



International Civil Aviation Organization

**WORKING PAPER**

A37-WP/245

TE/138

22/9/10

English and Russian only<sup>1</sup>

**ASSEMBLY — 37TH SESSION**

**TECHNICAL COMMISSION**

**Agenda Item 25: Follow-up of the High-level Safety Conference (2010)**

**IMPLEMENTATION OF THE CONTINUOUS FLIGHT DATA TRANSMISSION VIA  
SATELLITE CHANNELS CONCEPT TO ENSURE ACCESS TO FLIGHT DATA  
WHILE SEARCHING FOR AIRCRAFT IN THE INTERESTS OF  
ACCIDENTS INVESTIGATION AND PREVENTION**

(Presented by Interstate Aviation Committee (IAC)<sup>2</sup>)

**EXECUTIVE SUMMARY**

This paper provides suggestions on expediting the implementation process for continuous flight data transmission via satellite communication channels in civil aviation; since sometimes it is impossible to guarantee the successful search of an aircraft itself as well as its flight recorders and thus it is impossible to conduct an accident investigation in accordance with ICAO Standards.

**Action:** The Assembly is invited to:

- a) support the implementation of the flight data transmission via satellites concept;
- b) suggest that ICAO quicken the work concerning the development of Standards and Recommended Practices (SARPs) in this field; and
- c) recommend that Contracting States encourage the fastest development of necessary on-board and ground equipment.

<i>Strategic Objectives:</i>	This working paper relates to Strategic Objective A.
<i>Financial implications:</i>	Financing within the budget of ICAO Regular Programme
<i>References:</i>	A-330 AF447 accident investigation interim report Documentation of the FLIRECP ICAO Working Group Meeting Working documentation of BEA International Working Groups, organized within the framework of A-330 AF447 accident investigation

<sup>1</sup> English and Russian versions provided by IAC.

<sup>2</sup> Interstate Aviation Committee (IAC) is the executive body of the interstate Agreement on Civil Aviation and Airspace Use (international agreement, participants of which include Azerbaijan Republic, Republic of Armenia, Republic of Belarus, Georgia, Republic of Kazakhstan, Kyrgyz Republic, Republic of Moldova, the Russian Federation, Republic of Tajikistan, Turkmenistan, the Ukraine, Republic of Uzbekistan).

## 1. INTRODUCTION

1.1 The problem of flight data preservation during an accident investigation is very pressing within the international aviation community. This problem became even more relevant after the A-330 AF447 accident on 1 June 2009, when neither fuselage nor flight recorders were located after a year of search in the ocean. Therefore, the perception of ideas about using new technologies such as “deployable” floatable flight recorders and flight data transmission via satellites has changed.

## 2. DISCUSSION

2.1 The A-330 AF447 accident demonstrated once again the weak points of flight recorders installed on aircraft – if an airplane or helicopter falls into the water the recorders will rest at the bottom, along with the fuselage and the chance of recovering them would be strongly influenced by the location of the crash, water depth, financial capability, luck, etc. Moreover, in the above-mentioned accident, even the search of the place of accident and the search of the fuselage has not been successful so far. Lack of information from the flight recorders negatively affected the investigation and the determination of the reasons, not to mention the financial losses. At the same time the limited data received from the aircraft via the aircraft communications addressing and reporting system (ACARS) turned out to be insufficient both for making conclusions and searching for wreckage, although this data provided investigators the opportunity to make suggestions on possible reasons and to develop preventive measures.

2.2 The information gathered via satellite flight data transmission can assist accident investigations. This information is already used and transmitted as ACARS events, but this information is limited and discrete – that is why it is impossible to make an overall assessment of the on-board situation.

2.3 The idea of real-time aircraft-ground flight data transmission is not new and is used on limited numbers of aircraft.

2.4 It is assumed that the mass use of this concept is impossible because of the high cost of equipment, satellite channel rental, etc. But these arguments were given 10 to 15 years ago when the number of satellites were less and cell and satellite communications were considered a luxury.

2.5 The development of technologies and the launching into orbit of a large quantity of commercial and governmental satellites allowed expanded the use of satellite communication. New technologies not only allowed phone calls in-flight but also made high-speed Internet access on-board possible. Airlines actively implement the service of in-flight Internet access through the passengers’ portable devices. So the service that earlier was considered impossible would soon become standard, for example, the case with the multimedia entertainment systems installed into the passengers’ seats.

2.6 Therefore the argument concerning the high cost of flight data transmission via satellites can really be a puzzle. The amount of information sufficient for further investigation or at least for locating the place of accident is incomparable to the amount of information that is processed when even only one passenger is working in the Internet. So the continuous transmission of all flight parameters which are recorded by the modern flight recorder has the density of the data flow of 12 Kbit/sec. In comparison, viewing of a low-quality streaming video on one portable computer requires at least the

Internet throughput of 1000 Kbit/sec. Besides, at the earliest stage we can make flight data transmission only in discrete time intervals, compress data, and determine the minimal list of necessary parameters.

2.7 The introduction of this concept will of course require some investment for the installation of equipment and software on-board and in the ground centres for data gathering and analysis. Nevertheless, these costs cannot be compared with the possible financial losses in case of an aircraft loss and the impossibility of a readout from the flight recorders. For example, the cost of the A-330 AF447 accident investigation and searching has already exceeded 80 million Euro and is still growing. Indirect costs for airlines, manufacturers and aviation industry can significantly exceed direct financial costs.

2.8 It should be noted that the implementation of this concept is not only important for accident investigation but also has practical use for the airlines. If the operator collects the flight data from the aircraft, then that airline can reveal in real-time conditions, potential hazardous factors related to the aircraft control, functioning of aircraft systems and components, events of unlawful interference and can give the pilots recommendations on detecting and eliminating arising problems. The airline will be able to make efficient decisions concerning the necessary maintenance even when the aircraft is still approaching the airport, and the programs for daily analysis of the flight data information (FDM/FDA/FOQA) would be upgraded to a new level; and in the future that would even allow reduced operational costs.

2.9 The other possible use of this concept can be for air traffic management (ATM) to be able to track aircraft outside the radar coverage over oceans, in low airspace and above inhabited areas. The presently developing programme for the introduction of dependent surveillance can become universal.

2.10 In spite of the effectiveness and wide perspective of the satellite flight data transmission, the implementation of this concept can face the well-grounded reluctance of the airlines to bear additional expenses. That is why at the initial stage the States should provide support to the airlines and ICAO could foster the development of appropriate SARPs within the frame of international law as well as in the field of the development, installation and operation of the necessary equipment. The availability of the normative base, recommendations and in the future even the requirements to equip new aircraft with flight data transmission systems and ground data collection and analysis systems could well serve to encourage the development of this concept.

2.11 The work on studying the possibilities for data transmission and the work in the field of the development of appropriate Standards has already been started by the flight recorders ICAO FLIRECP Working Group as well as by other international informal working groups of experts.