. Analysis of the ATC tape recording made at the time of the 'MAYDAY' radio call failed to identify any of the sound frequencies associated with the engine which had been heard earlier. The aircraft is believed to have been flying at 2,500 feet prior to the last radar paint and, if the engine had failed completely at this altitude it is unlikely, considering glide performance, that it would have remained airborne for some 5 minutes. It is therefore likely that some power was available from the engine during at least part of this period. In the absence of wreckage examination it was not possible to determine a cause for the apparent lack of engine power at the time of the 'MAYDAY' call.

Flight planning

In the course of the investigation it was noted that a VFR flight plan had been filed for the flight which was to be conducted at night. (Appropriate instrument qualifications are not necessary for a pilot to file an IFR Flight Plan).

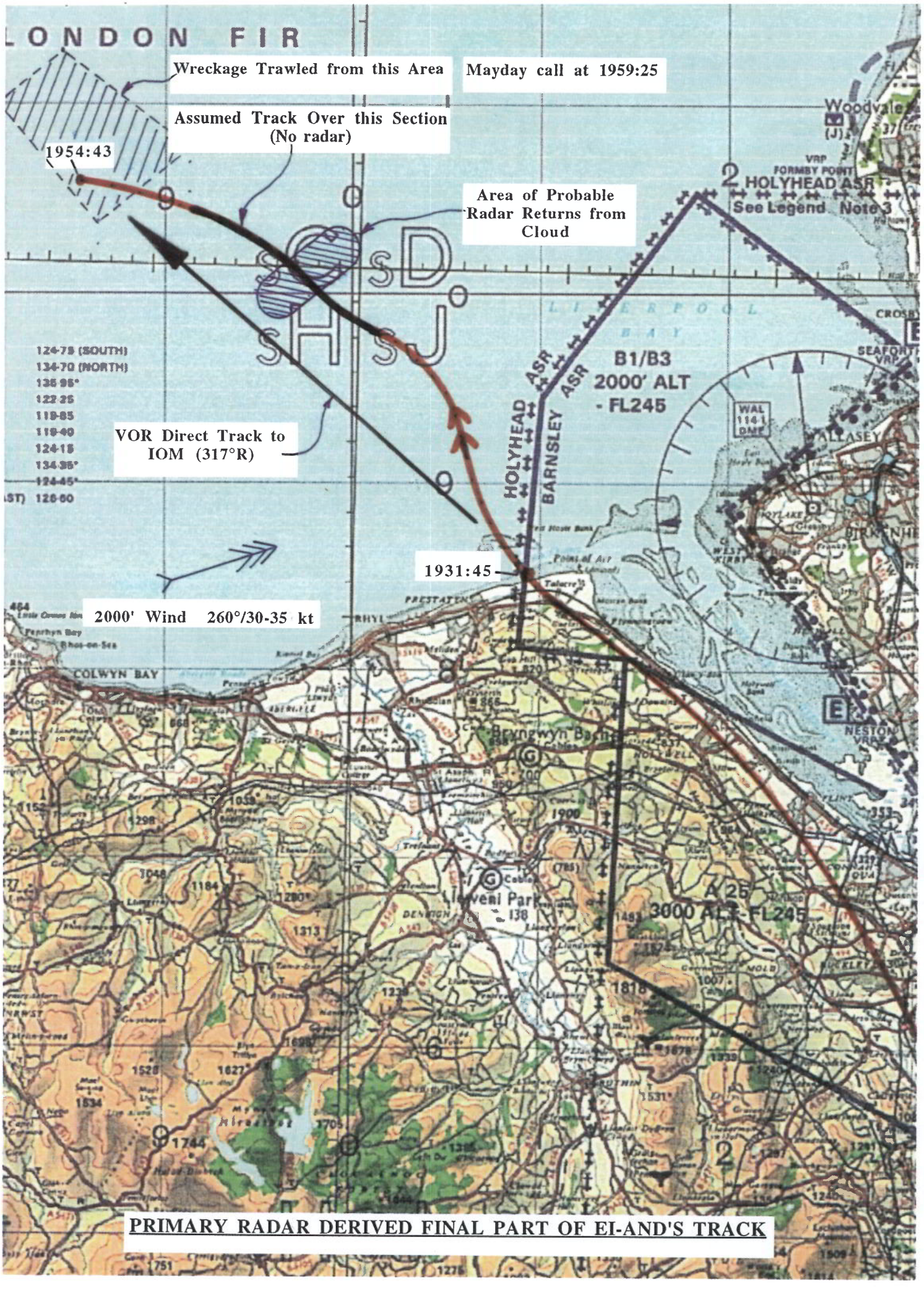
Under the provisions of the Rule 27 of Rules of the Air Regulations (Guernsey), a flight plan had to be filed for the Special VFR departure, which the pilot requested whilst taxiing. A flight plan was also required, under UK Rules of the Air Regulations 1991- Rule 20 (4), because the flight was planned to cross into the UK FIR. However, the ATC flight plan for the accident flight gave an ETD of 1715 hrs, which was later than the onset of official 'Darkness' (Sunset + 30 minutes). As this was a

flight at night, the Rules of the Air Regulations 1991- Rule 22 required that the flight be conducted under IFR or, in a control zone, under Special VFR. The VFR flight plan filed was therefore invalid.

This anomaly was not noticed by the planning staff at Guernsey when the plan was filed, although, as the relevant portion of the ICAO Document 4444, General Provisions, paragraph 8.3.1, states that:

> 'The first Air Traffic Service Units (ATSU) receiving a flight plan shall
>
> a) check for compliance with the format and data conventions; and
>
> b) check it for completeness and, to the extent possible, for accuracy ',

it remains the responsibility of the pilot to ensure that all portions of the flight plan are valid.


LONDON FIR
Wreckage Trawled from this Area
Mayday call at 1959:25
Assumed Track Over this Section
(No radar)
1954:43
Area of Probable
Radar Returns from
Cloud
HOLYHEAD ASR
See Legend Note 3
B1/B3
2000' ALT
- FL245
HOLYHEAD ASR
BARNSLEY ASR
VOR Direct Track to
IOM (317°R)
1931:45
2000' Wind 260°/30-35 kt
A25
3000 ALT - FL245
PRIMARY RADAR DERIVED FINAL PART OF EI-AND'S TRACK