First of all, it is important to accurately identify the state of an aircraft when an unsafe event occurs based on objective flight data and investigate the cause in order to translate risks collected by the above methods into the prevention of accidents. Once what happened is found out by analyzing objective flight data obtained, it becomes feasible to take more effective preventive measures and initiatives.

In the next chapter, we introduce flight data monitoring device (FDM) equipped with the functions of collecting flight operational data necessary for reducing safety risks through preventive measures and of utilizing such data for training programs for pilots and the preservation of their skills.

3. What is flight data monitoring device?

Flight data monitoring devices (FDM) are a collective term of devices capable of recording information such as the positions and altitudes of aircraft in flight, cockpit audio and image, etc. for the purpose of flight data monitoring*1. In the Digests, FDM refers to all devices installed on aircraft the aim of recording flight conditions other than flight recorders (See Figure 6) mandated to be installed under the provisions of the Civil Aeronautics Act. Since flight recorders are installed for the purpose of conducting accident investigations, high resistance to impact, fire, and water pressure is required. It is not that straightforward for an operator to use a recorded data for analysis of flight conditions. On the other hand, FDM is less resistant to impact than flight recorders, but operators can use objective information (data) recorded for various purposes (See Table 1 for recordable data).

Large aeroplanes such as airliners are equipped with quick access recorders (QAR) capable of recording broader data than FDR so that operators can collect available data in the same way as FDM. Operators monitor the status of operations of aircraft on a regular basis using data sent from QAR and utilize it for risk management and safe operations.

Figure 6: Flight recorders (Left: FDR, Right: CVR)

＊1 “Flight Data Monitoring”

This is a system to detect unsafe factors (operational risks) in flight and take measures before an accident occurs by recording and analyzing data of aircraft in cockpit audio and image. Daily operations are monitored to improve and ensure safety. FDM aims to acquire data in flight and records cockpit audio and image. Moreover, it records the positions, altitudes, ground speeds, triaxial speeds, triaxial acceleration, flight courses, etc. Furthermore, software that animates data obtained is used to review daily operations together with aircraft movements and cockpit image.

Table 1: Comparison of FDM and flight recorders

	FDM	Simple type FDM	FDR	QAR
Appearance				
Recorded data	・Latitude, longitude, GPS altitude, triaxial speed, triaxial acceleration, in addition, the following data is calculated based on the above measurement data; ground speed, rate of climb, traveling direction, pitch angle, roll angle (14 parameters: internal sensor + GPS) ・Cockpit audio and image are recorded	・Latitude, longitude, GPS altitude, pressure altitude, triaxial speed, triaxial acceleration, triaxial magnetic field (13 parameters: internal sensor) ・Cockpit audio and image are recorded	・Positions, altitudes, speeds, angles, acceleration, rudder control, status of equipment such as engines, alarms, etc. are directly recorded (78 parameters (Type IA))	・More than 2,000 parameters are recorded ・It is feasible to obtain data at short intervals and to record longer hours than FDR ・Cockpit audio and image are not recorded
Remarks	・Power source: Supplied from aircraft’s power source ・Impact resistance: Compliant with safety standards for the time of shock/crash of equipment installed on aircraft ・Fire resistance: Compliant with standards required for in-flight accessories	・Power source: Powered by own battery	・Impact resistance, fire resistance, and water pressure resistance are designed to be able to endure severe situations caused by accidents	・Impact resistance, fire resistance, and water pressure resistance are lower than FDR

(FDM listed here is some examples. We do not necessarily recommend the use of the same products. Please see also the “Guidelines for Introduction of FDM for Small Aircraft” created by the Civil Aviation Bureau, Ministry of Land, Infrastructure, Transport and Tourism.)