

Managing a major accident investigation in a small country

**The case of the B737-800, Ethiopian flight 409, crashing off the coast of Beirut – Lebanon
January 25, 2010**

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Abstract:

On the stormy night of January 25, 2010, a Boeing 737-800 type aircraft operated by Ethiopian Airlines as flight ET409 from Beirut, Lebanon, to Addis Ababa, Ethiopia, disappeared 4 and half minutes after take-off from the radar screen and all communications with the ATC were lost. Search and Rescue operations were immediately launched. In the absence of a permanent investigating bureau established in Lebanon, the minister of Transportation and Public Works nominated an investigation committee headed by the director general of civil aviation, 3 hours after the accident.

Sea Search and Rescue (SSR) efforts were initiated immediately, but were hampered by bad weather and limited resources; however, the assistance of various civil and military ships and aircraft present in the area provided a great help. Witnesses reports stating they saw an explosion around the same time and location of the crash contributed to spread many rumors that were further developed by the media.

A review of the ATC radar transcripts and communications showed a strange flight pattern that was not abiding by ATC instructions or consistent with any weather avoidance logic as identified on the radar screen. The aircraft was identified changing altitudes and headings in an inconsistent way despite various calls from ATC, while the voice of the pilot replying to these ATC instructions sounded very calm as if everything was normal. The final bank of the aircraft before it disappeared from the radar screen was very sharp and the altitude loss was very fast.

The DFDR and CVR recordings were only recuperated a few days later due to lack of proper under water tracking equipment and bad weather conditions. A long investigation process followed with many milestones and at the end, a final report was published within less than 2 years after the accident.

This paper will expand on the above explaining the main challenges encountered and exposing the experience from which we hope to learn in order to facilitate future investigations processes.

Introduction:

On the stormy night of January 25, 2010, a Boeing 737-800 type aircraft operated by Ethiopian Airlines as flight ET409 from Beirut, Lebanon, to Addis Ababa, Ethiopia, disappeared 4 and half minutes after take-off from the radar screen and all communications with the ATC were lost.

After having established without doubt that the airplane had disappeared, the Lebanese Authorities launched a technical investigation. In the absence of a permanent investigating bureau established in Lebanon, an Investigation Committee (IC) from Lebanese investigators was formed by a ministerial decree issued by the Minister of Public Works and Transport in order to conduct the technical investigation. The USA, as State of Manufacture, and Ethiopia, as State of the Operator/Registry, were invited to appoint accredited representatives and to be associated with the IC. Following the existence of a MOU between the French BEA and the Lebanese Directorate General of Civil Aviation (DGCA), the BEA was also invited to assist the Lebanese authorities to conduct the investigation. That assistance proved to be very useful.

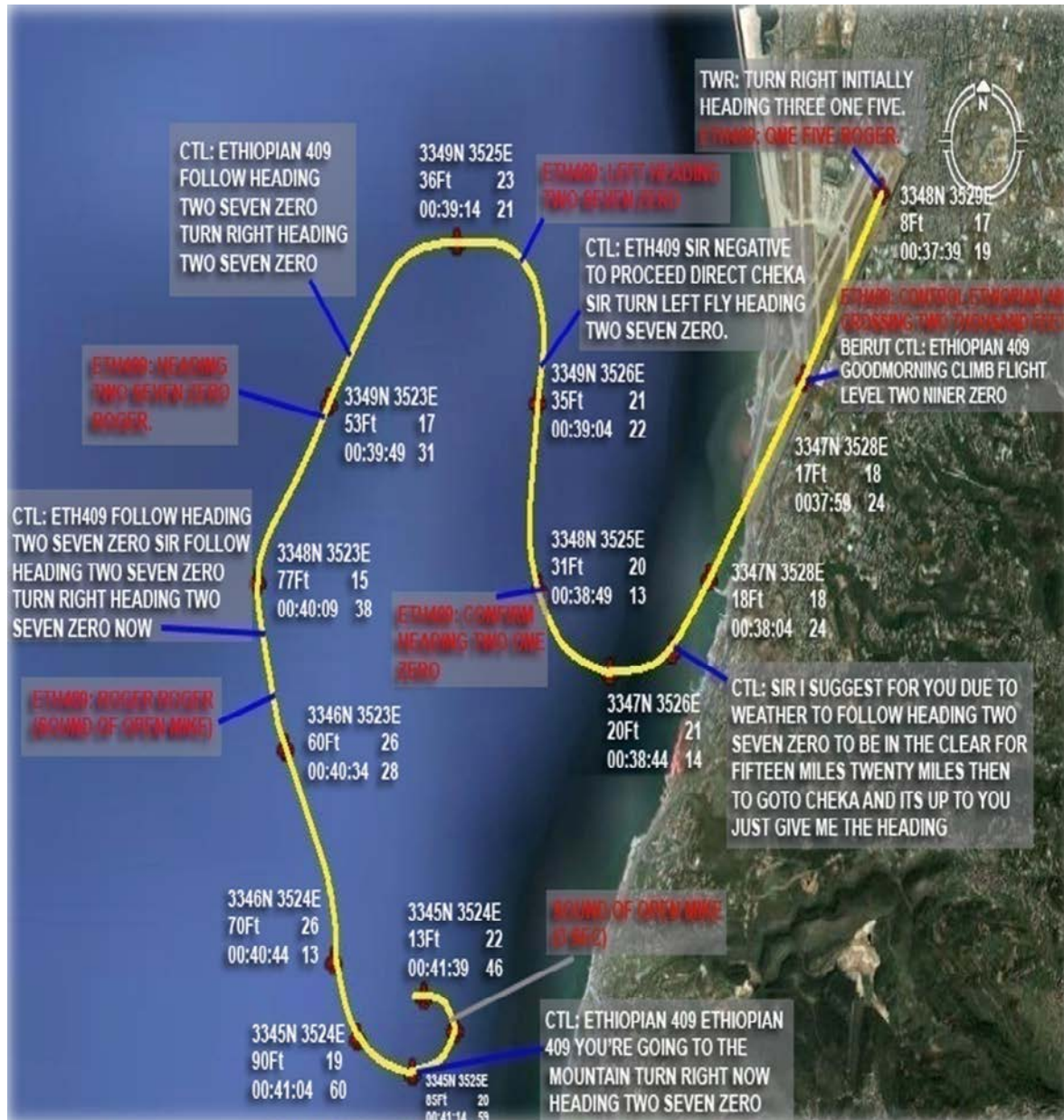
A SSR team was formed by Lebanese Army in conjunction with the Ministry of Public Works & Transportation. All Sea Search & Rescue operations were conducted in full coordination with the IC including daily briefings given by the SSR team to the members of the IC. The SSR operations were hampered by bad weather and limited resources; however, the assistance of various civil and military ships and aircraft present in the area provided a great help.

In the following paper we shall discuss the initial response to the accident, the communication and media relations, the SSR operations, the accident, the investigation process and the final report. In doing so, we shall examine the challenges encountered throughout each of these phases and try to learn from what happened in order to help countries with similar resources to be better prepared to face and handle such undesired occurrences.

Initial Response

The initial response to the accident by the Lebanese Authorities was efficient, considering the available resources and the organizational structure of the aviation system in the country. The SSR operations were launched on the spot and the Airport Emergency Response Plan (ERP) was activated, including the command center. In the absence a permanent investigating bureau established in Lebanon, an Investigation Committee from Lebanese investigators was formed by a ministerial decree issued by the Minister of Public Works and Transport in order to conduct the technical investigation. The director general of civil aviation was nominated in the same decree as investigator-in-charge (IIC), to lead and initiate immediately the investigation; the undersigned, who is a pilot with MEA and a certified air Safety Investigator, was nominated as deputy IIC, and the director of Safety at the Lebanese DGCA was nominated as a member. The USA, as State of Manufacture, and Ethiopia, as State of the Operator/Registry, were invited to appoint accredited representatives and to be associated with the IC. Following the existence of the MOU between the French BEA and the Lebanese DGCA, the BEA was also invited to assist the Lebanese authorities to conduct the investigation.

The accident occurred at 2:47 am LT; I received a call from the IIC at 5:45 am informing me about the accident, my nomination and requesting that I report to the command center a.s.a.p. I was there at 6:30 and we immediately went to the Radar room to review the radar tracks of the accident plane and listen to the communication that was going on between the ATC controller and the Flight Crew. What we saw and heard indicated that we surely need the DFDR and the CVR to understand what went on! The following figure reflects the flight tracks with the ATC transcript:



Having seen that, we went back to the command center where prominent government figures started to arrive, including the Prime Minister, the minister of Transportation and Public Work, who is responsible for the aviation sector in Lebanon, the minister of Interior who is responsible for the airport security forces, and various other government ministers, members of parliaments, the

commander of the Air Force, the commander of the Navy, the Director General of Security Forces and various other army and security officers.

Many were worried about the eye witness testimonies that had reported seeing an orange explosion and/or a ball of fire at the time and probable location of the crash; could that be an act of sabotage that went undetected through the airport security services? Without ruling out an act of unlawful interference, what we saw on the radar did not lead into the direction of a bomb planted on board; an aircraft following a very strange flight pattern without abiding by ATC instructions or being consistent with any weather avoidance logic as identified on the radar screen, changing altitudes and headings in an inconsistent way despite various calls from ATC, executing a very sharp final bank before it disappeared from the radar screen and then explode as a result of an act of sabotage! The coincidence would be very remote.

Nevertheless, the focus was now on the SSR operations and the hope of finding any survivals. Although the flight pattern identified on the radar screen indicated that the aircraft would have hit the water surface at a very high vertical and horizontal speeds, thus minimizing the chances of survivability; previous similar accidents have seen at least one person surviving a similar crash, the child surviving the crash of the Yemenia A310 off the coast of the Comoros Islands. For people who hoped to find the aircraft in one piece under the water with the bodies still attached to their seats, we had to explain the dynamics of impact with the water surface so that we can prepare the responsible persons to what to expect and avoid creating unwarranted hopes. That policy proved to be very wise as it increased the trust of the government in the IC.

Lebanon is a country where governments are usually formed in a coalition way where most political parties are represented. While that system helps avoid political unrest and achieve social peace, it certainly does not operate in a smooth manner, since every political party strives to achieve more at the expense of the other. However, during the course of the response to that accident, national unity and cooperation was manifested at its best, with the full support of all the political parties and the coordination between the various government departments and agencies. That cooperation also extended to external bodies present in Lebanon and in the area, so the help of the UNIFIL Forces stationed in Lebanon, the USA Navy present in the area and civil ships that were operating in Lebanon were sought and obtained.

The hospitals in Lebanon were alerted and the Beirut Rafic Hariri General Hospital was nominated as the central place to receive human remains. The minister of Public Health supervised personally this process to ensure that DNA was taken and human remains were examined, observations recorded and identified. This had to be promptly accomplished since it is customary in Moslem countries to bury the dead as soon as possible, thus it was crucial to deliver the remains of the occupants of the aircraft to the families, once they were identified. As a matter of facts, the only bodies recovered in a visually identifiable manner belonged to two babies who were on board and less than 10 other bodies, all of which were recuperated floating during the first day that followed

the crash. All other human remains were beyond visual identification as a result of the impact with the water surface at high speed.

Communication & Media Relations

Once the USA, the Ethiopian and the BEA teams arrived, a meeting of the IC was held. This was on the afternoon of the same day of the accident. Two working groups were formed, one for Operations and the other for Engineering and Maintenance; all parties were represented in the two groups. It was suggested that a group be formed to handle media relations and issue press releases in order to control the information being transmitted to the media; however, the IIC was against that idea and did not want any information released through the IC, he agreed with the minister of Transportation and Public Work that he shall relay the information to him and the minister shall handle the media.

Lebanon is a country where the freedom of the press is sacred. Controlling information in such an environment proved to be very difficult in the absence of official press releases being issued by the IC. This has created a very unhealthy environment, especially during the first days of the SSR and until the DFDR and CVR were found and the data known. Different media agencies came with different stories, official statements by the minister of Transportation and Public Work were misinterpreted; other ministers were issuing their personal opinion that were not very accurate nor represented what was found by the IC. The government had to interfere at the highest level in order to control that situation. Nevertheless, the gossip continued and everybody became an expert.

That situation was unhealthy and was putting a lot of pressure on the IC. The Ethiopian delegation kept on complaining about it till the end and the Ethiopian press initiated a counter-attack. Letters of complaint were received and the Ethiopian minister of Transport visited Lebanon personally and complained about it to the Lebanese minister. The Lebanese minister's position was very clear: the press in Lebanon is free and we cannot control it as government; however, no such leaks or communication was initiated by any member of the IC and all official Lebanese personalities have been briefed accordingly and, except for the first 3 days, no such personality issued any statement or released any opinion on the accident.

What complicated the matter further was that the preliminary factual report delivered to the government one month after the accident was not published for reasons which are still debatable; someone had told the minister that we cannot release any information till the investigation is over! While the release of such a factual report could have reduced the guesses and consequently the false analysis and hypothesis, refraining to publish that report has contributed to the dissemination of further unfounded gossips. This situation continued during the first year and only when the first factual report was released to the public a year after the crash, it was reduced.

Less than a year from the date of the accident, the IIC resigned his position as Director General of Civil Aviation and returned to his academic work. The deputy IIC became the IIC and the investigation continued. I made it a point to brief the media periodically with the Minister of

Transport on the progress of the investigation. While this policy did not stop completely the gossips, it surely helped reducing them tremendously and gave the media the correct information that could be released at the time. The fact that two investigation progress reports were issued and published during the 2nd year of the investigation limited the gossips to the explanation of the facts, instead to the facts themselves.

The SSR Operations

Once the accident was acknowledged, the SSR operations were launched under the command and control of the Lebanese Army. The Directorate General of Internal Security Forces, The Directorate General of Civil Defense, the Lebanese Red Cross and the Fire Brigade were all incorporated into the SSR efforts. However, due to lack of advanced equipment, the Army command decided to seek the assistance of the UNIFIL Naval Forces located in the area, this included ships and helicopters belonging to Germany, Italy, Turkey and Greece. The government also requested the assistance of the USA, France and the UK. Two civilian ships properly equipped for underwater search, the Ocean Alert and the Odyssey Explorer, were also contracted by the government and put at the disposition of the SSR team.

The reason the Army was tasked to lead the SSR operations are three fold: the 24 hours level of preparedness available at the Army Operations center, the necessity to protect the accident site and the lack of resources available to the other governmental entities. The Army also entertains good relationship with other forces operating in the region, especially the UNIFIL. This cooperation provided the government with supplemental developed tools that helped achieve the required SSR operations to a high standard, considering the prevailing weather and the logistics available to the Lebanese government.

The SSR operations also included the removal from deep sea of some aircraft parts, including the DFDR and the CVR. Based on the Radar tracks, the IC estimated the aircraft wreckage to be located 4-5 miles SW of BRHIA. Floating parts of the aircraft and some bodies were collected and found at different locations NE of the calculated wreckage area. The IC requested from the ships conducting the SSR operations to try to locate the exact area where the wreckage could be found. This was done through a survey of the sea bed where the wreckage location was calculated and through trials by a ship equipped with submarine identification technology to try to locate the signal transmitted from the CVR and DFDR. The equipment on board that ship was adjusted to enable it to pick up the signals sent from the pingers attached to the DFDR or CVR.

Two days after the accident, one of the ships reported picking a signal 14 Km to the west of the field. The sea bed in the area where the signal was located is 1400 m deep. The Lebanese Government decided to contract the Ocean Explorer ship to come to Lebanon in order to retrieve the wreckage, the recorders and the human remains from that deep location; the estimated time for the arrival of that ship was 10 days. In the mean time, a team from the BEA equipped with the proper technology was dispatched to that same area in order to determine with greater precision the

location of the wreckage. The BEA team was unable to receive any signal at that location, so they suggested to the IC to sail back to the area originally calculated by the IC. This suggestion was approved and this time the BEA team succeeded in locating precisely a signal.

The Ocean Alert ship took underwater pictures of that area and the location of the aircraft wreckage was successful. The depth of the sea bed in that area was 45m. However, the pictures and videos did not reveal the location of the DFDR or the CVR. Navy divers were sent with the proper equipment and a signal was located under the tail of the aircraft; the USNS Grapple ship picked up the tail from the sea bed, which allowed the Navy divers to retrieve the DFDR on 7 February and to deliver it to the IC. It was flown to the BEA laboratories at Le Bourget in France in the prime ministers private airplane and under the custody of the IIC and representatives from the other States, member of the IC.

The CVR was emitting no signal. Photos of the CVR were issued to the divers who continued a physical search of the sea bed to locate that equipment. On 10 February the CVR Chassis was located, but the CSMU was missing. The physical search continued and the CSMU was finally located by the Navy divers and delivered to the IC on 16 February. The same was also flown directly to the BEA laboratories at Le Bourget in the prime ministers private airplane and under the custody of the deputy IIC and an Ethiopian representative.

The total time spent carrying the SSR operations was 25 days, out of which 3 days where the operations ceased because of high seas and bad weather. A full description of the SSR operations and the recovery of the aircraft parts, including the DFDR and the CVR are detailed in the investigation report available on www.lebcaa.com.

The Accident

The flight was initially cleared by ATC on a LATEB 1 D departure (5000 feet on runway 21 heading then a right turn to Chekka), then, when the controller saw that this departure will lead the aircraft into weather west of the field, he changed the clearance to an “immediate right turn direct Chekka”. At 00:36:33 Z the takeoff thrust was set and the aircraft started its journey. The weather reported at that time indicated the presence of thunderstorms activity southwest and west of the field, as well as to the northwest on the localizer path for runway 16.

After take-off ATC (Tower) instructed ET 409 to turn right on a heading of 315°. ET 409 acknowledged and heading 315° was selected on the Mode Control Panel (MCP). As the aircraft was on a right turn, Control suggested to ET 409 to follow heading 270° “*due to weather*”. However, ET 409 continued right turn beyond the selected heading of 315° and Control immediately instructed them to “*turn left now heading 270°*”. ET 409 acknowledged, the crew selected 270° on the MCP and initiated a left turn. ET 409 continued the left turn beyond the instructed/selected heading of 270° despite several calls from ATC to turn right heading 270° and acknowledgment from the crew. ET 409 reached a southerly track before sharply turning left until it disappeared from the radar screen and crashed into the sea 4’ 59” after take-off. The aircraft

impacted the water surface around 6 NM South West of BRHIA and all occupants were fatally injured.

The recorder's data revealed that ET 409 encountered during flight two stick shakers for a period of 27" and 26". 11 "Bank Angle" aural warnings were registered as well as an over-speed clacker towards the end of the flight. The maximum registered AOA was 32°, maximum registered bank angle was 118° left, maximum registered speed was 407.5 knots, maximum registered G load was 4.412 and maximum registered nose down pitch value 63.1°. The DFDR recording stopped at 00:41:28 with the aircraft at 1291'. The last radar screen recording was at 00:41:28 with the aircraft at 1300'. The last CVR recording was a loud noise just prior to 00:41:30. The following figure reproduces the aircraft flight pattern based on the DFDR data:



The Investigation Process

The full IC met on the same day of the accident. Two working groups were formed, one for Operations and the other for Engineering and Maintenance; all parties were represented in the two groups. Media handling was left to the minister of Transportation and Public Work, as decided by the IIC.

Daily briefings were carried out on all investigation activities, in the morning and at the end of each day. A daily briefing was also carried out at the Beirut Naval Base, which served as the HQ of the SSR operations, on the SSR activities and feedback was requested from the IC in order to direct the operations.

The high sea and the confusion created by the false signal received from the DFDR delayed the positive identification of the wreckage location and the subsequent recuperation of the DFDR. The CVR was even harder to recuperate, since the pinger had detached from the main chassis. However, they were all recuperated and examined at the BEA laboratories at Le Bourget, in the presence of representatives from the all parties member in the IC.

The tracks reproduced from the DFDR confirmed what we had seen on radar. The data revealed nothing wrong with the aircraft systems and that all the aircraft behavior was in response to the flight crew input, till the end of the flight. What was surprising was that the aircraft went twice into prolonged stalls, once for 27 seconds and once for 26 seconds. The flight crew overbanked the aircraft triggering a “bank angle” warning 11 times during that very short flight, and only used the elevator trim 3 times during the initial phase of the flight; the aircraft was continuously out of trim and the flight crew were fighting both the aircraft and the auto-trim in order to maintain vertical control.

The CVR recordings revealed that the crew never discussed the fact that they were not following ATC instruction, they never mentioned any weather, although according to their flight pattern and to the noise of heavy rain recorded on the CVR they must have penetrated into weather. The F/O never called any deviation except once, during the 2nd stall when he called “speed”; the captain reply was he knew the speed was dropping and he asked the F/O to do something about it! No reaction was recorded to that request.

The IC met back in Beirut after gathering this information and decided to pursue the investigation in all required directions in order to explain the facts we had. A factual report was compiled and delivered to the Lebanese Government; it was not published as discussed earlier in this paper.

The NTSB offered to develop through Boeing a replay of the accident flight at the M-Cab simulator, which gives the possibility to the pilot in the simulator to observe the flight from the pilot seat and perspective. Furthermore it allowed the pilot in the simulator to interfere and try to break the chain of events at different times throughout the flight. That session was very enlightening! (For

further information on the M-Cab session, refer to Appendix K of the investigation report posted on www.lebcaa.com.)

A visit to Addis Ababa was also agreed upon in order to interview the operational and maintenance personnel at Ethiopian Airlines and at the Ethiopian CAA. That visit was delayed many times for various reasons and was only carried out a year after the accident. In the mean time the Ethiopian team was trying to focus on aircraft design and security issues. This has lead to the IC agreeing to carry-out through the NTSB an analysis of the trim tab, which revealed that it was operational on the accident plane; an analysis of a black soot identified near the APU exhaust, which revealed it was old superficial traces; and an analysis of the CVR chips, which revealed that 4 seconds of recordings were missing twice, over the period of 299 seconds that the flight took, from one out of the 4 channels that recorded voices in the cockpit; any such noise would have been picked up by the boom mike which was placed in INT position. (All reports concerning these analyses are attached to the investigation report).

The IC meetings were initially attended by all participants. Then the Ethiopian team started to either not to come, despite previous confirmation, as was the case for the M-Cab session, or to come and leave the next day without previous notice, except for an e-mail sent, most of the time after their departure. Various unwarranted reasons were given in each case. At the end, the USA and the BEA delegation stopped coming and stated they were satisfied with the information available to the investigation committee.

The Lebanese IIC and team pursued its efforts with the Ethiopian team till the end in order to reach a consensus on what has happened and why it did happen. While what has happened can be stated with confidence, why it did happen was in need of very close cooperation from the operator. That cooperation stopped short once we touched on operational matters. As a matter of fact, a quick look at the Ethiopian comments on the investigation report will reveal that, in their view, the aircraft could have crashed as a result of bad design, bad weather, bad ATC instructions and/or an explosion suffered by the aircraft at 1290 feet, as it was diving towards the sea at a very high rate of descent and speed in excess of 409 knots; that explosion could be the result of a bomb placed on board, a rocket, or a lightning strike. It could have also crashed as a result of a combination of all the above; however, the CRM of the pilots was good and they were trying their best to control the uncontrollable aircraft till the end!

Faced with that situation, we had to report what was happening to the minister of Transportation and Public Works, he received a ministerial delegation from Ethiopia and a meeting was held in Beirut where our position was explained. It was agreed that we shall continue and conclude the investigation in line with the ICAO provisions and that whatever disagreements would be discussed, and if not concluded will be appended to the report. As a matter of fact, instead of the normal 60 days available for the different parties to send their comments, the Lebanese party allowed nearly double that period, including a 12 hours meeting that was held in Paris with the Ethiopian delegation 6 weeks prior to the release of the final report and only received the Ethiopian

comments the night before the issue of the final report. Their comments were appended as sent with no comments from our side, as we saw no reason to comment!

A brief review of that investigation process reveals that the State relied mainly on resources external to the Lebanese Aviation Authorities, despite the fact that the IIC was initially the Director General of Civil Aviation in Lebanon. However, the assistance provided by the French BEA, with whom the Lebanese DGCA had signed an MOU, and the assistance of the NTSB and Boeing were essential in helping the investigation reach its final stages, while the defensive attitude adopted by the Ethiopian Authorities caused some delays to the investigation process and did not allow the analysis to be as deep and conclusive as we would have hoped to have.

The Report

Writing the report proved to be another challenge. While it would have been our desire to write and discuss as a committee in meeting all parts of the report, the delays that occurred and the attitude discussed previously made that task a bit difficult.

It must be noted that the two progress reports released in January and August 2011 had been discussed and agreed upon by all parties to the investigation. This formed a sound basis, since the first report contained most of the factual information. So we decided to write a first full draft and send it to the parties for comments. Once we received these comments we finalized the final draft and sent it to all concerned, giving the usual 60 days to comment; in fact these 60 days were extended to nearly double that time!

The report was developed in accordance with the ICAO template. It reproduced all the factual data obtained through the investigation. It contained an analysis based on the different identified flight events, flight operations were analyzed, so was the aircraft performance, and human factors issues. I must admit that with a better cooperation from the Ethiopian side we could have reached a better understanding of why things happened the way they did, at least from a flight crew and human factors perspectives; however, we had to deal with what we had!

The conclusions covered the aircraft, the Flight Crew, Flight Operations, the Operator, the ATS & Airport, the Flight Recorders, the medical and survivability issues, the SSR operations and the safety oversight. The factual cause of the accident was clear as evidenced by the DFDR data: *“The flight crew’s mismanagement of the aircraft’s speed, altitude, headings and attitude through inconsistent flight control inputs resulting in a loss of control.”* The Human Factor cause was also clear as evidenced by the CVR data: *“The flight crew failure to abide by CRM principles of mutual support and calling deviations hindered any timely intervention and correction.”* The report found 9 contributing factors that could have lead to these two causes. One of these factors was a possible subtle incapacitation that would explain the strange flight pattern resulting from the pilot’s input.

Since the main objective of any investigation is to come out with recommendations that would prevent similar reoccurrences, the report contains eleven recommendations, five to the operator, two to the Ethiopian CAA, one to ICAO, and three to Lebanon.

I am happy to advise that the recommendation to ICAO was accepted and Lebanon received a letter from ICAO to that effect. The recommendations to Lebanon have been taken into consideration and are mainly focused on facilitating future SSR operations and investigation, should such a mishap happen. Nothing was received from the Ethiopian side!

The two recommendations that could be of value to this paper were made to Lebanon and are as follows:

- 1- The Investigation recommends that the Lebanese Government establishes requirements to ensure that responses to such accidents are made systematically without reliance on foreign ad hoc assistance.

We were lucky this time for the presence of the Ocean Alert and the Odyssey Explorer ships that were doing other work in Lebanese waters, for the assistance provided by the UNIFIL Forces and the USA Navy present in the region, and for having a Prime Minister that has a private plane and was willing to put it at the disposition of the IC; however, all that valuable assistance was ad hoc and circumstantial. It is true that small countries like Lebanon might not have the means to acquire and maintain a large fleet of ships and helicopters to perform such a mission, it is also true that the size of aviation operation in Lebanon does not warrant such capital and operationally recurrent expenses. Nevertheless alternative means of dealing with such events should be systematically available; that could be through contractual agreements or cooperative agreements between countries in the same region and/or such countries and various specialized companies. We must bear in mind in doing so that the first hours following an accident are very crucial, especially in difficult geographical areas and under adverse weather conditions.

- 2- The Investigation recommends that the Lebanese government considers establishing administrative and logistic support for such investigations.

A systematic mean for establishing either a permanent investigation bureau independent from the DGCA or at least a pool of investigators that the minister can pick from under different circumstances to lead and conduct the investigation should be established. While the first option requires a continuous budget, the second option would only require an ad hoc budget for training in order to maintain the investigators currency. In both cases an emergency budget should be made available for such investigations; you will not always find people who will carry such investigations on voluntary basis and paying for their own expenses, only to partially recuperate these expenses at a later date.

The full report and appendices, in addition to the two progress reports, are available on the following site: www.lebcaa.com.

Conclusion

In conclusion, the investigation of the crash of the 737-800 Ethiopian flight 409 off the coast of Lebanon on the 25th January 2010 proved to be a very challenging event for that small country which was neither fully prepared nor fully equipped to face such a tragedy. The efficiency of the response relied mainly on the willful cooperation of the various parties in the governments, on the full back-up provided to the investigation by the Minister of Transportation and Public Works, on the presence of various civil and military ships and helicopters that supported the SSR operations and on the devotion of the members of the Lebanese Navy divers who operated under very adverse conditions. Such circumstantial assistance cannot be systematically relied on and a systematic alternative must be provided to deal with similar events. A systematic mean of establishing investigation committees and providing it with the necessary budget must also be developed.

Concerning media relations, I have always been of the opinion that the media is there to find and relay information; if you do not provide them with factual controlled information they will find other source and the information relayed in such cases might not be very accurate and will surely be uncontrolled. Such situations will only aggravate the repercussions of such occurrences and add pressure on the IC. Therefore, every IIC must be trained in media communication and every IC should have a media team that is properly trained and is tasked with relaying available factual information in due time, without harming the investigation process.

Finally, the sole goal of an investigation is to find out what really happened, why it did happen, and in doing so prevent similar reoccurrences. In order to reach the best results the cooperation of all concerned is essential. I will only repeat here what I kept on repeating to our Ethiopian counterparts on the IC, especially their technical consultants from the airline: you are the best placed to explain the human behavior of your own people, so please cooperate with us in order to reach the most probable reason for such behavior!