

6. SAFETY RECOMMENDATIONS

As a result of the accident investigation, the Aircraft Accident Commission makes the following recommendations:

I. To the Taiwanese civil aviation authorities:

Require China Airlines to implement the following:

(1) Reinforcement of education and training programs for flight crews

- ① Understanding of the design concept of advanced technology aircraft and establishment of the operational concept for such aircraft

Since it is considered to be important in the operation of advanced technology aircraft for an airline to establish its own operational concept based on a full understanding of the design concept of the manufacturers, China Airlines should reinforce the education and training system for flight crews so that each crew member will fully understand the concept and its application can be rooted more firmly in daily operations.

- ② Reinforcement of education and training on the Automatic Flight System.

China Airlines should review the following to deepen crews' understanding of the AFS functions of advanced technology aircraft.

- a. The reinforcement of education and training programs for controls and operations which crews rarely experience in daily flight, such as mode changes and manual overrides during auto flight.
- b. The establishment of measures which allow crews to easily recall the controls and operations described in a. above in flight in order to effectively implement them.
- c. Methods for enhancing crews' understanding of important technical information on flight operations issued by aircraft manufacturers.
- d. Measures to ensure that through education and training, crews do not activate the GO-lever of the A300-600R inadvertently, and that they take appropriate actions if this occurs.

(2) Establishment of appropriate task sharing

China Airlines should review the following to ensure that Cockpit Resource Management is performed most effectively when the CAP has the F/O to perform the PF task.

- a. Task sharing between the CAP and the F/O.
- b. Situations which require the CAP taking over the PF task from the F/O.

- c. Implementation of preflight briefing on mutual confirmation of the items of a. and b. above.

(3) Improvement of crew coordination

- ① Standardization of terms
China Airlines should standardize the terms used for instruction, response, confirmation and execution of operations in order to ensure that crews can have appropriate situational awareness of the flight.
- ② Procedures of AFS mode change
China Airlines should improve the procedures for mutual confirmation by crews of operation and monitoring of the AFS mode changes of advanced technology aircraft.
- ③ Reinforcement of standard call out
China Airlines should ensure the implementation of standard call outs in order to enhance the effectiveness of ① and ② above.

(4) Establishment of standardization of flight.

China Airlines should standardize flights by prescribing items that must be checked according to the flight attitude. This will 1) allow crew members to have an adequate situational awareness of the flight conditions and make the correct decisions based on their awareness, and 2) eliminate any effects of crew members' individuality.

2. To Airworthiness Authority of France:

Require Airbus Industrie to implement the followings;

- (1) Improvement of the AFS functions of A300-600R
 - ① Improvement of the AP disconnect and override functions
Airbus Industrie should review the AP disconnect and manual override functions, by which crews can safely control the aircraft irrespective of flight altitude or phase by applying a force exceeding a certain level on the control column.
 - ② Incorporation of out-of-trim prevention functions
Airbus Industrie should consider incorporating functions to prevent an abnormal out-of-trim condition from arising from a prolonged override operation of the autopilot by acting on the pitch axis via the control column, which moves the THS in the opposite direction to the elevator movement.
In this connection, Airbus Industrie should review the relationship between the Alpha floor function and out-of-trim condition.
 - ③ Improvement of warning and recognition functions for THS movement
Airbus Industrie should study warning and pilot-recognition enhancement functions which alert the pilots directly and actively to those situations which arise when the THS enters, or is close to, an out-of-trim situation, or when it continues to move for more than

a certain period of time, regardless of AP engagement or disengagement.

(2) Improvement of descriptions in the FCOM of the A300-600R type

The descriptions of the following in the FCOM of A300-600R should be improved from the operational viewpoint.

- ① AP manual override
 - the purpose of the function
 - the descriptions of the system
 - the difference between the supervisory override function and the manual override function
 - the examples of possible situations which may arise, the corresponding procedures for confirmation and subsequent operations to be performed.
- ② Disengagement of GO AROUND mode
 - the procedure for disengagement
 - the procedure for selecting other modes
 - the connection between the display changes on the FMA and the actual changes occurring in the aircraft.
- ③ Recovery procedures from out-of-trim situation
 - examples of possible scenarios and their corresponding detection procedures
 - the recovery procedure from out-of-trim situation when the AP is engaged and disengaged, respectively.

(3) Positive dissemination of technical information to operators

In the event of an accident or serious incident, Airbus Industrie should promptly disseminate the systematical explanation of its technical background to each operator, and furthermore should positively and promptly develop modifications, prepare the Service Bulletin(SB) and revise the FCOM to preclude the recurrence of such incidents.

3. To Airworthiness Authority of France:

Review the following along with Airbus Industrie.

A review of the AFS, taking into account crews' ability and behavior in an emergency or abnormal situation.

The AFS is designed with various factors under consideration; its functions are complicated. Therefore there are some occasions where it would be difficult for pilots to recognize the operating condition of the AFS or properly predict the effect of a mode change on the flight. There is a possibility that crew might be unable to take proper action when using functions which are rarely used in daily flights.

Because human thinking ability is restricted in times of high stress, such as in an emergency or abnormal situation, it would be even more difficult for crews to take action within a limited period.

It is considered that there is a limit to how thoroughly a crew can be taught to deal with such situations by routine education and training.

Accordingly the design of the AFS (function, mode display method, warning and crew recognition function) should be reviewed, taking into account pilot's behavior and human cognitive process under an emergency or abnormal situation.