SERIOUS INCIDENT

Aircraft Type and Registration:	Boeing 737-8F2, TC-JKF
No & Type of Engines:	2 CFM 56-7B22 turbofan engines
Year of Manufacture:	2006
Date & Time (UTC):	13 March 2011 at 1412 hrs
Location:	London Stansted Airport
Type of Flight:	Commercial Air Transport (Passenger)
Persons on Board:	Crew - 2 Passengers - N/K
Injuries:	Crew - None Passengers - None
Nature of Damage:	None
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	49
Commander's Flying Experience:	7,700 hours (of which 4,400 were on type) Last 90 days - 220 hours Last 28 days - 80 hours
Information Source:	AAIB Field Investigation

Synopsis

Shortly after takeoff from Stansted, the aircraft levelled at 800 ft aal (450 ft agl) and did not climb until the pilots received instructions from ATC. The pilots had misinterpreted altitude restrictions shown on the departure chart. One Safety Recommendation was made.

History of the flight

The aircraft was on a scheduled flight from London Stansted airport to Ankara, Turkey and was cleared to depart on a Clacton 8R standard instrument departure (CLN 8R SID) from Runway 22. After an uneventful start-up and taxi, the tower controller at Stansted issued a clearance for the aircraft to line up on Runway 22. The controller received a reply that sounded unclear and mumbled so he re-iterated the clearance. The controller observed the takeoff and initial climb, both of which appeared normal. He looked away for a short time and, when he looked back at the aircraft, saw it in a steep nose down attitude and descending before it levelled off. The local controller tried twice to establish communications with the aircraft but received no reply. He then contacted the departure controller at Swanwick who confirmed that the aircraft was on his frequency. The tower controller observed the aircraft flying a low-level left turn before commencing a climb.

The co-pilot, who was PF, had selected 800 ft on the Mode Control Panel (MCP) before takeoff. Shortly after takeoff he engaged the autopilot, the aircraft

pitched nose down and, after reaching a maximum altitude of approximately 1,050 ft, it descended to 800 ft aal. The pilots contacted London Control and passed their callsign along with the SID designator of the procedure that they were cleared to fly. This frequency change took place before the pilots were instructed to do so by Stansted tower, which is contrary to the instructions on the SID which indicates that pilots will be instructed when to contact the departure frequency. The departure controller requested the passing and cleared altitude from the pilot and, when the pilots requested the controller to "SAY AGAIN PLEASE", this request was repeated. After the second request, the pilot transmitted that he was "NOW EIGHT THOUSAND EIGHT HUNDRED FEET". The altitude readout on the radar screen[1] showed an altitude of 800 ft and the controller asked the pilot to confirm that he was at 800 ft and reiterated his request for the aircraft's cleared altitude. The pilot replied "ALTITUDE EIGHT HUNDRED, SIX SIXTY NOW". The aircraft had entered a left hand turn and continued flying the lateral part of the CLN 8R SID which consisted of a turn through approximately 130° to roll out on a track of 088° towards the Clacton VOR. During this turn, the first part of which was flown level at a height of approximately 450 ft agl, the pilot reported that the autopilot disengaged and that he received "PULL UP" and "DON'T SINK" GPWS warnings. The controller asked the pilot to confirm that he was climbing to 4000 ft to which the pilot replied that he was 'NOW CLIMBING FOUR THOUSAND'. During this last dialogue the aircraft selected altitude, as displayed on the ATC radar screen, changed from 800 ft to 3,200 ft and, after the pilot confirmed that they were climbing to 4,000 ft, the aircraft selected altitude readout changed to reflect this. The aircraft entered a climb having turned through approximately 100°. The remainder of the departure proceeded without further incident.

The commander of the aircraft was on his third flight to a UK airport and on his second flight to Stansted. On the previous occasion that he had departed from Stansted he had flown a Dover SID without incident. The first officer was on his first flight into Stansted. The captain stated that he set 800 ft on the MCP because he interpreted the instructions printed in the general information section of the departure chart to mean that he was required to level the aircraft at 850 ft and not climb above this until instructed to do so by London Control. It was not possible for the co-pilot to select exactly 850 ft on the MCP as altitudes can only be selected in increments of 100 ft so he selected the nearest value that would not exceed the perceived 850 ft clearance limit.

Clacton 8R SID (CLN 8R)

The pilots were using Jeppesen charts and the relevant chart for the CLN 8R SID is shown in Figure 1. The SID chart contains a panel of general information at the top of the page. Items 3, 4 and 5 state:

> *'**3**. Initial climb straight ahead to 850'*
> ***4.*** *Cruising levels will be issued after take-off by LONDON Control*
> ***5.*** *Do not climb above SID levels until instructed by ATC'*

The information displayed on the Jeppesen chart reflects the information published in the UK AIP although the positioning of this information on the page is different and the UK AIP states 847 ft instead of 850 ft.

Footnote

[1] The Mode S transponder give the ATC controller an on-screen readout of the altitude that the pilot has selected on the MCP.

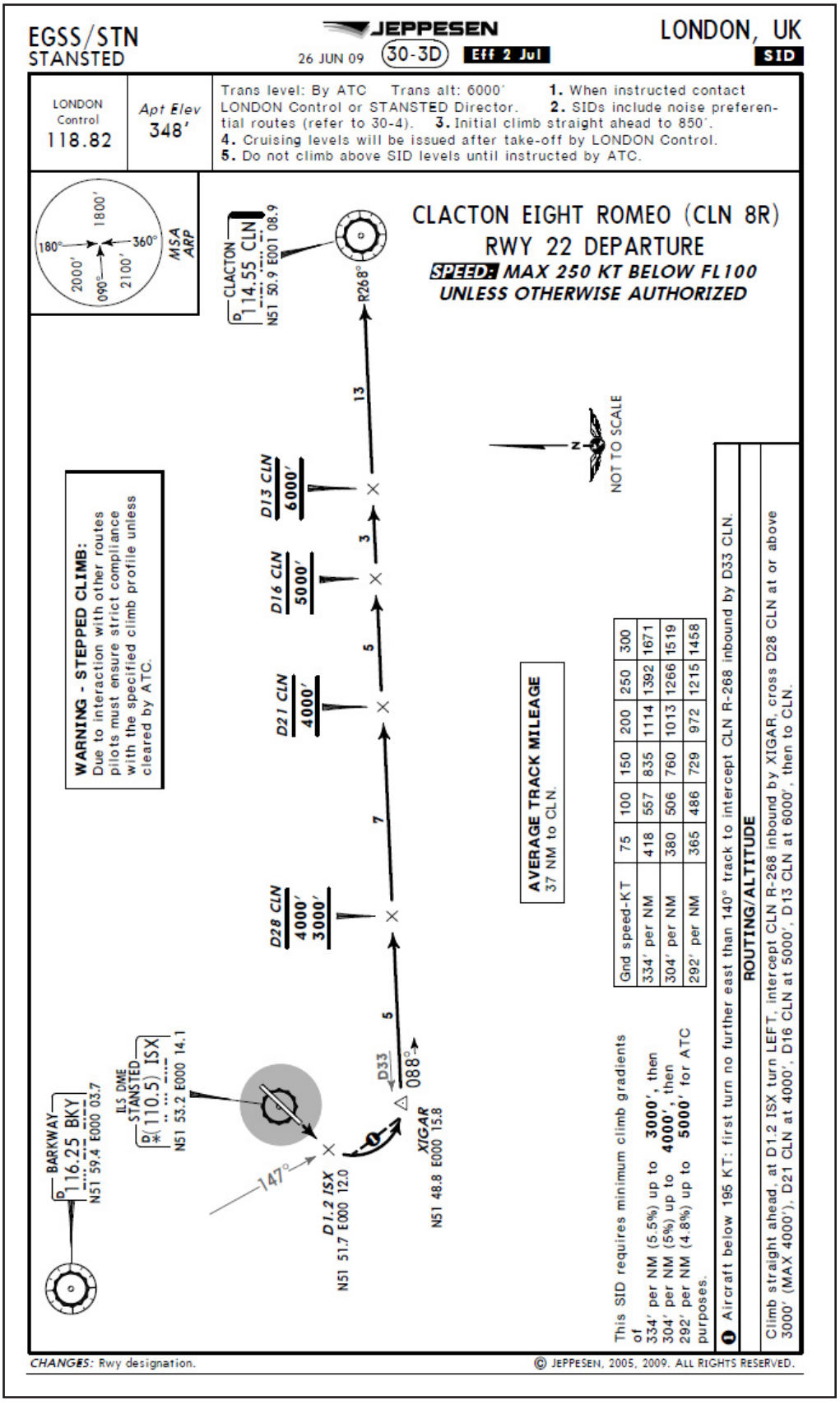

Figure 1

Clacton 8R SID

UK Standard Instrument Departures

The ICAO minimum height for commencing a turn on a SID is 120 m (394 ft). After the 1974 Trident (G-ARPI) Public Enquiry the CAA published a report entitled Safety Aspects of Terminal Area Procedures in which the UK opted to increase this height to 500 ft. This change is promulgated in UK AIP General Section GEN 1-7-48 where it states:

> *'...no turns are to be commenced below a height of 500 ft aal.'*

It is also stated in CAP 778 - Policy and Guidance for the Design and Operation of Departure Procedures in UK Airspace that states:

> *'The **earliest** point at which the first turn shall be specified is the point at which all aircraft will have achieved 500 ft aal.'*

Most of the SIDs published in the UK AIP contain a phrase reflecting this requirement with the majority using a phrase similar to that contained in the CLN 8R SID. However, the SIDs from Manchester airport, airports in the Channel Islands and the DVR and LAM SIDs from Stansted Airport show this information by using a phrase similar to:

> *'No turns below 850 ft QNH (500 ft QFE)[2].'*

The reason for the adoption of this phrase at Manchester and the Channel islands is unknown. However, the DVR SIDs at Stansted were amended in 2006 in response to a similar incident involving a departure on the DVR 5S SID.

Footnote

[2] The actual QNH altitude shown will vary depending on the geography of the airport. However, it will always reflect the minimum requirement of 500 ft aal.

Analysis

The commander of the aircraft was on only his second flight into Stansted and his third into any UK airport. The co-pilot had only operated into the UK once before and this was on his first flight into Stansted. The pilots misinterpreted the written instruction:

> *'Do not climb above SID levels until instructed by ATC'*

to mean that they had to await positive ATC clearance before climbing above any of the levels specified on the SID.

The previous time that the commander had departed out of Stansted, he flew a Dover SID and the general information wording of this procedure is different from the wording of the Clacton SID in that the Dover SIDs state

> *'No turns below 850 ft'*

where as the Clacton SIDs state:

> *'Initial climb straight ahead to 850 ft'.*

The phrase:

> *'Initial climb straight ahead to 850 ft'*

is grammatically similar to the phraseology specified in CAP 413 that ATC would use to instruct an aircraft to climb to and maintain a specified altitude (*'Climb to altitude 850 ft'*). The pilots interpreted 850 ft as the first SID level that they were required to maintain pending further instructions by ATC and they configured the aircraft accordingly.

It is possible for pilots, especially those whose first language is not English, to misinterpret the instruction:

> *'Initial climb straight ahead to 850 ft'*

to mean that the aircraft is to level off at this altitude. Additionally, it is possible for pilots to misinterpret the instruction:

> *'Do not climb above SID levels until instructed by ATC'*

to mean that they must obtain positive ATC clearance to climb above all of the levels specified on a SID.

The instruction not to commence a turn below 500 ft aal is shown in one of two different ways on SIDs published in the UK AIP. The commander's previous experience of a Stansted departure was on a Dover SID that presents this restriction using a different phrase to a Clacton SID. The pilot considered that this difference in phrasing was one of the factors that reinforced his misinterpretation of the information on the chart.

Safety action taken

As a result of this incident NATS has harmonised the general information section of published SIDs so that, where the phrase *'Initial climb straight ahead to...'* occurs, it is replaced by the phrase *'No turns below…'*. This action was only applied to airports within the London TMA.

The investigation revealed that vertical profile information given in the general information section of SIDs published in the UK AIP was misinterpreted. Therefore, the following Safety Recommendation is made:

Safety Recommendation 2011-089

It is recommended that the Civil Aviation Authority should ensure that the vertical profile information included within the general information section of all SIDs published in the UK AIP is unambiguous and that the wording used is consistent across all UK SIDs.

Conclusions

The pilots caused the aircraft to level incorrectly at 800 ft aal because they misinterpreted the information written in the general information section of the departure chart. This information originated from the UK AIP. The pilots' misinterpretation of the information was reinforced by the previous experience of the crew.