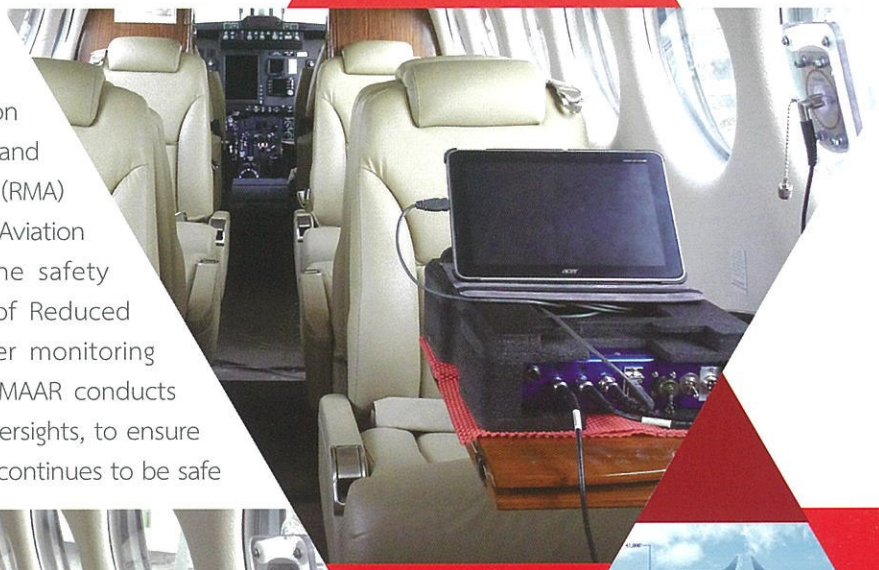
MAAR

# Height Keeping Performance Monitoring Services

AEROTHAI established Monitoring Agency for Asia Region (MAAR) under the approval of the Asia/ Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) to assume the duties and responsibilities of the Regional Monitoring Agency (RMA) for the Asia Region and assist the International Civil Aviation Organization (ICAO) in the continuation of the safety assessment program for the implementation of Reduced Vertical Separation Minimum (RVSM) and other monitoring requirements as determined by the APANPIRG. MAAR conducts periodic safety assessments, now called safety oversights, to ensure that the RVSM implementation in the Asia Region continues to be safe which needs to be achieved in terms of RVSM height monitoring.




Monitoring height keeping performance is to estimate and evaluate the Altimetry System Error (ASE) of an aircraft operating in the RVSM airspace. The ASE is the difference between the altitude which the pilot, ground controller, and aircraft systems believe aircraft to be at and the actual altitude. To be compliant with international standards, the ASE of an aircraft must be less than 245 ft (75 m).

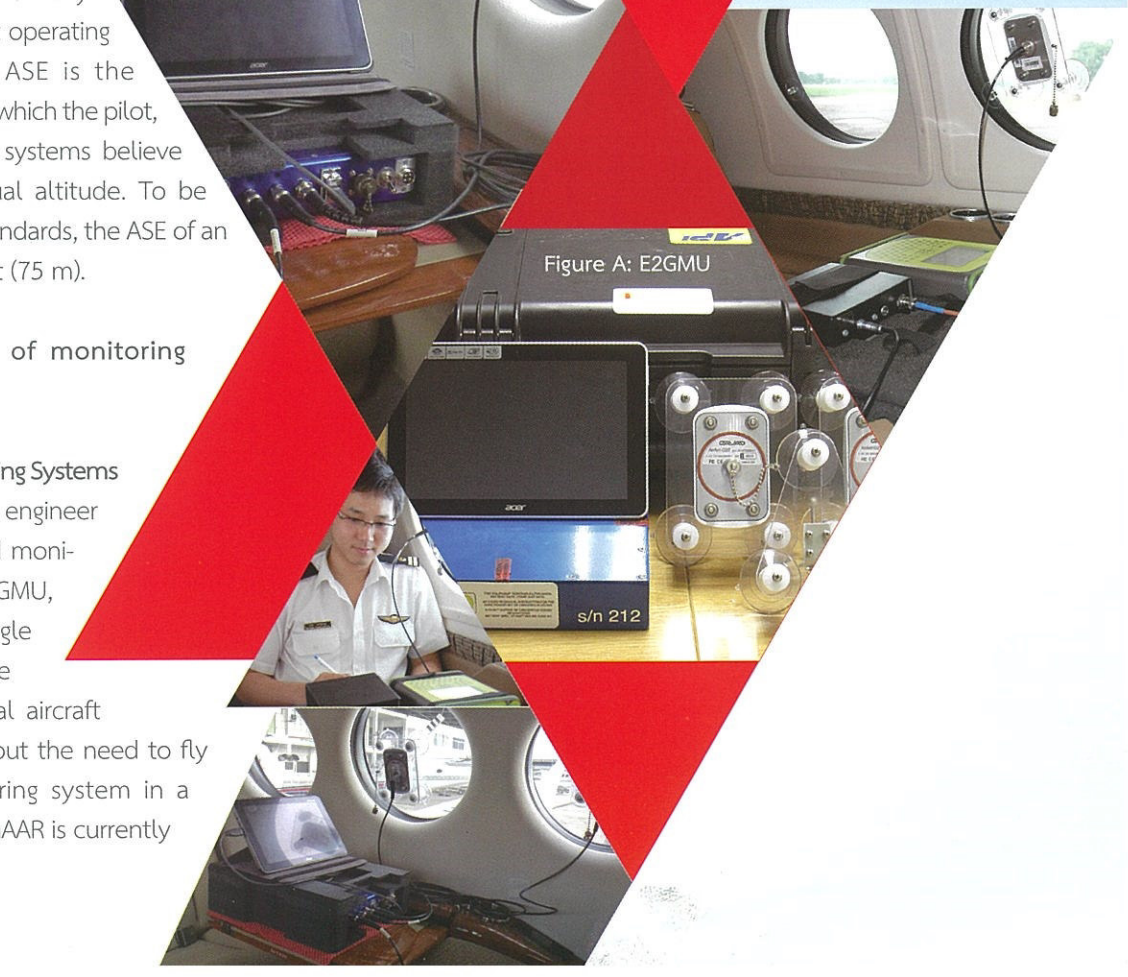
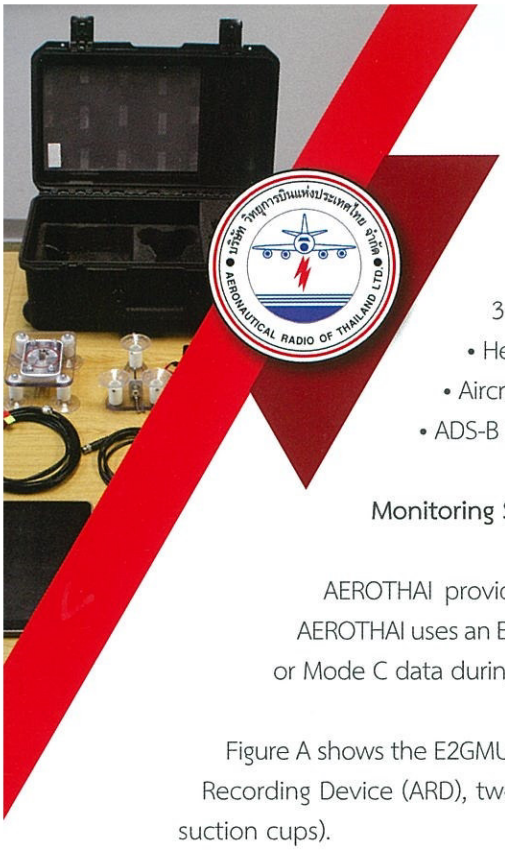



Figure A: E2GMU

**There are two main types of monitoring systems available today.**

### 1. In-Flight GPS-Based Monitoring Systems

This type of service requires an engineer to install a portable GPS-based monitoring unit, known as GMU or EGMU, on a targeted aircraft for a single flight. Its main advantage is the ability to monitor an individual aircraft during normal operations without the need to fly over a ground-based monitoring system in a particular portion of airspace. MAAR is currently providing this service.



## 2. Ground-Based Height Monitoring Systems

Ground-based monitoring units are stationary stations installed at fixed locations. These systems can compute Altimetry System Error (ASE) for all aircraft flying over their operational coverages. Ground-based systems can give repetitive measurements over a period of time, which allow RMAs to discover undesirable patterns or trends. There are 3 subtypes of ground-based monitoring systems available today:

- Height Monitoring Unit (HMU)
- Aircraft Geometric Height Measurement Element (AGHME)
- ADS-B Height Monitoring System (AHMS)

## Monitoring Service using EGMU : Overview

AEROTHAI provides the HKP monitoring service using a portable GPS-based Monitoring System (GMS). AEROTHAI uses an Enhanced GPS-based Monitoring Unit (EGMU) to collect (1) GPS data and (2) pressure altitude or Mode C data during a monitoring flight. We are now using the second generation of EGMU, called E2GMU.

Figure A shows the E2GMU - a portable unit composed of a Global Positioning System (GPS) receiver and the Altitude Recording Device (ARD), two GPS antennas and one ARD antenna (temporarily mounted on interior windows with suction cups).

The unit's portability allows the EGMU-based HKP monitoring to be conducted on flights that cannot be monitored by ground-based height monitoring systems.

### Pre-Flight

- The installation normally takes place on the ground before departure. Please allow at least 1 hour for our engineer to set up the equipment.
- The equipment can be installed in the aircraft cockpit or cabin, depending upon the aircraft type.

### In Flight

- To ensure collection of sufficient position data, the aircraft must fly at a single altitude from FL290 to FL410 for at least 40 minutes in a Mode-C radar coverage area.
- The HKP monitoring is best conducted in areas with Mode-C radar coverage.

### Post-Flight

- If the HKP monitoring is conducted outside the Mode-C radar coverage, or MAAR engineer is not able to retrieve Mode-C radar data, the operator needs to provide pressure altitude data from the Digital Flight Data Recorder (DFDR) to the height keeping performance monitoring service provider.
- After completion of the monitoring flight, the collected data will be processed to determine the aircraft's ASE. Final ASE results should be available within four to eight weeks of the monitoring flight.
- The official monitoring results will be submitted to the State Authority and a copy to the aircraft operator. The measured ASE of an aircraft must be less than 245 ft.

**Operators who wish to apply for this service, please follow**
**http://www.aerothai.co.th/maar/monitoringchecklist.php**

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