GPS Monitoring System History

Undetectable by collision avoidance systems

Undetectable by the flight crew

Undetectable by air traffic control
GMS Monitoring Flights Totals by Year

- **US Domestic RVSM Jan 2005**
- **ACY- Feb 2004 ICT - Oct 2004**
- **YOW - Mar 2005 CLE - May 2005 YQL - Sep 2005**
- **NAT RVSM MID-FL**
- **PHX - Nov 2008**
- **Long Term Monitoring Requirements 2 Years or 1,000 Flight Hours**
- **PDX - Jan 2016**
Total GMS Monitoring by Year

- GMS Monitoring began in 1995. Only a few test flights. This continued through the first half of 1996.
- Last half of 1996 the monitoring began to produce results for users.
- By 1997 we had 1040 monitoring flights which is the fifth highest yearly total. This was because the NAT (mid - FL were requiring RVSM approved aircraft) began in March 1997.
- From 1998-2001 we had a steady flow of monitoring flights.
- 2002-2005 produced the highest 3 years of monitoring flights.
- 20 January 2005 was the beginning of Domestic US RVSM.
Total GMS Monitoring by Year

• 2006-2011: Again there was a constant steady flow of monitoring flights.

• In 2012: The monitoring doubled from the year before. The reason for the large increase is the 2012 Long Term Monitoring Requirements of 1000 hours or 2 years went into effect.

• 2013-2015: It was three more years of higher than normal rate of monitoring (about 900 per year).

• 2016-Present: There has been a large drop off in GMS Monitoring Flights.

• More aircraft are making use of the AGHME (cost savings)
Total GMS Monitoring by Year

- Future of GMS Monitoring
  - Users are making use of the AGHME, it is free and it is a savings for the user.
  - In 2017 we are going to average about 1 aircraft monitoring per day.
  - As we head into the future of ADS-B we will probably use the GMS monitoring system less and less.

- When the 20,000th flight occurs, it may be a milestone for me to head into retirement.
## GMS Monitoring Flights by Month

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As of today there have been 19745 monitoring flights using a GMU. 94% (18609) had success in obtaining an ASE value, while 6% (1125) had no ASE value.
GMS Monitoring Flights with and without ASE Values

From 1996-2017 in 22 years there were approximately 50 GMS monitoring per year where no ASE could be calculated.

Possible causes for no ASE calculation:

a) In the beginning, test flights were conducted which we knew would not produce an ASE value.

b) No GPS data collected

c) Installers of equipment had installation issues

d) GPS antenna signal issues which resulted in large data gaps

e) No Mode C (radar data) was collected

f) In the early stages of a domestic flight we had to deal with 20 ARTCC to supply the data.
GMS Monitoring Flights with and without ASE Values

c) (Con’t) Coordination issues - data stored only 2 weeks. Now have all the CONUS radar streamed into the FAATC. Success rate improved with GMU upgrade to EGMU where the unit collects the Mode C data.

d) U.S. Military Flights continue to have a difficult time obtaining data. The monitored aircraft are not located where the monitoring coordinator works and then the aircraft moves to another location and the data does not get extracted and sent to the coordinator. Possible security issues.

e) Missing Weather data - on rare occasions the weather data is not available.
**Flight Information Form (FIF)**

**INFORMATION TO BE RECORDED PRIOR TO FLIGHT**

- **Airline/Operator:** Monarch Air, LLC
  - **GMU Container Number:** 107
- **Point of Contact for Operator:** Dillon Lohmer
  - **Phone:** 612-360-5218
  - **Email:** djlohmer(a?gmail.com)
  - **Fax:**
- **Aircraft Type/Series:** Cessna / Citation 550
  - **Aircraft Registration Number:** N888RL
- **Call Sign:** N888RL
  - **Airframe Serial Number:** 550-0254
- **Planned:**
  - **Origin:** KBZN
  - **Departure Date (UTC):** 10/12/17
  - **Departure Time (UTC):** 14:00Z
  - **Destination:** KBZN
  - **Arrival Date (UTC):** 10/12/17
  - **Arrival Time (UTC):** 15:30Z
- **Installer (Name/Org.):** Randy Dill / Duncan Aviation
- **Retriever (Name/Org.):** Randy Dill / Duncan Aviation
- **Mode S Equipped (Yes/No):** No
  - **Separation Between Mounted Antennas (ft.):** 6'
- **Installer/Operator Comments:**
  1) Good 3D Nav. before taxi.
  2) Depart KBZN @ 14:26Z, Squawk code 4316.
  3) Begin recording @ 14:29Z.
  4) Reach flight level 290 @ 14:43Z.
  5) Reach flight level 310 @ 14:47Z.
  6) Leave flight level 310 @ 15:16Z.
  7) Leave flight level 290 and stop recording @ 15:18Z.
  8) Arrive back KBZN @ 15:50Z.

**INFORMATION TO BE RECORDED BY FLIGHT CREW/GMU OPERATOR**

- **Data Collection:**
  - **Start Date (UTC):** 10/12/17
  - **Start Time (UTC):** 14:29Z
  - **GMU File Name:** EGMU1071710121427
  - **Start Time (UTC):** 14:26Z
  - **Origin (ICAO ID):** KBZN
  - **Departure Time (UTC):**
- **Please record the requested information as soon as practical when:**
  1. Aircraft is first established in level flight at or above FL 290, or
  2. The ATC assigned transponder code is changed at or above FL 290, or
  3. There is a flight level change and the aircraft remains at or above FL 290, or
  4. An autopilot change is initiated at or above FL 290, or
  5. The ARTCC or FIR changes.

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- **Data Collection:**
  - **End Date (UTC):** 10/12/17
  - **End Time (UTC):** 15:18Z
  - **Arrival Time (UTC):** 15:50Z
  - **Destination ICAO (ID):** KBZN

**Comments on flight conditions affecting height keeping performance, i.e. turb, and location**

- Continuous light chop on flight level 310 from 14:49Z to 14:55Z.