Flight Test Evaluation of the E-Systems Differential GPS Category III Automatic Landing System

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INTRODUCTION

The Federal Aviation Administration (FAA) has established a program to evaluate the technical feasibility of using Differential Global Positioning System (DGPS) based technology for International Civil Aviation Organization (ICAO) Category (CAT) III precision approach and landing applications. This program includes evaluation of DGPS systems developed by independent researchers/contractors onboard test aircraft provided by member airlines of the Air Transport Association.

The overall objective here at NASA Ames Research Center was to verify that the E-Systems DGPS system demonstrated the capability to meet the requirements for accuracy and integrity, as specified in the FAA CAT III Level 2 Flight Test Plan [1], over at least 91 completed CAT III approach and landings.

Specific objectives were:

1. **Accuracy**: Determine whether the CAT III equipment met the ICAO Annex 10 [2] Microwave Landing System (MLS) accuracy requirements for navigation sensor errors for a straight-in, Instrument Landing System (ILS) like approach for CAT III.

2. **Integrity Monitor Response**: Determine whether the CAT III equipment integrity monitor response had a low alarm rate and detected out of tolerance navigation sensor errors. The CAT III equipment was expected to detect all satellite signal anomalies which did occur and was not expected to generate any false alarms. In addition, a second set of more stringent alarm limits were implemented to check integrity logic and response time with the test aircraft stationary on the ground.

The E-Systems DGPS system performance was compared to Measures of Success (MOSs), as specified in the FAA CAT III Level 2 Flight Test Plan, where determination of successful performance was based on statistical hypothesis testing. For the E-Systems DGPS system to be considered successful, MOSs based on navigation sensor error must have successful performance [1].

ACCURACY AND INTEGRITY REQUIREMENTS

The navigation sensor error is specified in terms of two parameters: Path Following Error (PFE) and Control Motion Noise (CMN). With regard to MLS, PFE is defined as that portion of the guidance system error which will result in an actual aircraft displacement from the desired flight path [2]. CMN is defined as that portion of the guidance system error which, when coupled to the autopilot, results in control surface, wheel and column motion, and possibly attitude angle change, but does not cause aircraft displacement from the desired flight path [2].
The integrity under normal operating conditions is specified in terms of false alarms, missed alarms and time to alarm. A maximum of one false alarm is allowed and there can be no missed alarms. In addition, any alarm condition must be acknowledged in two seconds or less.

The integrity under artificial alarm limits is specified in terms of false alarms, missed alarms and time to alarm. A maximum of one false alarm is allowed and there can be no missed alarms. Any alarm condition must be acknowledged in two seconds or less.

The specific accuracy requirements for MOS 1 and MOS 2 as well as the specific integrity requirements for MOS 6 and MOS 7 are described in detail in the FAA CAT III Level 2 Flight Test Plan.

FLIGHT TEST FACILITIES

All test flights were conducted at NASA Ames Research Center's Crows Landing Flight Facility, located in the San Joaquin Valley approximately 45 miles East of NASA Ames Research Center. The NASA test facility at Crows Landing includes a Nike X-band monopulse radar tracker and a precision NiYag laser tracker. The laser tracker provides precise aircraft range, azimuth and elevation and is used to provide the GPS time-tagged truth reference data by tracking a laser retro-reflector mounted on the test aircraft.

The stated laser tracker range accuracy is nominally ±1 ft (1σ) out to 30,000 ft; azimuth and elevation accuracy are nominally ±0.2 mrad (1σ). These values equate to an estimated position error of ±0.230 m along-track, ±0.489 m laterally and ±0.448 m vertically at the 100 ft Height Above Threshold (HAT) position along the 3 degree approach path (2230 m from the laser tracker). However, experience with the laser tracker during this and other approach and landing flight tests has demonstrated accuracies which are consistently better than shown above.

The laser tracker was calibrated immediately prior to the start of the series of approaches during each test flight. In addition, the laser tracker was checked after each approach by tracking a static laser retro-reflector mounted at a survey point located approximately underneath the 100 ft HAT position along the 3 degree approach path (See Figure 1).

In the laser truth reference data post-processing, laser range, azimuth and elevation data were wild-pointed and smoothed with a zero phase-shift, low-pass digital filter. The static laser check data were then used to identify laser range, azimuth and elevation biases as a function of time. The laser truth reference data were corrected for refraction errors, and finally converted to the rectangular Runway Coordinate System (RCS).

Figure 2 shows a laser truth reference position error of ±0.033 m (1σ) laterally and ±0.048 m (1σ) vertically at the static laser retro-reflector position (2420 m from the laser tracker) for a three minute laser track of the static laser retro-reflector on the next to last day of the flight test. This data is the result of the above mentioned post-processing steps and is characteristic of static laser checks of this and other approach and landing flight tests conducted at the Crows Landing Flight Facility.
Figure 1  Crows Landing Flight Facility
Figure 2  Smoothed And Bias Corrected  
Static Laser Tracker Calibration Check Position Error  
CTOL Laser Calibration Check Target (Range: 2420 Meters)

FLIGHT TEST DESCRIPTION

The flight test consisted of standard 3 degree glide path straight-in approaches terminating with landings to Runway 35 at the Crows Landing Flight Facility (See Figure 3). Each approach was started at the Initial Approach Fix (IAF) located seven nautical miles out along the runway centerline with the test aircraft established on speed, on course, on glide path, configured for landing with all data collection equipment operational.

Laser tracking data were recorded from the time the test aircraft crossed the Final Approach Fix (FAF), located five and a quarter nautical miles out along the runway centerline, through landing and one half nautical mile past the aim point during roll-out.
At the completion of the touch and go, the test aircraft was flown back to the IAF (via the test pattern depicted in Figure 4), to set up for another approach.

Most of the approaches evaluated, from the FAF to the 200 ft HAT position, were accomplished with the guidance coupled to the autopilot. Upon passing the 200 ft HAT position, the autopilot was disengaged, and the pilot assumed control of the aircraft and landed. The remaining approaches were manually flown from the IAF through landing. All test flights were flown in day Visual Meteorological Conditions (VMC).

Figure 3 Crows Landing Flight Facility Runway 35 Approach
After the test aircraft initiated the touch and go or takeoff, the laser tracker was used to track the static laser retro-reflector, located on the runway centerline approximately 1600 ft prior to the Runway 35 Threshold (See Figure 1), to perform the laser tracker calibration check as discussed in the previous section. At the completion of the laser track of the static laser retro-reflector, the laser tracker re-acquired the test aircraft on its turn from base to final.

![Diagram showing flight test pattern](image)

Figure 4  Crows Landing Flight Facility Runway 35 Flight Test Pattern

**FLIGHT TEST RESULTS**

All of the 100 approaches and landings evaluated were accomplished at the Crows Landing Flight Facility between 16 and 23 June 1995. Refer to Table 1 for a summary of all of the approaches and stationary trials accomplished and to Table 2 for a summary of all of the invalid approaches and stationary trials. Using the laser tracker as ground truth reference, navigation sensor error was measured and evaluated for all of the approaches and landings. For the E-Systems DGPS system to be considered successful, MOSs based on navigation sensor error must achieve successful performance. Refer to the FAA CAT III Level 2 Flight Test Plan for a complete discussion of the individual MOSs as well as the data processing procedures for each of the different MOSs.

<table>
<thead>
<tr>
<th>DATE</th>
<th>FLIGHT NUMBER</th>
<th>APPROACHES</th>
<th>VALID</th>
<th>STATIONARY TRIALS</th>
<th>VALID</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-Jun-95</td>
<td>ES5167</td>
<td>7</td>
<td>4</td>
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<td>0</td>
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<tr>
<td>19-Jun-95</td>
<td>ES5170</td>
<td>17</td>
<td>14</td>
<td>2</td>
<td>2</td>
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<tr>
<td>20-Jun-95</td>
<td>ES5171</td>
<td>31</td>
<td>31</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>21-Jun-95</td>
<td>ES5172</td>
<td>30</td>
<td>27</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>23-Jun-95</td>
<td>ES5174</td>
<td>25</td>
<td>24</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>110</strong></td>
<td><strong>100</strong></td>
<td><strong>11</strong></td>
<td><strong>10</strong></td>
<td></td>
</tr>
</tbody>
</table>
Table 2: Invalid Approaches and Stationary Trials

<table>
<thead>
<tr>
<th>TRIAL</th>
<th>REASON INVALID</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES516701</td>
<td>Invalid Laser Check Data</td>
</tr>
<tr>
<td>ES516703</td>
<td>34 False Vertical Alarms With Cockpit Flags</td>
</tr>
<tr>
<td>ES516707</td>
<td>173 False Vertical Alarms With Cockpit Flags, Failed Lateral &amp; Vertical PFE &amp; CMN Criteria</td>
</tr>
<tr>
<td>ES517017</td>
<td>486 False Lateral Alarms, 193 False Vertical Alarms, Both With Cockpit Flags</td>
</tr>
<tr>
<td>ES517018</td>
<td>298 False Lateral Alarms, 208 False Vertical Alarms, Both With Cockpit Flags</td>
</tr>
<tr>
<td>ES517019</td>
<td>523 False Lateral Alarms, 226 False Vertical Alarms, Both With Cockpit Flags</td>
</tr>
<tr>
<td>ES517201</td>
<td>Aircraft Stationary Trial Data File Unavailable</td>
</tr>
<tr>
<td>ES517204</td>
<td>Late Laser Tracker Lock-On (630 ft HAT)</td>
</tr>
<tr>
<td>ES517207</td>
<td>Possible Invalid Laser Truth Data</td>
</tr>
<tr>
<td>ES517227</td>
<td>Invalid Laser Truth Data</td>
</tr>
<tr>
<td>ES517423</td>
<td>Hardware/Software Problem Forced A 360° Turn At The IAF Prior To Initiating The Approach</td>
</tr>
</tbody>
</table>

Note that between 19 and 23 June 1995, the airborne data collected did not contain valid yaw, pitch or roll angle information. In fact, zeros replaced the valid data. Therefore, the transformation of the laser truth data from the laser retro-reflector position, located at the top of the vertical stabilizer, to the navigation reference point (NRP) position did not take into account the attitude of the aircraft. The lack of this data is most evident in the lateral and vertical NRP unfiltered position difference plots shown in Appendix B.

The lateral bias was due primarily to the fact that the aircraft was flying a nominal true heading of approximately 10.0965 degrees while the airborne data file was recording zero degrees for the yaw angle. This had the apparent effect of rotating the laser retro-reflector located at the top of the vertical stabilizer to a negative $Y_{RCS}$ position with respect to the NRP position. The lateral bias was reduced somewhat due to the crab angle required to maintain runway heading. The winds were predominately out of the Northwest during the flight test, which caused the laser retro-reflector to rotate to a positive $Y_{RCS}$ position with respect to the no-wind laser retro-reflector position. However, the laser retro-reflector remained at a somewhat reduced negative $Y_{RCS}$ position with respect to the NRP position.

The vertical bias throughout the approach and especially in the landing portion of the approach was due primarily to the positive pitch attitude required to maintain the 3 degree glide path and later flare the aircraft, both of which in turn caused the laser retro-reflector located at the top of the vertical stabilizer to rotate to a positive $Z_{RCS}$ position with respect to the NRP position. The $Z_{RCS}$ bias remained relatively constant throughout the flare maneuver until the main landing gear contacted the runway. As the nose gear rotated down after main gear touchdown, the $Z_{RCS}$ bias decreased, until nose gear touchdown, where the positive pitch attitude carried throughout the flare decreased to approximately zero degrees, matching that of the invalid pitch angle data, resulting in the near elimination of the $Z_{RCS}$ bias.

**Vertical Navigation Sensor Error**

Evaluation of the vertical navigation sensor error, MOS 1, was based on passing the difference between the laser tracker truth reference and the vertical navigation sensor...
error (both referenced to the NRP) through the vertical PFE and CMN ICAO Annex 10 filters for MLS evaluation. The vertical PFE and CMN filter outputs were compared to the 95 percent thresholds from the 700 ft HAT position to the 50 ft HAT position. Estimation statistics were evaluated on the ensemble data from the 1500 ft HAT position through landing and the subsequent landing roll-out to further characterize the flight test results. Refer to Appendix A for all MOS 1 statistics and plots as required by the FAA CAT III Level 2 Flight Test Plan.

Of the 100 approaches and landings evaluated, two failed to pass MOS 1 specifications, resulting in the success of MOS 1. These two approaches and landings failed due to violating the vertical CMN 95 percent threshold, which was a result of the DGPS position solution intermittently switching between two different kinematic carrier phase ambiguity fixes approximately 0.5 m apart. The switching was due to the DGPS system trying to intermittently use a low altitude satellite in the solution, which caused the large position difference.

**Lateral Navigation Sensor Error**

Evaluation of the lateral navigation sensor error, MOS 2, was based on passing the difference between the laser tracker truth reference and the lateral navigation sensor error (both referenced to the NRP) through the lateral PFE and CMN ICAO Annex 10 filters for MLS evaluation. The lateral PFE and CMN filter outputs were compared to the 95 percent thresholds from the 200 ft HAT position through landing and the subsequent touch and go or landing roll-out. Estimation statistics were evaluated on the ensemble data from the 1500 ft HAT position through landing and the subsequent landing roll-out to further characterize the flight test results. Refer to Appendix A for all MOS 2 statistics and plots as required by the FAA CAT III Level 2 Flight Test Plan.

All 100 of the approaches and landings passed MOS 2 specifications, resulting in the success of MOS 2.

**Integrity Under Normal Operation**

Evaluation of the integrity under normal operation, MOS 6, was based on determining the number of missed integrity alarms and false integrity alarms along an approach and landing as well as the time to alarm. The navigation sensor error was compared to ILS CAT III monitor limits for position errors. The true alarm state was determined by the ground truth reference provided by the laser tracker. Estimation statistics were not evaluated due the fact that few or no integrity alarms were expected.

All 100 of the approaches and landings passed MOS 6 specifications, resulting in the success of MOS 6. One approach and landing did have 20 consecutive false lateral integrity alarms upon touchdown, which were considered a single false integrity alarm. These integrity alarms were labeled as false since they occurred even though the DGPS solution was within tolerance throughout the alarm period.

There were no integrity alarms during any of the 100 approaches and landings evaluated. In addition, there were no vertical or lateral missed integrity alarms.
Integrity Under Artificial Alarm Limits

In order to evaluate the integrity under artificial alarm limits, the artificial integrity alarm limits were set to values that varied as a function of the geometry of the satellites used while the test aircraft was stationary on the ground. These values ranged from 0.001 m to a maximum of 0.996 m vertically and from 0.001 m to a maximum of 2.640 m laterally. After a period of approximately five minutes in which the DGPS system resolved the carrier phase ambiguities, integrity alarms were generated by artificially degrading the pseudorange and carrier phase measurements of one of the five satellites being used. These artificial integrity alarms were recorded throughout the remainder of the stationary trial whenever the NRP solution exceeded that of the variable artificial integrity alarm limit.

Since the variable artificial integrity alarm limits were not recorded, evaluation of the integrity under artificial alarm limits, MOS 7, was based on determining whether the first artificial integrity alarm that occurred after the carrier phase ambiguities were resolved occurred at a position difference less than the maximum variable artificial integrity alarm limit value of 0.996 m vertically and 2.640 m laterally. The navigation sensor error was compared to the ground truth reference provided by the laser tracker. Since the airborne data collected did not contain valid yaw, pitch or roll angle information, nominal values for the test aircraft stationary at the CTOL aim point were used. Therefore, the transformation of the laser truth data from the laser retro-reflector position, located at the top of the vertical stabilizer, to the NRP position did take into account a nominal attitude of the aircraft at the CTOL aim point. Lateral and vertical NRP positions and position differences at the time of the first artificial integrity alarm for the stationary trials can be seen in Appendix A.

All ten of the stationary trials had artificial integrity alarms that occurred at a point where the NRP position difference was less than the maximum variable artificial integrity alarm limit value of 0.996 m vertically and 2.640 m laterally, resulting in the success of MOS 7.

Since the variable artificial integrity alarm limits were not recorded, it was not possible to determine whether there were any vertical or lateral missed or false integrity alarms, or if all alarm conditions were acknowledged in under two seconds. In addition, it was not possible to compute the estimation statistics for the time to alarm for the ensemble stationary trial data. The above mentioned results not obtained were all required by the FAA CAT III Level 2 Flight Test Plan.

SUMMARY OF RESULTS

Refer to Table 3 for a summary of all of the requirements compared to the actual performance, as well as a Pass or Fail score for each of the MOSs evaluated. Refer to Table 4 for a summary of the unsuccessful approaches. Refer to Appendix A for all ensemble statistics and plots as required by the FAA CAT III Level 2 Flight Test Plan. Refer to Appendix B for all of the statistics and plots for each individual approach and landing or stationary trial as required by the FAA CAT III Level 2 Flight Test Plan.
Table 3  Summary of Performance vs. MOS

<table>
<thead>
<tr>
<th>MOS #</th>
<th>Description</th>
<th>Performance</th>
<th>Req’d</th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vertical Navigation Sensor Error: PFE and CMN</td>
<td>98 successful/100</td>
<td>91/100</td>
<td>Pass</td>
</tr>
<tr>
<td>2</td>
<td>Lateral Navigation Sensor Error: PFE and CMN</td>
<td>100 successful/100</td>
<td>91/100</td>
<td>Pass</td>
</tr>
<tr>
<td>6</td>
<td>Integrity Under Normal Operation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vertical:</td>
<td>Yes</td>
<td>Yes</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>Time-To-Alarm Always ≤2 Seconds</td>
<td>0</td>
<td>0</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>Number of Missed Alarms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lateral:</td>
<td>Yes</td>
<td>Yes</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>Time-To-Alarm Always ≤2 Seconds</td>
<td>0</td>
<td>0</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>Number of Missed Alarms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of Vertical and Lateral False Alarms</td>
<td>1</td>
<td>≤1</td>
<td>Pass</td>
</tr>
<tr>
<td>7</td>
<td>Integrity Under Artificial Alarm Limits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vertical:</td>
<td>Unknown</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time-To-Alarm Always ≤2 Seconds</td>
<td>Unknown</td>
<td>0</td>
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<tr>
<td></td>
<td>Number of Missed Alarms</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Alarm Occurred @ NRP ≤ 0.996 m Zrcs Pos Diff</td>
<td>10 successful/10</td>
<td>10/10</td>
<td>Pass</td>
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<tr>
<td></td>
<td>Lateral:</td>
<td>Unknown</td>
<td>Yes</td>
<td></td>
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<tr>
<td></td>
<td>Time-To-Alarm Always ≤2 Seconds</td>
<td>Unknown</td>
<td>0</td>
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<tr>
<td></td>
<td>Number of Missed Alarms</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alarm Occurred @ NRP ≤ 2.640 m Yrcs Pos Diff</td>
<td>10 successful/10</td>
<td>10/10</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>Number of Vertical and Lateral False Alarms</td>
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Table 4  Unsuccessful Approaches

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<th>TRIAL</th>
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</thead>
<tbody>
<tr>
<td>ES517110</td>
<td>Failed Vertical CMN Criteria</td>
</tr>
<tr>
<td>ES517218</td>
<td>Failed Vertical CMN Criteria</td>
</tr>
</tbody>
</table>

CONCLUSIONS

With respect to MOS 1, the E-Systems DGPS system met the requirements for a successful approach and landing, based on the navigation sensor error requirements, 98 out of 100 approaches and landings. With respect to MOS 2, the E-Systems DGPS system met the requirements for a successful approach and landing, based on the navigation sensor error requirements, for all 100 approaches and landings. These were accomplished without aircraft attitude data for 96 out of the 100 approaches and landings evaluated. With respect to MOS 6, the E-Systems DGPS system met the requirements for a successful approach and landing, based on the integrity under normal operations requirements, for all 100 approaches and landings. With respect to MOS 7, the E-Systems DGPS system met the requirements for a successful stationary trial, based on the modified integrity under artificial alarm limits requirements, for all ten stationary trials.
LIST OF REFERENCES

1. O'Donnell, P. and Braff, R.
   "Category (CAT) IIIb Level 2 Flight Test Plan for the Global Positioning System (GPS)"
   The MITRE Corporation, May 1994

2. International Civil Aviation Organization
   "International Standards, Recommended Practices and Procedures for Air Navigation Services, Aeronautical Telecommunication"
   Annex 10, Convention on International Civil Aviation, Volume 1, April 1985
**TEST AIRCRAFT: IAI_WESTWIND**

* VERTICAL PFE AND CNR PERFORMANCE FOR MOS 1 *

SUCCESSFUL APPROACHES: 98
VALID APPROACHES: 100

$$$$$$$$$$$$$$$$$$
$ PASS MOS 1 $
$$$$$$$$$$$$$$$$$$$$

UNFILTERED VERTICAL ERROR ESTIMATION STATISTICS

| LOCATION | $|u| + 2SIG(m) | 2RMS(m) | 95P(m) | 2SIGUCL(m) |
|-----------|----------------|--------|--------|-----------|
| 1500FT HAT | 3.372 | 3.732 | 2.970 | 1.981 |
| 1400FT HAT | 3.489 | 3.660 | 2.734 | 2.530 |
| 1300FT HAT | 3.093 | 3.255 | 2.598 | 1.967 |
| 1200FT HAT | 3.057 | 3.107 | 2.393 | 2.151 |
| 1100FT HAT | 2.956 | 3.056 | 2.373 | 1.903 |
| 1000FT HAT | 2.682 | 2.929 | 2.149 | 1.312 |
| 900FT HAT | 2.614 | 3.033 | 2.236 | 1.016 |
| 800FT HAT | 2.276 | 2.716 | 2.014 | 0.699 |
| 700FT HAT | 2.161 | 2.548 | 1.964 | 0.657 |
| 600FT HAT | 1.916 | 2.273 | 1.748 | 0.505 |
| 500FT HAT | 1.600 | 1.970 | 1.503 | 0.307 |
| 400FT HAT | 1.434 | 1.748 | 1.389 | 0.256 |
| 300FT HAT | 1.177 | 1.423 | 1.111 | 0.177 |
| 200FT HAT | 0.950 | 1.070 | 0.827 | 0.149 |
| 100FT HAT | 0.629 | 0.578 | 0.507 | 0.132 |
| 50FT HAT | 0.410 | 0.389 | 0.326 | 0.101 |
| AIM POINT | 1.002 | 1.197 | 0.857 | 0.135 |
| AP+0.05NM | 1.119 | 1.347 | 0.958 | 0.163 |
| AP+0.10NM | 1.241 | 1.348 | 0.993 | 0.286 |
| AP+0.15NM | 1.201 | 1.074 | 0.967 | 0.631 |
| AP+0.20NM | 0.764 | 0.763 | 0.777 | 0.393 |
| AP+0.25NM | 0.464 | 0.419 | 0.360 | 0.081 |
| AP+0.30NM | 0.311 | 0.317 | 0.236 | 0.022 |
| AP+0.35NM | 0.369 | 0.363 | 0.330 | 0.035 |
| AP+0.40NM | 0.512 | 0.473 | 0.379 | 0.088 |
| AP+0.45NM | 0.565 | 0.558 | 0.688 | 0.225 |
| AP+0.50NM | 1.384 | 1.246 | 1.355 | 0.854 |

**PRECEEDING PAGE BLANK NOT FILMED**
| LOCATION          | $|u|$ | +2SIG (m) | 2RMS (m) | 95P (m) | 2SIGUCL (m) |
|-------------------|-----|-----------|----------|---------|-------------|
| 1500FT HAT        | 3.296 | 3.709     | 2.811    | 1.793   |             |
| 1400FT HAT        | 3.392 | 3.639     | 2.750    | 2.224   |             |
| 1300FT HAT        | 3.076 | 3.275     | 2.530    | 1.875   |             |
| 1200FT HAT        | 3.005 | 3.130     | 2.600    | 1.920   |             |
| 1100FT HAT        | 2.914 | 3.017     | 2.437    | 1.841   |             |
| 1000FT HAT        | 2.583 | 2.865     | 2.234    | 1.157   |             |
| 900FT HAT         | 2.524 | 3.013     | 2.122    | 0.857   |             |
| 800FT HAT         | 2.260 | 2.691     | 1.989    | 0.693   |             |
| 700FT HAT         | 2.067 | 2.489     | 1.880    | 0.557   |             |
| 600FT HAT         | 1.850 | 2.273     | 1.697    | 0.414   |             |
| 500FT HAT         | 1.616 | 1.999     | 1.469    | 0.307   |             |
| 400FT HAT         | 1.428 | 1.775     | 1.376    | 0.235   |             |
| 300FT HAT         | 1.183 | 1.473     | 1.082    | 0.161   |             |
| 200FT HAT         | 0.965 | 1.089     | 0.847    | 0.152   |             |
| 100FT HAT         | 0.662 | 0.638     | 0.583    | 0.121   |             |
| 50FT HAT          | 0.349 | 0.329     | 0.310    | 0.071   |             |
| AIM POINT         | 0.895 | 1.043     | 0.723    | 0.117   |             |
| AP+0.05NM         | 1.001 | 1.263     | 0.895    | 0.109   |             |
| AP+0.10NM         | 1.103 | 1.340     | 0.913    | 0.154   |             |
| AP+0.15NM         | 1.259 | 1.176     | 0.975    | 0.494   |             |
| AP+0.20NM         | 0.916 | 0.842     | 0.858    | 0.453   |             |
| AP+0.25NM         | 0.592 | 0.537     | 0.585    | 0.178   |             |
| AP+0.30NM         | 0.351 | 0.368     | 0.275    | 0.026   |             |
| AP+0.35NM         | 0.330 | 0.345     | 0.294    | 0.023   |             |
| AP+0.40NM         | 0.407 | 0.391     | 0.340    | 0.047   |             |
| AP+0.45NM         | 0.443 | 0.398     | 0.290    | 0.082   |             |
| AP+0.50NM         | 0.771 | 0.696     | 0.788    | 0.342   |             |
### VERT CONTROL MOTION NOISE ESTIMATION STATISTICS

| LOCATION | |u| + 2SIG(m) | 2RMS(m) | 95P(m) | 2SIGUCL(m) |
|----------|-----------------|-----------|---------|---------|------------|
| 1500FT HAT | 1.151 | 1.097 | 0.780 | 0.801 |
| 1400FT HAT | 0.738 | 0.705 | 0.702 | 0.331 |
| 1300FT HAT | 0.651 | 0.613 | 0.659 | 0.248 |
| 1200FT HAT | 0.672 | 0.620 | 0.537 | 0.247 |
| 1100FT HAT | 0.618 | 0.595 | 0.526 | 0.237 |
| 1000FT HAT | 0.602 | 0.573 | 0.535 | 0.219 |
| 900FT HAT | 0.524 | 0.519 | 0.476 | 0.182 |
| 800FT HAT | 0.608 | 0.598 | 0.496 | 0.241 |
| 700FT HAT | 0.489 | 0.480 | 0.479 | 0.155 |
| 600FT HAT | 0.432 | 0.402 | 0.391 | 0.105 |
| 500FT HAT | 0.374 | 0.343 | 0.349 | 0.075 |
| 400FT HAT | 0.300 | 0.273 | 0.267 | 0.047 |
| 300FT HAT | 0.299 | 0.268 | 0.281 | 0.042 |
| 200FT HAT | 0.231 | 0.208 | 0.193 | 0.026 |
| 100FT HAT | 0.336 | 0.306 | 0.283 | 0.040 |
| 50FT HAT | 0.397 | 0.358 | 0.297 | 0.059 |
| AIM POINT | 0.392 | 0.440 | 0.326 | 0.026 |
| AP+0.05NM | 0.455 | 0.417 | 0.303 | 0.070 |
| AP+0.10NM | 0.509 | 0.487 | 0.544 | 0.158 |
| AP+0.15NM | 0.783 | 0.717 | 0.638 | 0.209 |
| AP+0.20NM | 0.644 | 0.626 | 0.621 | 0.111 |
| AP+0.25NM | 0.543 | 0.505 | 0.585 | 0.094 |
| AP+0.30NM | 0.274 | 0.246 | 0.296 | 0.031 |
| AP+0.35NM | 0.239 | 0.218 | 0.134 | 0.030 |
| AP+0.40NM | 0.303 | 0.283 | 0.299 | 0.054 |
| AP+0.45NM | 0.507 | 0.453 | 0.652 | 0.117 |
| AP+0.50NM | 1.051 | 0.972 | 0.954 | 0.418 |
**TEST AIRCRAFT: IAI_WESTWIND**

***********************
* LATERAL PFE AND CNN PERFORMANCE FOR MOS 2 *
***********************

SUCCESSFUL APPROACHES: 100
VALID APPROACHES: 100

$\begin{array}{cccc} 
\text{LOCATION} & |u| + 2 \text{SIG (m)} & 2 \text{RMS (m)} & 95\% \text{(m)} & 2 \text{SIG UCL (m)} \\
\hline 
1500\text{FT} & 3.344 & 4.019 & 3.048 & 1.466 \\
1400\text{FT} & 3.100 & 3.649 & 2.889 & 1.360 \\
1300\text{FT} & 2.873 & 3.602 & 2.835 & 0.923 \\
1200\text{FT} & 2.517 & 3.000 & 2.196 & 0.857 \\
1100\text{FT} & 2.246 & 2.736 & 2.014 & 0.630 \\
1000\text{FT} & 2.041 & 2.396 & 1.861 & 0.595 \\
900\text{FT} & 1.929 & 2.269 & 1.783 & 0.528 \\
800\text{FT} & 1.858 & 2.115 & 1.604 & 0.549 \\
700\text{FT} & 1.793 & 1.949 & 1.584 & 0.594 \\
600\text{FT} & 1.755 & 1.898 & 1.478 & 0.579 \\
500\text{FT} & 1.727 & 1.859 & 1.472 & 0.570 \\
400\text{FT} & 1.514 & 1.786 & 1.219 & 0.321 \\
300\text{FT} & 1.536 & 1.790 & 1.338 & 0.345 \\
200\text{FT} & 1.595 & 1.816 & 1.366 & 0.404 \\
100\text{FT} & 1.770 & 2.131 & 1.580 & 0.408 \\
50\text{FT} & 1.833 & 2.334 & 1.699 & 0.353 \\
\text{AIM POINT} & 1.933 & 2.636 & 1.675 & 0.291 \\
\text{AP+0.05NM} & 1.962 & 2.729 & 1.649 & 0.272 \\
\text{AP+0.10NM} & 1.985 & 2.744 & 1.671 & 0.288 \\
\text{AP+0.15NM} & 2.004 & 2.801 & 1.701 & 0.276 \\
\text{AP+0.20NM} & 1.978 & 2.777 & 1.646 & 0.264 \\
\text{AP+0.25NM} & 1.914 & 2.678 & 1.549 & 0.251 \\
\text{AP+0.30NM} & 1.924 & 2.688 & 1.595 & 0.255 \\
\text{AP+0.35NM} & 1.876 & 2.606 & 1.548 & 0.252 \\
\text{AP+0.40NM} & 1.917 & 2.522 & 1.575 & 0.344 \\
\text{AP+0.45NM} & 2.092 & 2.663 & 1.612 & 0.493 \\
\text{AP+0.50NM} & 2.102 & 2.647 & 1.653 & 0.563 \\
\end{array} \$
### LAT PATH FOLLOWING ERROR ESTIMATION STATISTICS

| LOCATION | $|u|+2\text{SIG}(m)$ | 2RMS(m) | 95P(m) | 2SIGUCL(m) |
|----------|----------------------|---------|--------|------------|
| 1500FT HAT | 3.466 | 4.190 | 2.884 | 1.542 |
| 1400FT HAT | 2.922 | 3.578 | 2.689 | 1.046 |
| 1300FT HAT | 2.904 | 3.645 | 2.804 | 0.938 |
| 1200FT HAT | 2.531 | 3.171 | 2.356 | 0.719 |
| 1100FT HAT | 2.186 | 2.848 | 1.876 | 0.456 |
| 1000FT HAT | 2.025 | 2.500 | 1.823 | 0.487 |
| 900FT HAT | 1.841 | 2.208 | 1.614 | 0.448 |
| 800FT HAT | 1.751 | 2.102 | 1.532 | 0.404 |
| 700FT HAT | 1.626 | 1.928 | 1.398 | 0.364 |
| 600FT HAT | 1.649 | 1.858 | 1.366 | 0.446 |
| 500FT HAT | 1.687 | 1.888 | 1.421 | 0.479 |
| 400FT HAT | 1.504 | 1.814 | 1.224 | 0.293 |
| 300FT HAT | 1.460 | 1.750 | 1.253 | 0.282 |
| 200FT HAT | 1.474 | 1.732 | 1.251 | 0.310 |
| 100FT HAT | 1.674 | 2.034 | 1.471 | 0.354 |
| 50FT HAT | 1.742 | 2.199 | 1.615 | 0.330 |
| AIM POINT | 1.795 | 2.439 | 1.580 | 0.255 |
| AP+0.05NM | 1.852 | 2.554 | 1.584 | 0.253 |
| AP+0.10NM | 1.898 | 2.650 | 1.572 | 0.249 |
| AP+0.15NM | 1.923 | 2.706 | 1.559 | 0.246 |
| AP+0.20NM | 1.943 | 2.753 | 1.572 | 0.242 |
| AP+0.25NM | 1.929 | 2.750 | 1.579 | 0.231 |
| AP+0.30NM | 1.903 | 2.709 | 1.544 | 0.227 |
| AP+0.35NM | 1.900 | 2.684 | 1.518 | 0.237 |
| AP+0.40NM | 1.888 | 2.616 | 1.523 | 0.263 |
| AP+0.45NM | 1.896 | 2.520 | 1.470 | 0.337 |
| AP+0.50NM | 2.016 | 2.567 | 1.496 | 0.497 |
| LOCATION     | $|u|$ | +2SIG(m) | 2RMS(m) | 95P(m) | 2SIGUCL(m) |
|--------------|-----|---------|---------|--------|-------------|
| 1500FT HAT   | 3.807 | 3.599   | 1.003   | 8.583  |
| 1400FT HAT   | 0.780 | 0.745   | 0.818   | 0.370  |
| 1300FT HAT   | 0.702 | 0.685   | 0.785   | 0.316  |
| 1200FT HAT   | 0.705 | 0.631   | 0.575   | 0.226  |
| 1100FT HAT   | 0.588 | 0.530   | 0.533   | 0.168  |
| 1000FT HAT   | 0.583 | 0.525   | 0.518   | 0.164  |
| 900FT HAT    | 0.584 | 0.584   | 0.578   | 0.230  |
| 800FT HAT    | 0.520 | 0.495   | 0.478   | 0.163  |
| 700FT HAT    | 0.639 | 0.601   | 0.621   | 0.238  |
| 600FT HAT    | 0.589 | 0.577   | 0.581   | 0.224  |
| 500FT HAT    | 0.588 | 0.557   | 0.572   | 0.206  |
| 400FT HAT    | 0.335 | 0.317   | 0.352   | 0.067  |
| 300FT HAT    | 0.261 | 0.259   | 0.242   | 0.045  |
| 200FT HAT    | 0.317 | 0.300   | 0.294   | 0.060  |
| 100FT HAT    | 0.369 | 0.332   | 0.320   | 0.065  |
| 50FT HAT     | 0.410 | 0.366   | 0.370   | 0.073  |
| ATN POINT    | 0.405 | 0.369   | 0.340   | 0.057  |
| AP+0.05NM    | 0.359 | 0.332   | 0.287   | 0.042  |
| AP+0.10NM    | 0.338 | 0.302   | 0.295   | 0.048  |
| AP+0.15NM    | 0.343 | 0.307   | 0.367   | 0.051  |
| AP+0.20NM    | 0.277 | 0.254   | 0.271   | 0.041  |
| AP+0.25NM    | 0.212 | 0.196   | 0.204   | 0.025  |
| AP+0.30NM    | 0.215 | 0.208   | 0.239   | 0.029  |
| AP+0.35NM    | 0.268 | 0.242   | 0.237   | 0.036  |
| AP+0.40NM    | 0.393 | 0.354   | 0.375   | 0.077  |
| AP+0.45NM    | 0.403 | 0.373   | 0.413   | 0.097  |
| AP+0.50NM    | 0.371 | 0.352   | 0.436   | 0.096  |
TEST AIRCRAFT: IAI_WESTWIND

***************************************************************************
*LAT AND VERT INTEGRITY PERFORMANCE FOR MOS 6 *
***************************************************************************

VERTICAL TIME TO ALARM 2 SECONDS OR LESS
NUMBER OF MISSED VERTICAL ALARMS: 0
NUMBER OF FALSE VERTICAL ALARMS: 0

LATERAL TIME TO ALARM 2 SECONDS OR LESS
NUMBER OF MISSED LATERAL ALARMS: 0
NUMBER OF FALSE LATERAL ALARMS: 1

$$$$$$$$$$$$$$
$ PASS MOS 6 $
$$$$$$$$$$$$$$
TEST AIRCRAFT: IAI WESTWIND

* LAT AND VERT ARTIFICIAL INTEG PERF FOR MOS 7 *

VERTICAL
TIME TO ALARM 2 SECONDS OR LESS: UNKNOWN
NUMBER OF MISSED VERTICAL ALARMS: UNKNOWN
NUMBER OF FALSE VERTICAL ALARMS: UNKNOWN
NUMBER OF VERTICAL ALARMS PER MIN: UNKNOWN
ALARM OCCURRED AT NRP ≤ 0.996 m Yrcs POS DIFF

LATERAL
TIME TO ALARM 2 SECONDS OR LESS: UNKNOWN
NUMBER OF MISSED LATERAL ALARMS: UNKNOWN
NUMBER OF FALSE LATERAL ALARMS: UNKNOWN
NUMBER OF LATERAL ALARMS PER MIN: UNKNOWN
ALARM OCCURRED AT NRP ≤ 2.640 m Yrcs POS DIFF

$\text{$$$$$$$$$$$$$$}$
$\text{PASS MOS 7}$
$\text{$$$$$$$$$$$$$$}$

* LAT AND VERT ARTIFICIAL INTEGRITY DATA FOR *
* THE FIRST ARTIFICIAL INTEGRITY ALARM OF THE *
* STATIC TRIAL AFTER THE 290 SECOND AMBIGUITY *
* RESOLUTION PERIOD *

<table>
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<tr>
<th>TRIAL</th>
<th>Yrcs(m)</th>
<th>Vdiff(m)</th>
<th>Zrcs(m)</th>
<th>Zdiff(m)</th>
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<td>-2.230</td>
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<tr>
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<td>-0.066</td>
<td>-2.170</td>
<td>-0.293</td>
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LATERAL AND VERTICAL UNFILTERED ERROR FOR ALL VALID APPROACHES

NRP Yrcs Diff (m)

NRP Zrcs Diff (m)

NRP Xrcs Position (m)
ENSEMBLE LPFE MEAN AND STANDARD DEVIATION FOR ALL VALID APPROACHES

ENSPLE LPFE Mean (m)

NRP Xrcs Position (m)

ENSPLE LPFE Std Dev (m)
ENSEMBLE VERT CONTROL MOTION NOISE STATISTICS FOR ALL VALID APPROACHES
APPENDIX B

INDIVIDUAL APPROACH AND LANDING OR STATIONARY TRIAL RESULTS
APPROACH #: ES516702
START TIME: 506072.056
STOP TIME: 506224.528

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 0.8
AVERAGE HDOP: 0.8

MINIMUM VDOP: 3.4
MAXIMUM VDOP: 3.5
AVERAGE VDOP: 3.4

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

*****************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
*****************************************************************************

*****************************************************************************
* VALID APPROACH *
*****************************************************************************

*****************************************************************************
* SUCCESSFUL APPROACH *
*****************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 0.314
NRP Yrcs MEAN DIFFERENCE (m): -0.102
NRP Zrcs MEAN DIFFERENCE (m): 0.238

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.717
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.317
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.432

NRP Xrcs 2-RMS DIFFERENCE (m): 0.954
NRP Yrcs 2-RMS DIFFERENCE (m): 0.377
NRP Zrcs 2-RMS DIFFERENCE (m): 0.643

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 464.355
LGRP Yrcs POSITION (m): -0.301
APPROACH #: ES516704
START TIME: 507851.781
STOP TIME: 507994.847

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.8
AVERAGE HDOP: 0.7

MINIMUM VDOP: 1.6
MAXIMUM VDOP: 2.6
AVERAGE VDOP: 2.5

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 7

* METHOD OF EVALUATION: NAV SENSOR ACCURACY *

* VALID APPROACH *

* SUCCESSFUL APPROACH *

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
-----------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.463
NRP Yrcs MEAN DIFFERENCE (m): -0.006
NRP Zrcs MEAN DIFFERENCE (m): 0.229

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.674
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.297
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.550

NRP Xrcs 2-RMS DIFFERENCE (m): 1.145
NRP Yrcs 2-RMS DIFFERENCE (m): 0.297
NRP Zrcs 2-RMS DIFFERENCE (m): 0.716

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRP Xrcs POSITION (m): 430.568
LGRP Yrcs POSITION (m): -0.860
APPROACH #: ES516705
START TIME: 508412.462
STOP TIME: 508567.264

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.6
AVERAGE HDOP: 0.6

MINIMUM VDOP: 1.5
MAXIMUM VDOP: 1.5
AVERAGE VDOP: 1.5

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY                           *
******************************************************************************

******************************************************************************
* VALID APPROACH                                                    *
******************************************************************************

******************************************************************************
* SUCCESSFUL APPROACH                                               *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 0.492
NRP Yrcs MEAN DIFFERENCE (m): -0.014
NRP Zrcs MEAN DIFFERENCE (m): 0.169

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.632
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.216
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.468

NRP Xrcs 2-RMS DIFFERENCE (m): 1.169
NRP Yrcs 2-RMS DIFFERENCE (m): 0.218
NRP Zrcs 2-RMS DIFFERENCE (m): 0.578

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 645.039
LGRP Yrcs POSITION (m): -0.596
APPROACH #: ES516706
START TIME: 508965.924
STOP TIME: 509106.990

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.6
AVERAGE HDOP: 0.6

MINIMUM VDOP: 1.4
MAXIMUM VDOP: 1.4
AVERAGE VDOP: 1.4

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

*****************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
*****************************************************************************

*****************************************************************************
* VALID APPROACH *
*****************************************************************************

*****************************************************************************
* SUCCESSFUL APPROACH *
*****************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
--------------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.414
NRP Yrcs MEAN DIFFERENCE (m): -0.148
NRP Zrcs MEAN DIFFERENCE (m): 0.163

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.628
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.328
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.461

NRP Xrcs 2-RMS DIFFERENCE (m): 1.039
NRP Yrcs 2-RMS DIFFERENCE (m): 0.442
NRP Zrcs 2-RMS DIFFERENCE (m): 0.564

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
--------------------------------------------------------
LGRP Xrcs POSITION (m): 569.789
LGRP Yrcs POSITION (m): -0.266
APPROACH #: ES517001
START TIME: 145581.187
STOP TIME: 145875.330

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.6
AVERAGE HDOP: 0.6

MINIMUM VDOP: 1.9
MAXIMUM VDOP: 2.0
AVERAGE VDOP: 2.0

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

*******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
*******************************************************************************

*******************************************************************************
* VALID STATIC TRIAL *
*******************************************************************************

*******************************************************************************
* SUCCESSFUL STATIC TRIAL *
*******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): -0.250
NRP Yrcs MEAN DIFFERENCE (m): 5.435
NRP Zrcs MEAN DIFFERENCE (m): -1.377

NRP Xrcs 2-SIGMA DIFFERENCE (m): 1.044
NRP Yrcs 2-SIGMA DIFFERENCE (m): 13.227
NRP Zrcs 2-SIGMA DIFFERENCE (m): 4.572

NRP Xrcs 2-RMS DIFFERENCE (m): 1.158
NRP Yrcs 2-RMS DIFFERENCE (m): 17.120
NRP Zrcs 2-RMS DIFFERENCE (m): 5.337
APPROACH #: ES517002
START TIME: 146565.319
STOP TIME: 146725.056

MINIMUM HDOP: 0.9
MAXIMUM HDOP: 0.9
AVERAGE HDOP: 0.9

MINIMUM VDOP: 1.4
MAXIMUM VDOP: 1.5
AVERAGE VDOP: 1.5

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

********************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
********************************************************************

********************************************************************
* VALID APPROACH *
********************************************************************

********************************************************************
* SUCCESSFUL APPROACH *
********************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
---------------------------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m) : 0.527
NRP Yrcs MEAN DIFFERENCE (m) : 1.221
NRP Zrcs MEAN DIFFERENCE (m) : 0.034

NRP Xrcs 2-SIGMA DIFFERENCE (m) : 0.827
NRP Yrcs 2-SIGMA DIFFERENCE (m) : 0.459
NRP Zrcs 2-SIGMA DIFFERENCE (m) : 0.932

NRP Xrcs 2-RMS DIFFERENCE (m) : 1.339
NRP Yrcs 2-RMS DIFFERENCE (m) : 2.485
NRP Zrcs 2-RMS DIFFERENCE (m) : 0.934

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
---------------------------------------------------------------------
LGRP Xrcs POSITION (m) : 217.527
LGRP Yrcs POSITION (m) : -0.748
APPROACH #: ES517003
START TIME: 147234.594
STOP TIME: 147395.462

MINIMUM HDOP: 0.7
MAXIMUM HDOP: 1.2
AVERAGE HDOP: 1.1

MINIMUM VDOP: 1.2
MAXIMUM VDOP: 1.9
AVERAGE VDOP: 1.8

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 9
AVERAGE NUMBER OF SVs: 8

*******************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *                    
*******************************************************************

*******************************************************************
* VALID APPROACH                                                 
*******************************************************************

*******************************************************************
* SUCCESSFUL APPROACH                                           
*******************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 0.585
NRP Yrcs MEAN DIFFERENCE (m): 1.188
NRP Zrcs MEAN DIFFERENCE (m): 0.023

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.827
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.535
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.844

NRP Xrcs 2-RMS DIFFERENCE (m): 1.432
NRP Yrcs 2-RMS DIFFERENCE (m): 2.436
NRP Zrcs 2-RMS DIFFERENCE (m): 0.845

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 177.325
LGRP Yrcs POSITION (m): -1.732
APPROACH #: ES517004
START TIME: 147919.990
STOP TIME: 148085.264

MINIMUM HDOP: 1.0
MAXIMUM HDOP: 1.0
AVERAGE HDOP: 1.0

MINIMUM VDOP: 4.3
MAXIMUM VDOP: 4.5
AVERAGE VDOP: 4.4

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

*****************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
*****************************************************************************

*****************************************************************************
* VALID APPROACH *
*****************************************************************************

*****************************************************************************
* SUCCESSFUL APPROACH *
*****************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
--------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.496
NRP Yrcs MEAN DIFFERENCE (m): 1.094
NRP Zrcs MEAN DIFFERENCE (m): 0.030

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.825
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.728
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.867

NRP Xrcs 2-RMS DIFFERENCE (m): 1.290
NRP Yrcs 2-RMS DIFFERENCE (m): 2.306
NRP Zrcs 2-RMS DIFFERENCE (m): 0.869

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
--------------------------------------------------
LGRP Xrcs POSITION (m): 202.584
LGRP Yrcs POSITION (m): -1.823
APPROACH #: ES517005
START TIME: 148593.990
STOP TIME: 148750.396

MINIMUM HDOP: 0.9
MAXIMUM HDOP: 0.9
AVERAGE HDOP: 0.9

MINIMUM VDOP: 4.2
MAXIMUM VDOP: 4.5
AVERAGE VDOP: 4.4

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

**********************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY                         *
**********************************************************************

**********************************************************************
* VALID APPROACH                                                      *
**********************************************************************

**********************************************************************
* SUCCESSFUL APPROACH                                                 *
**********************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRPC Xrcs MEAN DIFFERENCE (m): 0.636
NRPC Yrscs MEAN DIFFERENCE (m): 1.077
NRPC Zrscs MEAN DIFFERENCE (m): 0.174

NRPC Xrscs 2-SIGMA DIFFERENCE (m): 0.956
NRPC Yrscs 2-SIGMA DIFFERENCE (m): 0.665
NRPC Zrscs 2-SIGMA DIFFERENCE (m): 0.791

NRPC Xrscs 2-RMS DIFFERENCE (m): 1.591
NRPC Yrscs 2-RMS DIFFERENCE (m): 2.255
NRPC Zrscs 2-RMS DIFFERENCE (m): 0.864

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

NRPC Xrscs POSITION (m): 250.487
NRPC Yrscs POSITION (m): -2.010
APPROACH #: ES517006
START TIME: 149289.726
STOP TIME: 149445.792

MINIMUM HDOP: 1.0
MAXIMUM HDOP: 1.0
AVERAGE HDOP: 1.0

MINIMUM VDOP: 8.0
MAXIMUM VDOP: 8.6
AVERAGE VDOP: 8.3

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
******************************************************************************

******************************************************************************
* VALID APPROACH *
******************************************************************************

******************************************************************************
* SUCCESSFUL APPROACH *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
-----------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.472
NRP Yrcs MEAN DIFFERENCE (m): 1.019
NRP Zrcs MEAN DIFFERENCE (m): 0.174

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.884
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.506
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.852

NRP Xrcs 2-RMS DIFFERENCE (m): 1.293
NRP Yrcs 2-RMS DIFFERENCE (m): 2.100
NRP Zrcs 2-RMS DIFFERENCE (m): 0.921

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRP Xrcs POSITION (m): 177.703
LGRP Yrcs POSITION (m): -1.187
APPROACH #: ES517007
START TIME: 149949.979
STOP TIME: 150115.111

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 0.9
AVERAGE HDOP: 0.9

MINIMUM VDOP: 6.4
MAXIMUM VDOP: 7.2
AVERAGE VDOP: 6.9

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

*****************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
*****************************************************************************

*****************************************************************************
* VALID APPROACH *
*****************************************************************************

*****************************************************************************
* SUCCESSFUL APPROACH *
*****************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
--------------------------------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.559
NRP Yrcs MEAN DIFFERENCE (m): 1.159
NRP Zrcs MEAN DIFFERENCE (m): 0.193

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.917
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.514
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.814

NRP Xrcs 2-RMS DIFFERENCE (m): 1.446
NRP Yrcs 2-RMS DIFFERENCE (m): 2.373
NRP Zrcs 2-RMS DIFFERENCE (m): 0.901

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
--------------------------------------------------------------------------
LGRP Xrcs POSITION (m): 143.952
LGRP Yrcs POSITION (m): -1.449

81
APPROACH #: ES517008
START TIME: 150595.264
STOP TIME: 150760.330

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 0.8
AVERAGE HDOP: 0.8

MINIMUM VDOP: 4.7
MAXIMUM VDOP: 5.4
AVERAGE VDOP: 5.0

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

********************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY  *
********************************************************************************

********************************************************************************
* VALID APPROACH  *
********************************************************************************

********************************************************************************
* SUCCESSFUL APPROACH  *
********************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
---------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.488
NRP Yrcs MEAN DIFFERENCE (m): 1.028
NRP Zrcs MEAN DIFFERENCE (m): 0.241

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.839
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.551
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.811

NRP Xrcs 2-RMS DIFFERENCE (m): 1.288
NRP Yrcs 2-RMS DIFFERENCE (m): 2.128
NRP Zrcs 2-RMS DIFFERENCE (m): 0.944

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
---------------------------------------------
LGRP Xrcs POSITION (m): 119.964
LGRP Yrcs POSITION (m): -1.518
APPROACH #: ES517009
START TIME: 151160.462
STOP TIME: 151324.990

MINIMUM HDOP: 0.7
MAXIMUM HDOP: 0.8
AVERAGE HDOP: 0.8

MINIMUM VDOP: 3.6
MAXIMUM VDOP: 3.9
AVERAGE VDOP: 3.7

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

*****************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
*****************************************************************************

*****************************************************************************
* VALID APPROACH *
*****************************************************************************

*****************************************************************************
* SUCCESSFUL APPROACH *
*****************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
-----------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.288
NRP Yrcs MEAN DIFFERENCE (m): 0.912
NRP Zrcs MEAN DIFFERENCE (m): 0.227

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.829
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.791
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.750

NRP Xrcs 2-RMS DIFFERENCE (m): 1.010
NRP Yrcs 2-RMS DIFFERENCE (m): 1.989
NRP Zrcs 2-RMS DIFFERENCE (m): 0.876

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
--------------------------------------------------
LGRP Xrcs POSITION (m): 191.918
LGRP Yrcs POSITION (m): -1.342
APPROACH #: ES517010
START TIME: 151715.385
STOP TIME: 151880.990

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 0.8
AVERAGE HDOP: 0.8

MINIMUM VDOP: 2.7
MAXIMUM VDOP: 3.0
AVERAGE VDOP: 2.8

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
******************************************************************************

******************************************************************************
* VALID APPROACH *
******************************************************************************

******************************************************************************
* SUCCESSFUL APPROACH *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
--------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.309
NRP Yrcs MEAN DIFFERENCE (m): 1.018
NRP Zrcs MEAN DIFFERENCE (m): 0.286

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.887
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.670
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.722

NRP Xrcs 2-RMS DIFFERENCE (m): 1.081
NRP Yrcs 2-RMS DIFFERENCE (m): 2.144
NRP Zrcs 2-RMS DIFFERENCE (m): 0.922

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
--------------------------------------------------
LGRP Xrcs POSITION (m): 138.777
LGRP Yrcs POSITION (m): -2.601
APPROACH #: ES517011
START TIME: 152287.253
STOP TIME: 152455.264

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 1.3
AVERAGE HDOP: 1.0

MINIMUM VDOP: 2.2
MAXIMUM VDOP: 6.2
AVERAGE VDOP: 4.0

MINIMUM NUMBER OF SVs: 6
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

******************************************************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
******************************************************************************************************************

******************************************************************************************************************
* VALID APPROACH *
******************************************************************************************************************

******************************************************************************************************************
* SUCCESSFUL APPROACH *
******************************************************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
------------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.561
NRP Yrcs MEAN DIFFERENCE (m): 1.207
NRP Zrcs MEAN DIFFERENCE (m): 0.217

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.842
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.391
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.884

NRP Xrcs 2-RMS DIFFERENCE (m): 1.403
NRP Yrcs 2-RMS DIFFERENCE (m): 2.446
NRP Zrcs 2-RMS DIFFERENCE (m): 0.984

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
------------------------------------------------------
LGRP Xrcs POSITION (m): 159.779
LGRP Yrcs POSITION (m): -1.451
APPRAOCH #: ES517012
START TIME: 152820.462
STOP TIME: 152991.847

MINIMUM HDOP: 1.4
MAXIMUM HDOP: 1.4
AVERAGE HDOP: 1.4

MINIMUM VDOP: 5.1
MAXIMUM VDOP: 5.5
AVERAGE VDOP: 5.4

MINIMUM NUMBER OF SVs: 6
MAXIMUM NUMBER OF SVs: 6
AVERAGE NUMBER OF SVs: 6

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
******************************************************************************

******************************************************************************
* VALID APPROACH *
******************************************************************************

******************************************************************************
* SUCCESSFUL APPROACH *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
-----------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.486
NRP Yrcs MEAN DIFFERENCE (m): 1.177
NRP Zrcs MEAN DIFFERENCE (m): 0.195

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.917
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.636
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.812

NRP Xrcs 2-RMS DIFFERENCE (m): 1.336
NRP Yrcs 2-RMS DIFFERENCE (m): 2.438
NRP Zrcs 2-RMS DIFFERENCE (m): 0.901

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRP Xrcs POSITION (m): 264.286
LGRP Yrcs POSITION (m): -1.750
APPROACH #: ES517013
START TIME: 161071.045
STOP TIME: 161400.243

MINIMUM HDOP: 0.7
MAXIMUM HDOP: 0.8
AVERAGE HDOP: 0.8

MINIMUM VDOP: 2.7
MAXIMUM VDOP: 2.9
AVERAGE VDOP: 2.8

MINIMUM NUMBER OF SVS: 7
MAXIMUM NUMBER OF SVS: 7
AVERAGE NUMBER OF SVS: 7

*******************************************************************
*   METHOD OF EVALUATION: NAV SENSOR ACCURACY                *
*******************************************************************

*******************************************************************
*   VALID STATIC TRIAL                                        *
*******************************************************************

*******************************************************************
*   SUCCESSFUL STATIC TRIAL                                   *
*******************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
-------------------------------------------------

NRP Xrcs MEAN DIFFERENCE (m): 0.362
NRP Yrcs MEAN DIFFERENCE (m): 1.612
NRP Zrcs MEAN DIFFERENCE (m): 0.404

NRP Xrcs 2-SIGMA DIFFERENCE (m): 1.209
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.154
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.957

NRP Xrcs 2-RMS DIFFERENCE (m): 1.409
NRP Yrcs 2-RMS DIFFERENCE (m): 3.227
NRP Zrcs 2-RMS DIFFERENCE (m): 1.252
NRP LONGITUDINAL, LATERAL AND VERTICAL UNFILTERED POSITION DIFFERENCES

ES517014

NRP Xrcs Diff (m)

NRP Yrcs Diff (m)

NRP Zrcs Diff (m)

NRP Xrcs Position (m)
APPROACH #: ES517015
START TIME: 162660.660
STOP TIME: 162823.198

MINIMUM HDOP: 0.5
MAXIMUM HDOP: 0.5
AVERAGE HDOP: 0.5

MINIMUM VDOP: 1.2
MAXIMUM VDOP: 1.3
AVERAGE VDOP: 1.2

MINIMUM NUMBER OF SVs: 9
MAXIMUM NUMBER OF SVs: 9
AVERAGE NUMBER OF SVs: 9

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
******************************************************************************

******************************************************************************
* VALID APPROACH *
******************************************************************************

******************************************************************************
* SUCCESSFUL APPROACH *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 0.621
NRP Yrcs MEAN DIFFERENCE (m): 1.176
NRP Zrcs MEAN DIFFERENCE (m): 0.104

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.961
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.679
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.699

NRP Xrcs 2-RMS DIFFERENCE (m): 1.570
NRP Yrcs 2-RMS DIFFERENCE (m): 2.447
NRP Zrcs 2-RMS DIFFERENCE (m): 0.729

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 264.285
LGRP Yrcs POSITION (m): -0.038
APPROACH #: ES517016
START TIME: 163240.319
STOP TIME: 163400.122

MINIMUM HDOP: 0.7
MAXIMUM HDOP: 0.7
AVERAGE HDOP: 0.7

MINIMUM VDOP: 1.6
MAXIMUM VDOP: 1.7
AVERAGE VDOP: 1.7

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

*****************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
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*****************************************************************************
* VALID APPROACH *
*****************************************************************************

*****************************************************************************
* SUCCESSFUL APPROACH *
*****************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
--------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.645
NRP Yrcs MEAN DIFFERENCE (m): 1.055
NRP Zrcs MEAN DIFFERENCE (m): 0.097

NRP Xrcs 2-SIGMA DIFFERENCE (m): 1.045
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.679
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.718

NRP Xrcs 2-RMS DIFFERENCE (m): 1.660
NRP Yrcs 2-RMS DIFFERENCE (m): 2.216
NRP Zrcs 2-RMS DIFFERENCE (m): 0.744

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
--------------------------------------------------
LGRP Xrcs POSITION (m): 255.607
LGRP Yrcs POSITION (m): -0.586
APPROACH #: ES517101
START TIME: 229444.494
STOP TIME: 229771.990

MINIMUM HDOP: 1.0
MAXIMUM HDOP: 1.3
AVERAGE HDOP: 1.1

MINIMUM VDOP: 1.5
MAXIMUM VDOP: 3.0
AVERAGE VDOP: 2.1

MINIMUM NUMBER OF SVs: 6
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

**********************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
**********************************************************************

**********************************************************************
* VALID STATIC TRIAL *
**********************************************************************

**********************************************************************
* SUCCESSFUL STATIC TRIAL *
**********************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean Difference (m)</th>
<th>2-Sigma Difference (m)</th>
<th>2-RMS Difference (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRP Xrcs</td>
<td>-1.540</td>
<td>6.130</td>
<td>6.860</td>
</tr>
<tr>
<td>NRP Yrcs</td>
<td>1.810</td>
<td>1.228</td>
<td>3.823</td>
</tr>
<tr>
<td>NRP Zrcs</td>
<td>1.810</td>
<td>4.871</td>
<td>6.069</td>
</tr>
</tbody>
</table>
APPROACH #: ES517102
START TIME: 230352.462
STOP TIME: 230511.990

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.6
AVERAGE HDOP: 0.6

MINIMUM VDOP: 1.2
MAXIMUM VDOP: 1.3
AVERAGE VDOP: 1.3

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

********************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY  *
********************************************************************************

********************************************************************************
*  VALID APPROACH   *
********************************************************************************

********************************************************************************
*  SUCCESSFUL APPROACH   *
********************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
-----------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.621
NRP Yrcs MEAN DIFFERENCE (m): 1.060
NRP Zrcs MEAN DIFFERENCE (m): -0.014

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.400
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.423
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.723

NRP Xrcs 2-RMS DIFFERENCE (m): 1.305
NRP Yrcs 2-RMS DIFFERENCE (m): 2.162
NRP Zrcs 2-RMS DIFFERENCE (m): 0.723

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRP Xrcs POSITION (m): 153.869
LGRP Yrcs POSITION (m): -0.657
APPROACH #: ES517103
START TIME: 230935.792
STOP TIME: 231098.517

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.6
AVERAGE HDOP: 0.6

MINIMUM VDOP: 1.3
MAXIMUM VDOP: 1.4
AVERAGE VDOP: 1.4

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
******************************************************************************

******************************************************************************
* VALID APPROACH *
******************************************************************************

******************************************************************************
* SUCCESSFUL APPROACH *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
---------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.566
NRP Yrcs MEAN DIFFERENCE (m): 1.022
NRP Zrcs MEAN DIFFERENCE (m): -0.047

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.344
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.460
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.682

NRP Xrcs 2-RMS DIFFERENCE (m): 1.183
NRP Yrcs 2-RMS DIFFERENCE (m): 2.095
NRP Zrcs 2-RMS DIFFERENCE (m): 0.689

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
--------------------------------------------------
LGRP Xrcs POSITION (m): 171.348
LGRP Yrcs POSITION (m): -0.602
NRP LONGITUDINAL, LATERAL AND VERTICAL UNFILTERED POSITION DIFFERENCES

ES517103

NRP Xrcs Diff (m)

NRP Yrcs Diff (m)

NRP Zrcs Diff (m)

NRP Xrcs Position (m)
APPROACH #: ES517104  
START TIME: 231514.056  
STOP TIME: 231675.462

MINIMUM HDOP: 0.6  
MAXIMUM HDOP: 0.6  
AVERAGE HDOP: 0.6

MINIMUM VDOP: 1.8  
MAXIMUM VDOP: 1.9  
AVERAGE VDOP: 1.9

MINIMUM NUMBER OF SVs: 7  
MAXIMUM NUMBER OF SVs: 7  
AVERAGE NUMBER OF SVs: 7

**************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY   *
**************************************************

**************************************************
* VALID APPROACH                               *
**************************************************

**************************************************
* SUCCESSFUL APPROACH                          *
**************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

-----------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.475
NRP Yrcs MEAN DIFFERENCE (m): 0.942
NRP Zrcs MEAN DIFFERENCE (m): -0.044

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.371
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.496
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.757

NRP Xrcs 2-RMS DIFFERENCE (m): 1.019
NRP Yrcs 2-RMS DIFFERENCE (m): 1.948
NRP Zrcs 2-RMS DIFFERENCE (m): 0.762

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRP Xrcs POSITION (m): 382.541
LGRP Yrcs POSITION (m): -0.378
NRP LONGITUDINAL, LATERAL AND VERTICAL UNFILTERED POSITION DIFFERENCES

ES517104

NRP Xrcs Diff (m)

NRP Yrcs Diff (m)

NRP Zrcs Diff (m)
APPROACH #: ES517105
START TIME: 232084.330
STOP TIME: 232240.990

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.6
AVERAGE HDOP: 0.6

MINIMUM VDOP: 2.0
MAXIMUM VDOP: 2.1
AVERAGE VDOP: 2.1

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

***********************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY  *
***********************************************************************

***********************************************************************
* VALID APPROACH  *
***********************************************************************

***********************************************************************
* SUCCESSFUL APPROACH  *
***********************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
--------------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.703
NRP Yrcs MEAN DIFFERENCE (m): 1.103
NRP Zrcs MEAN DIFFERENCE (m): 0.028

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.299
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.375
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.734

NRP Xrcs 2-RMS DIFFERENCE (m): 1.437
NRP Yrcs 2-RMS DIFFERENCE (m): 2.238
NRP Zrcs 2-RMS DIFFERENCE (m): 0.736

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-------------------------------------------------
LGRP Xrcs POSITION (m): 195.974
LGRP Yrcs POSITION (m): -1.270

133
APPROACH #: ES517106
START TIME: 232676.660
STOP TIME: 232835.264

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.6
AVERAGE HDOP: 0.6

MINIMUM VDOP: 2.2
MAXIMUM VDOP: 2.2
AVERAGE VDOP: 2.2

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
******************************************************************************

******************************************************************************
* VALID APPROACH *
******************************************************************************

******************************************************************************
* SUCCESSFUL APPROACH *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NR P Xrcs MEAN DIFFERENCE (m): 0.644
NR P Yrcs MEAN DIFFERENCE (m): 1.041
NR P Zrcs MEAN DIFFERENCE (m): 0.051

NR P Xrcs 2-SIGMA DIFFERENCE (m): 0.414
NR P Yrcs 2-SIGMA DIFFERENCE (m): 0.461
NR P Zrcs 2-SIGMA DIFFERENCE (m): 0.696

NR P Xrcs 2-RMS DIFFERENCE (m): 1.354
NR P Yrcs 2-RMS DIFFERENCE (m): 2.133
NR P Zrcs 2-RMS DIFFERENCE (m): 0.704

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGR P Xrcs POSITION (m): 504.372
LGR P Yrcs POSITION (m): -0.785
APPROACH #: ES517107
START TIME: 233294.111
STOP TIME: 233457.781

MINIMUM HDOP: 0.4
MAXIMUM HDOP: 1.1
AVERAGE HDOP: 0.6

MINIMUM VDOP: 1.5
MAXIMUM VDOP: 3.8
AVERAGE VDOP: 2.3

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 9
AVERAGE NUMBER OF SVs: 9

**********************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY                        *
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* VALID APPROACH                                                    *
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* SUCCESSFUL APPROACH                                               *
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TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

| NRP Xrcs MEAN DIFFERENCE (m): 0.517 |
| NRP Yrcs MEAN DIFFERENCE (m): 1.034 |
| NRP Zrcs MEAN DIFFERENCE (m): 0.040 |
| NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.531 |
| NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.591 |
| NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.813 |
| NRP Xrcs 2-RMS DIFFERENCE (m): 1.163 |
| NRP Yrcs 2-RMS DIFFERENCE (m): 2.150 |
| NRP Zrcs 2-RMS DIFFERENCE (m): 0.816 |

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

| LGRP Xrcs POSITION (m): 250.034 |
| LGRP Yrcs POSITION (m): -0.560 |
APPROACH #: ES517108
START TIME: 233912.264
STOP TIME: 234070.319

MINIMUM HDOP: 1.0
MAXIMUM HDOP: 1.1
AVERAGE HDOP: 1.0

MINIMUM VDOP: 4.1
MAXIMUM VDOP: 4.5
AVERAGE VDOP: 4.4

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

*************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
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*************************************************
* VALID APPROACH *
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* SUCCESSFUL APPROACH *
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TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 0.538
NRP Yrcs MEAN DIFFERENCE (m): 1.039
NRP Zrcs MEAN DIFFERENCE (m): 0.005

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.518
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.620
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.775

NRP Xrcs 2-RMS DIFFERENCE (m): 1.195
NRP Yrcs 2-RMS DIFFERENCE (m): 2.169
NRP Zrcs 2-RMS DIFFERENCE (m): 0.775

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 263.189
LGRP Yrcs POSITION (m): -3.067
NRP LONGITUDINAL, LATERAL AND VERTICAL UNFILTERED POSITION DIFFERENCES

ES517108

NRP Xrcs Diff (m)

NRP Yrcs Diff (m)

NRP Zrcs Diff (m)

NRP Xrcs Position (m)
APPROACH #: ES517109
START TIME: 234507.330
STOP TIME: 234675.396

MINIMUM HDOP: 0.9
MAXIMUM HDOP: 1.0
AVERAGE HDOP: 1.0

MINIMUM VDOP: 4.4
MAXIMUM VDOP: 4.6
AVERAGE VDOP: 4.5

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

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* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
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* VALID APPROACH *
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* SUCCESSFUL APPROACH *
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TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

-----------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.604
NRP Yrcs MEAN DIFFERENCE (m): 0.847
NRP Zrcs MEAN DIFFERENCE (m): -0.055

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.823
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.769
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.915

NRP Xrcs 2-RMS DIFFERENCE (m): 1.461
NRP Yrcs 2-RMS DIFFERENCE (m): 1.860
NRP Zrcs 2-RMS DIFFERENCE (m): 0.922

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRP Xrcs POSITION (m): 146.038
LGRP Yrcs POSITION (m): -0.443
APPROACH #: ES517110
START TIME: 235102.649
STOP TIME: 235267.385

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 0.9
AVERAGE HDOP: 0.9

MINIMUM VDOP: 3.9
MAXIMUM VDOP: 4.2
AVERAGE VDOP: 4.1

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

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METHOD OF EVALUATION: NAV SENSOR ACCURACY
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--------------------------------------------------------------------------------
VALID APPROACH
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UNSUCCESSFUL APPROACH (MOS 1) DUE TO LESS THAN
95 PERCENT OF ALL OF THE DATA POINTS WITHIN
THE VERTICAL FILTER REQUIREMENTS
--------------------------------------------------------------------------------

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
------------------------------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.692
NRP Yrcs MEAN DIFFERENCE (m): 1.184
NRP Zrcs MEAN DIFFERENCE (m): 0.282

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.585
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.668
NRP Zrcs 2-SIGMA DIFFERENCE (m): 1.002

NRP Xrcs 2-RMS DIFFERENCE (m): 1.502
NRP Yrcs 2-RMS DIFFERENCE (m): 2.461
NRP Zrcs 2-RMS DIFFERENCE (m): 1.150

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
------------------------------------------------------------------------
LGRP Xrcs POSITION (m): 237.857
LGRP Yrcs POSITION (m): -0.353
APPROACH #: ES517111
START TIME: 235697.122
STOP TIME: 235861.122

MINIMUM HDOP: 0.9
MAXIMUM HDOP: 1.0
AVERAGE HDOP: 1.0

MINIMUM VDOP: 7.4
MAXIMUM VDOP: 8.3
AVERAGE VDOP: 7.8

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

*****************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY  *
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* VALID APPROACH  *
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* SUCCESSFUL APPROACH  *
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TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
--------------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.590
NRP Yrcs MEAN DIFFERENCE (m): 1.020
NRP Zrcs MEAN DIFFERENCE (m): 0.088

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.796
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.725
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.660

NRP Xrcs 2-RMS DIFFERENCE (m): 1.423
NRP Yrcs 2-RMS DIFFERENCE (m): 2.165
NRP Zrcs 2-RMS DIFFERENCE (m): 0.683

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
--------------------------------------------------------
LGRP Xrcs POSITION (m): 222.842
LGRP Yrcs POSITION (m): -1.139
APPROACH #: ESS17112
START TIME: 236298.451
STOP TIME: 236466.330

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 0.8
AVERAGE HDOP: 0.8

MINIMUM VDOP: 6.0
MAXIMUM VDOP: 6.5
AVERAGE VDOP: 6.3

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

*********************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
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* VALID APPROACH *
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* SUCCESSFUL APPROACH *
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TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 0.727
NRP Yrcs MEAN DIFFERENCE (m): 1.217
NRP Zrcs MEAN DIFFERENCE (m): 0.079

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.725
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.566
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.639

NRP Xrcs 2-RMS DIFFERENCE (m): 1.625
NRP Yrcs 2-RMS DIFFERENCE (m): 2.499
NRP Zrcs 2-RMS DIFFERENCE (m): 0.658

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 265.179
LGRP Yrcs POSITION (m): -0.926
APPROACH #: ES517113
START TIME: 236890.990
STOP TIME: 237055.045

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 0.8
AVERAGE HDOP: 0.8

MINIMUM VDOP: 4.4
MAXIMUM VDOP: 4.9
AVERAGE VDOP: 4.6

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

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* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
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* VALID APPROACH *
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* SUCCESSFUL APPROACH *
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TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
-----------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.668
NRP Yrcs MEAN DIFFERENCE (m): 1.021
NRP Zrcs MEAN DIFFERENCE (m): 0.095

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.889
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.766
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.812

NRP Xrcs 2-RMS DIFFERENCE (m): 1.605
NRP Yrcs 2-RMS DIFFERENCE (m): 2.181
NRP Zrcs 2-RMS DIFFERENCE (m): 0.834

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRP Xrcs POSITION (m): 342.721
LGRP Yrcs POSITION (m): -0.929
NRP LONGITUDINAL, LATERAL AND VERTICAL UNFILTERED POSITION DIFFERENCES

ES517113

NRP Xrcs Diff (m)

NRP Yrcs Diff (m)

NRP Zrcs Diff (m)

NRP Xrcs Position (m)
APPROACH #: ES517114
START TIME: 237498.121
STOP TIME: 237664.319

MINIMUM HDOP: 0.7
MAXIMUM HDOP: 0.8
AVERAGE HDOP: 0.7

MINIMUM VDOP: 3.3
MAXIMUM VDOP: 3.6
AVERAGE VDOP: 3.4

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

*
METHOD OF EVALUATION: NAV SENSOR ACCURACY
*

VALID APPROACH

SUCCESSFUL APPROACH

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 0.597
NRP Yrcs MEAN DIFFERENCE (m): 1.118
NRP Zrcs MEAN DIFFERENCE (m): -0.009

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.762
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.601
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.786

NRP Xrcs 2-RMS DIFFERENCE (m): 1.416
NRP Yrcs 2-RMS DIFFERENCE (m): 2.315
NRP Zrcs 2-RMS DIFFERENCE (m): 0.786

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 177.299
LGRP Yrcs POSITION (m): -0.674
APPROACH #: ES517115
START TIME: 238070.792
STOP TIME: 238240.188

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 1.2
AVERAGE HDOP: 1.0

MINIMUM VDOP: 2.5
MAXIMUM VDOP: 6.2
AVERAGE VDOP: 4.4

MINIMUM NUMBER OF SVs: 6
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 6

******************************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
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* VALID APPROACH *
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******************************************************************************************
* SUCCESSFUL APPROACH *
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TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
-----------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.762
NRP Yrcs MEAN DIFFERENCE (m): 1.200
NRP Zrcs MEAN DIFFERENCE (m): 0.039

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.603
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.645
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.654

NRP Xrcs 2-RMS DIFFERENCE (m): 1.638
NRP Yrcs 2-RMS DIFFERENCE (m): 2.484
NRP Zrcs 2-RMS DIFFERENCE (m): 0.659

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRP Xrcs POSITION (m): 254.801
LGRP Yrcs POSITION (m): -1.163
APPROACH #: ES517116
START TIME: 238637.319
STOP TIME: 238800.253

MINIMUM HDOP: 1.3
MAXIMUM HDOP: 1.3
AVERAGE HDOP: 1.3

MINIMUM VDOP: 5.6
MAXIMUM VDOP: 5.9
AVERAGE VDOP: 5.8

MINIMUM NUMBER OF SVs: 6
MAXIMUM NUMBER OF SVs: 6
AVERAGE NUMBER OF SVs: 6

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
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* VALID APPROACH *
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* SUCCESSFUL APPROACH *
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TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 0.630
NRP Yrcs MEAN DIFFERENCE (m): 1.144
NRP Zrcs MEAN DIFFERENCE (m): 0.100

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.700
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.489
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.777

NRP Xrcs 2-RMS DIFFERENCE (m): 1.442
NRP Yrcs 2-RMS DIFFERENCE (m): 2.340
NRP Zrcs 2-RMS DIFFERENCE (m): 0.802

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 191.840
LGRP Yrcs POSITION (m): -0.482
APPROACH #: ES517117
START TIME: 239246.122
STOP TIME: 239410.528

MINIMUM HDOP: 1.4
MAXIMUM HDOP: 1.5
AVERAGE HDOP: 1.4

MINIMUM VDOP: 5.0
MAXIMUM VDOP: 5.3
AVERAGE VDOP: 5.1

MINIMUM NUMBER OF SVs: 6
MAXIMUM NUMBER OF SVs: 6
AVERAGE NUMBER OF SVs: 6

***********************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY                           *
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*                              VALID APPROACH                            *
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***********************************************************************
*                              SUCCESSFUL APPROACH                       *
***********************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
--------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.618
NRP Yrcs MEAN DIFFERENCE (m): 1.137
NRP Zrcs MEAN DIFFERENCE (m): 0.064

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.687
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.513
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.814

NRP Xrcs 2-RMS DIFFERENCE (m): 1.415
NRP Yrcs 2-RMS DIFFERENCE (m): 2.331
NRP Zrcs 2-RMS DIFFERENCE (m): 0.824

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRF Xrcs POSITION (m): 202.384
LGRF Yrcs POSITION (m): -1.419
APPROACH #: ES517118
START TIME: 239826.462
STOP TIME: 239995.187

MINIMUM HDOP: 1.5
MAXIMUM HDOP: 1.5
AVERAGE HDOP: 1.5

MINIMUM VDOP: 4.2
MAXIMUM VDOP: 4.6
AVERAGE VDOP: 4.3

MINIMUM NUMBER OF SVs: 6
MAXIMUM NUMBER OF SVs: 6
AVERAGE NUMBER OF SVs: 6

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* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
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********************************************************************
* VALID APPROACH *
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* SUCCESSFUL APPROACH *
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TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRPs

NRPs Xrcs MEAN DIFFERENCE (m): 0.581
NRPs Yrcs MEAN DIFFERENCE (m): 1.119
NRPs Zrcs MEAN DIFFERENCE (m): 0.122

NRPs 2-SIGMA DIFFERENCE (m): 0.702
NRPs Yrcs 2-SIGMA DIFFERENCE (m): 0.499
NRPs Zrcs 2-SIGMA DIFFERENCE (m): 0.753

NRPs 2-RMS DIFFERENCE (m): 1.357
NRPs Yrcs 2-RMS DIFFERENCE (m): 2.293
NRPs Zrcs 2-RMS DIFFERENCE (m): 0.791

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRPs

LGRPs Xrcs POSITION (m): 204.254
LGRPs Yrcs POSITION (m): -1.795
NRP LONGITUDINAL, LATERAL AND VERTICAL UNFILTERED POSITION DIFFERENCES

ES517118

NRP Xrcs Diff (m)

NRP Yrcs Diff (m)

NRP Zrcs Diff (m)

NRP Xrcs Position (m)
APPROACH #: ES517119
START TIME: 243926.056
STOP TIME: 244085.451

MINIMUM HDOP: 0.7
MAXIMUM HDOP: 1.0
AVERAGE HDOP: 0.8

MINIMUM VDOP: 0.0
MAXIMUM VDOP: 2.6
AVERAGE VDOP: 1.3

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

/* METHOD OF EVALUATION: NAV SENSOR ACCURACY */

/* VALID APPROACH */

/* SUCCESSFUL APPROACH */

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

_____________________________________________________
NRP Xrcs  MEAN DIFFERENCE (m): 0.707
NRP Yrcs  MEAN DIFFERENCE (m): 1.147
NRP Zrcs  MEAN DIFFERENCE (m): 0.042

NRP Xrcs  2-SIGMA DIFFERENCE (m): 0.812
NRP Yrcs  2-SIGMA DIFFERENCE (m): 0.641
NRP Zrcs  2-SIGMA DIFFERENCE (m): 0.728

NRP Xrcs  2-RMS DIFFERENCE (m): 1.630
NRP Yrcs  2-RMS DIFFERENCE (m): 2.381
NRP Zrcs  2-RMS DIFFERENCE (m): 0.733

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

_____________________________________________________
LGRP Xrcs POSITION (m): 124.154
LGRP Yrcs POSITION (m): 0.031
APPRAOCH #: E5517120
START TIME: 244449.583
STOP TIME: 244611.451

MINIMUM HDOP: 0.9
MAXIMUM HDOP: 1.0
AVERAGE HDOP: 1.0

MINIMUM VDOP: 2.8
MAXIMUM VDOP: 3.0
AVERAGE VDOP: 2.9

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

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* METHOD OF EVALUATION: NAV SENSOR ACCURACY  *
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------------------------------------------------------------------------------------------------
*  VALID APPROACH  *
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------------------------------------------------------------------------------------------------
*  SUCCESSFUL APPROACH  *
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TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
-----------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.790
NRP Yrcs MEAN DIFFERENCE (m): 1.211
NRP Zrcs MEAN DIFFERENCE (m): 0.005

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.694
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.439
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.895

NRP Xrcs 2-RMS DIFFERENCE (m): 1.726
NRP Yrcs 2-RMS DIFFERENCE (m): 2.462
NRP Zrcs 2-RMS DIFFERENCE (m): 0.895

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRP Xrcs POSITION (m): 164.138
LGRP Yrcs POSITION (m): -1.474
APPROACH #: ES517121
START TIME: 244984.111
STOP TIME: 245135.517

MINIMUM HDOP: 0.9
MAXIMUM HDOP: 0.9
AVERAGE HDOP: 0.9

MINIMUM VDOP: 3.2
MAXIMUM VDOP: 3.2
AVERAGE VDOP: 3.2

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

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* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
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******************************************************************************
* VALID APPROACH *
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******************************************************************************
* SUCCESSFUL APPROACH *
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TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
-------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.749
NRP Yrcs MEAN DIFFERENCE (m): 1.147
NRP Zrcs MEAN DIFFERENCE (m): -0.002

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.737
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.575
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.897

NRP Xrcs 2-RMS DIFFERENCE (m): 1.670
NRP Yrcs 2-RMS DIFFERENCE (m): 2.365
NRP Zrcs 2-RMS DIFFERENCE (m): 0.897

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-------------------------------------------------
LGRP Xrcs POSITION (m): 234.815
LGRP Yrcs POSITION (m): -2.708
APPROACH #: ES517122
START TIME: 245489.111
STOP TIME: 245640.111
MINIMUM HDOP: 0.9
MAXIMUM HDOP: 0.9
AVERAGE HDOP: 0.9
MINIMUM VDOP: 3.4
MAXIMUM VDOP: 3.5
AVERAGE VDOP: 3.4
MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

* METHOD OF EVALUATION: NAV SENSOR ACCURACY *

* VALID APPROACH *

* SUCCESSFUL APPROACH *

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

-----------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.685
NRP Yrcs MEAN DIFFERENCE (m): 0.950
NRP Zrcs MEAN DIFFERENCE (m): 0.025

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.718
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.642
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.820

NRP Xrcs 2-RMS DIFFERENCE (m): 1.547
NRP Yrcs 2-RMS DIFFERENCE (m): 2.006
NRP Zrcs 2-RMS DIFFERENCE (m): 0.821

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------
LGRP Xrcs POSITION (m): 161.005
LGRP Yrcs POSITION (m): -0.466
APPROACH #:  ES517123
START TIME:  246018.517
STOP TIME:  246180.264

MINIMUM HDOP:  0.8
MAXIMUM HDOP:  0.8
AVERAGE HDOP:  0.8

MINIMUM VDOP:  3.3
MAXIMUM VDOP:  3.5
AVERAGE VDOP:  3.4

MINIMUM NUMBER OF SVs:  7
MAXIMUM NUMBER OF SVs:  7
AVERAGE NUMBER OF SVs:  7

********************************************************************************
*  METHOD OF EVALUATION: NAV SENSOR ACCURACY  *
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********************************************************************************
*  VALID APPROACH  *
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********************************************************************************
*  SUCCESSFUL APPROACH  *
********************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 0.598
NRP Yrcs MEAN DIFFERENCE (m): 1.039
NRP Zrcs MEAN DIFFERENCE (m): -0.169

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.816
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.709
NRP Zrcs 2-SIGMA DIFFERENCE (m): 1.068

NRP Xrcs 2-RMS DIFFERENCE (m): 1.448
NRP Yrcs 2-RMS DIFFERENCE (m): 2.196
NRP Zrcs 2-RMS DIFFERENCE (m): 1.120

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 68.411
LGRP Yrcs POSITION (m): -0.306
APPROACH #: ES517124
START TIME: 246569.122
STOP TIME: 246730.319

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 0.8
AVERAGE HDOP: 0.8

MINIMUM VDOP: 3.2
MAXIMUM VDOP: 3.3
AVERAGE VDOP: 3.2

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

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* METHOD OF EVALUATION: NAV SENSOR ACCURACY             *
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*  VALID APPROACH                                      *
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**********************************************************
*  SUCCESSFUL APPROACH                                 *
**********************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
--------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.684
NRP Yrcs MEAN DIFFERENCE (m): 1.148
NRP Zrcs MEAN DIFFERENCE (m): -0.004

NRP Xrcs 2-SIGMA DIFFERENCE (m): 1.727
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.643
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.911

NRP Xrcs 2-RMS DIFFERENCE (m): 2.203
NRP Yrcs 2-RMS DIFFERENCE (m): 2.385
NRP Zrcs 2-RMS DIFFERENCE (m): 0.911

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRP Xrcs POSITION (m): 217.891
LGRP Yrcs POSITION (m): -1.343
APPROACH #: ES517125
START TIME: 247177.122
STOP TIME: 247330.517

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 0.8
AVERAGE HDOP: 0.8

MINIMUM VDOP: 2.8
MAXIMUM VDOP: 3.0
AVERAGE VDOP: 2.9

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

***********************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY                         *
***********************************************************************

***********************************************************************
* VALID APPROACH                                                      *
***********************************************************************

***********************************************************************
* SUCCESSFUL APPROACH                                                *
***********************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
-----------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.606
NRP Yrcs MEAN DIFFERENCE (m): 1.129
NRP Zrcs MEAN DIFFERENCE (m): 0.076

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.500
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.664
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.901

NRP Xrcs 2-RMS DIFFERENCE (m): 1.311
NRP Yrcs 2-RMS DIFFERENCE (m): 2.353
NRP Zrcs 2-RMS DIFFERENCE (m): 0.914

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRP Xrcs POSITION (m): 337.325
LGRP Yrcs POSITION (m): -2.694
APPROACH #: ESS17126
START TIME: 247710.056
STOP TIME: 247860.396

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.8
AVERAGE HDOP: 0.6

MINIMUM VDOP: 1.6
MAXIMUM VDOP: 2.6
AVERAGE VDOP: 1.9

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY                         *
******************************************************************************

******************************************************************************
* VALID APPROACH                                                      *
******************************************************************************

******************************************************************************
* SUCCESSFUL APPROACH                                                *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRp Xrcs MEAN DIFFERENCE (m): 0.637
NRp Yrcs MEAN DIFFERENCE (m): 0.902
NRp Zrcs MEAN DIFFERENCE (m): 0.093

NRp Xrcs 2-SIGMA DIFFERENCE (m): 0.755
NRp Yrcs 2-SIGMA DIFFERENCE (m): 0.688
NRp Zrcs 2-SIGMA DIFFERENCE (m): 0.832

NRp Xrcs 2-RMS DIFFERENCE (m): 1.481
NRp Yrcs 2-RMS DIFFERENCE (m): 1.931
NRp Zrcs 2-RMS DIFFERENCE (m): 0.852

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 302.166
LGRP Yrcs POSITION (m): -0.362
APPROACH #: ES517127
START TIME: 248275.660
STOP TIME: 248435.198

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.6
AVERAGE HDOP: 0.6

MINIMUM VDOP: 1.5
MAXIMUM VDOP: 1.5
AVERAGE VDOP: 1.5

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

* METHOD OF EVALUATION: NAV SENSOR ACCURACY *

* VALID APPROACH *

* SUCCESSFUL APPROACH *

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 0.710
NRP Yrcs MEAN DIFFERENCE (m): 1.183
NRP Zrcs MEAN DIFFERENCE (m): 0.094

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.709
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.423
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.782

NRP Xrcs 2-RMS DIFFERENCE (m): 1.586
NRP Yrcs 2-RMS DIFFERENCE (m): 2.403
NRP Zrcs 2-RMS DIFFERENCE (m): 0.804

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 260.391
LGRP Yrcs POSITION (m): -1.053
APPROACH #: ES517129
START TIME: 249340.858
STOP TIME: 249504.726

MINIMUM HDOP: 0.7
MAXIMUM HDOP: 0.7
AVERAGE HDOP: 0.7

MINIMUM VDOP: 1.6
MAXIMUM VDOP: 1.7
AVERAGE VDOP: 1.7

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

********************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
********************************************************************************

********************************************************************************
* VALID APPROACH *
********************************************************************************

********************************************************************************
* SUCCESSFUL APPROACH *
********************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
--------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.582
NRP Yrcs MEAN DIFFERENCE (m): 1.116
NRP Zrcs MEAN DIFFERENCE (m): -0.049

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.773
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.494
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.792

NRP Xrcs 2-RMS DIFFERENCE (m): 1.398
NRP Yrcs 2-RMS DIFFERENCE (m): 2.286
NRP Zrcs 2-RMS DIFFERENCE (m): 0.798

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
--------------------------------------------------
LGRP Xrcs POSITION (m): 162.773
LGRP Yrcs POSITION (m): -0.457
APPROACH #: ES517130
START TIME: 249861.781
STOP TIME: 250015.264

MINIMUM HDOP: 0.7
MAXIMUM HDOP: 0.7
AVERAGE HDOP: 0.7

MINIMUM VDOP: 1.7
MAXIMUM VDOP: 1.7
AVERAGE VDOP: 1.7

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

***********************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
***********************************************************************

***********************************************************************
* VALID APPROACH *
***********************************************************************

***********************************************************************
* SUCCESSFUL APPROACH *
***********************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 0.694
NRP Yrcs MEAN DIFFERENCE (m): 1.120
NRP Zrcs MEAN DIFFERENCE (m): 0.040

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.754
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.625
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.893

NRP Xrcs 2-RMS DIFFERENCE (m): 1.579
NRP Yrcs 2-RMS DIFFERENCE (m): 2.326
NRP Zrcs 2-RMS DIFFERENCE (m): 0.897

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 103.225
LGRP Yrcs POSITION (m): -2.144
APPROACH #: ES517131
START TIME: 250375.924
STOP TIME: 250540.990

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 0.9
AVERAGE HDOP: 0.8

MINIMUM VDOP: 1.7
MAXIMUM VDOP: 3.1
AVERAGE VDOP: 2.3

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

*********************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY                                  *
*********************************************************************************

*********************************************************************************
* VALID APPROACH                                                            *
*********************************************************************************

*********************************************************************************
* SUCCESSFUL APPROACH                                                      *
*********************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
-------------------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.769
NRP Yrcs MEAN DIFFERENCE (m): 1.124
NRP Zrcs MEAN DIFFERENCE (m): -0.060

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.713
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.519
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.793

NRP Xrcs 2-RMS DIFFERENCE (m): 1.695
NRP Yrcs 2-RMS DIFFERENCE (m): 2.308
NRP Zrcs 2-RMS DIFFERENCE (m): 0.802

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-------------------------------------------------
LGRP Xrcs POSITION (m): 199.681
LGRP Yrcs POSITION (m): -2.640
APPROACH #: ES517132
START TIME: 250947.594
STOP TIME: 251105.385

MINIMUM HDOP: 0.9
MAXIMUM HDOP: 0.9
AVERAGE HDOP: 0.9

MINIMUM VDOP: 3.0
MAXIMUM VDOP: 3.1
AVERAGE VDOP: 3.1

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

********************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY                       *
********************************************************************

********************************************************************
* VALID APPROACH                                                   *
********************************************************************

********************************************************************
* SUCCESSFUL APPROACH                                              *
********************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
-------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.643
NRP Yrcs MEAN DIFFERENCE (m): 1.118
NRP Zrcs MEAN DIFFERENCE (m): 0.076

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.808
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.457
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.874

NRP Xrcs 2-RMS DIFFERENCE (m): 1.519
NRP Yrcs 2-RMS DIFFERENCE (m): 2.283
NRP Zrcs 2-RMS DIFFERENCE (m): 0.887

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
------------------
LGRP Xrcs POSITION (m): 264.429
LGRP Yrcs POSITION (m): -0.363
APPROACH #: ES517133
START TIME: 251726.121
STOP TIME: 252030.990

MINIMUM HDOP: 0.9
MAXIMUM HDOP: 0.9
AVERAGE HDOP: 0.9

MINIMUM VDOP: 2.7
MAXIMUM VDOP: 2.9
AVERAGE VDOP: 2.8

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

**************************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
**************************************************************************************

**************************************************************************************
* VALID STATIC TRIAL *
**************************************************************************************

**************************************************************************************
* SUCCESSFUL STATIC TRIAL *
**************************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 1.127
NRP Yrcs MEAN DIFFERENCE (m): 1.908
NRP Zrcs MEAN DIFFERENCE (m): -1.507

NRP Xrcs 2-SIGMA DIFFERENCE (m): 1.403
NRP Yrcs 2-SIGMA DIFFERENCE (m): 1.856
NRP Zrcs 2-SIGMA DIFFERENCE (m): 5.330

NRP Xrcs 2-RMS DIFFERENCE (m): 2.654
NRP Yrcs 2-RMS DIFFERENCE (m): 4.244
NRP Zrcs 2-RMS DIFFERENCE (m): 6.123

245
APPROACH #: ES517202
START TIME: 328318.264
STOP TIME: 328473.264

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 1.0
AVERAGE HDOP: 0.9

MINIMUM VDOP: 1.5
MAXIMUM VDOP: 2.7
AVERAGE VDOP: 1.9

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
******************************************************************************

******************************************************************************
* VALID APPROACH *
******************************************************************************

******************************************************************************
* SUCCESSFUL APPROACH *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
-----------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.715
NRP Yrcs MEAN DIFFERENCE (m): 1.162
NRP Zrcs MEAN DIFFERENCE (m): 0.006

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.851
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.431
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.914

NRP Xrcs 2-RMS DIFFERENCE (m): 1.664
NRP Yrcs 2-RMS DIFFERENCE (m): 2.364
NRP Zrcs 2-RMS DIFFERENCE (m): 0.915

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRP Xrcs POSITION (m): 209.604
LGRP Yrcs POSITION (m): -0.789
CONTROL MOTION NOISE

PATH FOLLOWING ERROR
APPROACH #: ES517203
START TIME: 329357.594
STOP TIME: 329512.858

MINIMUM HDOP: 0.5
MAXIMUM HDOP: 0.5
AVERAGE HDOP: 0.5

MINIMUM VDOP: 1.2
MAXIMUM VDOP: 1.2
AVERAGE VDOP: 1.2

MINIMUM NUMBER OF SVs: 9
MAXIMUM NUMBER OF SVs: 9
AVERAGE NUMBER OF SVs: 9

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY                             *
******************************************************************************

******************************************************************************
* VALID APPROACH                                                        *
******************************************************************************

******************************************************************************
* SUCCESSFUL APPROACH                                                   *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
-----------------------------------------------

NRP Xrcs MEAN DIFFERENCE (m): 0.674
NRP Yrcs MEAN DIFFERENCE (m): 1.176
NRP Zrcs MEAN DIFFERENCE (m): 0.165

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.873
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.558
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.805

NRP Xrcs 2-RMS DIFFERENCE (m): 1.605
NRP Yrcs 2-RMS DIFFERENCE (m): 2.417
NRP Zrcs 2-RMS DIFFERENCE (m): 0.871

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------

LGRP Xrcs POSITION (m): 226.388
LGRP Yrcs POSITION (m): -0.789
APPROACH #: ES517205
START TIME: 330402.792
STOP TIME: 330558.045

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 0.9
AVERAGE HDOP: 0.9

MINIMUM VDOP: 2.7
MAXIMUM VDOP: 2.9
AVERAGE VDOP: 2.8

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

***********************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY                           *
***********************************************************************

***********************************************************************
* VALID APPROACH                                                     *
***********************************************************************

***********************************************************************
* SUCCESSFUL APPROACH                                                *
***********************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
--------------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.656
NRP Yrcs MEAN DIFFERENCE (m): 1.180
NRP Zrcs MEAN DIFFERENCE (m): 0.100

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.867
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.614
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.820

NRP Xrcs 2-RMS DIFFERENCE (m): 1.573
NRP Yrcs 2-RMS DIFFERENCE (m): 2.438
NRP Zrcs 2-RMS DIFFERENCE (m): 0.844

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRP Xrcs POSITION (m): 290.706
LGRP Yrcs POSITION (m): -1.296

255
CONTROL MOTION NOISE

LATERNAL CMM FILTER OUTPUT (m)

VERTICAL CMM FILTER OUTPUT (m)

PATH FOLLOWING ERROR

LATERNAL PFE FILTER OUTPUT (m)

VERTICAL PFE FILTER OUTPUT (m)
APPROACH #: ES517206
START TIME: 330934.715
STOP TIME: 331084.913

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 0.8
AVERAGE HDOP: 0.8

MINIMUM VDOP: 3.0
MAXIMUM VDOP: 3.1
AVERAGE VDOP: 3.1

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY  *
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******************************************************************************
* VALID APPROACH  *
******************************************************************************

******************************************************************************
* SUCCESSFUL APPROACH  *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

----------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.763
NRP Yrcs MEAN DIFFERENCE (m): 1.153
NRP Zrcs MEAN DIFFERENCE (m): 0.078

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.659
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.454
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.864

NRP Xrcs 2-RMS DIFFERENCE (m): 1.662
NRP Yrcs 2-RMS DIFFERENCE (m): 2.350
NRP Zrcs 2-RMS DIFFERENCE (m): 0.878

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

----------------------------------------
LGRP Xrcs POSITION (m): 218.830
LGRP Yrcs POSITION (m): -1.175
APPROACH #: ES517208
START TIME: 331972.594
STOP TIME: 332124.990

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 0.8
AVERAGE HDOP: 0.8

MINIMUM VDOP: 3.0
MAXIMUM VDOP: 3.1
AVERAGE VDOP: 3.1

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

*****************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
*****************************************************************************

*****************************************************************************
* VALID APPROACH *
*****************************************************************************

*****************************************************************************
* SUCCESSFUL APPROACH *
*****************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

-----------------------------------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.696
NRP Yrcs MEAN DIFFERENCE (m): 1.131
NRP Zrcs MEAN DIFFERENCE (m): 0.033

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.923
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.582
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.800

NRP Xrcs 2-RMS DIFFERENCE (m): 1.670
NRP Yrcs 2-RMS DIFFERENCE (m): 2.336
NRP Zrcs 2-RMS DIFFERENCE (m): 0.803

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

-----------------------------------------------------------------------------
LGRP Xrcs POSITION (m): 276.733
LGRP Yrcs POSITION (m): -0.112

263
APPROACH #: ES517209
START TIME: 332497.396
STOP TIME: 332649.198

MINIMUM HDOP: 0.7
MAXIMUM HDOP: 0.7
AVERAGE HDOP: 0.7

MINIMUM VDOP: 2.7
MAXIMUM VDOP: 2.8
AVERAGE VDOP: 2.8

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY  *
******************************************************************************

******************************************************************************
* VALID APPROACH  *
******************************************************************************

******************************************************************************
* SUCCESSFUL APPROACH  *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
******************************************************************************

NRP Xrcs MEAN DIFFERENCE (m): 0.711
NRP Yrcs MEAN DIFFERENCE (m): 1.253
NRP Zrcs MEAN DIFFERENCE (m): 0.036

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.878
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.529
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.865

NRP Xrcs 2-RMS DIFFERENCE (m): 1.671
NRP Yrcs 2-RMS DIFFERENCE (m): 2.561
NRP Zrcs 2-RMS DIFFERENCE (m): 0.868

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
******************************************************************************

LGRP Xrcs POSITION (m): 301.156
LGRP Yrcs POSITION (m): -0.822
APPROACH #: ES517210
START TIME: 333016.792
STOP TIME: 333168.924

MINIMUM HDOP: 0.7
MAXIMUM HDOP: 0.7
AVERAGE HDOP: 0.7

MINIMUM VDOP: 2.3
MAXIMUM VDOP: 2.5
AVERAGE VDOP: 2.4

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

***********************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY
***********************************************************************

***********************************************************************
*  VALID APPROACH
***********************************************************************

***********************************************************************
*  SUCCESSFUL APPROACH
***********************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 0.825
NRP Yrcs MEAN DIFFERENCE (m): 1.217
NRP Zrcs MEAN DIFFERENCE (m): -0.018

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.424
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.361
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.828

NRP Xrcs 2-RMS DIFFERENCE (m): 1.704
NRP Yrcs 2-RMS DIFFERENCE (m): 2.461
NRP Zrcs 2-RMS DIFFERENCE (m): 0.829

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 149.679
LGRP Yrcs POSITION (m): -0.888
APPROACH #: ES517211
START TIME: 333537.528
STOP TIME: 333690.243

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 0.8
AVERAGE HDOP: 0.8

MINIMUM VDOP: 2.7
MAXIMUM VDOP: 2.9
AVERAGE VDOP: 2.8

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

*****************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
*****************************************************************************

*****************************************************************************
* VALID APPROACH *
*****************************************************************************

*****************************************************************************
* SUCCESSFUL APPROACH *
*****************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

<table>
<thead>
<tr>
<th></th>
<th>MEAN DIFFERENCE (m)</th>
<th>2-SIGMA DIFFERENCE (m)</th>
<th>2-RMS DIFFERENCE (m)</th>
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<tbody>
<tr>
<td>NRP Xrcs</td>
<td>0.724</td>
<td>0.729</td>
<td>1.621</td>
</tr>
<tr>
<td>NRP Yrcs</td>
<td>1.216</td>
<td>0.635</td>
<td>2.514</td>
</tr>
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<td>NRP Zrcs</td>
<td>0.097</td>
<td>0.826</td>
<td>0.848</td>
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LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

<table>
<thead>
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<th></th>
<th>POSITION (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGRP Xrcs</td>
<td>177.744</td>
</tr>
<tr>
<td>LGRP Yrcs</td>
<td>-2.276</td>
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</tbody>
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APPROACH #: ESS17212
START TIME: 334047.583
STOP TIME: 334200.385

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.6
AVERAGE HDOP: 0.6

MINIMUM VDOP: 1.5
MAXIMUM VDOP: 1.6
AVERAGE VDOP: 1.6

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY                         *
******************************************************************************

******************************************************************************
* VALID APPROACH                                       *
******************************************************************************

******************************************************************************
* SUCCESSFUL APPROACH                                 *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
-------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.654
NRP Yrcs MEAN DIFFERENCE (m): 1.270
NRP Zrcs MEAN DIFFERENCE (m): 0.091

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.839
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.378
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.727

NRP Xrcs 2-RMS DIFFERENCE (m): 1.554
NRP Yrcs 2-RMS DIFFERENCE (m): 2.569
NRP Zrcs 2-RMS DIFFERENCE (m): 0.749

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRP Xrcs POSITION (m): 135.341
LGRP Yrcs POSITION (m): -1.459

279
APPROACH #: ES517213
START TIME: 334560.243
STOP TIME: 334715.462

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.6
AVERAGE HDOP: 0.6

MINIMUM VDOP: 1.5
MAXIMUM VDOP: 1.5
AVERAGE VDOP: 1.5

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

********************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY                      *
********************************************************************

********************************************************************
* VALID APPROACH                                                  *
********************************************************************

********************************************************************
* SUCCESSFUL APPROACH                                             *
********************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
---------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.748
NRP Yrcs MEAN DIFFERENCE (m): 1.166
NRP Zrcs MEAN DIFFERENCE (m): 0.057

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.797
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.386
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.957

NRP Xrcs 2-RMS DIFFERENCE (m): 1.695
NRP Yrcs 2-RMS DIFFERENCE (m): 2.363
NRP Zrcs 2-RMS DIFFERENCE (m): 0.964

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRP Xrcs POSITION (m): 334.591
LGRP Yrcs POSITION (m): -0.084
APPROACH #: ESS17214
START TIME: 335071.792
STOP TIME: 335227.385

MINIMUM HDOP: 0.5
MAXIMUM HDOP: 0.7
AVERAGE HDOP: 0.6

MINIMUM VDOP: 1.2
MAXIMUM VDOP: 1.6
AVERAGE VDOP: 1.3

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 9
AVERAGE NUMBER OF SVs: 9

********************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
********************************************************************************

********************************************************************************
* VALID APPROACH *
********************************************************************************

********************************************************************************
* SUCCESSFUL APPROACH *
********************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

<table>
<thead>
<tr>
<th>NRP Xrcs MEAN DIFFERENCE (m)</th>
<th>0.717</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRP Yrcs MEAN DIFFERENCE (m)</td>
<td>1.201</td>
</tr>
<tr>
<td>NRP Zrcs MEAN DIFFERENCE (m)</td>
<td>-0.005</td>
</tr>
<tr>
<td>NRP Xrcs 2-SIGMA DIFFERENCE (m)</td>
<td>0.940</td>
</tr>
<tr>
<td>NRP Yrcs 2-SIGMA DIFFERENCE (m)</td>
<td>0.577</td>
</tr>
<tr>
<td>NRP Zrcs 2-SIGMA DIFFERENCE (m)</td>
<td>0.837</td>
</tr>
<tr>
<td>NRP Xrcs 2-RMS DIFFERENCE (m)</td>
<td>1.715</td>
</tr>
<tr>
<td>NRP Yrcs 2-RMS DIFFERENCE (m)</td>
<td>2.471</td>
</tr>
<tr>
<td>NRP Zrcs 2-RMS DIFFERENCE (m)</td>
<td>0.837</td>
</tr>
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</table>

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

<table>
<thead>
<tr>
<th>LGRP Xrcs POSITION (m)</th>
<th>226.083</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGRP Yrcs POSITION (m)</td>
<td>-1.442</td>
</tr>
</tbody>
</table>
APPROACH #: ES517215
START TIME: 335597.056
STOP TIME: 335750.462

MINIMUM HDOP: 0.7
MAXIMUM HDOP: 0.7
AVERAGE HDOP: 0.7

MINIMUM VDOP: 1.6
MAXIMUM VDOP: 1.7
AVERAGE VDOP: 1.7

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY                          *
******************************************************************************

******************************************************************************
* VALID APPROACH                                                            *
******************************************************************************

******************************************************************************
* SUCCESSFUL APPROACH                                                        *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT → ROLL-OUT
-----------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.720
NRP Yrcs MEAN DIFFERENCE (m): 1.191
NRP Zrcs MEAN DIFFERENCE (m): 0.028

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.967
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.573
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.910

NRP Xrcs 2-RMS DIFFERENCE (m): 1.735
NRP Yrcs 2-RMS DIFFERENCE (m): 2.450
NRP Zrcs 2-RMS DIFFERENCE (m): 0.912

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRP Xrcs POSITION (m): 162.972
LGRP Yrcs POSITION (m): -1.037
APPROACH #: ESS17216
START TIME: 336088.396
STOP TIME: 336235.913

MINIMUM HDOP: 0.7
MAXIMUM HDOP: 0.8
AVERAGE HDOP: 0.7

MINIMUM VDOP: 1.7
MAXIMUM VDOP: 1.8
AVERAGE VDOP: 1.7

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

******************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
******************************************************

******************************************************
* VALID APPROACH *
******************************************************

******************************************************
* SUCCESSFUL APPROACH *
******************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
--------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.751
NRP Yrcs MEAN DIFFERENCE (m): 1.204
NRP Zrcs MEAN DIFFERENCE (m): 0.061

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.910
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.585
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.822

NRP Xrcs 2-RMS DIFFERENCE (m): 1.755
NRP Yrcs 2-RMS DIFFERENCE (m): 2.478
NRP Zrcs 2-RMS DIFFERENCE (m): 0.831

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
--------------------------------------------------
LGRP Xrcs POSITION (m): 235.617
LGRP Yrcs POSITION (m): -2.115
NRP LONGITUDINAL, LATERAL AND VERTICAL UNFILTERED POSITION DIFFERENCES

ES517216

NRP Xrcs Diff (m)

NRP Yrcs Diff (m)

NRP Zrcs Diff (m)

NRP Xrcs Position (m)
APPROACH #: ES517217
START TIME: 336601.264
STOP TIME: 336755.583

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 0.9
AVERAGE HDOP: 0.9

MINIMUM VDOP: 1.8
MAXIMUM VDOP: 3.1
AVERAGE VDOP: 2.7

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 7

************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
************************************************************************

************************************************************************
* VALID APPROACH *
************************************************************************

************************************************************************
* SUCCESSFUL APPROACH *
************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 0.682
NRP Yrcs MEAN DIFFERENCE (m): 1.137
NRP Zrcs MEAN DIFFERENCE (m): 0.073

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.801
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.466
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.787

NRP Xrcs 2-RMS DIFFERENCE (m): 1.582
NRP Yrcs 2-RMS DIFFERENCE (m): 2.322
NRP Zrcs 2-RMS DIFFERENCE (m): 0.801

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 202.738
LGRP Yrcs POSITION (m): -1.979
APPROACH #: ES517218
START TIME: 337125.660
STOP TIME: 337275.319

MINIMUM HDOP: 0.9
MAXIMUM HDOP: 0.9
AVERAGE HDOP: 0.9

MINIMUM VDOP: 3.0
MAXIMUM VDOP: 3.1
AVERAGE VDOP: 3.1

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
******************************************************************************

******************************************************************************
* VALID APPROACH *
******************************************************************************

******************************************************************************
* UNSUCCESSFUL APPROACH (MOS 1) DUE TO LESS THAN *
* 95 PERCENT OF ALL OF THE DATA POINTS WITHIN *
* THE VERTICAL FILTER REQUIREMENTS *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
-----------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.621
NRP Yrcs MEAN DIFFERENCE (m): 1.316
NRP Zrcs MEAN DIFFERENCE (m): -0.217

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.893
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.654
NRP Zrcs 2-SIGMA DIFFERENCE (m): 1.123

NRP Xrcs 2-RMS DIFFERENCE (m): 1.530
NRP Yrcs 2-RMS DIFFERENCE (m): 2.712
NRP Zrcs 2-RMS DIFFERENCE (m): 1.204

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRP Xrcs POSITION (m): 341.769
LGRP Yrcs POSITION (m): -0.530
APPROACH #: ES517219
START TIME: 341276.264
STOP TIME: 341430.309

MINIMUM HDOP: 0.5
MAXIMUM HDOP: 1.2
AVERAGE HDOP: 0.7

MINIMUM VDOP: 1.3
MAXIMUM VDOP: 3.2
AVERAGE VDOP: 1.7

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 9
AVERAGE NUMBER OF SVs: 9

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
******************************************************************************

******************************************************************************
* VALID APPROACH *
******************************************************************************

******************************************************************************
* UNSUCCESSFUL APPROACH (MOS 6) DUE TO *
* FALSE LATERAL INTEGRITY ALARMS: 20 *
* UNDER NORMAL OPERATIONS *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

<table>
<thead>
<tr>
<th>NRP Xrcs MEAN DIFFERENCE (m)</th>
<th>0.486</th>
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<tbody>
<tr>
<td>NRP Yrcs MEAN DIFFERENCE (m)</td>
<td>1.161</td>
</tr>
<tr>
<td>NRP Zrcs MEAN DIFFERENCE (m)</td>
<td>0.130</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NRP Xrcs 2-SIGMA DIFFERENCE (m)</th>
<th>1.208</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRP Yrcs 2-SIGMA DIFFERENCE (m)</td>
<td>0.439</td>
</tr>
<tr>
<td>NRP Zrcs 2-SIGMA DIFFERENCE (m)</td>
<td>0.935</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>NRP Xrcs 2-RMS DIFFERENCE (m)</th>
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<tr>
<td>NRP Yrcs 2-RMS DIFFERENCE (m)</td>
<td>2.364</td>
</tr>
<tr>
<td>NRP Zrcs 2-RMS DIFFERENCE (m)</td>
<td>0.971</td>
</tr>
</tbody>
</table>

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

<table>
<thead>
<tr>
<th>LGRP Xrcs POSITION (m)</th>
<th>462.258</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGRP Yrcs POSITION (m)</td>
<td>0.645</td>
</tr>
</tbody>
</table>
APPROACH #: ES517220
START TIME: 341831.594
STOP TIME: 341988.517

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.6
AVERAGE HDOP: 0.6

MINIMUM VDOP: 1.6
MAXIMUM VDOP: 1.7
AVERAGE VDOP: 1.7

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

********************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
********************************************************************

********************************************************************
* VALID APPROACH *
********************************************************************

********************************************************************
* SUCCESSFUL APPROACH *
********************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 0.388
NRP Yrcs MEAN DIFFERENCE (m): 1.287
NRP Zrcs MEAN DIFFERENCE (m): 0.028

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.725
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.285
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.723

NRP Xrcs 2-RMS DIFFERENCE (m): 1.062
NRP Yrcs 2-RMS DIFFERENCE (m): 2.590
NRP Zrcs 2-RMS DIFFERENCE (m): 0.726

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 316.266
LGRP Yrcs POSITION (m): -0.810
APPROACH #: ES517221
START TIME: 342361.198
STOP TIME: 342519.990

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.6
AVERAGE HDOP: 0.6

MINIMUM VDOP: 1.8
MAXIMUM VDOP: 1.8
AVERAGE VDOP: 1.8

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

********************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
********************************************************************************

********************************************************************************
* VALID APPROACH *
********************************************************************************

********************************************************************************
* SUCCESSFUL APPROACH *
********************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

---------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.442
NRP Yrcs MEAN DIFFERENCE (m): 1.225
NRP Zrcs MEAN DIFFERENCE (m): -0.114

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.577
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.430
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.837

NRP Xrcs 2-RMS DIFFERENCE (m): 1.056
NRP Yrcs 2-RMS DIFFERENCE (m): 2.487
NRP Zrcs 2-RMS DIFFERENCE (m): 0.868

---------------------------------------------
LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

---------------------------------------------
LGRP Xrcs POSITION (m): 351.948
LGRP Yrcs POSITION (m): -3.666
APPROACH #: ES517222
START TIME: 342906.122
STOP TIME: 343062.122

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.6
AVERAGE HDOP: 0.6

MINIMUM VDOP: 2.5
MAXIMUM VDOP: 2.6
AVERAGE VDOP: 2.5

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
******************************************************************************

******************************************************************************
* VALID APPROACH *
******************************************************************************

******************************************************************************
* SUCCESSFUL APPROACH *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

| NRP Xrcs MEAN DIFFERENCE (m) | 0.337 |
| NRP Yrcs MEAN DIFFERENCE (m) | 1.272 |
| NRP Zrcs MEAN DIFFERENCE (m) | -0.077 |

| NRP Xrcs 2-SIGMA DIFFERENCE (m) | 0.716 |
| NRP Yrcs 2-SIGMA DIFFERENCE (m) | 0.365 |
| NRP Zrcs 2-SIGMA DIFFERENCE (m) | 0.717 |

| NRP Xrcs 2-RMS DIFFERENCE (m) | 0.984 |
| NRP Yrcs 2-RMS DIFFERENCE (m) | 2.570 |
| NRP Zrcs 2-RMS DIFFERENCE (m) | 0.733 |

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

| LGRP Xrcs POSITION (m) | 315.455 |
| LGRP Yrcs POSITION (m) | -1.552 |
APPROACH #: ES517223
START TIME: 343435.451
STOP TIME: 343589.715

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.6
AVERAGE HDOP: 0.6

MINIMUM VDOP: 2.7
MAXIMUM VDOP: 2.8
AVERAGE VDOP: 2.7

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

************************************************************************************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
************************************************************************************************************************************************

************************************************************************************************************************************************
* VALID APPROACH *
************************************************************************************************************************************************

************************************************************************************************************************************************
* SUCCESSFUL APPROACH *
************************************************************************************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 0.420
NRP Yrcs MEAN DIFFERENCE (m): 1.164
NRP Zrcs MEAN DIFFERENCE (m): -0.178

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.687
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.703
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.573

NRP Xrcs 2-RMS DIFFERENCE (m): 1.086
NRP Yrcs 2-RMS DIFFERENCE (m): 2.431
NRP Zrcs 2-RMS DIFFERENCE (m): 0.674

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 384.845
LGRP Yrcs POSITION (m): -1.405
NRP LONGITUDINAL, LATERAL AND VERTICAL UNFILTERED POSITION DIFFERENCES

ES517223

NRP Xrcs Diff (m)

NRP Yrcs Diff (m)

NRP Zrcs Diff (m)

NRP Xrcs Position (m)
APPROACH #: ES517224
START TIME: 343997.924
STOP TIME: 344150.254

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.7
AVERAGE HDOP: 0.6

MINIMUM VDOP: 2.7
MAXIMUM VDOP: 2.8
AVERAGE VDOP: 2.8

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
******************************************************************************

******************************************************************************
* VALID APPROACH *
******************************************************************************

******************************************************************************
* SUCCESSFUL APPROACH *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
--------------------------------------------------
NRP Xrs Mean Difference (m): 0.428
NRP Yrs Mean Difference (m): 1.252
NRP Zrs Mean Difference (m): -0.064

NRP Xrs 2-SIGMA Difference (m): 0.595
NRP Yrs 2-SIGMA Difference (m): 0.333
NRP Zrs 2-SIGMA Difference (m): 0.604

NRP Xrs 2-RMS Difference (m): 1.042
NRP Yrs 2-RMS Difference (m): 2.527
NRP Zrs 2-RMS Difference (m): 0.617

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-------------------------------------------------
LGRP Xrs Position (m): 342.140
LGRP Yrs Position (m): -0.748
APPROACH #: ES517225
START TIME: 344523.451
STOP TIME: 344680.660

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.7
AVERAGE HDOP: 0.7

MINIMUM VDOP: 1.8
MAXIMUM VDOP: 2.7
AVERAGE VDOP: 2.4

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 7

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY  *
******************************************************************************

******************************************************************************
* VALID APPROACH  *
******************************************************************************

******************************************************************************
* SUCCESSFUL APPROACH  *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
--------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.368
NRP Yrcs MEAN DIFFERENCE (m): 1.248
NRP Zrcs MEAN DIFFERENCE (m): -0.198

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.768
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.498
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.685

NRP Xrcs 2-RMS DIFFERENCE (m): 1.064
NRP Yrcs 2-RMS DIFFERENCE (m): 2.545
NRP Zrcs 2-RMS DIFFERENCE (m): 0.791

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRP Xrcs POSITION (m): 332.181
LGRP Yrcs POSITION (m): -2.730
APPROACH #: ES517226
START TIME: 345067.264
STOP TIME: 345223.792

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.7
AVERAGE HDOP: 0.7

MINIMUM VDOP: 1.7
MAXIMUM VDOP: 2.5
AVERAGE VDOP: 2.1

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 7

********************************************************************
* Método de Evaluación: Sensor Accuracy of NAV SENSOR ACCURACY *
********************************************************************

********************************************************************
* Válido APPROACH *
********************************************************************

********************************************************************
* Exitoso APPROACH *
********************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
----------------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.393
NRP Yrcs MEAN DIFFERENCE (m): 1.191
NRP Zrcs MEAN DIFFERENCE (m): 0.038

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.312
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.373
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.668

NRP Xrcs 2-RMS DIFFERENCE (m): 0.846
NRP Yrcs 2-RMS DIFFERENCE (m): 2.411
NRP Zrcs 2-RMS DIFFERENCE (m): 0.672

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
--------------------------------------------------
LGRP Xrcs POSITION (m): 384.394
LGRP Yrcs POSITION (m): -1.143
APPROACH #: ES517228
START TIME: 346155.056
STOP TIME: 346315.715

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.6
AVERAGE HDOP: 0.6

MINIMUM VDOP: 1.5
MAXIMUM VDOP: 1.6
AVERAGE VDOP: 1.6

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

********************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY  *
********************************************************************************

********************************************************************************
*  VALID APPROACH   *
********************************************************************************

********************************************************************************
*  SUCCESSFUL APPROACH  *
********************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 0.528
NRP Yrcs MEAN DIFFERENCE (m): 1.263
NRP Zrcs MEAN DIFFERENCE (m): -0.258

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.253
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.390
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.768

NRP Xrcs 2-RMS DIFFERENCE (m): 1.087
NRP Yrcs 2-RMS DIFFERENCE (m): 2.556
NRP Zrcs 2-RMS DIFFERENCE (m): 0.926

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 384.123
LGRP Yrcs POSITION (m): 0.245
APPROACH #: ES517229
START TIME: 346698.660
STOP TIME: 346858.264

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.6
AVERAGE HDOP: 0.6

MINIMUM VDOP: 1.4
MAXIMUM VDOP: 1.4
AVERAGE VDOP: 1.4

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

*: METHOD OF EVALUATION: NAV SENSOR ACCURACY *
*******************************************************************************

*: VALID APPROACH *
*******************************************************************************

*: SUCCESSFUL APPROACH *
*******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 0.559
NRP Yrcs MEAN DIFFERENCE (m): 1.228
NRP Zrcs MEAN DIFFERENCE (m): -0.177

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.247
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.416
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.586

NRP Xrcs 2-RMS DIFFERENCE (m): 1.144
NRP Yrcs 2-RMS DIFFERENCE (m): 2.492
NRP Zrcs 2-RMS DIFFERENCE (m): 0.685

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 444.033
LGRP Yrcs POSITION (m): -0.834

343
APPROACH #: ES517230
START TIME: 347244.330
STOP TIME: 347410.177

MINIMUM HDOP: 0.9
MAXIMUM HDOP: 0.9
AVERAGE HDOP: 0.9

MINIMUM VDOP: 2.9
MAXIMUM VDOP: 3.2
AVERAGE VDOP: 3.1

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

**********************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY                        *
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**********************************************************************
* VALID APPROACH                                                    *
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**********************************************************************
* SUCCESSFUL APPROACH                                               *
**********************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
-----------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.493
NRP Yrcs MEAN DIFFERENCE (m): 1.327
NRP Zrcs MEAN DIFFERENCE (m): -0.130

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.247
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.329
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.644

NRP Xrcs 2-RMS DIFFERENCE (m): 1.016
NRP Yrcs 2-RMS DIFFERENCE (m): 2.675
NRP Zrcs 2-RMS DIFFERENCE (m): 0.695

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRP Xrcs POSITION (m): 436.617
LGRP Yrcs POSITION (m): -0.733

347
NRP LONGITUDINAL, LATERAL AND VERTICAL UNFILTERED POSITION DIFFERENCES

ES517230

NRP Xrcs Diff (m)

NRP Yrcs Diff (m)

NRP Zrcs Diff (m)

NRP Xrcs Position (m)
APPROACH #: ES517231
START TIME: 347768.187
STOP TIME: 347935.122

MINIMUM HDOP: 0.9
MAXIMUM HDOP: 0.9
AVERAGE HDOP: 0.9

MINIMUM VDOP: 3.4
MAXIMUM VDOP: 3.5
AVERAGE VDOP: 3.5

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

********************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
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********************************************************************************
* VALID APPROACH *
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********************************************************************************
* SUCCESSFUL APPROACH *
********************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

-----------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.586
NRP Yrcs MEAN DIFFERENCE (m): 1.291
NRP Zrcs MEAN DIFFERENCE (m): -0.217

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.172
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.371
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.621

NRP Xrcs 2-RMS DIFFERENCE (m): 1.185
NRP Yrcs 2-RMS DIFFERENCE (m): 2.609
NRP Zrcs 2-RMS DIFFERENCE (m): 0.757

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

-----------------------------------------------
LGRP Xrcs POSITION (m): 440.975
LGRP Yrcs POSITION (m): -0.596

351
APPROACH #: ES517232
START TIME: 348490.045
STOP TIME: 348795.045

MINIMUM HDOP: 0.9
MAXIMUM HDOP: 0.9
AVERAGE HDOP: 0.9

MINIMUM VDOP: 3.7
MAXIMUM VDOP: 3.8
AVERAGE VDOP: 3.8

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

*********************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY  *
*********************************************************************************

*********************************************************************************
* VALID STATIC TRIAL  *
*********************************************************************************

*********************************************************************************
* SUCCESSFUL STATIC TRIAL  *
*********************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): -0.366
NRP Yrcs MEAN DIFFERENCE (m): 0.384
NRP Zrcs MEAN DIFFERENCE (m): -0.662

NRP Xrcs 2-SIGMA DIFFERENCE (m): 1.809
NRP Yrcs 2-SIGMA DIFFERENCE (m): 3.055
NRP Zrcs 2-SIGMA DIFFERENCE (m): 1.591

NRP Xrcs 2-RMS DIFFERENCE (m): 1.952
NRP Yrcs 2-RMS DIFFERENCE (m): 3.150
NRP Zrcs 2-RMS DIFFERENCE (m): 2.070

355
APPROACH #: ES517401
START TIME: 490683.726
STOP TIME: 490830.122

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.6
AVERAGE HDOP: 0.6

MINIMUM VDOP: 1.8
MAXIMUM VDOP: 1.9
AVERAGE VDOP: 1.8

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

********************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY                      *
********************************************************************

********************************************************************
* VALID APPROACH                                                   *
********************************************************************

********************************************************************
* SUCCESSFUL APPROACH                                              *
********************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
------------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.484
NRP Yrcs MEAN DIFFERENCE (m): 1.380
NRP Zrcs MEAN DIFFERENCE (m): -0.111

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.932
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.490
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.685

NRP Xrcs 2-RMS DIFFERENCE (m): 1.344
NRP Yrcs 2-RMS DIFFERENCE (m): 2.803
NRP Zrcs 2-RMS DIFFERENCE (m): 0.720

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRP Xrcs POSITION (m): 417.162
LGRP Yrcs POSITION (m): -1.812
APPROACH #: ES517402
START TIME: 491176.528
STOP TIME: 491320.122

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.6
AVERAGE HDOP: 0.6

MINIMUM VDOP: 1.8
MAXIMUM VDOP: 1.9
AVERAGE VDOP: 1.9

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY                        *
******************************************************************************

******************************************************************************
* VALID APPROACH         *                                               *
******************************************************************************

******************************************************************************
* SUCCESSFUL APPROACH    *                                               *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT --> ROLL-OUT
-------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.549
NRP Yrcs MEAN DIFFERENCE (m): 1.474
NRP Zrcs MEAN DIFFERENCE (m): -0.097

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.226
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.291
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.605

NRP Xrcs 2-RMS DIFFERENCE (m): 1.121
NRP Yrcs 2-RMS DIFFERENCE (m): 2.962
NRP Zrcs 2-RMS DIFFERENCE (m): 0.635

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------
LGRP Xrcs POSITION (m): 442.087
LGRP Yrcs POSITION (m): -1.290
APPROACH #: ES517403
START TIME: 491676.649
STOP TIME: 491815.111

MINIMUM HDOP: 0.4
MAXIMUM HDOP: 0.6
AVERAGE HDOP: 0.5

MINIMUM VDOP: 1.2
MAXIMUM VDOP: 1.8
AVERAGE VDOP: 1.5

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 10
AVERAGE NUMBER OF SVs: 9

********************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
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********************************************************************************
* VALID APPROACH *
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********************************************************************************
* SUCCESSFUL APPROACH *
********************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
-----------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.549
NRP Yrcs MEAN DIFFERENCE (m): 1.550
NRP Zrcs MEAN DIFFERENCE (m): -0.062

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.261
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.230
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.614

NRP Xrcs 2-RMS DIFFERENCE (m): 1.128
NRP Yrcs 2-RMS DIFFERENCE (m): 3.108
NRP Zrcs 2-RMS DIFFERENCE (m): 0.626

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------------
LGRP Xrcs POSITION (m): 30.090
LGRP Yrcs POSITION (m): -1.284
APPROACH #: ES517404
START TIME: 492175.187
STOP TIME: 492322.924

MINIMUM HDOP: 1.0
MAXIMUM HDOP: 1.0
AVERAGE HDOP: 1.0

MINIMUM VDOP: 3.3
MAXIMUM VDOP: 3.5
AVERAGE VDOP: 3.4

MINIMUM NUMBER OF SVs: 9
MAXIMUM NUMBER OF SVs: 9
AVERAGE NUMBER OF SVs: 9

**********************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY  *
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**********************************************************************************
* VALID APPROACH  *
**********************************************************************************

**********************************************************************************
* SUCCESSFUL APPROACH  *
**********************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
--------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.570
NRP Yrcs MEAN DIFFERENCE (m): 1.533
NRP Zrcs MEAN DIFFERENCE (m): -0.182

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.245
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.300
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.685

NRP Xrcs 2-RMS DIFFERENCE (m): 1.167
NRP Yrcs 2-RMS DIFFERENCE (m): 3.080
NRP Zrcs 2-RMS DIFFERENCE (m): 0.776

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
----------------------------------------------
LGRP Xrcs POSITION (m): 301.513
LGRP Yrcs POSITION (m): -1.206
NRP LONGITUDINAL, LATERAL AND VERTICAL UNFILTERED POSITION DIFFERENCES

ES517404

NRP Xrcs Diff (m)

NRP Yrcs Diff (m)

NRP Zrcs Diff (m)

NRP Xrcs Position (m)
APPROACH #: ES517405
START TIME: 492668.330
STOP TIME: 492815.264

MINIMUM HDOP: 1.0
MAXIMUM HDOP: 1.0
AVERAGE HDOP: 1.0

MINIMUM VDOP: 3.3
MAXIMUM VDOP: 3.6
AVERAGE VDOP: 3.4

MINIMUM NUMBER OF SVs: 9
MAXIMUM NUMBER OF SVs: 9
AVERAGE NUMBER OF SVs: 9

*****************************************************************
*               METHOD OF EVALUATION: NAV SENSOR ACCURACY           *
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*****************************************************************
*                       VALID APPROACH                          *
*****************************************************************

*****************************************************************
*            SUCCESSFUL APPROACH                               *
*****************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRp Xrcs MEAN DIFFERENCE (m): 0.601
NRp Yrcs MEAN DIFFERENCE (m): 1.547
NRp Zrcs MEAN DIFFERENCE (m): -0.164

NRp Xrcs 2-SIGMA DIFFERENCE (m): 0.303
NRp Yrcs 2-SIGMA DIFFERENCE (m): 0.243
NRp Zrcs 2-SIGMA DIFFERENCE (m): 0.682

NRp Xrcs 2-RMS DIFFERENCE (m): 1.240
NRp Yrcs 2-RMS DIFFERENCE (m): 3.104
NRp Zrcs 2-RMS DIFFERENCE (m): 0.756

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 283.313
LGRP Yrcs POSITION (m): -1.441
APPROACH #: ES517406
START TIME: 493158.649
STOP TIME: 493305.187

MINIMUM HDOP: 0.9
MAXIMUM HDOP: 0.9
AVERAGE HDOP: 0.9

MINIMUM VDOP: 3.1
MAXIMUM VDOP: 3.2
AVERAGE VDOP: 3.2

MINIMUM NUMBER OF SVs: 9
MAXIMUM NUMBER OF SVs: 9
AVERAGE NUMBER OF SVs: 9

**********************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
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**********************************************************************
* VALID APPROACH *
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**********************************************************************
* SUCCESSFUL APPROACH *
**********************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

---------------------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.312
NRP Yrcs MEAN DIFFERENCE (m): 1.488
NRP Zrcs MEAN DIFFERENCE (m): -0.059

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.977
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.169
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.675

NRP Xrcs 2-RMS DIFFERENCE (m): 1.160
NRP Yrcs 2-RMS DIFFERENCE (m): 2.982
NRP Zrcs 2-RMS DIFFERENCE (m): 0.685

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

---------------------------------------------------------------
LGRP Xrcs POSITION (m): 259.157
LGRP Yrcs POSITION (m): -1.347

377
APPROACH #: ES517407
START TIME: 493661.330
STOP TIME: 493805.858

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 0.9
AVERAGE HDOP: 0.8

MINIMUM VDOP: 2.7
MAXIMUM VDOP: 4.6
AVERAGE VDOP: 3.3

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 9
AVERAGE NUMBER OF SVs: 9

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
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******************************************************************************
* VALID APPROACH *
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******************************************************************************
* SUCCESSFUL APPROACH *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
-----------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.430
NRP Yrcs MEAN DIFFERENCE (m): 1.488
NRP Zrcs MEAN DIFFERENCE (m): -0.115

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.810
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.353
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.643

NRP Xrcs 2-RMS DIFFERENCE (m): 1.182
NRP Yrcs 2-RMS DIFFERENCE (m): 2.997
NRP Zrcs 2-RMS DIFFERENCE (m): 0.682

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
-----------------------------------------------------
LGRP Xrcs POSITION (m): 343.814
LGRP Yrcs POSITION (m): -1.994
APPROACH #: ES517408
START TIME: 494136.385
STOP TIME: 494287.781

MINIMUM HDOP: 0.9
MAXIMUM HDOP: 0.9
AVERAGE HDOP: 0.9

MINIMUM VDOP: 4.1
MAXIMUM VDOP: 4.2
AVERAGE VDOP: 4.2

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

*************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY  *
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*************************************************************************
*  VALID APPROACH   *
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*************************************************************************
*  SUCCESSFUL APPROACH  *
*************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
---------------------------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.216
NRP Yrcs MEAN DIFFERENCE (m): 1.352
NRP Zrcs MEAN DIFFERENCE (m): -0.087

NRP Xrcs 2-SIGMA DIFFERENCE (m): 1.048
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.574
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.713

NRP Xrcs 2-RMS DIFFERENCE (m): 1.134
NRP Yrcs 2-RMS DIFFERENCE (m): 2.764
NRP Zrcs 2-RMS DIFFERENCE (m): 0.734

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
---------------------------------------------------------------------
LGRP Xrcs POSITION (m): 262.831
LGRP Yrcs POSITION (m): -1.343
NRP LONGITUDINAL, LATERAL AND VERTICAL UNFILTERED POSITION DIFFERENCES

ES517408

NRP Xrcs Diff (m)

NRP Yrcs Diff (m)

NRP Zrcs Diff (m)

NRP Xrcs Position (m)

-6000 -5000 -4000 -3000 -2000 -1000 0 1000 2000

-5 0 5

-6000 -5000 -4000 -3000 -2000 -1000 0 1000 2000

0 0.5 1 1.5 2

-6000 -5000 -4000 -3000 -2000 -1000 0 1000 2000

0 1 2

-1 0 1 2
APPROACH #: ES517409
START TIME: 494636.451
STOP TIME: 494785.121

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 0.8
AVERAGE HDOP: 0.8

MINIMUM VDOP: 3.5
MAXIMUM VDOP: 3.8
AVERAGE VDOP: 3.6

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

*******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY                          *
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*******************************************************************************
* VALID APPROACH                                                       *
*******************************************************************************

*******************************************************************************
* SUCCESSFUL APPROACH                                                  *
*******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
-----------------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.319
NRP Yrcs MEAN DIFFERENCE (m): 1.443
NRP Zrcs MEAN DIFFERENCE (m): -0.154

NRP Xrcs 2-SIGMA DIFFERENCE (m): 1.031
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.451
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.803

NRP Xrcs 2-RMS DIFFERENCE (m): 1.212
NRP Yrcs 2-RMS DIFFERENCE (m): 2.921
NRP Zrcs 2-RMS DIFFERENCE (m): 0.860

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
--------------------------------------------------------
LGRP Xrcs POSITION (m): 419.403
LGRP Yrcs POSITION (m): -0.120
APPROACH #: ES517410
START TIME: 495147.396
STOP TIME: 495299.462

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 0.8
AVERAGE HDOP: 0.8

MINIMUM VDOP: 2.9
MAXIMUM VDOP: 3.2
AVERAGE VDOP: 3.1

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

**********************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
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**********************************************************************
* VALID APPROACH *
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**********************************************************************
* SUCCESSFUL APPROACH *
**********************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

---------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.303
NRP Yrcs MEAN DIFFERENCE (m): 1.546
NRP Zrcs MEAN DIFFERENCE (m): -0.149

NRP Xrcs 2-SIGMA DIFFERENCE (m): 1.015
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.425
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.798

NRP Xrcs 2-RMS DIFFERENCE (m): 1.182
NRP Yrcs 2-RMS DIFFERENCE (m): 3.122
NRP Zrcs 2-RMS DIFFERENCE (m): 0.853

---------------------------------------------
LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
---------------------------------------------
LGRP Xrcs POSITION (m): 416.364
LGRP Yrcs POSITION (m): -0.606
APPROACH #: ES517411
START TIME: 495656.330
STOP TIME: 495810.649

MINIMUM HDOP: 0.7
MAXIMUM HDOP: 0.8
AVERAGE HDOP: 0.7

MINIMUM VDOP: 2.5
MAXIMUM VDOP: 2.7
AVERAGE VDOP: 2.5

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

*******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
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*******************************************************************************
* VALID APPROACH *
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*******************************************************************************
* SUCCESSFUL APPROACH *
*******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 0.249
NRP Yrcs MEAN DIFFERENCE (m): 1.282
NRP Zrcs MEAN DIFFERENCE (m): -0.124

NRP Xrcs 2-SIGMA DIFFERENCE (m): 1.064
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.488
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.658

NRP Xrcs 2-RMS DIFFERENCE (m): 1.175
NRP Yrcs 2-RMS DIFFERENCE (m): 2.611
NRP Zrcs 2-RMS DIFFERENCE (m): 0.703

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 368.557
LGRP Yrcs POSITION (m): -0.809
APPRAOCH #: ES517412
START TIME: 496165.528
STOP TIME: 496320.188

MINIMUM HDOP: 0.7
MAXIMUM HDOP: 1.1
AVERAGE HDOP: 0.8

MINIMUM VDOP: 2.1
MAXIMUM VDOP: 4.0
AVERAGE VDOP: 2.8

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

***************************************************************************************
*   METHOD OF EVALUATION: NAV SENSOR ACCURACY   *
***************************************************************************************

***************************************************************************************
*   VALID APPROACH   *
***************************************************************************************

***************************************************************************************
*   SUCCESSFUL APPROACH   *
***************************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRPs Xrcs MEAN DIFFERENCE (m): 0.240
NRPs Yrcs MEAN DIFFERENCE (m): 1.188
NRPs Zrcs MEAN DIFFERENCE (m): -0.097

NRPs Xrcs 2-SIGMA DIFFERENCE (m): 1.131
NRPs Yrcs 2-SIGMA DIFFERENCE (m): 0.582
NRPs Zrcs 2-SIGMA DIFFERENCE (m): 0.827

NRPs Xrcs 2-RMS DIFFERENCE (m): 1.228
NRPs Yrcs 2-RMS DIFFERENCE (m): 2.445
NRPs Zrcs 2-RMS DIFFERENCE (m): 0.850

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRPs Xrcs POSITION (m): 312.520
LGRPs Yrcs POSITION (m): -0.768
NRP LONGITUDINAL, LATERAL AND VERTICAL UNFILTERED POSITION DIFFERENCES

ES517412

NRP Xrcs Diff (m)

NRP Yrcs Diff (m)

NRP Zrcs Diff (m)

NRP Xrcs Position (m)
APPROACH #: ES517413
START TIME: 496666.792
STOP TIME: 496824.462

MINIMUM HDOP: 0.7
MAXIMUM HDOP: 1.2
AVERAGE HDOP: 0.9

MINIMUM VDOP: 1.8
MAXIMUM VDOP: 4.1
AVERAGE VDOP: 2.7

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
******************************************************************************

******************************************************************************
* VALID APPROACH *
******************************************************************************

******************************************************************************
* SUCCESSFUL APPROACH *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

---------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.204
NRP Yrcs MEAN DIFFERENCE (m): 1.260
NRP Zrcs MEAN DIFFERENCE (m): -0.094

NRP Xrcs 2-SIGMA DIFFERENCE (m): 1.114
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.398
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.709

NRP Xrcs 2-RMS DIFFERENCE (m): 1.187
NRP Yrcs 2-RMS DIFFERENCE (m): 2.551
NRP Zrcs 2-RMS DIFFERENCE (m): 0.734

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

---------------------------------------------
LGRP Xrcs POSITION (m): 303.430
LGRP Yrcs POSITION (m): -0.350
APPROACH #: ES517414
START TIME: 497167.253
STOP TIME: 497320.056

MINIMUM HDOP: 1.3
MAXIMUM HDOP: 1.3
AVERAGE HDOP: 1.3

MINIMUM VDOP: 4.1
MAXIMUM VDOP: 4.3
AVERAGE VDOP: 4.2

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

****************************************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
****************************************************************************************************

****************************************************************************************************
* VALID APPROACH *
****************************************************************************************************

****************************************************************************************************
* SUCCESSFUL APPROACH *
****************************************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
--------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.378
NRP Yrcs MEAN DIFFERENCE (m): 1.302
NRP Zrcs MEAN DIFFERENCE (m): -0.021

NRP Xrcs 2-SIGMA DIFFERENCE (m): 0.940
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.397
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.855

NRP Xrcs 2-RMS DIFFERENCE (m): 1.207
NRP Yrcs 2-RMS DIFFERENCE (m): 2.634
NRP Zrcs 2-RMS DIFFERENCE (m): 0.856

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
--------------------------------------------------
LGRP Xrcs POSITION (m): 311.440
LGRP Yrcs POSITION (m): -1.988

409
APPROACH #: ES517415
START TIME: 497671.517
STOP TIME: 497828.385

MINIMUM HDOP: 1.4
MAXIMUM HDOP: 1.4
AVERAGE HDOP: 1.4

MINIMUM VDOP: 4.1
MAXIMUM VDOP: 4.3
AVERAGE VDOP: 4.2

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

*********************************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
*********************************************************************************************

*********************************************************************************************
* VALID APPROACH *
*********************************************************************************************

*********************************************************************************************
* SUCCESSFUL APPROACH *
*********************************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
---------------------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.282
NRP Yrcs MEAN DIFFERENCE (m): 1.135
NRP Zrcs MEAN DIFFERENCE (m): -0.135

NRP Xrcs 2-SIGMA DIFFERENCE (m): 1.147
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.483
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.912

NRP Xrcs 2-RMS DIFFERENCE (m): 1.278
NRP Yrcs 2-RMS DIFFERENCE (m): 2.321
NRP Zrcs 2-RMS DIFFERENCE (m): 0.952

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
--------------------------------------------------------------
LGRP Xrcs POSITION (m): 440.847
LGRP Yrcs POSITION (m): -0.711
APPROACH #: ES517416
START TIME: 498167.396
STOP TIME: 498325.385

MINIMUM HDOP: 1.4
MAXIMUM HDOP: 1.4
AVERAGE HDOP: 1.4

MINIMUM VDOP: 3.7
MAXIMUM VDOP: 4.0
AVERAGE VDOP: 3.9

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

*********************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY             *
*********************************************************

*********************************************************
* VALID APPROACH                                       *
*********************************************************

*********************************************************
* SUCCESSFUL APPROACH                                  *
*********************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

| NRP Xrcs MEAN DIFFERENCE (m) | 0.217 |
| NRP Yrcs MEAN DIFFERENCE (m) | 1.205 |
| NRP Zrcs MEAN DIFFERENCE (m) | -0.099 |
| NRP Xrcs 2-SIGMA DIFFERENCE (m) | 1.172 |
| NRP Yrcs 2-SIGMA DIFFERENCE (m) | 0.570 |
| NRP Zrcs 2-SIGMA DIFFERENCE (m) | 0.744 |
| NRP Xrcs 2-RMS DIFFERENCE (m) | 1.250 |
| NRP Yrcs 2-RMS DIFFERENCE (m) | 2.475 |
| NRP Zrcs 2-RMS DIFFERENCE (m) | 0.770 |

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

| LGRP Xrcs POSITION (m) | 331.417 |
| LGRP Yrcs POSITION (m) | -0.764 |
APPROACH #: ES517417
START TIME: 498666.396
STOP TIME: 498825.330

MINIMUM HDOP: 1.1
MAXIMUM HDOP: 1.4
AVERAGE HDOP: 1.2

MINIMUM VDOP: 1.5
MAXIMUM VDOP: 3.5
AVERAGE VDOP: 2.0

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

*******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY  *
*******************************************************************************

*******************************************************************************
*       VALID APPROACH        *
*******************************************************************************

*******************************************************************************
*      SUCCESSFUL APPROACH       *
*******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
--------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.223
NRP Yrcs MEAN DIFFERENCE (m): 1.298
NRP Zrcs MEAN DIFFERENCE (m): -0.124

NRP Xrcs 2-SIGMA DIFFERENCE (m): 1.239
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.453
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.909

NRP Xrcs 2-RMS DIFFERENCE (m): 1.317
NRP Yrcs 2-RMS DIFFERENCE (m): 2.635
NRP Zrcs 2-RMS DIFFERENCE (m): 0.942

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
--------------------------------------------------
LGRP Xrcs POSITION (m): 386.805
LGRP Yrcs POSITION (m): -0.893
NRP LONGITUDINAL, LATERAL AND VERTICAL UNFILTERED POSITION DIFFERENCES

ES317417

NRP Xrcs Diff (m)

NRP Yrcs Diff (m)

NRP Zrcs Diff (m)

NRP Xrcs Position (m)
APPROACH #: ES517418
START TIME: 499166.462
STOP TIME: 499325.462

MINIMUM HDOP: 1.0
MAXIMUM HDOP: 1.8
AVERAGE HDOP: 1.6

MINIMUM VDOP: 1.5
MAXIMUM VDOP: 4.4
AVERAGE VDOP: 3.7

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 7

******************************************************************************************************************
*       METHOD OF EVALUATION: NAV SENSOR ACCURACY       *
******************************************************************************************************************

******************************************************************************************************************
* VALID APPROACH
******************************************************************************************************************

******************************************************************************************************************
* SUCCESSFUL APPROACH
******************************************************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
*************************************************************
NRP Xrcs MEAN DIFFERENCE (m): 0.321
NRP Yrcs MEAN DIFFERENCE (m): 1.286
NRP Zrcs MEAN DIFFERENCE (m): -0.147

NRP Xrcs 2-SIGMA DIFFERENCE (m): 1.041
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.382
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.900

NRP Xrcs 2-RMS DIFFERENCE (m): 1.223
NRP Yrcs 2-RMS DIFFERENCE (m): 2.601
NRP Zrcs 2-RMS DIFFERENCE (m): 0.947

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
*****************************************************
LGRP Xrcs POSITION (m): 368.233
LGRP Yrcs POSITION (m): 0.027
APPROACH #: ES517419
START TIME: 499680.451
STOP TIME: 499840.858

MINIMUM HDOP: 1.4
MAXIMUM HDOP: 1.5
AVERAGE HDOP: 1.5

MINIMUM VDOP: 3.5
MAXIMUM VDOP: 3.9
AVERAGE VDOP: 3.7

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

*******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY                            *
*******************************************************************************

*******************************************************************************
*           VALID APPROACH                                               *
*******************************************************************************

*******************************************************************************
*                SUCCESSFUL APPROACH                                          *
*******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
---------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.171
NRP Yrcs MEAN DIFFERENCE (m): 1.232
NRP Zrcs MEAN DIFFERENCE (m): -0.101

NRP Xrcs 2-SIGMA DIFFERENCE (m): 1.209
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.449
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.874

NRP Xrcs 2-RMS DIFFERENCE (m): 1.257
NRP Yrcs 2-RMS DIFFERENCE (m): 2.505
NRP Zrcs 2-RMS DIFFERENCE (m): 0.897

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
--------------------------------------------------
LGRP Xrcs POSITION (m): 443.015
LGRP Yrcs POSITION (m): -0.495
APPRAOCH #: ES517420
START TIME: 504860.330
STOP TIME: 505004.330

MINIMUM HDOP: 0.7
MAXIMUM HDOP: 0.7
AVERAGE HDOP: 0.7

MINIMUM VDOP: 2.7
MAXIMUM VDOP: 2.8
AVERAGE VDOP: 2.7

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY                           *
******************************************************************************

******************************************************************************
* VALID APPROACH                                                      *
******************************************************************************

******************************************************************************
* SUCCESSFUL APPROACH                                               *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

---------------------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.347
NRP Yrcs MEAN DIFFERENCE (m): 1.344
NRP Zrcs MEAN DIFFERENCE (m): -0.033

NRP Xrcs 2-SIGMA DIFFERENCE (m): 1.220
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.640
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.797

NRP Xrcs 2-RMS DIFFERENCE (m): 1.404
NRP Yrcs 2-RMS DIFFERENCE (m): 2.763
NRP Zrcs 2-RMS DIFFERENCE (m): 0.800

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

---------------------------------------------------------------
LGRP Xrcs POSITION (m): 282.081
LGRP Yrcs POSITION (m): -1.052
APPROACH #: ES517421
START TIME: 505317.330
STOP TIME: 505459.858

MINIMUM HDOP: 0.7
MAXIMUM HDOP: 0.7
AVERAGE HDOP: 0.7

MINIMUM VDOP: 2.3
MAXIMUM VDOP: 2.5
AVERAGE VDOP: 2.4

MINIMUM NUMBER OF SVs: 8
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

********************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
********************************************************************************

********************************************************************************
* VALID APPROACH *
********************************************************************************

********************************************************************************
* SUCCESSFUL APPROACH *
********************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT
--------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 0.061
NRP Yrcs MEAN DIFFERENCE (m): 1.395
NRP Zrcs MEAN DIFFERENCE (m): -0.081

NRP Xrcs 2-SIGMA DIFFERENCE (m): 1.186
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.539
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.871

NRP Xrcs 2-RMS DIFFERENCE (m): 1.193
NRP Yrcs 2-RMS DIFFERENCE (m): 2.841
NRP Zrcs 2-RMS DIFFERENCE (m): 0.886

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION
--------------------------------------------------
LGRP Xrcs POSITION (m): 162.796
LGRP Yrcs POSITION (m): -2.560
NRP LONGITUDINAL, LATERAL AND VERTICAL UNFILTERED POSITION DIFFERENCES

ES517421

NRP Xrcs Diff (m)

NRP Yrcs Diff (m)

NRP Zrcs Diff (m)

NRP Xrcs Position (m)
APPROACH #: ES517422
START TIME: 505784.122
STOP TIME: 505924.913

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 0.8
AVERAGE HDOP: 0.8

MINIMUM VDOP: 2.7
MAXIMUM VDOP: 2.9
AVERAGE VDOP: 2.8

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

****************************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
****************************************************************************************

****************************************************************************************
* VALID APPROACH *
****************************************************************************************

****************************************************************************************
* SUCCESSFUL APPROACH *
****************************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 0.364
NRP Yrcs MEAN DIFFERENCE (m): 1.509
NRP Zrcs MEAN DIFFERENCE (m): -0.237

NRP Xrcs 2-SIGMA DIFFERENCE (m): 1.297
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.470
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.839

NRP Xrcs 2-RMS DIFFERENCE (m): 1.487
NRP Yrcs 2-RMS DIFFERENCE (m): 3.054
NRP Zrcs 2-RMS DIFFERENCE (m): 0.964

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 387.159
LGRP Yrcs POSITION (m): -2.346
APPROACH #: ES517424
START TIME: 506985.198
STOP TIME: 507124.858

MINIMUM HDOP: 0.6
MAXIMUM HDOP: 0.6
AVERAGE HDOP: 0.6

MINIMUM VDOP: 1.4
MAXIMUM VDOP: 1.5
AVERAGE VDOP: 1.5

MINIMUM NUMBER OF SVS: 8
MAXIMUM NUMBER OF SVS: 8
AVERAGE NUMBER OF SVS: 8

*****************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
*****************************************************************************

*****************************************************************************
* VALID APPROACH *
*****************************************************************************

*****************************************************************************
* SUCCESSFUL APPROACH *
*****************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 0.361
NRP Yrcs MEAN DIFFERENCE (m): 1.366
NRP Zrcs MEAN DIFFERENCE (m): -0.098

NRP Xrcs 2-SIGMA DIFFERENCE (m): 1.296
NRP Yrcs 2-SIGMA DIFFERENCE (m): 0.466
NRP Zrcs 2-SIGMA DIFFERENCE (m): 0.772

NRP Xrcs 2-RMS DIFFERENCE (m): 1.484
NRP Yrcs 2-RMS DIFFERENCE (m): 2.772
NRP Zrcs 2-RMS DIFFERENCE (m): 0.797

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGRP Xrcs POSITION (m): 340.446
LGRP Yrcs POSITION (m): -2.308
NRP LONGITUDINAL, LATERAL AND VERTICAL UNFILTERED POSITION DIFFERENCES

NRP Xrcs Diff (m)

NRP Yrcs Diff (m)

NRP Zrcs Diff (m)
APPROACH #: ES517425  
START TIME: 507484.462  
STOP TIME: 507634.198

MINIMUM HDOP: 0.5  
MAXIMUM HDOP: 0.7  
AVERAGE HDOP: 0.6

MINIMUM VDOP: 1.2  
MAXIMUM VDOP: 1.6  
AVERAGE VDOP: 1.3

MINIMUM NUMBER OF SVs: 8  
MAXIMUM NUMBER OF SVs: 9  
AVERAGE NUMBER OF SVs: 9

**********************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY  *
**********************************************************************************

**********************************************************************************
* VALID APPROACH  *
**********************************************************************************

**********************************************************************************
* SUCCESSFUL APPROACH  *
**********************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRp Xrcs MEAN DIFFERENCE (m): 0.431  
NRp Yrcs MEAN DIFFERENCE (m): 1.454  
NRp Zrcs MEAN DIFFERENCE (m): -0.144

NRp Xrcs 2-SIGMA DIFFERENCE (m): 1.278  
NRp Yrcs 2-SIGMA DIFFERENCE (m): 0.385  
NRp Zrcs 2-SIGMA DIFFERENCE (m): 0.690

NRp Xrcs 2-RMS DIFFERENCE (m): 1.541  
NRp Yrcs 2-RMS DIFFERENCE (m): 2.933  
NRp Zrcs 2-RMS DIFFERENCE (m): 0.747

LANDING GEAR REFERENCE POINT TOUCHDOWN POSITION

LGp Xrcs POSITION (m): 470.908  
LGp Yrcs POSITION (m): -0.962
NRP LONGITUDINAL, LATERAL AND VERTICAL UNFILTERED POSITION DIFFERENCES

ES517425

NRP Xrcs Diff (m)

NRP Yrcs Diff (m)

NRP Zrcs Diff (m)

NRP Xrcs Position (m)
APPROACH #: ES517426
START TIME: 508529.056
STOP TIME: 508829.847

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 0.9
AVERAGE HDOP: 0.8

MINIMUM VDOP: 1.7
MAXIMUM VDOP: 2.9
AVERAGE VDOP: 1.8

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 8
AVERAGE NUMBER OF SVs: 8

***************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
***************************************************************

***************************************************************
* VALID STATIC TRIAL *
***************************************************************

***************************************************************
* SUCCESSFUL STATIC TRIAL *
***************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

-------------------------------------------------------------
NRP Xrcs MEAN DIFFERENCE (m): 1.755
NRP Yrcs MEAN DIFFERENCE (m): 3.473
NRP Zrcs MEAN DIFFERENCE (m): 1.063

NRP Xrcs 2-SIGMA DIFFERENCE (m): 3.507
NRP Yrcs 2-SIGMA DIFFERENCE (m): 6.275
NRP Zrcs 2-SIGMA DIFFERENCE (m): 3.121

NRP Xrcs 2-RMS DIFFERENCE (m): 4.962
NRP Yrcs 2-RMS DIFFERENCE (m): 9.360
NRP Zrcs 2-RMS DIFFERENCE (m): 3.776
APPROACH #: ES517427
START TIME: 509244.264
STOP TIME: 509519.847

MINIMUM HDOP: 0.9
MAXIMUM HDOP: 0.9
AVERAGE HDOP: 0.9

MINIMUM VDOP: 3.1
MAXIMUM VDOP: 3.1
AVERAGE VDOP: 3.1

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

******************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY *
******************************************************************************

******************************************************************************
* VALID STATIC TRIAL *
******************************************************************************

******************************************************************************
* SUCCESSFUL STATIC TRIAL *
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 0.921
NRP Yrcs MEAN DIFFERENCE (m): 0.582
NRP Zrcs MEAN DIFFERENCE (m): 3.877

NRP Xrcs 2-SIGMA DIFFERENCE (m): 1.820
NRP Yrcs 2-SIGMA DIFFERENCE (m): 1.989
NRP Zrcs 2-SIGMA DIFFERENCE (m): 11.282

NRP Xrcs 2-RMS DIFFERENCE (m): 2.590
NRP Yrcs 2-RMS DIFFERENCE (m): 2.304
NRP Zrcs 2-RMS DIFFERENCE (m): 13.689
APPROACH #: ES517428  
START TIME: 510531.198  
STOP TIME: 510580.972

MINIMUM HDOP: 0.9  
MAXIMUM HDOP: 0.9  
AVERAGE HDOP: 0.9

MINIMUM VDOP: 2.7  
MAXIMUM VDOP: 2.7  
AVERAGE VDOP: 2.7

MINIMUM NUMBER OF SVs: 7  
MAXIMUM NUMBER OF SVs: 7  
AVERAGE NUMBER OF SVs: 7

******************************************************************************  
* METHOD OF EVALUATION: NAV SENSOR ACCURACY  *  
******************************************************************************

******************************************************************************  
*   VALID STATIC TRIAL    *  
******************************************************************************

******************************************************************************  
* SUCCESSFUL STATIC TRIAL  *  
******************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT  

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<th>MEAN DIFFERENCE (m)</th>
<th>2-SIGMA DIFFERENCE (m)</th>
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<td>NRP Yrcs</td>
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<td>NRP Zrcs</td>
<td>-0.937</td>
<td>0.866</td>
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APPROACH #: ES517429  
START TIME: 510946.121  
STOP TIME: 511004.937

MINIMUM HDOP: 0.9  
MAXIMUM HDOP: 0.9  
AVERAGE HDOP: 0.9

MINIMUM VDOP: 2.5  
MAXIMUM VDOP: 2.6  
AVERAGE VDOP: 2.6

MINIMUM NUMBER OF SVs: 7  
MAXIMUM NUMBER OF SVs: 7  
AVERAGE NUMBER OF SVs: 7

**********************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY  *                    *
**********************************************************************

**********************************************************************
* VALID STATIC TRIAL  *                                           *
**********************************************************************

**********************************************************************
* SUCCESSFUL STATIC TRIAL  *                                       *
**********************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

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<td>NRP Zrcs</td>
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APPROACH #: ES517430
START TIME: 511432.187
STOP TIME: 511499.888

MINIMUM HDOP: 0.8
MAXIMUM HDOP: 0.8
AVERAGE HDOP: 0.8

MINIMUM VDOP: 2.2
MAXIMUM VDOP: 2.3
AVERAGE VDOP: 2.3

MINIMUM NUMBER OF SVs: 7
MAXIMUM NUMBER OF SVs: 7
AVERAGE NUMBER OF SVs: 7

*********************************************************************************
* METHOD OF EVALUATION: NAV SENSOR ACCURACY  *
*********************************************************************************

*********************************************************************************
*  VALID STATIC TRIAL  *
*********************************************************************************

*********************************************************************************
* SUCCESSFUL STATIC TRIAL  *
*********************************************************************************

TIME HISTORY ANALYSIS FROM 200 ft HAT -> ROLL-OUT

NRP Xrcs MEAN DIFFERENCE (m): 1.781
NRP Yrcs MEAN DIFFERENCE (m): -6.250
NRP Zrcs MEAN DIFFERENCE (m): 28.820

NRP Xrcs 2-SIGMA DIFFERENCE (m): 1.516
NRP Yrcs 2-SIGMA DIFFERENCE (m): 9.811
NRP Zrcs 2-SIGMA DIFFERENCE (m): 36.144

NRP Xrcs 2-RMS DIFFERENCE (m): 3.871
NRP Yrcs 2-RMS DIFFERENCE (m): 15.890
NRP Zrcs 2-RMS DIFFERENCE (m): 68.035
# GLOSSARY

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tr>
<td>AP</td>
<td>Aim Point</td>
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<td>CAT</td>
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<td>CG</td>
<td>Center of Gravity</td>
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<td>CMN</td>
<td>Control Motion Noise</td>
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<td>CTOL</td>
<td>Conventional Take-Off and Landing Aim Point</td>
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<td>DGPS</td>
<td>Differential Global Positioning System</td>
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<td>EOR</td>
<td>End of Runway</td>
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<td>FAA</td>
<td>Federal Aviation Administration</td>
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<td>Final Approach Fix</td>
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<td>GS</td>
<td>Glide Slope</td>
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<td>Height Above Threshold</td>
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<td>HDOP</td>
<td>Horizontal Dilution of Precision</td>
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<td>IAF</td>
<td>Initial Approach Fix</td>
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<td>ICAO</td>
<td>International Civil Aviation Organization</td>
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<td>ILS</td>
<td>Instrument Landing System</td>
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<td>Intercept Location</td>
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<td>Lateral Control Motion Noise</td>
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<td>Landing Gear Reference Point</td>
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<td>Lateral Path Following Error</td>
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<td>Lateral Sensor Error</td>
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<td>MLS</td>
<td>Microwave Landing System</td>
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<td>Measure of Success</td>
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<td>X\text{rcs}</td>
<td>Runway Coordinate System X Direction</td>
</tr>
<tr>
<td>Y\text{rcs}</td>
<td>Runway Coordinate System Y Direction</td>
</tr>
<tr>
<td>Y\text{diff}</td>
<td>Runway Coordinate System Y Direction Position Difference</td>
</tr>
<tr>
<td>Z\text{rcs}</td>
<td>Runway Coordinate System Z Direction</td>
</tr>
<tr>
<td>Z\text{diff}</td>
<td>Runway Coordinate System Z Direction Position Difference</td>
</tr>
<tr>
<td>lul+2SIG</td>
<td>Mean Absolute Value + Two Sigma Standard Deviation</td>
</tr>
<tr>
<td>2RMS</td>
<td>Two Root Mean Square</td>
</tr>
<tr>
<td>zSIGUCL</td>
<td>Two Sigma Standard Deviation Upper Confidence Level</td>
</tr>
<tr>
<td>95P</td>
<td>95th Percentile</td>
</tr>
</tbody>
</table>
**Flight Test Evaluation of the E-Systems Differential GPS Category III Automatic Landing System**

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**Abstract:**
Test flights were conducted to evaluate the capability of Differential Global Positioning System (DGPS) to provide the accuracy and integrity required for International Civil Aviation Organization (ICAO) Category (CAT) III precision approach and landings. These test flights were part of a Federal Aviation Administration (FAA) program to evaluate the technical feasibility of using DGPS based technology for CAT III precision approach and landing applications.

A IAI Westwind 1124 aircraft (N24RH) was equipped with DGPS receiving equipment and additional computing capability provided by E-Systems. The test flights were conducted at NASA Ames Research Center's Crows Landing Flight Facility, Crows Landing, California. The flight test evaluation was based on completing 100 approaches and landings. The navigation sensor error accuracy requirements were based on ICAO requirements for the Microwave Landing System (MLS).

All of the approaches and landings were evaluated against ground truth reference data provided by a laser tracker. Analysis of these approaches and landings shows that the E-Systems DGPS system met the navigation sensor error requirements for a successful approach and landing 98 out of 100 approaches and landings, based on the requirements specified in the FAA CAT III Level 2 Flight Test Plan [1]. In addition, the E-Systems DGPS system met the integrity requirements for a successful approach and landing or stationary trial for all 100 approaches and landings and all ten stationary trials, based on the requirements specified in the FAA CAT III Level 2 Flight Test Plan.

**Subject Terms:**
DGPS Automatic Landing System

**Security Classification:**
Unclassified

**Limitation of Abstract:**
Unclassified