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Date : 8 March 2014  
Type : Boeing B777-200  
Registration : 9M-MRO  
Operator : Malaysia Airlines  
Fatality : 239  
Nature : A/craft missing during flight  
Location : En-route KUL - PEK

## **SUMMARY**

On 08 March 2014, a scheduled passenger flight from Kuala Lumpur to Beijing, operated by Malaysia Airlines (MAS) and designated flight MH370, went missing soon after a routine handover from the Malaysian Air Traffic Control (ATC) to Viet Nam ATC. The aircraft operating the flight was a Boeing 777-200 ER, registered as 9M-MRO. On board the aircraft were 12 crew and 227 passengers (239 persons in total). A review of available radar and satellite communications indicated that the aircraft flew back across the Malaysian Peninsula and subsequently travelled to the southern Indian Ocean. Despite an extensive air and sea search, the location of the aircraft and occupants remains unknown. However, some debris have been recovered consistent with having drifted over nearly two years from the area in which impact is thought to have occurred.

## **CAUSE**

Undetermined.

## **SAFETY RECOMMENDATIONS**

It is recommended that:

### 1. Safety Recommendation of Preliminary Report

On 09 April 2014, the Ministry of Transport, Malaysia, issued a Preliminary Report that contained the following Safety Recommendation to the International Civil Aviation Organization (ICAO):

“It is recommended that the International Civil Aviation Organization examine the safety benefits of introducing a standard for real-time tracking of commercial air transport aircraft”.

Based on the above recommendation, the ICAO Council has adopted Amendments 40 and 42 on 02 March 2016 and 27 February 2017, respectively, to the International Standards and Recommended Practices, Operation of Aircraft - International Commercial Air Transport - Aeroplanes (Annex 6, Part I to the Convention on International Civil Aviation). Excerpts of the amendments are listed below.



Amendment 40

“6.18 Location of an aeroplane in distress  
(Applicable on 10 November 2016)

6.18.1 All aeroplanes of a maximum certificated take-off mass of over 27 000 kg for which the individual certificate of airworthiness is first issued on or after 1 January 2021, shall autonomously transmit information from which a position can be determined by the operator at least once every minute, when in distress, in accordance with Appendix 9.

6.18.2 Recommendation. - All aeroplanes of a maximum certificated take-off mass of over 5 700 kg for which the individual certificate of airworthiness is first issued on or after 1 January 2021, should autonomously transmit information from which a position can be determined at least once every minute, when in distress, in accordance with Appendix 9.

6.18.3 The operator shall make position information of a flight in distress available to the appropriate organizations, as established by the State of the Operator.”

Amendment 42

“3.5 AIRCRAFT TRACKING  
(Applicable on 8 November 2018)

3.5.1 The operator shall establish an aircraft tracking capability to track aeroplanes throughout its area of operations.

3.5.2 Recommendation. — The operator should track the position of an aeroplane through automated reporting at least every 15 minutes for the portion(s) of the in-flight operation(s) under the following conditions:

- a) the aeroplane has a maximum certificated take-off mass of over 27 000 kg and a seating capacity greater than 19; and
- b) where an ATS unit obtains aeroplane position information at greater than 15 minute intervals.

3.5.3 The operator shall track the position of an aeroplane through automated reporting at least every 15 minutes for the portion(s) of the in-flight operation(s) that is planned in an oceanic area(s) under the following conditions:

- a) the aeroplane has a maximum certificated take-off mass of over 45 500 kg and a seating capacity greater than 19; and
- b) where an ATS unit obtains aeroplane position information at greater than 15 minute intervals.”

2. Safety Recommendations of this Report

As a result of the issues identified in the investigation and in order to enhance greater aviation safety and benefits, the investigation has made the following Safety Recommendations (SR) to the following organisations:



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## 2.1 Department of Civil Aviation - SR #01-07

SR	Safety Recommendation
#01	To review the existing coordination procedures/establish new procedures between KL ATSC and Joint Air Traffic Control Centre (JATCC) with regard to unidentified primary target observed by the Radar Controller.
#02	To review the present Duty Roster System for KL ATSC with the objective of improving the working conditions.
#03	To develop a comprehensive Quick Reference on ATC actions relating to aircraft emergency to be available at all Controller working positions.
#04	Air Traffic Controllers are to be provided refresher training to ensure established procedures are always complied with.
#05	To review and enhance the training syllabi of the courses for Lead-in and On-the-job training to include ATC actions during aircraft emergencies for ATS personnel at KL ATSC.
#06	To review and introduce more stringent security measures for cargo scanning at Penang International Airport/all airports and the point of entry into airside at KLIA/all airports.
#07	To review the privileging process of the appointment of the designated aviation medical examiners on a regular basis.

## 2.2 Civil Aviation Authority of Viet Nam - SR #08 – 09

SR	Safety Recommendation
#08	To observe the provisions of the Operational Letter of Agreement between Civil Aviation Authorities of adjacent Flight Information Regions.
#09	To observe the requirement of Language Proficiency as outlined from the following document: d) ICAO Annex 1 Personnel Licencing Chapter 1 paragraph 1.2.9.2 Language Proficiency; ii) ICAO Doc 9835 AN/53 Manual on the Implementation of ICAO Language Proficiency Requirements Chapter 6 – Language Testing Criteria for Global Harmonization.

## 2.3 Malaysia Airlines Berhad - SR #10-17

SR	Safety Recommendation
#10	To ensure that the flight crew report to MAB Flight Operations of any serious ailment that can cause medical incapacitation and therapy prescribed at MAB medical facilities as well as MAB-appointed panel clinics.
#11	To ensure that the medical records of the flight crew maintained by the MAB Medical Centre to include records maintained by different panel clinics. The complete medical record of the individual flight crew shall show all visits to any panel clinics, the details of ailments and therapy prescribed.
#12	To review the process of reporting system and the action flow when flight crew and cabin crew's health may become a risk factor for the safety of the aircraft operations.
#13	The personnel manning the Flight-Following System/Flight Explorer should be adequately trained and qualified to enable them to provide information relating to flights to the relevant authorities and/or organisations.



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#14	The current Flight-Following System/ Flight Explorer should be upgraded to the Global real-time Tracking System
#15	To review and introduce new security measures for cargo scanning at Penang International Airport/all airports and the point of entry into airside at KLIA/all airports.
#16	A document back-up system should be implemented on every training sorties, simulator trainings, and flight trainings completed by a trainee should have their original form submitted to the Training Department and a copy retained by the trainee in his personal training file.
#17	To develop a comprehensive Quick Reference for the Operations Control Centre that covers every aspect of abnormal operations/situations.

#### 2.4 Malaysia Airports Holdings Berhad - SR #18

SR	Safety Recommendation
#18	To review and introduce new security procedures for the scanning of cargo at the point of entry at all airports and the point of entry into the airside at KLIA/all airports in Malaysia.

#### 2.5 International Civil Aviation Organization - SR #19

SR	Safety Recommendation
#19	<p>To review the effectiveness of current ELTs fitted to passenger aircraft and consider ways to more effectively determine the location of an aircraft that enters water.</p> <p><u>Note:</u> The Investigation Team is cognizant of the fact that this effort is already underway.</p>