AircraftScatter Sharp is a new program that I wrote using C# to assist those wanting to do aircraft scatter work. It is an improvement upon and an extension of the software I had previously written to work with PlanePlotter. Unlike the old program, AircraftScatter Sharp requires no auxiliary programs, but runs as a stand-alone program. It has several important capabilities:

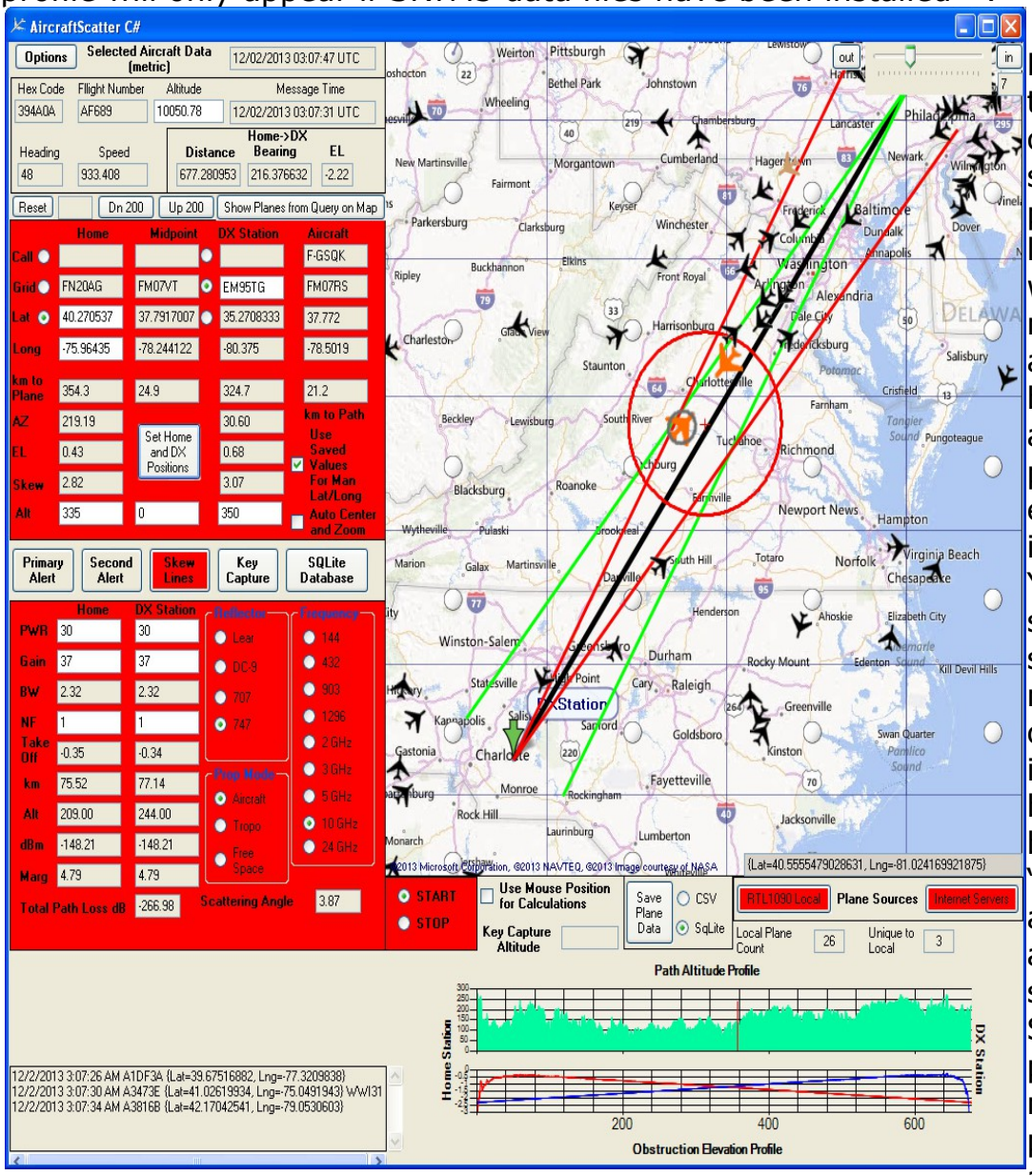
1. Real-time capture and display of plane position data derived from internet servers, from a local RTL1090 server, or both
2. Display of the direct path line between two stations, along with skew lines to allow a quick assessment of the angular deviation of an aircraft position from the direct path line for both stations, and a midpoint circle to show when an aircraft is within a specified distance from the midpoint of the path. Path altitude and elevation/obstruction profiles are also shown.
3. Highlighting of aircraft near the ideal position for "reflection", based both on distance from the midpoint of the path as well as angular deviation from the path
4. Real-time calculation of path loss/received signal at both locations based on plane location and user-adjustable station parameters, using either bistatic scatter, troposcatter[1] [2] or free path formulas
5. An integrated SQLite database that allows you [1] to save information on all planes appearing on your screen for however long you want [minutes, hours, days, weeks, months] and [2] to then analyze that data to determine when aircraft scatter opportunities will most likely occur. You can analyze the data without interrupting its collection, and powerful SQL search functions are automatically included and easily selectable using only mouse-clicks to generate the SQL query statements.

This last piece, the SQL database, provides what has been missing from previous aircraft-scatter software (except for my earlier program mentioned above, which also included this feature). For EME we have software predictors of when the moon will be "available" to us as a reflector. For rain-scatter we have RainScatter, by Andy Flowers, K0SM[3] to give us this information. But there has been nothing similar for aircraft scatter until now.

Below I will describe the program in some detail. For "Getting Started" instructions on installing and using it, go to the appendix.

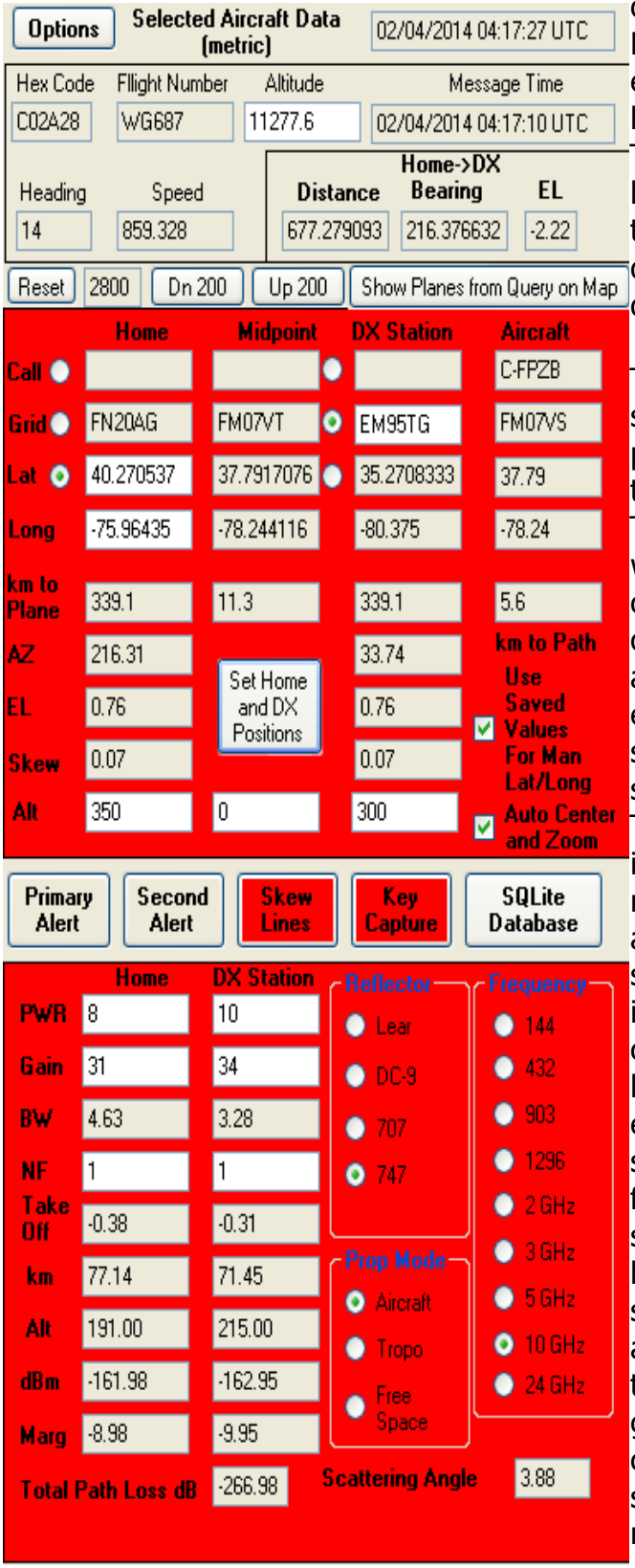
AircraftScatter Sharp's main form has a map on the right side of the form which contains a real-time display of all aircraft downloaded from the server[s]. The aircraft icons shown on the map accurately represent aircraft positions and headings. Planes from the internet server as shown in black, red, or green depending upon their position, and planes from the local server are shown in brown. Below the map is a path altitude profile and a path elevation profile for the path between the home and DX stations. On the left is the data and calculator area. The path between W3SZ and W4DEX shown on the map has been selected by entering the appropriate 6 digit grid square for W4DEX, and

entering latitude and longitude directly for W3SZ into the text boxes on the left. This causes the direct path line, the skew lines, and the midpoint circle to be drawn on the map along with markers and labels for the Home and DX stations. If grid square is entered, latitude and longitude are calculated, and vice versa, as determined by user selection. The program also contains the call3.txt file and can use it to supply grid information for stations included in it. New stations can be added to it via this program. Thus you can also enter position information for either the Home or DX station by typing that station's call. The path altitude profile will only appear if SRTM3 data files have been installed[4] [5].



Before making the screen shot on the left, I selected a plane by by left-clicking it with the mouse. This action put a black ring around the plane icon for easier identification. You can easily see the selected plane near the center of the map. It is colored red because it is both within the "secondary alert" circle and within the skew lines. Selecting this plane in this manner also placed additional information about the plane into the data area on the left side of the form.

On the left below is an enlargement of the data area on the left side of the main form. Across the top it shows the ICAO hexcode for the plane, its flight number, altitude, and the time at which its data was received. Just below that are its heading and speed. To the right of that is a description of the length and bearing of the path from the home station to the DX station, along with a notation of the elevation of each station relative to the horizon, as seen from the other station. The next portion of the form has four buttons and a textbox. These are used to display planes from the stored SQLite database on the map, and will be discussed more fully below.



The portion of the form just below this section is colored red because there is a plane (in this case the selected plane) that has activated the secondary alert. This alert is activated when a plane is within the user-defined "optimal range circle" that is drawn around the midpoint of the path (the radius is user-adjustable). This red color provides an easily visible indication that the secondary alert has been activated. This section of the data area has 4 columns. These respectively give positional information about the Home station, the midpoint of the path between the Home and DX stations, the DX station, and the selected aircraft. This information includes for the Home and DX stations callsign (optional), grid square, latitude, longitude, km to plane, azimuth to plane, elevation of plane as seen from that station, skew angle of the plane position from the direct path as seen from that station, and altitude of the location (must be entered by user). Callsign, grid square, latitude, longitude, and altitude are user-adjustable. Radiobuttons allow the user to select direct entry of callsign, grid square, or latitude and longitude. A check box allows one to recall previously stored data for latitude and longitude rather than entering those values

manually. Another check box causes the map to automatically center on the midpoint of the selected path and zoom to include both the Home Station and the DX Station when "Set Home and DX Positions" is left clicked or if the "Enter" key is typed. If Key Capture is turned on, one can use the latitude and longitude of a point on the map to position the Home station by selecting manual lat/long entry by clicking the "Lat" radio button and then positioning the mouse cursor over the desired position and then hitting <Clt>F1. One can similarly position the DX station by positioning the mouse cursor over the desired position and then hitting <Clt>F2 after the "Lat" radio button has been selected.

The next portion of the display contains buttons that activate or deactivate the audio primary and secondary alarms (but do not affect the panel color changes that accompany these audio alerts), the skew lines and midpoint circle display, and key capture, and it also contains a button that brings up the SQLite database analysis page. The secondary alert sounds when any plane enters the midpoint circle. The primary alert sounds if at least one of those planes is also within both sets of skew lines. A plane turns from black to green when it enters the midpoint circle (i.e., if it activates the secondary alert), and it turns red if it is also positioned between the skew lines (i.e., if it activates the primary alert). Both the angle of the skew lines and the radius of the midpoint circle are adjustable from one of the options page tabs.

The next section of the display is used for entry and display of RF-related information. In the example shown above it is red because a plane was both within the midpoint circle and also within the skew lines when this screen capture was performed (i.e., the primary alert was activated). To perform these RF calculations, the user first selects plane size (Lear, DC-9, 707, and 747 as examples of very small, small, medium, and large) and frequency, and then enters power, antenna gain, and receiver noise figure for both the Home and DX stations. Once this has been done, the program continuously calculates and displays the received signal level, signal margin, and total path loss for both stations in real time. A check box located below the map display and labeled "Use Mouse Position for Calculations" is provided so that these calculations can be made for the case where a reflector is positioned at a user-selected point on the map, rather than using aircraft data. This allows path analysis to be performed for any given map position in the absence of any aircraft at the desired position. To use this function, check this box and then double-left-click on the map position for which you want calculations to be performed. A set of radiobuttons allows one to substitute free-space path or troposcatter loss calculations for the aircraft-scatter calculations.

This portion of the form also contains at its bottom right corner a text box that indicates the scattering angle that is used for troposcatter calculations.

Below this section of the main form is a textbox that displays a small portion of the data for the unique "local" aircraft, in order to provide a visual indication of

the status of the local RTL1090 server connection. If no unique local aircraft information is available, then this textbox remains blank.

The map portion of the form has a few features that should be noted. Boundary lines for the Maidenhead grid squares are shown by default. These can be turned off using one of the tabs on the Options form, which is accessed by clicking the Options button at the top left of the main form. A grid square label pop-up for a given grid is activated by hovering the mouse over the marker placed in the center of that grid. A tab on the options form allows one to turn this function on or off, and to make the grid square center markers more or less visible.

At the top right of the map are controls for zooming the map in and out.

At the lower right edge of the map is a box that displays the latitude and longitude for the point over which the mouse is hovering.

Below the map are several additional control/display groups. Below the left bottom edge of the map are the radiobuttons used to either start or stop aircraft data download from either the internet server or the local RTL1090 server, labeled "START" and "STOP". It is necessary to click on "START" to initiate downloading of aircraft information.

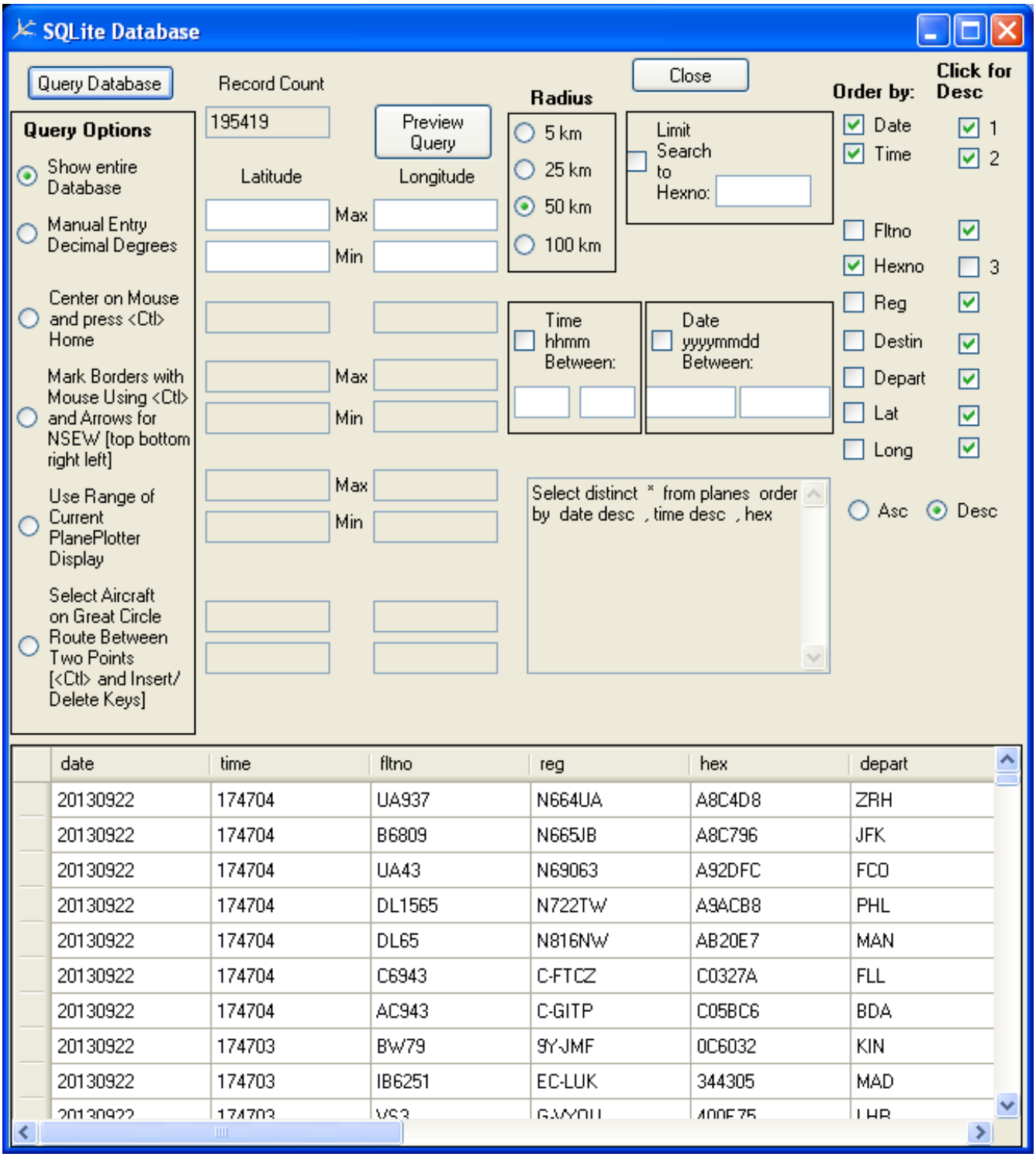
To the right of the START/STOP control group is the checkbox described above that allows one to use the mouse to select the map location that will be used as the scattering point, instead of an actual aircraft. The textbox below this, labled "Key Capture Altitude" will display the altitude for any point on the map if one has key capture enabled and hits <Ctl>F3 while the mouse is over the selected point. This feature, like the path altitude profile feature, requires that SRTM3 height files be installed in the appropriate directory. Hitting <Ctl>F4 will display a Message Box containing the position and altitude of the point last referenced by hitting <Ctl>F3.

To the right of these objects is the SQL Database control group. Included in this control group are buttons used to activate the function to save all aircraft data to a file, labeled "Save Plane Data", and to select between CSV file or SQLite database file storage (labeled "CSV" and "SqLite" respectively. The SQLite database file is the default and is strongly recommended.

To the right of this button group are two buttons, used to select for downloading, display on the map, and for analysis aircraft from the RTL1090 server, from the internet server, or both. These buttons are labeled "RTL1090 Local" and "Internet Server", respectively. Below this are two textboxes. The textbox on the left is labeled "Local Plane Count" and it displays the total number of aircraft currently "seen" by the local RTL1090 receiver (if used). The textbox on the right is labeled "Unique to Local" and it gives the number of these local aircraft that are "unique", and not "seen" by the internet aircraft server.

If one hovers over an aircraft, information for that aircraft will pop up whether or not that aircraft is the "selected" aircraft, as demonstrated in the MessageBox on the left. However, to conserve computer resources, certain data such as the skew angle is only calculated for the selected aircraft and for aircraft within the midpoint circle. The image on the left was obtained by hovering over an aircraft that was not within the midpoint circle. Thus skew information is not available, and is displayed as "NaN" (shorthand for "Not a Number").

VII. Getting Historical Aircraft Position Data. Below is the SQLite database analysis form that is accessed by clicking on the "SQLite Database" button on the main form of the program. This form shows at the top left that 195,419 plane records have been saved in this database.



Information about each plane in the database includes date, time, flight number, registration (whether FAA or other), ICAO hexcode, departing airport, destination airport, latitude of plane, longitude of plane, altitude, bearing, speed, airframe type, squawk, and vertical speed. You can see by the checkboxes near the top right of this form that the entries in the search that is displayed here were specified to be ordered by date, then time, and then by the ICAO hexcode. The

"Query Options" box on the left shows that "show entire database" has been selected, so the table contains all 195,419 planes.

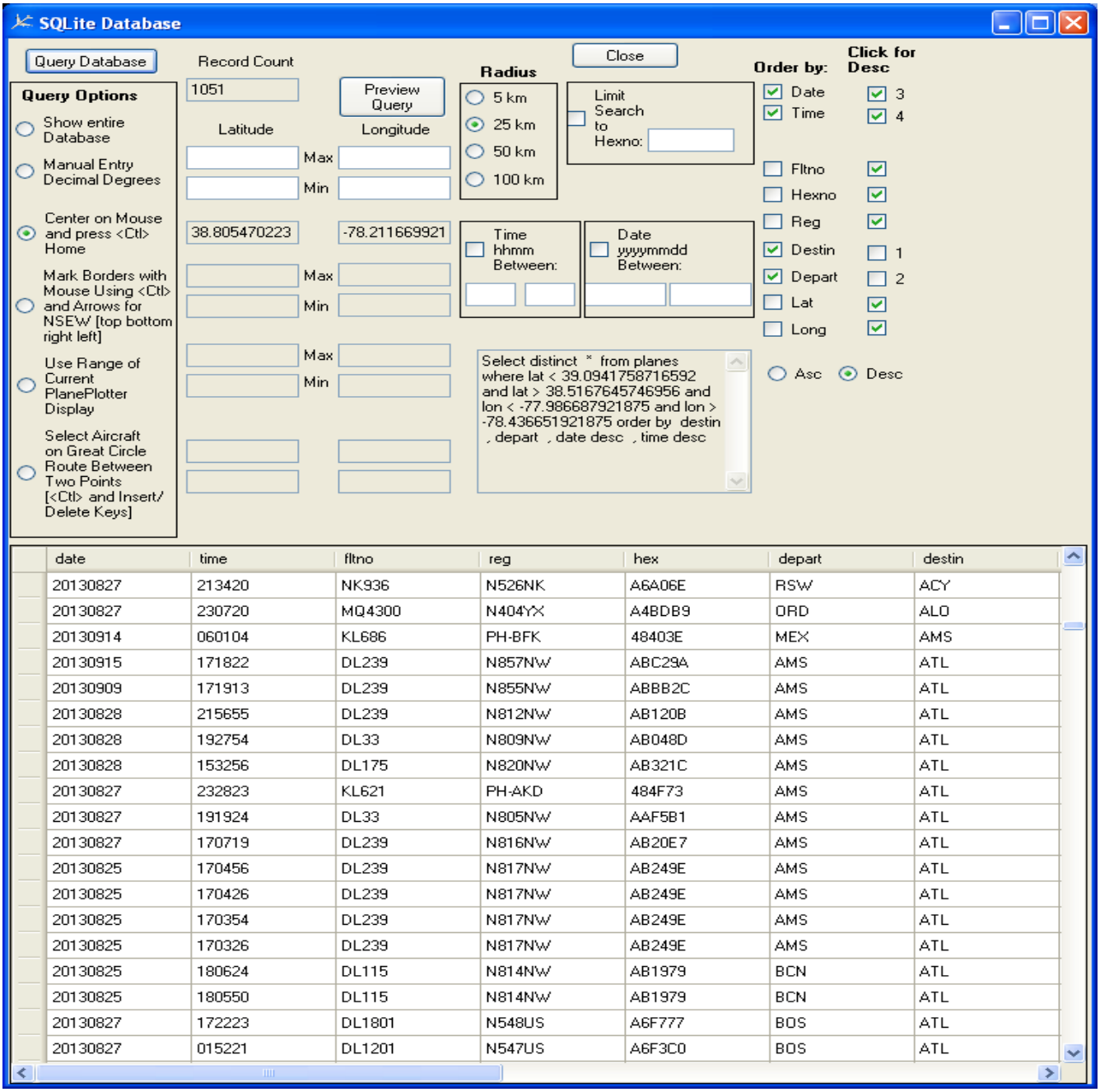
In order to plan an aircraft-scatter session, one enters the Home and DX station 6-digit grid squares into the primary form and left-clicks the "Set Home and DX Positions" (labeled as "Calculate Lat/Long from Home/DX Grids" or "Calculate Lat/Long or Home/DX Grids" on some older illustrations) button. That places the direct path line and the midpoint circle and skew lines onto the map, to help one decide on exactly what geographical area to explore with the database. One then opens the SQLite database form by either left-clicking the "SQLite Database" button, thus bringing up the SQLite database form, or by clicking on the "Show Planes from Query on Map" button, which will bring up the SQLite database form and also display the first 200 planes in the selected dataset on the map, where they can be analyzed and viewed just as if they were "live" planes. From the SQLite database form, one can then select a region from which to display aircraft records in one of several ways.

If one wants to see when aircraft are likely to be within a 5, 25, 50, or 100 km square centered on the midpoint of the direct path, one clicks the appropriate radio button on the SQLite database page to set the radius desired. With the key capture function activated, one uses the mouse to place the cursor over the midpoint of the direct path and hits <Ctl>HOME on the keyboard. This puts the coordinates for the midpoint into the appropriate text boxes on the SQLite database page, as shown in the illustration below. One then left clicks the RadioButton labeled "Center on Mouse and press Home Key" on the database page to choose this method of location selection for the database query, and finally one left clicks the "Query Database" button. This sends the appropriate query to the database, and the data returned to the data grid includes only planes that are within this region. One can order the display of these planes by date, time, etc. as described below and quickly see what aircraft are likely to be available for use, and when.

There are 4 other, alternative methods of limiting the geographic region from which planes are returned in the query. These are also shown in the "Query Options" panel, located both above and below the RadioButton for the option just described. These include (1) manual entry of the maximum and minimum latitude and longitude for a rectangle from within which all planes will be selected, (2) setting the borders of a rectangle using the map and the mouse, (3) using the display area of the map itself to set the boundaries, or (4) selecting a great circle route between any two points (such as the Home and DX stations) and using the "Radius" radiobuttons to specify a distance from that path from within which planes will be selected.

One can also, and simultaneously, limit the search query by date and/or time, and by the ICAO hexno, which is a unique identifier assigned to every plane that is put into service worldwide, and which stays with the plane for its entire life.

The searches can also have the data returned by the query ordered by up to 9 additional parameters. For the first example above, with 195419 planes, you can see that the search displayed was first ordered by date, then by time, and finally by hexno. Date and time were ordered in descending fashion, and hexno was ordered in ascending fashion.



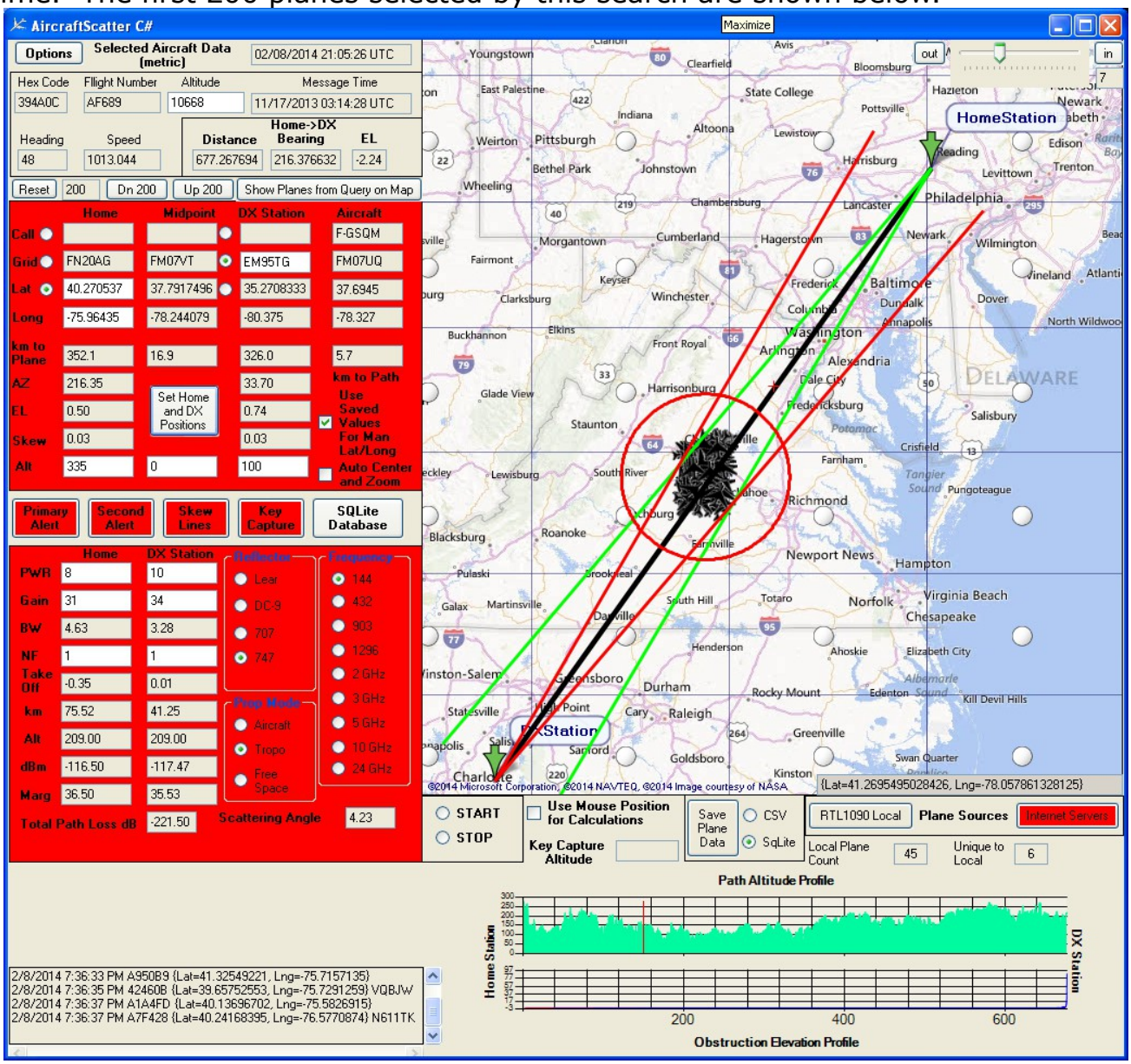
date	time	fltno	reg	hex	depart	destin
20130827	213420	NK936	N526NK	A6A06E	RSW	ACY
20130827	230720	MQ4300	N404YX	A4BDB9	ORD	ALO
20130914	060104	KL686	PH-BFK	48403E	MEX	AMS
20130915	171822	DL239	N857NW	ABC29A	AMS	ATL
20130909	171913	DL239	N855NW	ABBB2C	AMS	ATL
20130828	215655	DL239	N812NW	AB120B	AMS	ATL
20130828	192754	DL33	N809NW	AB048D	AMS	ATL
20130828	153256	DL175	N820NW	AB321C	AMS	ATL
20130827	232823	KL621	PH-AKD	484F73	AMS	ATL
20130827	191924	DL33	N805NW	AAF5B1	AMS	ATL
20130827	170719	DL239	N816NW	AB20E7	AMS	ATL
20130825	170456	DL239	N817NW	AB249E	AMS	ATL
20130825	170426	DL239	N817NW	AB249E	AMS	ATL
20130825	170354	DL239	N817NW	AB249E	AMS	ATL
20130825	170326	DL239	N817NW	AB249E	AMS	ATL
20130825	180624	DL115	N814NW	AB1979	BCN	ATL
20130825	180550	DL115	N814NW	AB1979	BCN	ATL
20130827	172223	DL1801	N548US	A6F777	BOS	ATL
20130827	015221	DL1201	N547US	A6F3C0	BOS	ATL

In the second example above we have limited the search to a circle with radius 25 km centered on the midpoint of the path between W3SZ and W4DEX. This query returns 1051 flight records, and in this case I ordered the query by alphabetically ascending destination, then alphabetically ascending departure airport, and then by descending date and descending time. Reviewing the data, you can quickly

see that flights crossing this point in this time span were flights from RSW to ACY, ORD to ALO, MEX to AMS, AMS to ATL, BCN to ATL, etc. A careful inspection of the form will show the choices I made to direct the query, and the text box below the time and date check boxes shows the query that the program automatically formed based on the selections I made with just a few clicks of the mouse.

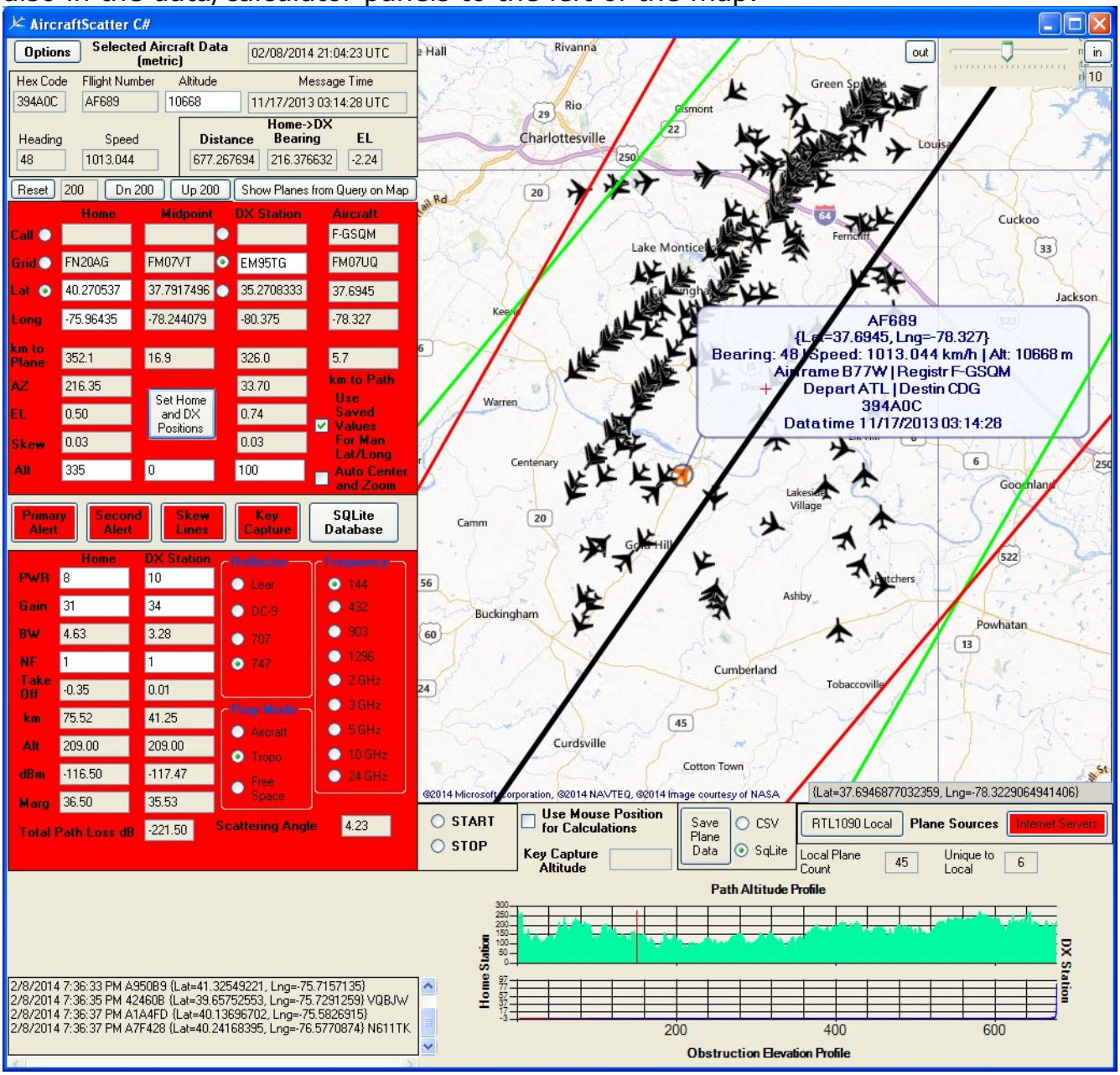
The order of the plane record display can also be changed by clicking on the heading for any column of the display itself.

Clicking on the "Show Planes from Query on Map" will display, 200 planes at a time. The first 200 planes selected by this search are shown below.



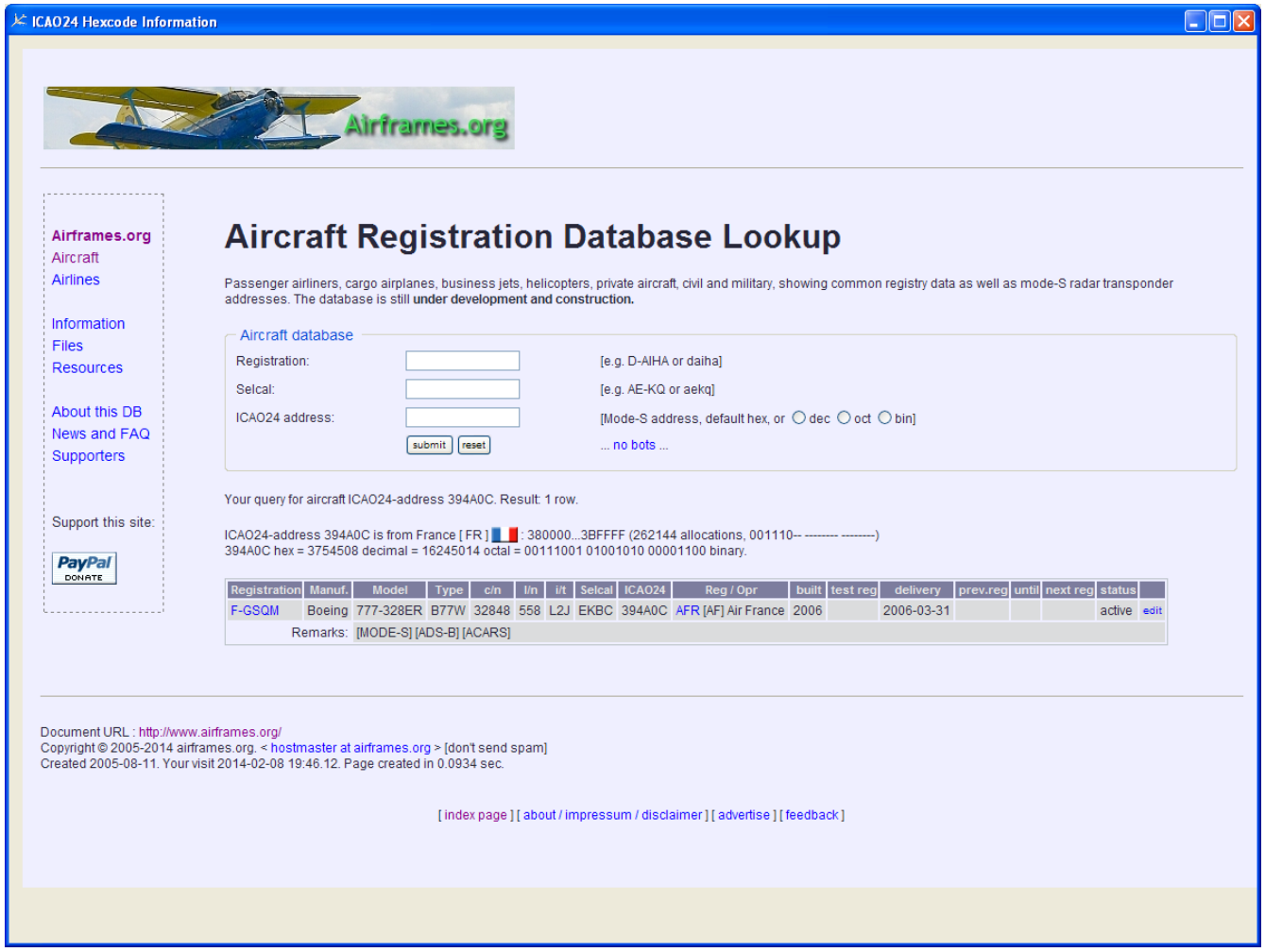
The planes are clearly too densely packed to provide any useful information, so we need to zoom in. With zooming in, we can easily see individual planes, and click on them (or hover over them with the mouse) to get more information on them. As you can see below, zooming in separates the planes nicely. I have both

left-clicked and hovered over a plane near the bottom center of the display. As a result, you can see its information both in the tooltip displayed on the map and also in the data/calculator panels to the left of the map.

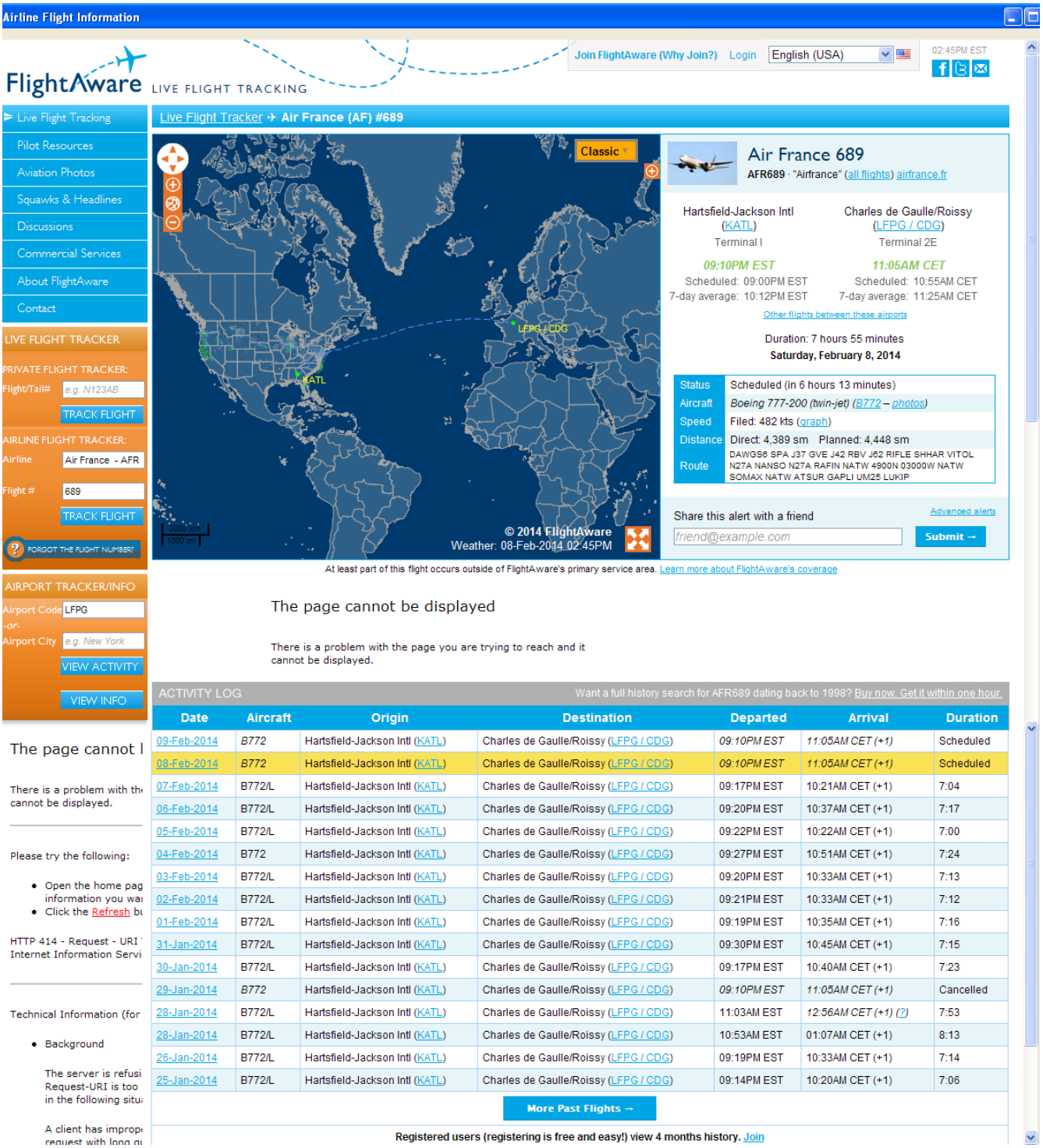


You can see that is has flight number AF689 and ICAO hexno 394AOC. You can also see that it was recorded at 03:14:28 UTC on 11/17/2013 and see all of its position and RF calculation parameters, just as if it was a "live" plane.

You can get more information about it by clicking <Ctl>F7, which will bring up information for its hexno at airframes.org. This is shown below.



By clicking <Ctl>F8 you can bring up flight information from FlightAware.com, as is shown below. This gives you a history of several weeks of arrival and departure times, that you can use to get an idea of how much variability there is in flight times, to supplement the data you acquired with Aircraft Scatter Sharp. This is shown below. Note that there is an option to click on a link that will show ALL flights by ALL airlines that run between the same two airports. This can be very helpful!



However, because plane schedules are NOT like clockwork, using published schedules and estimating when a plane will be in a given area can be unproductive. But using Aircraft Scatter Sharp to gather large amounts of data over a period of days or weeks or longer allows one to make statistically based decisions on when aircraft are most likely to be in the region of interest, by examining the historical data obtained using this program. Using the various functions on the database form, one can select which data is to be displayed is obtained, and by analyzing that data, one can then devise operating schedules

that will be most likely to be productive. Further suggestions on using Aircraft Scatter Sharp are contained in the appendix, which precedes the list of references.

If you have any questions, please contact me by email at mycall at comcast dot net. You may download a copy of the program from the web page listed below.

There is also a copy of this talk plus additional information at
http://www.nitehawk.com/w3sz/AircraftScatter.htm

Roger Rehr W3SZ
9-25-2013

Appendix. Suggestions for getting started.

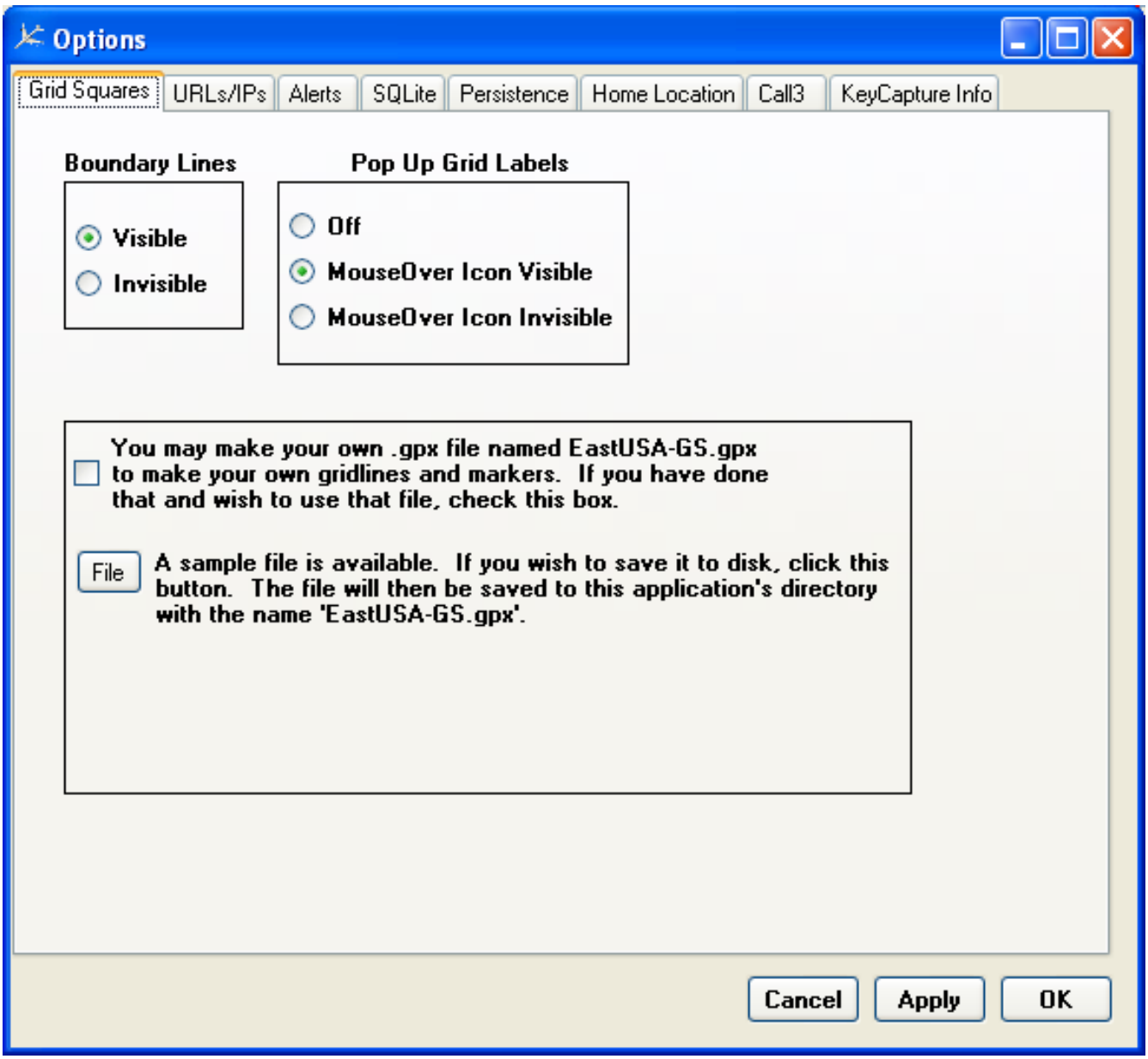
1. The program has been tested and works with Windows XP 32 bit and both the 32 and 64 bit versions of Windows 7. It has not been tested with other operating systems.
2. Download Aircraft Scatter Sharp from: http://www.nitehawk.com/w3sz/AircraftScatterSharp.zip
3. Unzip it.
4. Double-left-click "Setup.exe"
5. When installation completes, the program will start immediately.
6. When it starts it will tell you that it is writing to disk the initial dBplanes.sqlite database file and the call3.txt file. It will also remind you that you need to go to options to set up the URL, Directory, and File to use for the Internet plane servers, using the "URLs/IPs" tab on the "Options" form.
7. While on the Options form, you should also go to the "Home Location" tab and set the home latitude, longitude, and altitude. After you have entered the appropriate data, click the "Set Home Station" button for each and then click "OK" to close the Options form.
8. There are numerous ToolTips which appear when you hover over the various controls, textboxes, etc. to guide you as you learn the program.
9. After you have entered the URL and Directory and File for the internet plane server, you can start downloading plane data from the internet by left-clicking the "START" button near the bottom of the data/calculation form.
10. Buttons turn RED when activated, and return to their baseline color when deactivated.
11. Using the internet plane server is selected by default. You can deselect it by clicking on the "Internet Servers" button. When you exit the program, your choice will be remembered.
12. You can additionally select to display local plane data, sent using the port 30003 server of RTL1090 by clicking on the "RTL1090 Local" button.
13. To save plane data to the SQLite database, click the "Save Plane Data" button.
14. Hover over a plane with the mouse to see its ToolTip data. You need to hover near the "3 o'clock" to "6 o'clock" quadrant below the plane to activate the ToolTip.
15. Left-click a plane to make it the "selected" plane and put all of its data into the data/calculation portion of the main form. You need to click near the "3 o'clock" to "6 o'clock" quadrant below the plane to select it.
16. In order to use the Hotkeys, you need to turn on key capture, using the "KeyCapture" button near the middle of the data/calculation portion of the main form. The hotkeys are F1-F9 combined with the <Ctl> key.

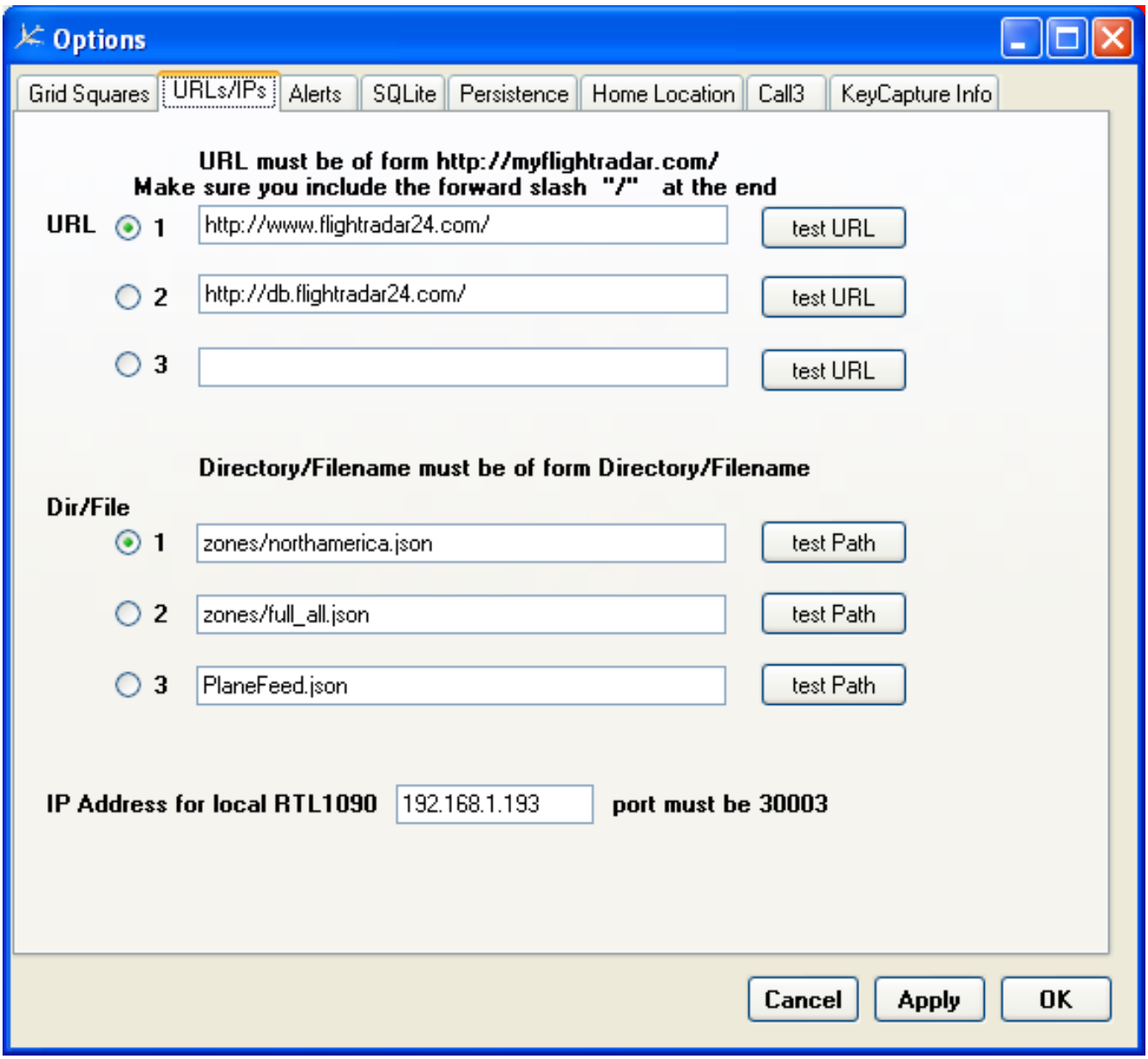
    <Ctl>F1 Put the Lat/Long of the point under the mouse pointer into Home Station Lat/Long [need to have Lat/Long for the Home station selected by the radio button]

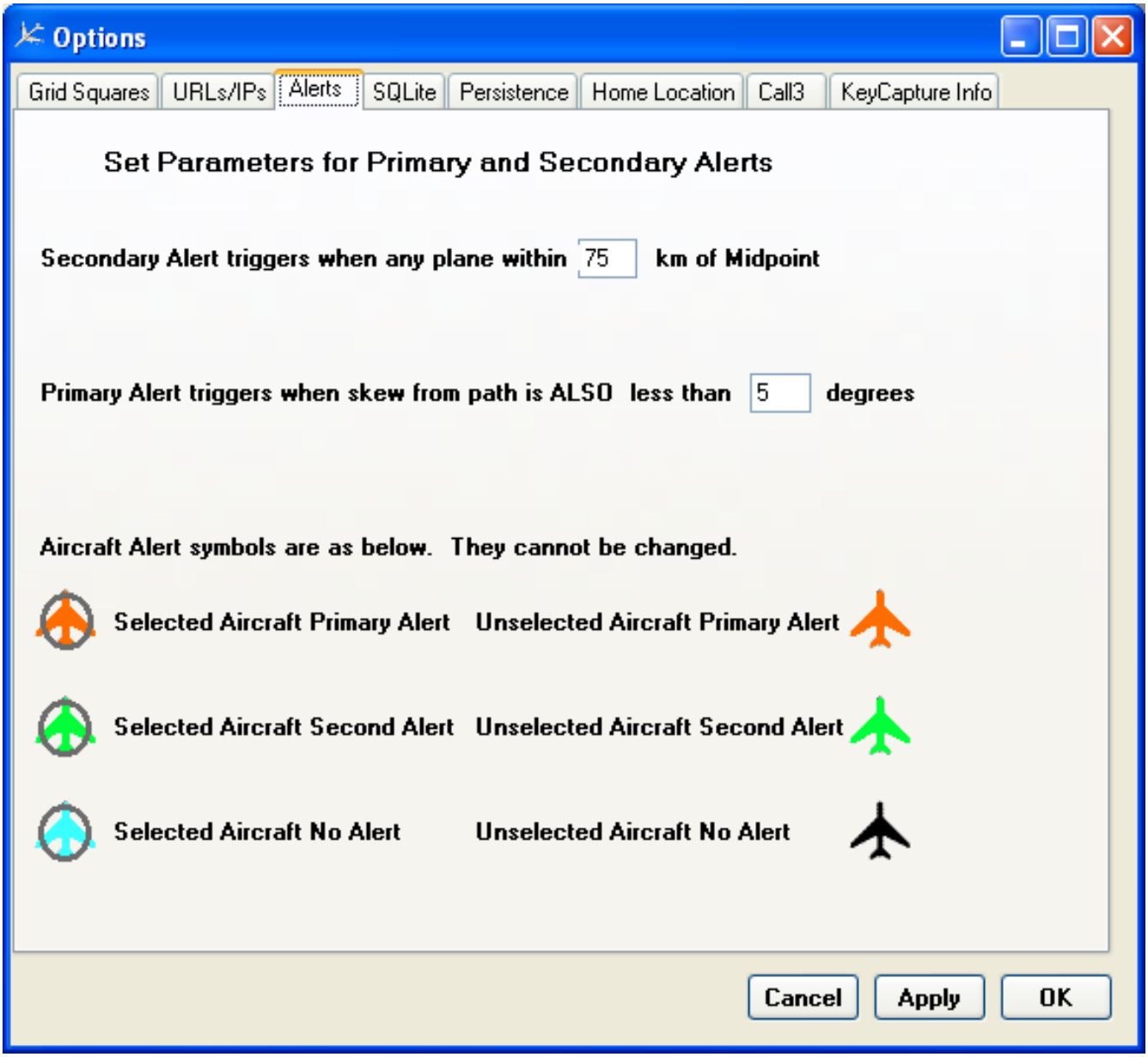
    <Ctl>F2 Put the Lat/Long of the point under the mouse pointer into DX Station Lat/Long [need to have Lat/Long for the DX station selected by the

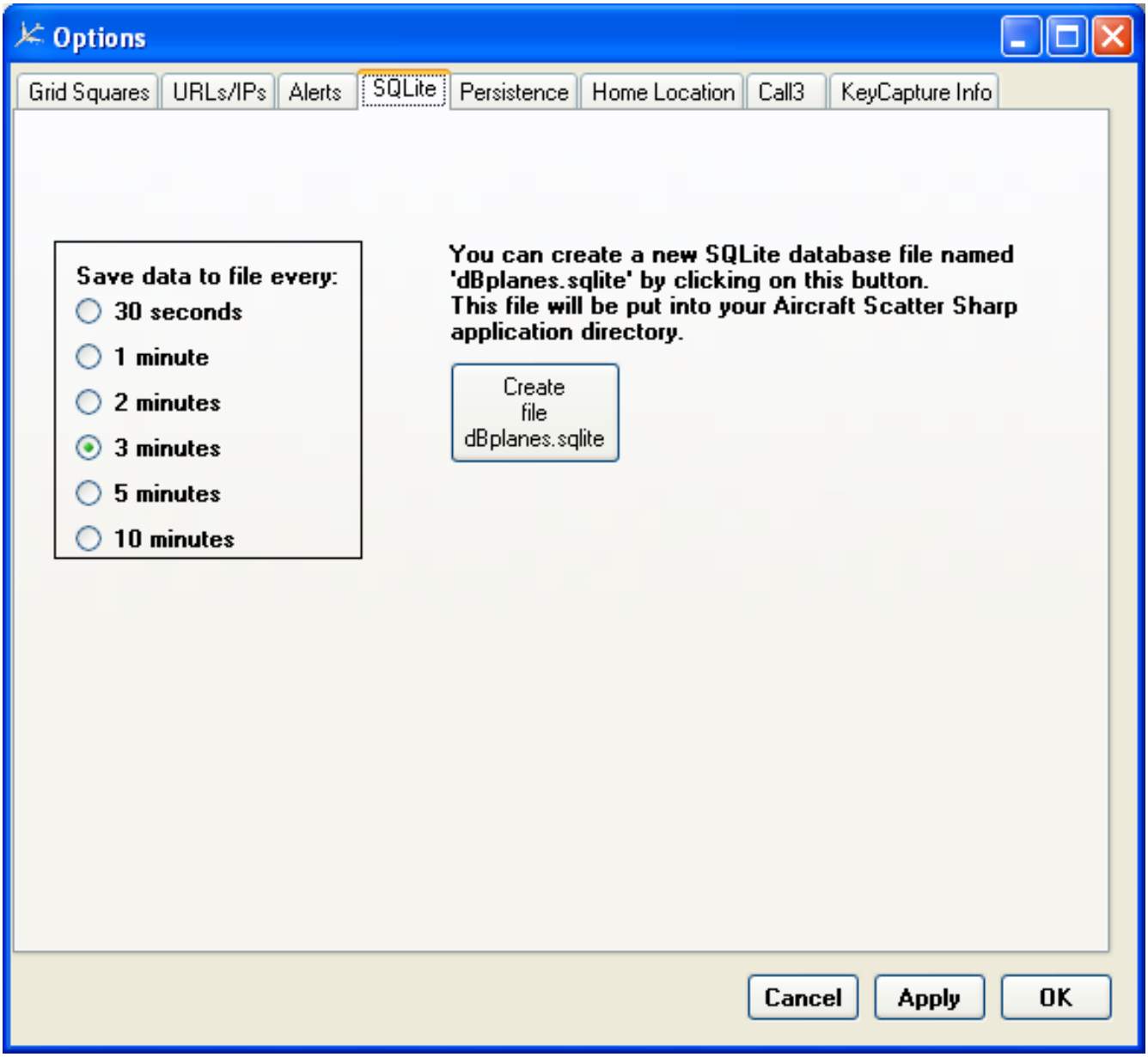
radio button]
<Ctl>F3 Put the altitude of the point under the mouse pointer into the small textbox at the lower right corner of the data/calculation portion of the man form
<Ctl>F4 Pops up a message box with the Lat/Long/Altitude of the point last obtained with the <Ctl>F3 combination
<Ctl>F5 Turn on all helpful tooltips [does not affect plane tooltips]
<Ctl>F6 Turn off all helpful tooltips [does not affect plane tooltips]
<Ctl>F7 Gets plane data for the selected plane from airframes.org, using ICAO hexno
<Ctl>F8 Gets flight data for the selected plane from FlightAware.com using flight number
<Ctl>F9 Shows the list of Hotkeys

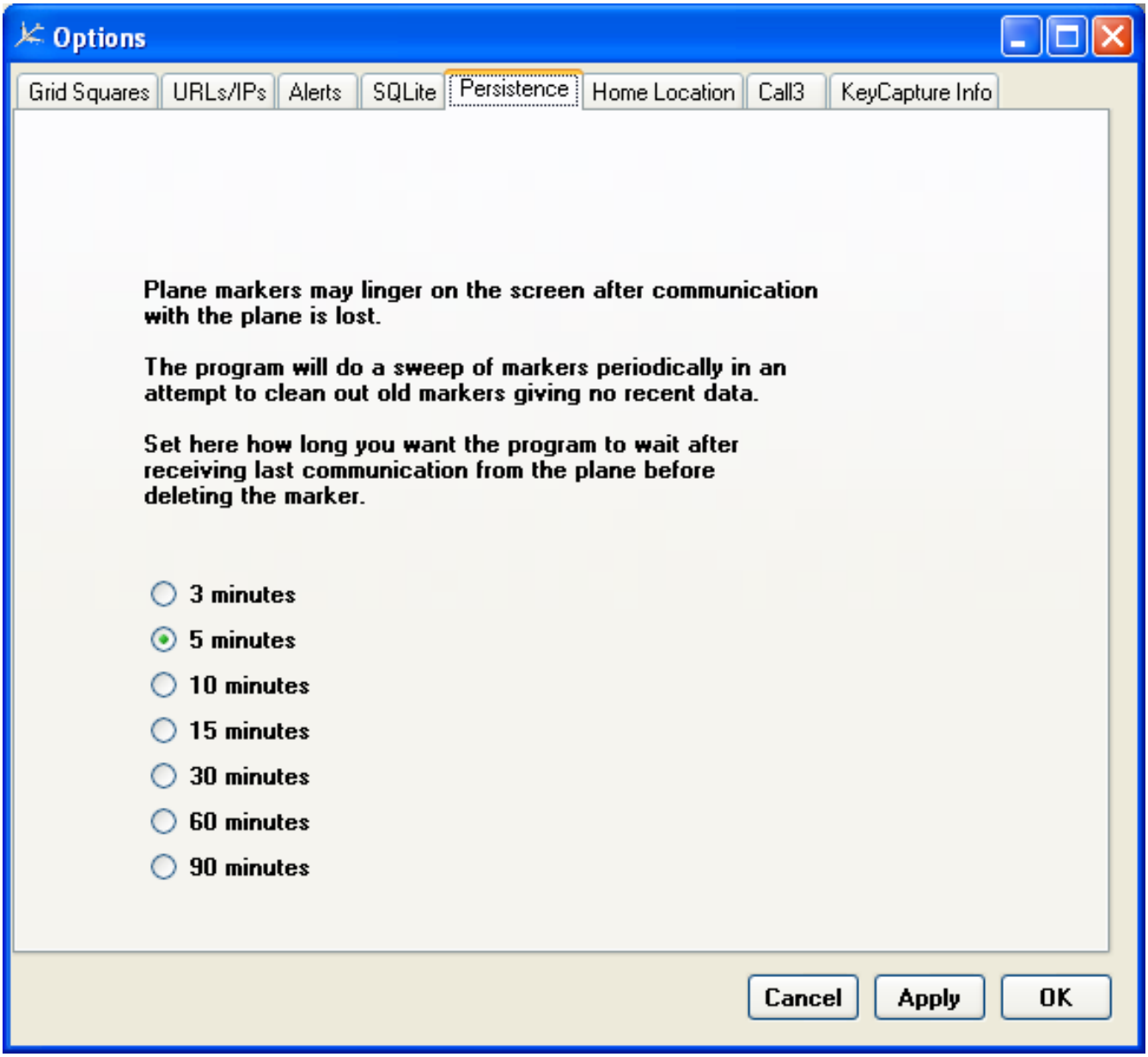
17. Zoom the map in and out using the "in" and "out" buttons at the top right of the map.
18. You may drag the map to a new center by rightclicking while you are dragging the map with the mouse pointer.
19. If you have "Auto Center and Zoom" clicked [the default] then each time you click "Set Home and DX Positions" (labeled as "Calculate Lat/Long from Home/DX Grids" or "Calculate Lat/Long or Home/DX Grids" on some older illustrations), the map will center itself on the midpoint of the path you have created.
20. You can enter Home and DX station position data one of 3 ways:
    - Click on the "Call" radio button and type in a call. If that call is contained in the call3.txt database, its grid and Lat/Long information will be entered.
    - Click on the "Grid" radio button and type a 4 or preferably 6 digit grid
    - Click on the "Lat" radio button and enter the latitude and longitude values
21. Once you have entered the position data for Home and DX stations as described above, left-click the "Set Home and DX Positions" (labeled as "Calculate Lat/Long from Home/DX Grids" or "Calculate Lat/Long or Home/DX Grids" on some older illustrations) button to calculate the path between the home and DX stations.
22. The Path Altitude Profile will only be displayed if you have downloaded all of the necessary SRTM3 data files from http://dds.cr.usgs.gov/srtm/version2_1/SRTM3/North_America/ and put it into the %localAppData%/W3SZ/ElevationData/SRTM3 directory. This is most likely of the form x:/Documents and Settings/Username/Local Settings/Application Data/W3SZ/ElevationData/SRTM3/.
23. Read the tooltips and the Options pages for more useful information.
24. I have reproduced the Options pages from my installation below, in case you have trouble reading them at your site:

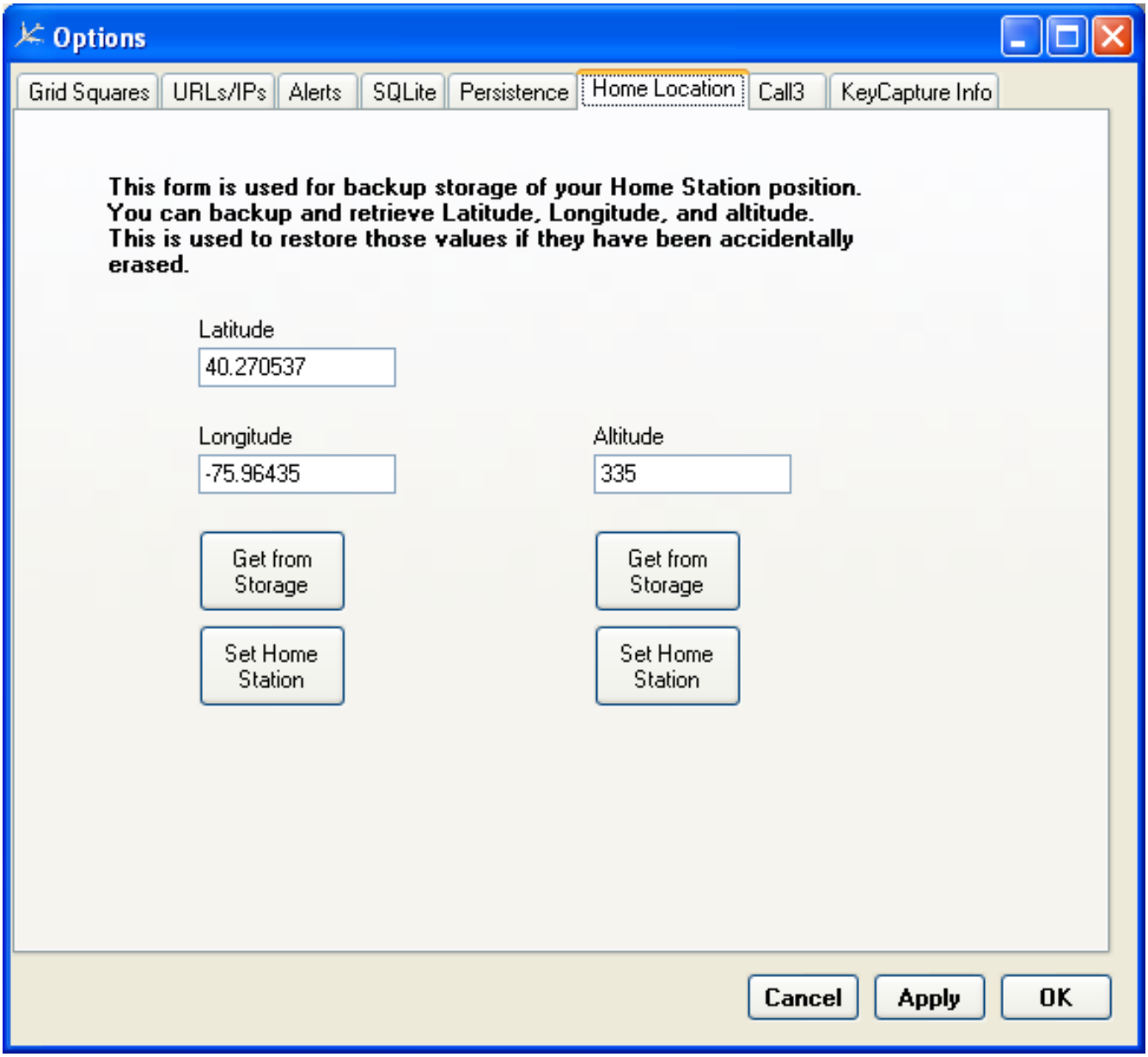

Options
Grid Squares
URLs/IPs
Alerts
SQLite
Persistence
Home Location
Call3
KeyCapture Info
Boundary Lines
Visible
Invisible
Pop Up Grid Labels
Off
MouseOver Icon Visible
MouseOver Icon Invisible
You may make your own .gpx file named EastUSA-GS.gpx to make your own gridlines and markers. If you have done that and wish to use that file, check this box.
File
A sample file is available. If you wish to save it to disk, click this button. The file will then be saved to this application's directory with the name 'EastUSA-GS.gpx'.
Cancel
Apply
OK

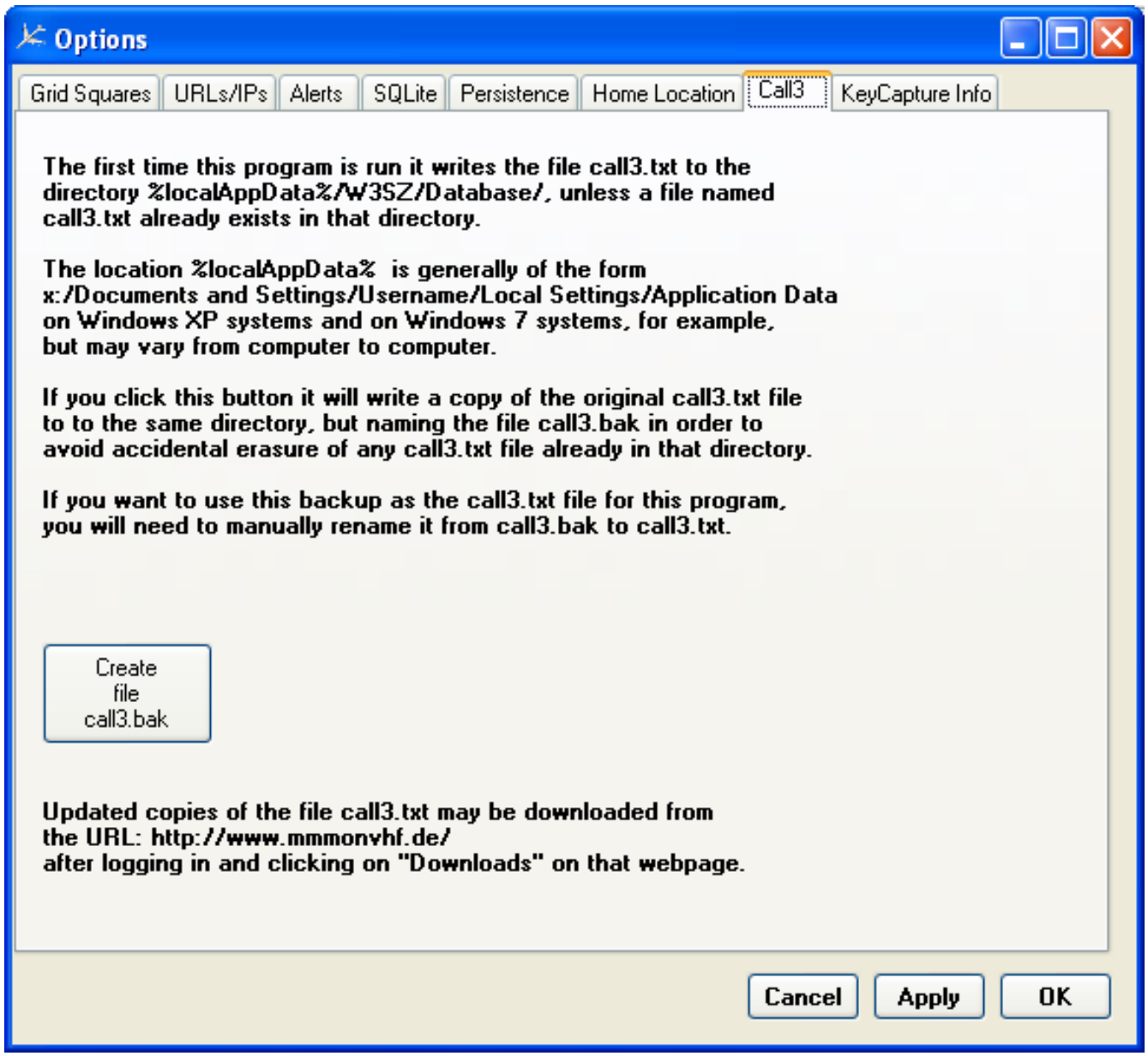

Options
Grid Squares
URLs/IPs
Alerts
SQLite
Persistence
Home Location
Call3
KeyCapture Info
URL must be of form http://myflightradar.com/
Make sure you include the forward slash "/" at the end
URL
1
http://www.flightradar24.com/
test URL
2
http://db.flightradar24.com/
test URL
3
test URL
Directory/Filename must be of form Directory/Filename
Dir/File
1
zones/northamerica.json
test Path
2
zones/full_all.json
test Path
3
PlaneFeed.json
test Path
IP Address for local RTL1090
192.168.1.193
port must be 30003
Cancel
Apply
OK

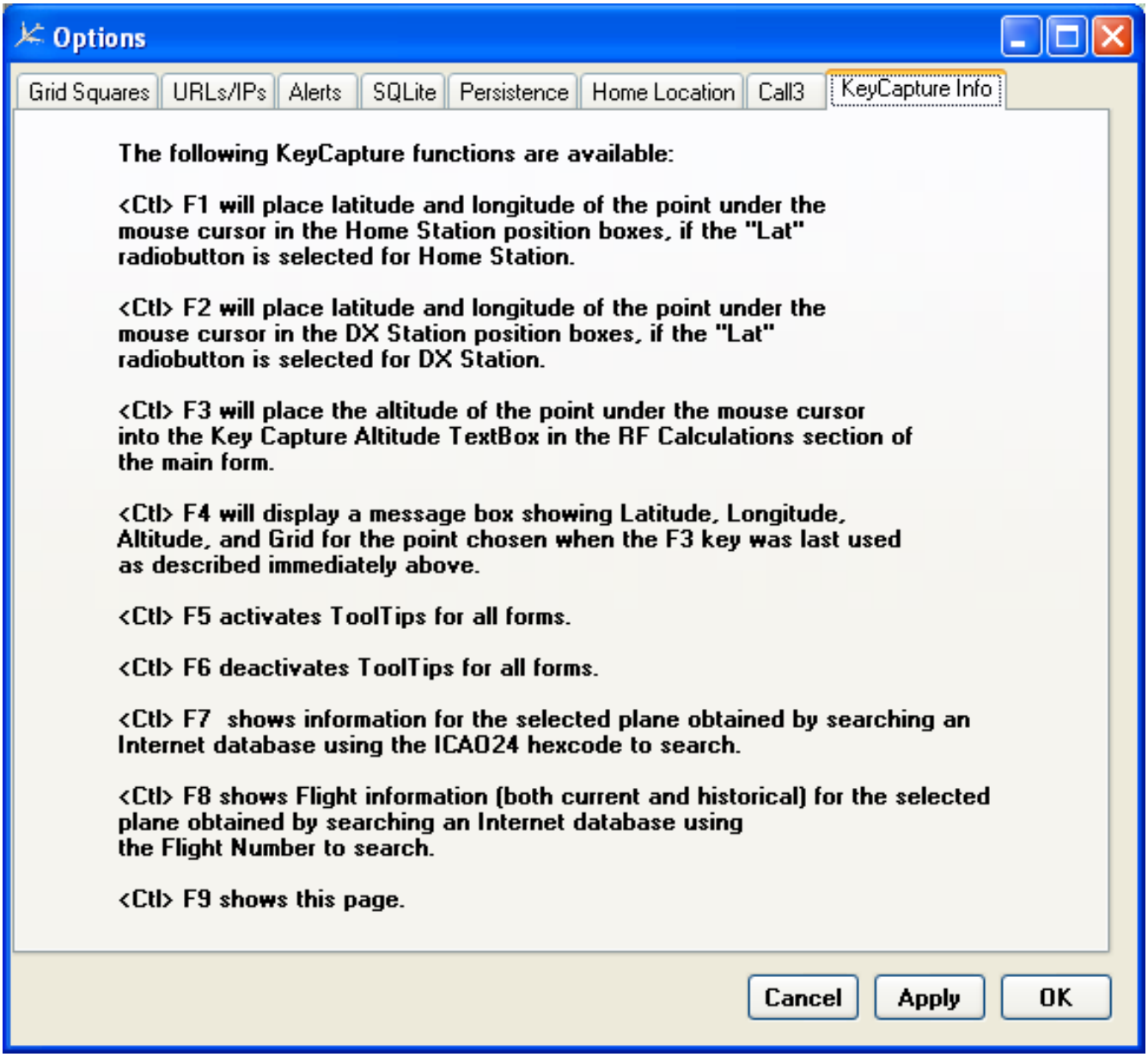

Options
Grid Squares
URLs/IPs
Alerts
SQLite
Persistence
Home Location
Call3
KeyCapture Info
Set Parameters for Primary and Secondary Alerts
Secondary Alert triggers when any plane within 75 km of Midpoint
Primary Alert triggers when skew from path is ALSO less than 5 degrees
Aircraft Alert symbols are as below. They cannot be changed.
Selected Aircraft Primary Alert
Unselected Aircraft Primary Alert
Selected Aircraft Second Alert
Unselected Aircraft Second Alert
Selected Aircraft No Alert
Unselected Aircraft No Alert
Cancel
Apply
OK


Options
Grid Squares
URLs/IPs
Alerts
SQLite
Persistence
Home Location
Call3
KeyCapture Info
Save data to file every:
30 seconds
1 minute
2 minutes
3 minutes
5 minutes
10 minutes
You can create a new SQLite database file named 'dBplanes.sqlite' by clicking on this button.
This file will be put into your Aircraft Scatter Sharp application directory.
Create file dBplanes.sqlite
Cancel
Apply
OK


Options
Grid Squares
URLs/IPs
Alerts
SQLite
Persistence
Home Location
Call3
KeyCapture Info
Plane markers may linger on the screen after communication with the plane is lost.
The program will do a sweep of markers periodically in an attempt to clean out old markers giving no recent data.
Set here how long you want the program to wait after receiving last communication from the plane before deleting the marker.
3 minutes
5 minutes
10 minutes
15 minutes
30 minutes
60 minutes
90 minutes
Cancel
Apply
OK


Options
Grid Squares
URLs/IPs
Alerts
SQLite
Persistence
Home Location
Call3
KeyCapture Info
This form is used for backup storage of your Home Station position.
You can backup and retrieve Latitude, Longitude, and altitude.
This is used to restore those values if they have been accidentally erased.
Latitude
40.270537
Longitude
-75.96435
Altitude
335
Get from Storage
Get from Storage
Set Home Station
Set Home Station
Cancel
Apply
OK


Options
Grid Squares
URLs/IPs
Alerts
SQLite
Persistence
Home Location
Call3
KeyCapture Info
The first time this program is run it writes the file call3.txt to the directory %localAppData%/W3SZ/Database/, unless a file named call3.txt already exists in that directory.
The location %localAppData% is generally of the form x:/Documents and Settings/Username/Local Settings/Application Data on Windows XP systems and on Windows 7 systems, for example, but may vary from computer to computer.
If you click this button it will write a copy of the original call3.txt file to to the same directory, but naming the file call3.bak in order to avoid accidental erasure of any call3.txt file already in that directory.
If you want to use this backup as the call3.txt file for this program, you will need to manually rename it from call3.bak to call3.txt.
Create file call3.bak
Updated copies of the file call3.txt may be downloaded from the URL: http://www.mmmonvhf.de/
after logging in and clicking on "Downloads" on that webpage.
Cancel
Apply
OK


Options
Grid Squares
URLs/IPs
Alerts
SQLite
Persistence
Home Location
Call3
KeyCapture Info
The following KeyCapture functions are available:
<Ctl> F1 will place latitude and longitude of the point under the mouse cursor in the Home Station position boxes, if the "Lat" radiobutton is selected for Home Station.
<Ctl> F2 will place latitude and longitude of the point under the mouse cursor in the DX Station position boxes, if the "Lat" radiobutton is selected for DX Station.
<Ctl> F3 will place the altitude of the point under the mouse cursor into the Key Capture Altitude TextBox in the RF Calculations section of the main form.
<Ctl> F4 will display a message box showing Latitude, Longitude, Altitude, and Grid for the point chosen when the F3 key was last used as described immediately above.
<Ctl> F5 activates ToolTips for all forms.
<Ctl> F6 deactivates ToolTips for all forms.
<Ctl> F7 shows information for the selected plane obtained by searching an Internet database using the ICAO24 hexcode to search.
<Ctl> F8 shows Flight information (both current and historical) for the selected plane obtained by searching an Internet database using the Flight Number to search.
<Ctl> F9 shows this page.
Cancel
Apply
OK

1 Atkins, R. Radio Propagation by Tropospheric Scattering. Communications Quarterly Winter 1991, pp 119-127.
2 Yeh, LP. Simple Methods for Designing Troposcatter Circuits. IRE Transactions on Communications Systems September 1960, pp 193-198.
3 Flowers, A. RainScatter 1.61. http://www.frontiernet.net/~aflowers/rainscatter/
4 Jet Propulsion Laboratory, California Institute of Technology. http://www2.jpl.nasa.gov/srtm/
5 SRTM3 files for North America can be downloaded from http://dds.cr.usgs.gov/srtm/version2_1/SRTM3/North_America/