B737CL and B737NG Airdata System Design Differences

13-15 September 2016
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Boeing 737

- Derived from the B707 and B727 technologies
- Narrow-body/single aisle airliner
- Developed into a family of 10+ models/derivatives
- Capacity of 85-220 passengers
- Boeing’s only single aisle airplane produced today
- The best selling airliner with 13533 firm orders (July 2016)
The history of the B737 development (Cont’d)

737-100
- First Flight: April 9, 1967

737-200
- First Flight: August 8, 1967
- 737-200 Advanced followed in 1971

B737CL:
- B737-300 First Flight February 24, 1984
- The -400 and -500 followed

B737NG:
- B737-700 First Flight February 9, 1997
- The -600, -800, -900 and -900ER followed
Images of the B737CL and B737NG cockpit

B737CL cockpit

B737NG cockpit resembles B777
Pitot and static systems of aircraft

- The Pitot-static system is used to determine and display
  - Airspeed
  - Mach number
  - Altitude
  - Altitude trend

- Large Pitot-static system errors can be hazardous
# Pitot and static systems of aircraft

- **General system types used by Boeing**

<table>
<thead>
<tr>
<th>Model</th>
<th>Airdata System Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>707</td>
<td>Flush Static (Not RVSM qualified by Boeing)</td>
</tr>
<tr>
<td>727</td>
<td>Flush Static</td>
</tr>
<tr>
<td>737-100/-200/-300/-400/-500</td>
<td>Pitot-static (737-100 Not RVSM qualified by Boeing)</td>
</tr>
<tr>
<td>737-NG</td>
<td>Flush Static</td>
</tr>
<tr>
<td>737-700C</td>
<td>Pitot-static</td>
</tr>
<tr>
<td>737-MAX</td>
<td>Flush Static</td>
</tr>
<tr>
<td>747-100/-200/-300/-SR/-SP</td>
<td>Pitot-static (5inch)</td>
</tr>
<tr>
<td>747-400</td>
<td>Pitot-static (5inch/10inch)</td>
</tr>
<tr>
<td>747-8</td>
<td>Pitot-static (10inch)</td>
</tr>
<tr>
<td>757</td>
<td>Flush Static</td>
</tr>
<tr>
<td>767</td>
<td>Pitot-static</td>
</tr>
<tr>
<td>777</td>
<td>Flush Static</td>
</tr>
<tr>
<td>787</td>
<td>Flush Static</td>
</tr>
</tbody>
</table>
Boeing Airplane Models ASERs

- B733 1
- B737 16
- B738 2
- B744 3
- B744-10 6
- B763 7
- B747-LCF 1
- B757 1
Pitot and static systems of aircraft

- Must understand the details at the time of design to better understand system selection
  - Configuration features and details
  - Future anticipated derivatives
  - Flight envelope
  - Corrections/type of corrections needed
  - Technology available
  - Certification demands
  - Cost/reliability
B737CL Exhibits Larger ASE Average & SD vs. B737NG
Reflects Older vs Newer Design and Build Requirements
and Some Shortcomings In The Ability to Monitor In Service

- AGHME Monitored data for 1/1/2011 to 1/1/2016 (5 Years))
- AGHME Monitored data for 1/1/2015 to 1/1/2016 (1 Year)
Pitot and static systems of aircraft (Cont’d)

Different types/combination of pitot-static systems

- Simple Pitot Tube
- Static Source
- Pitot-Static Tube

Alternate

Static Port
Do not plug or deform holes indicated. Area must be smooth and clean.
Pitot and static systems of aircraft (Cont’d)

Different types/combination of Pitot-static systems

**Pitot-Static Probe**

- **737CL**

**Pitot with Flush Static**

- **737NG**
Pitot and static systems of the B737CL vs. B737NG

**B737CL**
- 4 Pitot-Static(P/S) Probes
- 2 Alternate Flush Static Ports

**B737NG**
- 3 Pitot Probes
- 4 Flush Static Ports
- 2 Alternate Flush Static Ports
- 2 Alpha Vanes
Service Letter
(Skin Quality and Condition)

B737CL  

B737NG

ATTACHMENT II To: 737-SL-02-014-B
30 June 2004
Page 1 of 1

ATTACHMENT II To: 737-SL-02-017-G
2 July 2004
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RVSM FLUSH STATIC PORT AREA

3 X 3 FRAME AND STRINGER BAY AREA

STAT HOUSE PORT LOCATIONS

3 INCH (76 mm) RADIUS AREA

LEFT SIDE IS SHOWN, RIGHT SIDE IS OPPOSITE CRITICAL AREA ADJACENT TO THE PRIMARY STATIC PORTS
Approximate Number of B737CL & NG Operating in North America

- The monitored data statistics of the FAA AGHME sites are summarized, 2010 through 2016
  - Note: The Atlantic City and Portland sites were excluded.

<table>
<thead>
<tr>
<th>Model</th>
<th>2010 - 2012</th>
<th>2012 - 2014</th>
<th>2014 - 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>B737CL</td>
<td>386</td>
<td>358</td>
<td>238</td>
</tr>
<tr>
<td>B737NG</td>
<td>650</td>
<td>893</td>
<td>1187</td>
</tr>
</tbody>
</table>
737 Service Letters

- **737-200**
  - 737-SL-02-015
    - 08 Aug 1996
    - Currently in revision

- **737-CL**
  - 737-SL-02-014
    - 30 June 2004
    - Currently in revision

- **737NG**
  - 737-SL-02-017
    - 12 July 2016
737 Service Letters

B737CL

Initial in-service airworthiness

In support of B737CL qualification for RVSM Boeing released SB 737-53-1180 to assist the operators in qualifying and maintaining their in-service B737CL prior to line number 2755. Upon the incorporation of the SB and the airplane flight manual revision document individual airplane are qualified for the RVSM airspace. Airplanes delivered after position number 2754 are RVSM qualified.

B737NG

Initial in-service airworthiness

The airplane flight manual documents the eligibility of B737-600/-700/-800/-900/BBJ/-700C airplane type in RVSM airspace.

The referenced documents: MPD, AMM and SRM provide the necessary data to maintain airworthiness compliance with the RVSM requirements.
ASE – Primary Error Sources

- Pitot-static Probes
  - Deterioration – erosion / corrosion

- Pressure Transducer
  - ADC
  - ADM
  - Failures or instability with time
# 737 Recent Service Bulletins

## B737CL
- 737-200, 737-200C, 737-300, 737-400, and 737-500
- 737-34-2454
- NAVIGATION - Air Data System - Altimetry System Test

## B737NG
- 737-600, 737-700, 737-700C, 737-800, 737-900 and 737-900ER
- 737-34-2642
- NAVIGATION - Air Data System - Altimetry System Test