Google Earth presentation of American Airlines flight 77 and United Airlines flight 93

Over the last year, several requests were filed at NTSB under the Freedom of Information Act, asking for flight data of four planes used on 9/11/2001 in the attack on America. Several people received their replies, along with some interesting data.

Mike Williams, headmaster of 911myths.com site, got a spreadsheet of Flight Data Recorder data for AA77 [1]. The so-called "Pilots for Truth" organization additionally got the raw FDR file from the same plane. They proceeded to decode it themselves and produced their spreadsheet data file, available at **aa77fdr.com [2]**. James Randi Education Foundation forum member **SLOB**, got a spreadsheet file of UA93 flight data [3]. All three sources provide data, which can be used to plot the flight paths of hijacked planes on Google Earth software.

AA77 911myths.com data
911myths data provides geographical coordinates for each second of the flight. Using longitude, latitude and pressure altitude, provided in the spreadsheet file, one can reconstruct AA77's flight path in Google Earth. Due to an unidentified error, the longitude data appears to have been shifted towards west by about 0°21' longitude or some 18.5 nautical miles. Thus, the longitude had been adjusted to reflect the fact, that the plane actually took off from Dulles International airport. The whole flight was adjusted accordingly by a constant correction to the longitude.

Altitude was taken directly from the spreadsheet file, converted to metric units and is presented as relative in Google Earth (i.e. as altitude above ground).

AA77 aa77fdr.com data
aa77fdr.com data also presents Lat/Long data for the whole flight. In comparison with 911myths data, which has a resolution of 1 geographical minute, this set has a resolution of about 1 geographical second and can be used to plot a much smoother path.

Latitude and longitude data were taken directly from the spreadsheet file, while the pressure altitude data was modified to reflect the weather conditions on the day of 9/11, and eventually converted to metric. Altitude is presented as absolute in Google Earth (i.e. altitude above mean sea level).

Since aa77fdr.com's data produces a smoother flight path, 3D plane models were added, to help visualize plane's pitch and roll. Both parameters come directly from the spreadsheet flight data. Plane is also positioned according to its true heading in the spreadsheet.

UA93 data
This data set does not provide any direct geospatial values. In addition, even the plane's distance measuring equipment (DME) data is only presented with 1 nautical mile resolution, which is too coarse for any precise calculations regarding the flight path as a whole. UA93 presentation is more like a visualization aid for the last pilot maneuvers leading to the crash, than a highly accurate representation of plane's flight path.

The only relatively accurate positions of the plane, during its whole flight, appear to be the take off at Newark and the crash at Shanksville. Lacking direct Lat/Long data, flight path had to be calculated from plane's speed and heading data. Conveniently, groundspeed is available in the spreadsheet, so there's no need for further speed calculations.

There is no track angle or even true heading available, so magnetic heading was used, after

adjustments for magnetic declination and drift angle were performed.

Using this newly calculated heading and the provided groundspeed, it was possible to calculate the plane's flight path. This was calculated backwards, from the site of the crash. Due to inherent lack of precision in the original data and certain short cuts, taken during the calculations, flight path might only be accurate down to 1-2 nautical miles, by the last calculated points.

Original spreadsheet only provides the pressure altitude data for the z-axis. Pressure altitude had been adjusted for local weather conditions on 9/11/2001 and is presented as absolute altitude in Google Earth (altitude above MSL).

UA93 's flight path also comes with 3D plane models, depicting plane's attitude. Pitch and roll were taken directly from spreadsheet data, while plane's true heading was calculated from provided magnetic heading and local magnetic declination.

Troubleshooting the display in Google Earth
In case the 3D plane models appear to be tilting and rolling in the wrong direction, try to update Google Earth software to version 4.0.2737 or later. Some previous versions seem to implement tilt and roll properties backwards.

Software used
Google Earth v4.0.2737
OpenOffice.org v2.0
Borland Delphi
gVim
WinRar

Special thanks
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Dan O. of JREF forum, for supplying the 3D Boeing 757 model [4].

References
[1] - http://www.911myths.com/html/ntsb_release_august_22_2006.html
[2] - http://www.aa77fdr.com/source/AAL77_tabular.zip
[3] - http://thepiratebay.org/tor/3696132
[4] - http://sketchup.google.com/3dwarehouse/details?mid=791af615e17374d38eeaefe98ae26867