International Civil Aviation Organization

WORKING PAPER

A38-WP/354
TE/158
19/9/13
English and Spanish only[1]

ASSEMBLY — 38TH SESSION

TECHNICAL COMMISSION

Agenda Item 31: Aviation Safety — Emerging Issues

EMERGING TECHNOLOGIES FOR THE COLLECTION AND ANALYSIS OF FLIGHT DATA FOR GENERAL AVIATION

(Presented by the 22 Member States[2] of the
Latin American Civil Aviation Commission)

EXECUTIVE SUMMARY

Currently, flight recorders based on modified smartphones are available in the market, combining the portable wireless capacity of a flight data recorder with powerful web-based automated flight data analysis and recording tools that permit the recording of flight parameters based on global positioning system (GPS) data. Aeronautical authorities might require the deployment of this equipment to collect flight information and safety data in order to assess the level of risk of the various operators as compared to average values for similar flights.

Action: The Assembly is invited to:

a) urge States to assess these emerging technologies and approve their use in order to improve safety oversight; and
b) urge ICAO to collect more information on emerging and low-cost technologies for circulation to the States with a view to improving general aviation.

Strategic Objectives:	This working paper relates to the Safety Strategic Objective.
Financial implications:	Not applicable
References:	Annex 6 — *Operation of Aircraft*, Part I — *International Commercial Air Transport — Aeroplanes* Doc 9859, *Safety Management Manual (SMM)*

[1] English and Spanish versions provided by LACAC

[2] Argentina, Aruba, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Dominican Republic, Uruguay, and Venezuela

1. BACKGROUND

1.1 Data collection is critical to help accident investigators understand what went wrong and the cause of the aviation accident, especially if there were no survivors. It is clear that without this information, there is a high probability that the same accident may occur again on another aircraft under similar circumstances.

1.2 A flight data recorder is a system designed to collect and record data from a variety of sensors. These sensors are mounted along the aircraft structure and collect data from the devices, components, and system elements that tell the story of how they have been configured and are used during and before the occurrence of an accident. All this information is collected and stored in digital form in a fluorescent yellow or orange shock-resistant box.

1.3 Since the invention of flight data recorders (FDRs) for recording flight parameters only for accident investigation purposes to the current proactive use of FDRs for analysing flights under normal conditions, technology has advanced much and many FDR functions have been reduced to the size of a smartphone with voice and data recording functions.

2. DISCUSSION

2.1 Currently, flight recorders based on modified smartphones are available in the market, combining the portable wireless capacity of a flight data recorder with powerful web-based automated flight data analysis and recording tools that permit the recording of flight parameters based on GPS data (position and speed) in the 4 Hz band, with wide area augmentation system (WAAS)/satellite-based augmentation system (SBAS), voice recorder built into the smartphone microphone, 3-axis dual accelerometer, propeller revolutions per minute (RPM) determination through the recording of the propeller sound, and with a calculation software, 8 GB internal memory (approximately 100 hours of data plus voice recording in the air traffic control (ATC) channel), where data uploading and downloading can be done using a conventional Wi-Fi antenna.

2.2 Most devices have a web-based interface, recording and 3D reproduction capabilities, such as Google Earth, cockpit display, 2D flight movement display, local and universal time, recording volume control, engine status (on or off), speed, GPS altitude, GPS vertical speed, amongst other functionalities.

2.3 For data collection, these technologies are accessible from a quick access recorder (QAR) or may require an external high-power (500 mW) Wi-Fi directional access point to properly load data from a distance of up to 300 feet. Access points are pre-configured and do not require electric power (use network power).

2.4 The cost of these devices is approximately 500 dollars and the flight data analysis service ranges from 30 to 100 dollars per unit. The service includes, *inter alia*, detection of rough landings, violation of restricted airspaces, detection of landings, take-offs and go-arounds, detection of low-level flights, landings in unauthorized aerodromes, etc.

2.5 In the region, GPS receptors are now being used for the analysis and collection of aircraft data, for example, in aircraft that operate and fly over the tourist circuit of the Nazca and Palpa Lines (Peru), where the accident and incident rate and deviations from the approved circuit paths have been significantly reduced.

3. CONCLUSION

3.1 Aeronautical authorities might require the deployment of these devices for collecting flight and safety data in order to assess the level of risk of the various operators as compared with averages in similar flights, and, in some areas lacking air traffic services (ATS) surveillance and with prohibited or restricted areas, to assess the level of compliance with flight plans outside of such areas.

3.2 Pilots and associations may use these devices to monitor and analyse their flight activities and benefit from advanced flight recording capabilities.

3.3 Flight schools and small-aircraft operators, as well as general aviation will appreciate the capability of these devices for automatically monitoring the critical behaviour of pilots compared to a broad range of criteria. Students, professors, and pilots will be able to benefit from the possibility of reviewing each flight in much detail with just an Internet navigator, using Google Earth Plug-In, Google Maps and the latest HTML 5 streaming audio technology.

4. RECOMMENDATIONS

4.1 States are urged to assess these emerging technologies and approve their use in order to improve safety oversight.

4.2 The ICAO Secretariat is urged to collect more information on emerging and low-cost technologies and circulate it to the States with a view to improving general aviation.

5. MEASURES PROPOSED TO THE ASSEMBLY

5.1 The Assembly is invited to take note of the information provided herein and consider the recommendations shown in item 4 of this working paper.

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