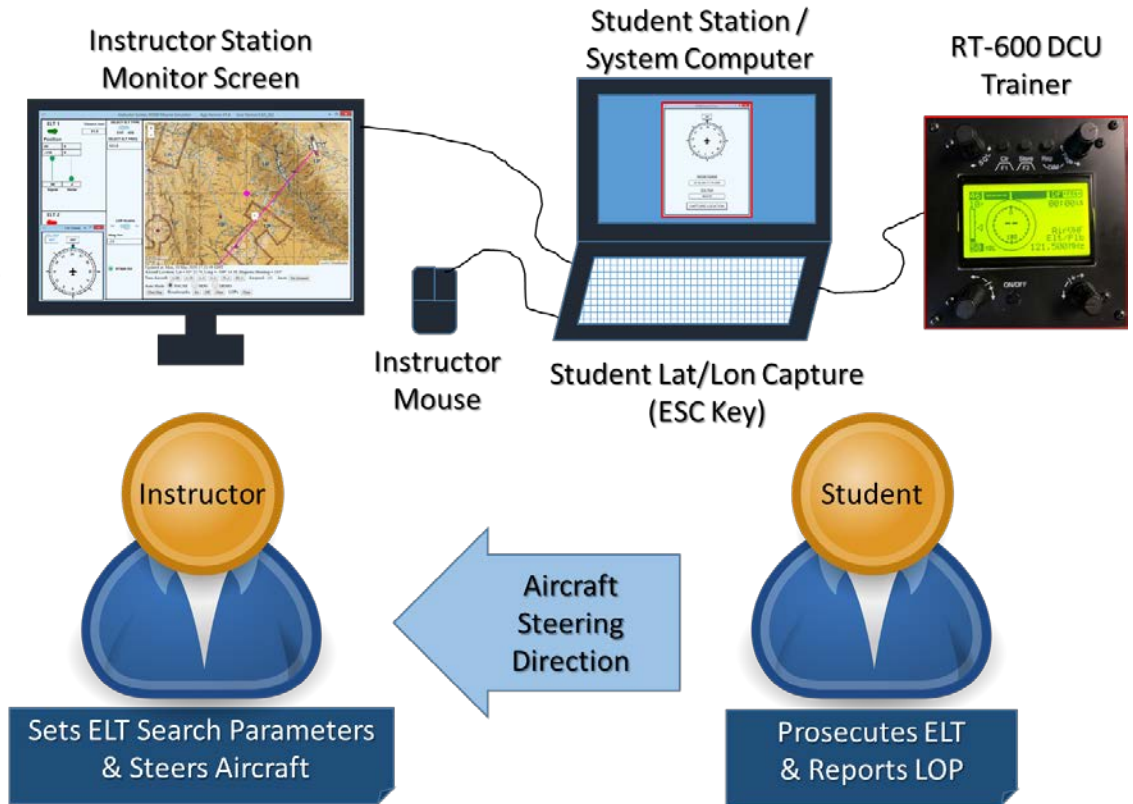**RT600 Mission Simulator User Guide**

Mission Simulator Software Application Version 1.3

Typical System Configuration:

Note: The System Computer Screen Resolution should be set up in "Multiple Monitors: Extend these displays" mode to display different windows on each monitor.

The instructor uses a separate monitor screen (usually <u>not</u> visible to the student) and a mouse to set up and control the search training scenario. The sortie setup can include the position of the ELT(s), the initial position and HDG of the aircraft, the ELT type (applies to both ELTs) & frequency and the ELT signal strength and noise levels. The Instructor also "flies" the airplane in 2-D space during the training scenario. The Student should only be able to see the Student Screen and the RT600 DCU Trainer. This gives the Student the information necessary to prosecute an ELT and report a Line of Position to the target. Using the bearing information from the DCU Trainer, the student can provide aircraft steering direction to the instructor to maneuver the airplane. When ready, the student can press the Escape key on the computer keyboard to temporarily snapshot the current aircraft position to be included in a Line of Position (LOP) report (similar to pressing the Range button on the G1000 MFD). During the sortie, the instructor can vary some of the ELT parameters such as signal strength & noise levels. The instructor can turn on "breadcrumb" flight track markers to record the sortie progress and plot LOPs. These can be used for debrief after the sortie is over. At any time the instructor can press the "PAUSE" button to pause the training scenario. When finished, the instructor can reset the training scenario via the Clear Map button & reposition the aircraft. To shut the Mission Simulator down, just select to red/white X on the upper right corner of the Instructor Screen window.

Note: The DCU Trainer USB cable must be plugged in to the PC before starting the Mission Simulation program on the PC. To start the RT600 Mission Simulator – click on the Desktop Shortcut: RT600MsnSim. If not working, ensure the DCU Trainer USB cable is plugged into the PC & then close and restart the Mission Simulation program.

For those who have purchased an earlier version, please update the DCU Trainer unit to firmware ver. 4

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Page 1 of 12

Instructor Screen:

VHF Mode

1. Plug in RT600 DCU Trainer before starting the Simulation program
2. Turn on desired ELT(s)

DCU Trainer FW (should be Ver 4 or later)

Simulator shutdown (X)

3. Enter ELT Position (D M.m)

4. Select the ELT type (406 or VHF – i.e. 121.5, 121.775 or other tunable VHF freq) & enter/select frequency.

Reposition aircraft by moving mouse to desired position then left double click

5. Select sliders to desired max signal & noise levels

Actual ELT 1 Position

Actual ELT 2 Position

Time readout

6. Enter Mag Var for the local area

Relative BRG & Mag BRG to ELT:
A) Includes noise
B) Average BRG if 2 ELTs

ELT Audio Mute

Aircraft location & Mag HDG

406 Mode

Distance (nm) from aircraft to ELT

Position that is actually transmitted from the 406 MHz ELT with GPS turned on

Select 406 MHz frequency & GPS transmission type:
Hi Res: Accurate to 4 sec
Low Res: Accurate to 15 min
Off: No transmitted GPS position

Time (secs) to next 50 sec 406 signal burst (Digits only visible when a 406 freq. is tuned on the RT600 DCU)

Select VHF homing freq, either 121.5 (Real ELT) or 121.775 (Practice Beacon)

Instructor Screen Map & Aircraft Controls

Map Display Settings

Display AIP Overlay

Restore Student Screen

Restore HSI Screen

View Second Student Window on Instructor Monitor

Aircraft HDG Controls

Autopilot Mode:
1) Pause = No AC movement (on Hold)
2) HDG = Fly aircraft on current selected HDG & speed
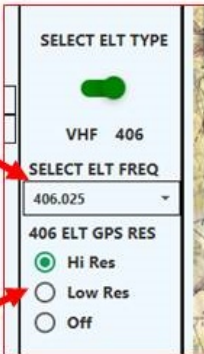3) Demo = Aircraft flies in a preset pattern around the ELT
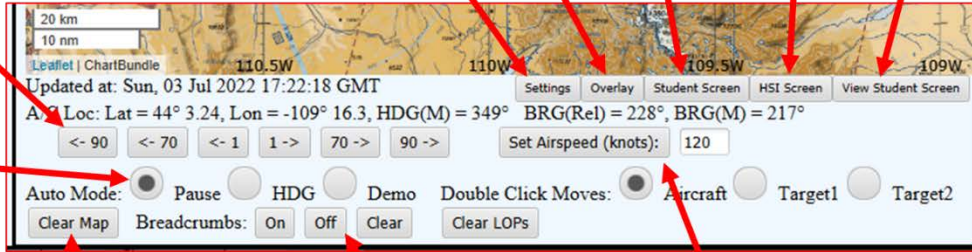
Clears aircraft & breadcrumbs from screen. Right click on map & select Reload Page to restore aircraft icon.

Breadcrumb flight track record controls

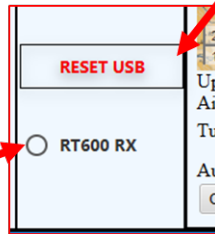Aircraft speed controls; Press "Set Airspeed" after entering new number (1200 kts max)

406 MHz Mode Controls

Select 406 freq. from drop down list

Select 406 GPS Transmit Mode:
Hi Res= 4 sec resolution
Low Res=15 min resolution
Off=no GPS

When connecting DCU after this program starts up, press this to reset USB connection

Error Flags

DCU Trainer not communicating over USB (Green Dot is not visible)

If controls or displays aren't working, you may need to close this program, reconnect DCU, then restart the program

Error Flags

Student has tuned wrong frequency on DCU Trainer

ELT Audio:

The ELT audio will play thru your computer's speakers. The audio volume knob on the DCU Trainer is active. Speaker volume can also be controlled by your computer's audio system. The appropriate 121 warble tone or 406 detection tone will be heard when the ELT is in range and properly tuned on the DCU Trainer. The 121 warble tone level is appropriately attenuated

relative to the distance to the ELT. Some background static noise will also be heard. The background noise is driven by the noise level slider control.

Line of Position Plotting:

When enabled, Line of Positions (LOPs) are now plotted on the Instructor Screen when the Student presses the ESC key on their PC keyboard. They are sequentially numbered. The Instructor can clear all plotted LOPs by pressing the LOPs Clear button on the Instructor Screen. These plots can be useful during training debrief.

Pressing the ESC key on the Student keyboard will plot the current LOP on the Instructor screen when enabled.

The LOP is always plotted directly off the nose of the airplane. This assumes the crew has pointed the aircraft into the ELT to null out the BRG display on the RT600.

LOP Plotting Control
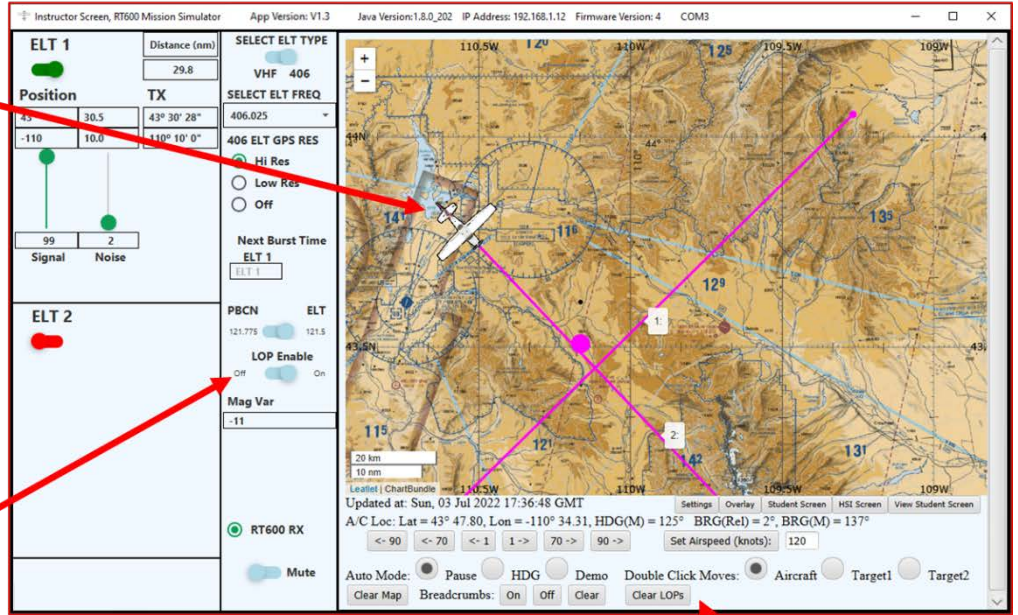
All LOPs will be cleared when the LOPs Clear button is pressed

ELT Signal and Noise:

The ELT Signal and Noise slider bar on the Instructor Screen uses a simplified algorithm to refle[   ] student may encounter during an ELT search. Note that the below settings are arbitrary, we sugg[   ] to simulate the typical experience you get in your area of operation.

A) The baseline signal level can be set (1 to 100) to simulate variances in signal strength due to damaged ELTs and/or signal obstruction (note: no terrain modeling or masking is included in this system). The received signal level will also vary with distance from the ELT and typical 121/406 transmitted power levels.

B) The noise slider bar introduces noise variance in instantaneous (white marbles) and averaged (black marble) ELT BRG indications. Some randomness in BRG indications is also added to better reflect real world experience. The greater the Noise setting (1-50), the greater the spread of the white marbles and resulting random BRG indications. Typical noise settings for simulating a well-functioning ELT in a relatively quiet noise environment would be in the range of 1 to 5.

C) The BRG averaging shows the effects on BRG indications due to relative BRG change (e.g. station passage, etc.). The CLR button on the DCU Trainer should clear all BRG averaging like it does on the airplane.

Instructor HSI Screen

A separate HSI window is provided to allow the instructor to steer the airplane using the HDG bug on the HSI compass rose. Using the computer mouse control wheel, the HDG bug can be moved left or right to the desired selected heading. Note that the mouse pointer must be placed the inside the HSI window to change the selected heading. About 2 seconds after instructor stops moving the bug the aircraft will begin to turn to that new selected heading. Pressing down on the mouse control wheel (if equipped) will move to HDG bug to the current aircraft HDG.

This window will always be on top of your desktop screen. You can close the window or move it out of the way if so desired. If the window is closed, you must restart the Mission Simulator program to display it again. Please note that the depiction of the degree marks on the compass rose may be slightly off of the desired selected heading. Use the Selected HDG window digital display to accurately set the HDG bug.
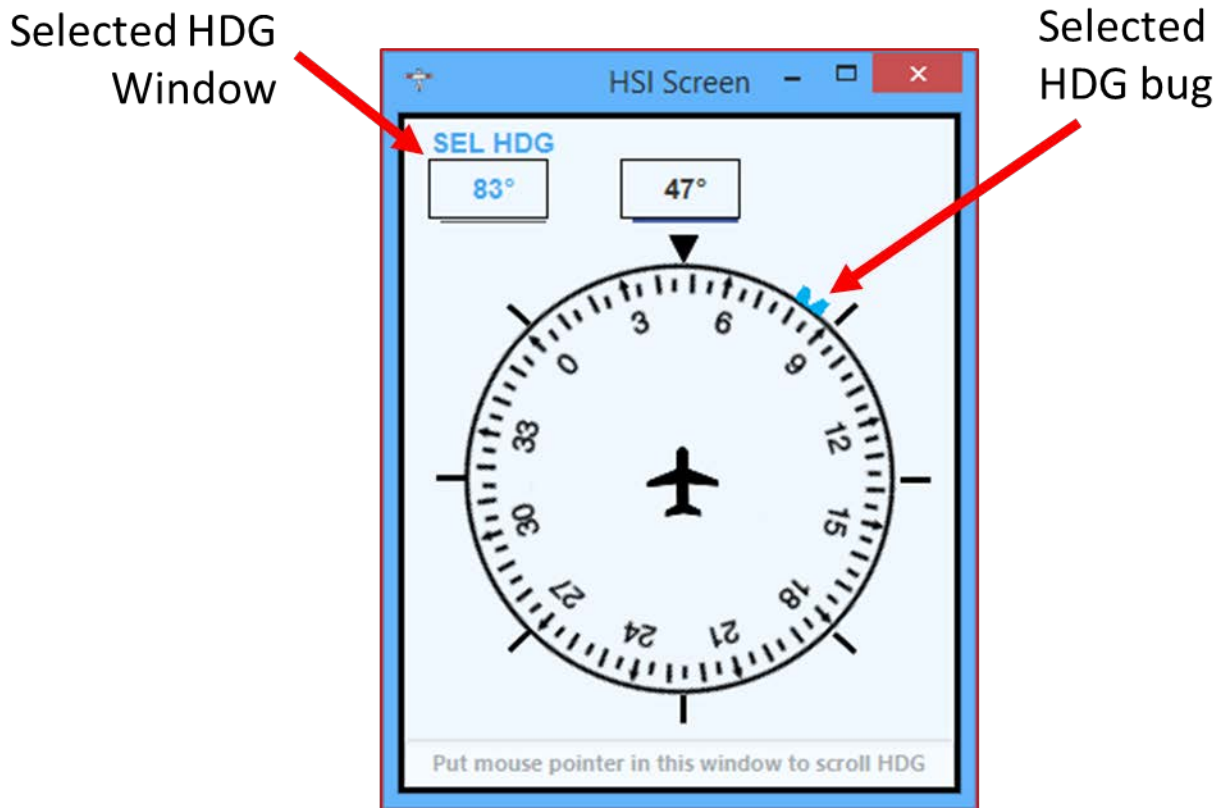

Instructor HSI Screen
(Mouse pointer must be in this window for SEL HDG to scroll)

Map Display Settings

The Settings button on the Instructor Screen displays the Settings Screen which has two tabs as described below.

Icons Selection Tab: Choose your desired aircraft icon on the map display. Provision to incorporate a Custom Icon is available. Please refer to separate Special Instructions to import a custom icon.
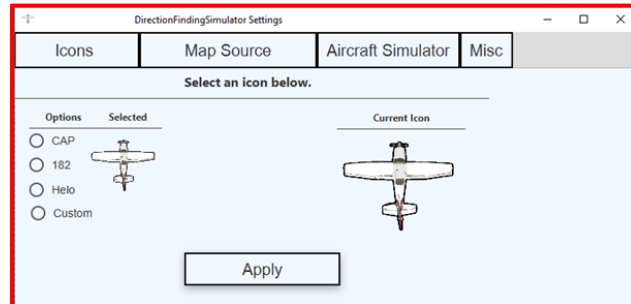
Map Source Selection Tab: Choose your desired map background & apply. To save this selection for the next time the program is started, select "Save and Exit" when exiting this program.

Three initial map backgrounds are provided. You may enter a custom map background which will be saved in the available map sources list. See below for more information on Custom Map Sources URL and editing Map Sources text file were the Available Map Source list is stored. Provision to incorporate a locally stored custom map atlas is available (allows a map to be displayed without an internet connection). Please refer to separate Special Instructions to import a custom map atlas.
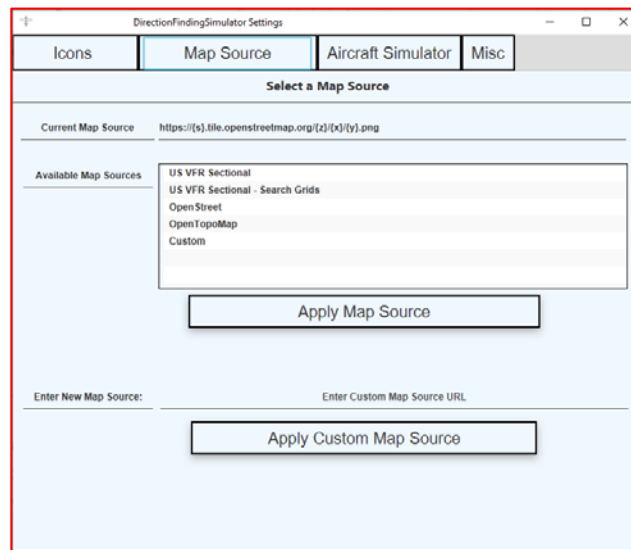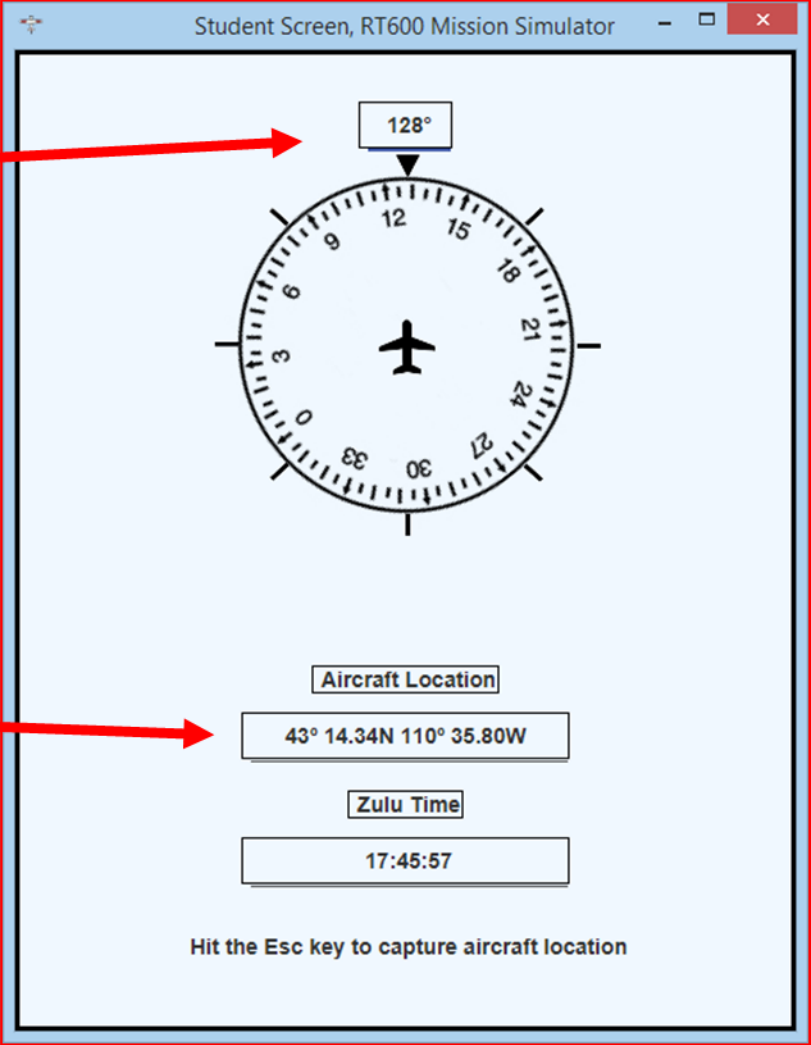

Instructor Notes:

1) If ELT 2 is turned on, the ELT2 signal burst will always be 20 seconds offset from ELT1. Pressing the "Q" key on the PC keyboard sends an immediate ELT1 406 signal burst to the DCU Trainer & will restart both 406 signal burst timers. This will allow the instructor to quickly demonstrate the various 406 displays on the DCU Trainer without having to wait 50 secs each time.

.2) At startup, the initial aircraft position and map center position will <u>always</u> be ~10nm north of ELT1.

Student Screen:

Student Screen

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Page 7 of 12

DCU Trainer:

The DCU Trainer will power up upon plugging the USB cable into the computer (the ON/OFF push button is used for other purposes – see below). The first screen is the Becker 517 / RT-600 **Version Select** page. Within 5 seconds of power up, select the desired version number to run on the DCU Trainer by turning the upper right Page rotary knob.

For those of you who have purchased an earlier system, please update your DCU Trainer to **firmware version 4** (FW: V4) or later. Update instructions are available upon request – just send us an email.

Version Select Page

The below are additional DCU Trainer functions <u>not</u> found on the flight hardware:

Pressing the **Clr** button while on the **Version Select** page places the DCU Trainer into a self-contained DEMO mode. With the DCU Trainer plugged into any 5V USB power source, you can demo the trainer's basic functions. Exit the DEMO mode by a Long Push of the ON/OFF button.

Display Contrast Adjustment Knob

Bearing Page

ON/OFF Push Button Functions:

Short push (< 5 secs) = **DCU Version 2.x:** Return to the V2.x power up page to select Training or Emergency Mode.

Long Push (>5 secs) = **All DCU Versions:** Return to the DCU Trainer Version Select page.

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Page 8 of 12

RT600 Mission Simulator Preferences

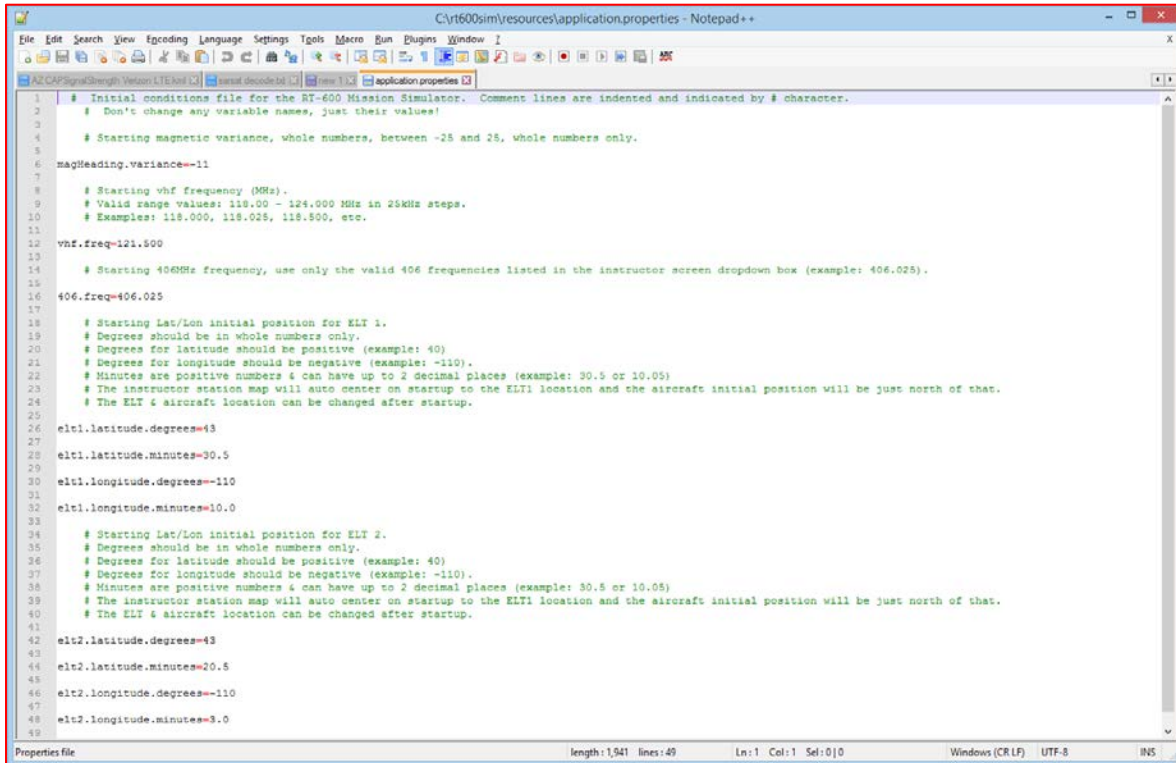<u>The RT600 Mission Simulator Instructor Settings include:</u>

A) Initial ELT 1 and 2 lat/lon locations. (Note: the initial aircraft position will **<u>always</u>** be 10nm north of ELT1)

B) Initial VHF and 406 ELT frequencies

C) Magnetic Variance for your local area.

<u>Options for saving RT600 Simulator preferences for the Instructor Settings:</u>

1) The Default Preferences can be changed by editing the "application.properties" file located in the resources folder. These Default Preferences won't change unless you manually edit the file again. It is recommended that whoever is the administrator for this simulator program be the one authorized to edit this Default Preferences file.

2) The last used Instructor Settings can be saved by the instructor upon exiting the simulator program and recalled upon the next program start up. These Saved Preferences won't change the Default Preferences file.

Changing the Default Preferences in the application.properties file:

The program's initial startup settings can be varied to accommodate your local area by modifying the parameters in the application.properties file in the Resources Folder on the C drive at C:\rt600sim. Please pay <u>careful</u> attention to formatting and punctuation.

If the application.properties file has been corrupted, there is a backup file with the original delivery settings in the resources folder called: ap.bak. To recover, please: 1) note original file name (application.properties). 2) Delete old application.properties file. 3) Make a copy of the backup file in the same resources folder. 4) Rename the copied file to the original properties file name (application.properties). 5) Edit the new file's parameters to match your local area.

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Page 9 of 12

Saving "Last Used" Instructor Settings:

As an option, the instructor can save their last used Instructor Settings upon exiting the RT600 Mission Simulator program. Upon exiting the program, the below window will pop up and ask the instructor if they want to save their Instructor Settings.
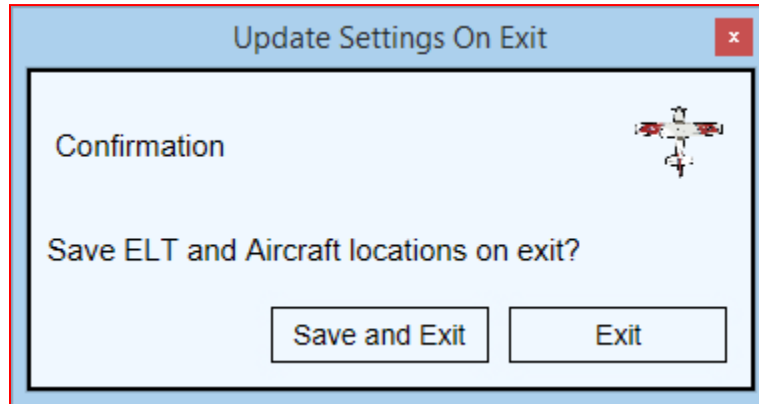
Selecting "Save and Exit" will create/update a savedAppProperties preferences file in the resources folder to save the Instructor Settings and map background from this session. Selecting "Exit" will just terminate the program and not save any Instructor Settings from this training session. Note that if no selection is made, this window will timeout after ~10 seconds and the program will exit without saving the latest settings.
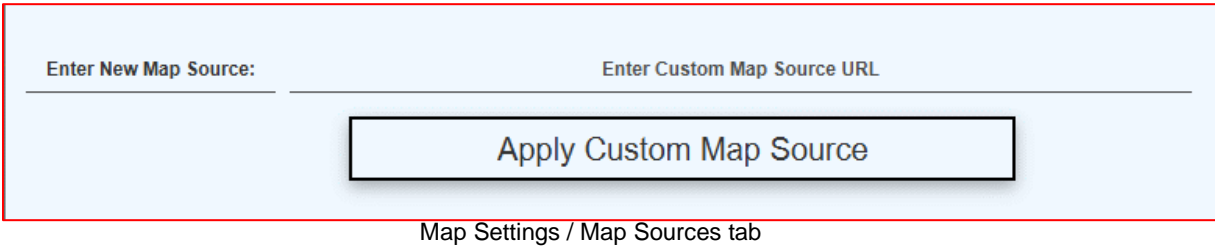
If any instructor saves their settings on a previous session, the following window will appear on subsequent program starts:
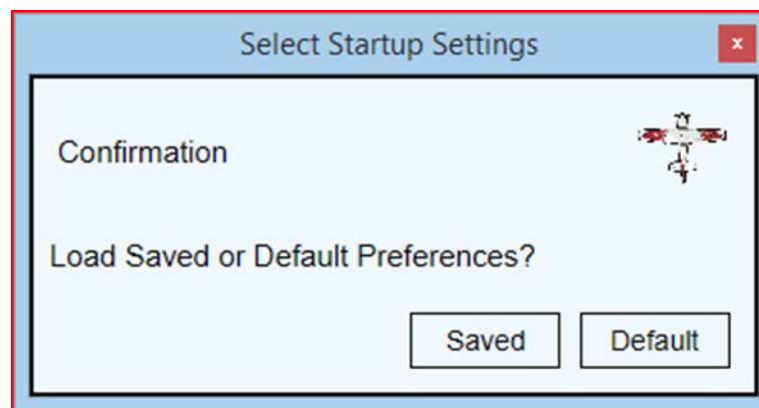
Selecting "Saved" will load the Instructor Settings saved by a previous instructor. Selecting "Default" will load the Default Preferences as detailed on the previous page. If no selection is made within 10 seconds, the "Saved" selection will be automatically made and the startup will continue. Notes: A) if no settings are saved by any previous instructor, this preference loading window will not appear. B) the Saved Preferences file will remain on the computer unless it is manually deleted from the resources folder.

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Page 10 of 12

Custom Map Source

This program uses Leaflet Javascript as its map engine and Web Mapping Service (WMS) map sources for the map backgrounds. See: Leafletjs.com for more information on Leaflet, WMS formats and links to various Leaflet compatible WMS map source providers. **Usage of Custom map source URLs should only be attempted by experienced software administrators who have a background in WMS and its associated URL formats & attributions.** No support is provided by us regarding Custom URL formats and/or map source providers.

Map Settings / Map Sources tab

Map Sources Text File

The MapSources text file in the resource folder contains the background map URL and associated attribution for the map providers. This file also contains the Custom Map Source information if applied via the above "Apply Custom Map Source" button. If required, this file may be manually edited as long as the 3 line format detailed at the top of the file is followed for all map sources added to the file. If maps are added, the user is responsible to add the appropriate attribution associated with that map provider per their copyright requirements, if any. If the MapSources file is corrupted, there is a backup file with the original delivery settings in the resources folder called: ms.bak. Follow the steps as detailed in the above applications.properties file recovery instructions to restore the contents of the MapSources.txt file from the ms.bak file.

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Page 11 of 12

DCU Trainer – General differences from the airborne equipment:

1. Version 3.3: The <u>VHF</u> SCAN mode on the Bearing Page has been disabled. The label SCAN has been replaced with dashes. Note: the <u>406</u> SCAN mode is fully functional on V3.2 and 3.3.

2. Version 2.x: The 406 SCAN mode on the all the bearing pages is inoperative.

Users are encouraged to submit any observations or suggested improvements you may observe to the SimTechAZ team. Please email your comments to <u>SimTechArizona@gmail.com</u>.

Thank you for using the RT600 Mission Simulator System.

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Page 12 of 12