

# **vERAM**

Version 1.0

***Facility Engineer's Guide***

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## Introduction

This guide is intended to assist you, the facility engineer, with creating facility configurations for vERAM. Before reading this guide, it is recommended that you read the Controller's Guide to become familiar with the general operation of vERAM.

After creating a facility configuration, you will be able to export it as a single compressed file which you can then post on your ARTCC's web site for controllers to download and import into vERAM. vERAM will automatically overwrite any older version of the facility and its GeoMaps provided the facility ID stays the same. This compressed facility file will include the GeoMaps Set you build with the GeoMap Set Editor, which is discussed later in this document.

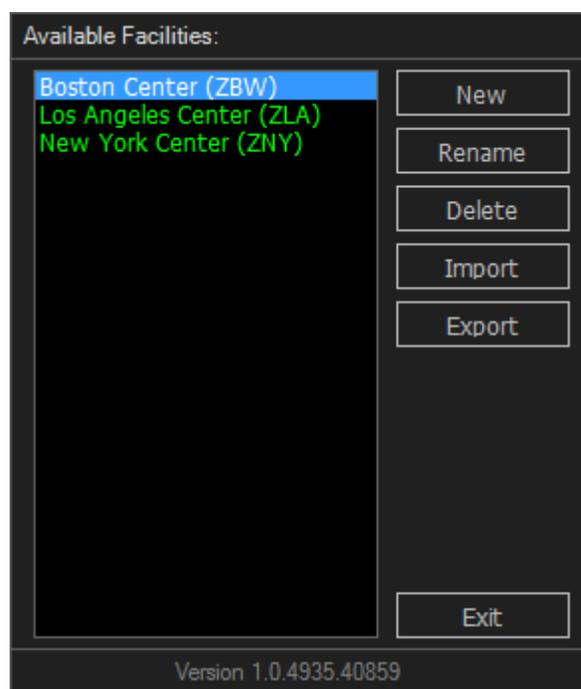
## The Facilities Window

Each time you run vERAM, you'll see the Facilities Window, shown at right. Obviously, the first time you run vERAM, the list of facilities will be empty.

To create a new facility, press the New button. You will be prompted to enter the three-character facility ID. It is recommended that you use the real-world facility identifier such as ZBW for Boston Center. You will also be prompted for a name for the facility, which can be anything descriptive. The new facility will be created with all default settings.

To edit a facility, double-click the facility name in the list. The facility will be loaded and the main radar screen will appear. You can then open the Edit Facility window as described below.

To export a facility configuration as a single compressed file, select the facility and press the Export button. You will be prompted for a location on your hard disk where vERAM will store the file. You can then post this file for download on your ARTCC's web site.



## Facility Configuration

Once you have loaded a facility and the main radar screen loads, you can access the Edit Facility window by pressing the CTRL-F key combination. Following is an overview of each tab within the Edit Facility window. The more complex settings are covered in detail in later sections.

### Airspace Tab

The screenshot shows the 'Edit Facility - Boston Center' window with the 'Airspace' tab selected. The window contains the following configuration fields:

Parameter	Value	Latitude	Longitude	Action
CA Lateral Min:	5.0			
CA Vertical Min:	1,000	43.06253	-71.95471	
CA Floor:	2,000	0.00000	0.00000	Clear
Transition Altitude:	18,000	0.00000	0.00000	Clear
Visibility Range:	400	0.00000	0.00000	Clear
Observer Vis. Range:	300	0.00000	0.00000	Clear
IFR Squawk Range:	3000		6777	
VFR Squawk Range:	1000		2777	

At the bottom of the window are three buttons: OK, Apply, and Cancel.

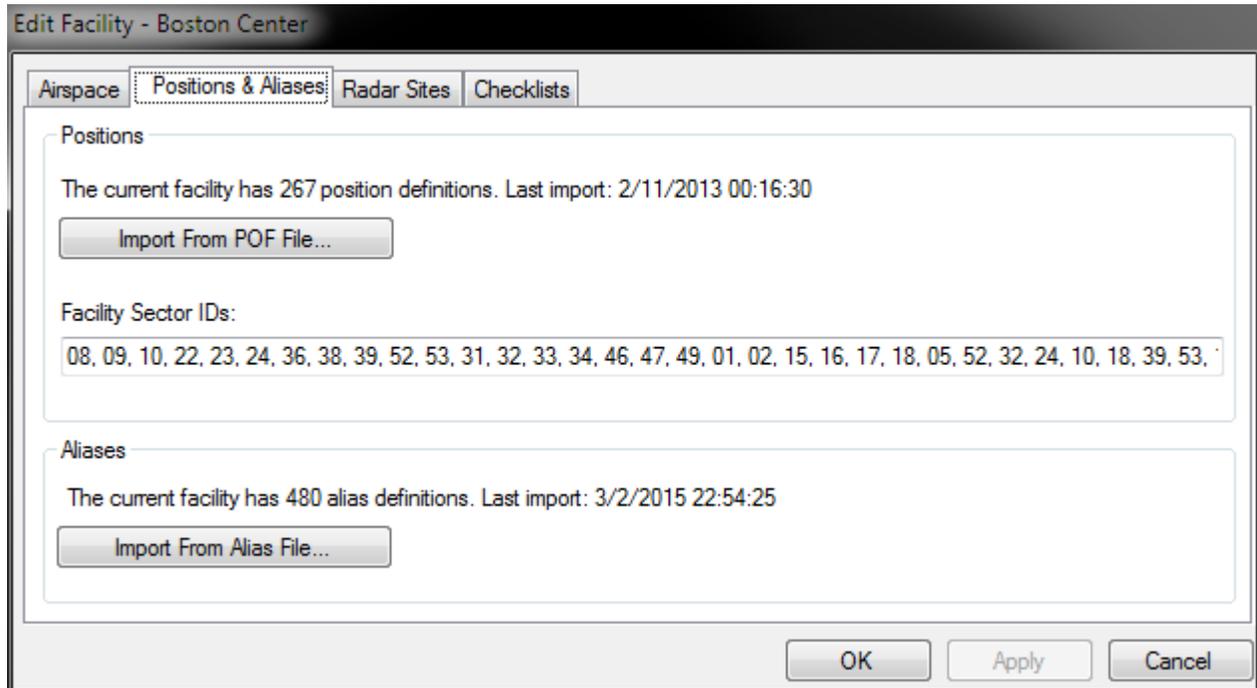
The three CA settings are used in the detecting of potential conflicts between aircraft.

The transition altitude is used to determine below which altitude a target's true altitude will be shown, versus pressure altitude.

The four visibility centers are used to create the area of coverage where targets will be visible to your radar sites. These work the same as visibility centers in VRC. Most facilities will only need to define the first visibility center, and leave the other three set to zero.

The two squawk ranges are used when vERAM chooses a squawk code to assign to an aircraft.

## Positions & Aliases Tab



vERAM stores all position data and aliases within the facility configuration itself. It does not use separate POF or Alias files like VRC uses. However, vERAM does support importing position information and aliases from POF files and alias files. In fact, this is the only way to define positions and aliases.

vERAM supplements the POF file information by allowing you to specify which positions are considered “In-Facility”. The “In-Facility” setting is currently only used to help format error messages. For example, if you try to perform an operation on a track that you do not control, the error message will show the sector ID of the controlling sector only if that sector ID is within your facility. Otherwise it will just show a generic “NOT YOUR CONTROL” message. This is for realism purposes only and has no actual affect on functionality at this time. (It may in the future.)

To import positions or text aliases, press the appropriate Import button and select the POF or alias file from your hard disk. The position and alias data will be included when you export the facility file for other users to import. In other words, only the facility engineer that creates the facility needs to import POF or alias files. Each time you import a POF or alias file, the existing positions or aliases are deleted before importing.

## Radar Sites Tab

Edit Facility - Boston Center

Airspace | Positions & Aliases | **Radar Sites** | Checklists

Radar Sites:

ID	Term	Lat	Lon	Elev	Slope	PSR Rng	SSR Rng	3NM Rng	COS Slope
ACR	<input type="checkbox"/>	41.24846	-70.06069	94	0.175	60	60	0	15.000
ALR	<input type="checkbox"/>	42.74153	-73.82035	454	0.175	60	60	40	15.000
BDL	<input type="checkbox"/>	41.93857	-72.68249	229	0.175	60	60	40	15.000
BTR	<input type="checkbox"/>	44.46729	-73.15054	384	0.175	60	60	0	15.000
COV	<input type="checkbox"/>	41.72080	-71.59839	574	0.175	60	60	40	15.000
DSV	<input type="checkbox"/>	42.63833	-77.65306	2113	0.175	177	193	0	15.000
MHR	<input type="checkbox"/>	42.95001	-71.29922	734	0.175	60	60	40	15.000
PWR	<input type="checkbox"/>	43.82856	-70.26629	508	0.175	60	60	40	15.000

Delete Selected Radar Site

OK Apply Cancel

vERAM has the ability to simulate radar coverage by allowing you to specify the physical location of each radar site that can potentially “see” aircraft in the facility airspace.

Targets must be within visibility range of one of the visibility centers in order to be displayed. The visibility centers and range determine for which targets the VATSIM server will send position reports to vERAM. The radar site coverage determines which of those targets are actually displayed on the radar screen.

Enter a value in the “3nm Sep Range” column in order to create reduced separation airspace. If a target is within the specified distance of the radar site, and that radar site is the closest site to the aircraft, the target will be shown as a dot, indicating that it is in reduced separation airspace. The target will also be eligible for a reduced separation halo if requested by the controller.

Check the box in the “Term” column if you want to define the radar site as a Terminal type radar. These radar sensors spin at a faster rate (about 12 RPM or one rotation every five seconds) and will therefore provide faster position updates for targets that are closer to that radar site than to any other radar site.

See [Configuring Radar Sites](#) for more details on defining radar site volume of coverage.

## Checklists Tab

Emergency Checklist

1	NATURE OF EMERGENCY
2	FUEL REMAINING IN TIME
3	PIREP WX/IFR CAPABILITY
4	PILOT INTENTIONS
5	LAST KNOWN POSITION
6	HEADING & AIRSPEED
7	NAVIGATION EQUIPMENT
8	NAVAID SIGNALS RECEIVED
9	VISIBLE LANDMARKS
10	ACFT COLOR/SOULS

Position Relief Checklist

1	SECTOR CONFIGURATION
2	SPECIAL USE AIRSPACE
3	TMU RESTRICTIONS/NOTAMS
4	NAVAIDS/FREQ/VSCS/URET
5	NON RVSM/TRANSIT/PENDING
6	RADAR DISPLAY SETUP/EBUS
7	WEATHER/ALTIMETERS/PIREPS
8	SIGMETS/AIRPORT CONDITIONS
9	TRAFFIC CURRENT/PENDING
10	

OK Apply Cancel

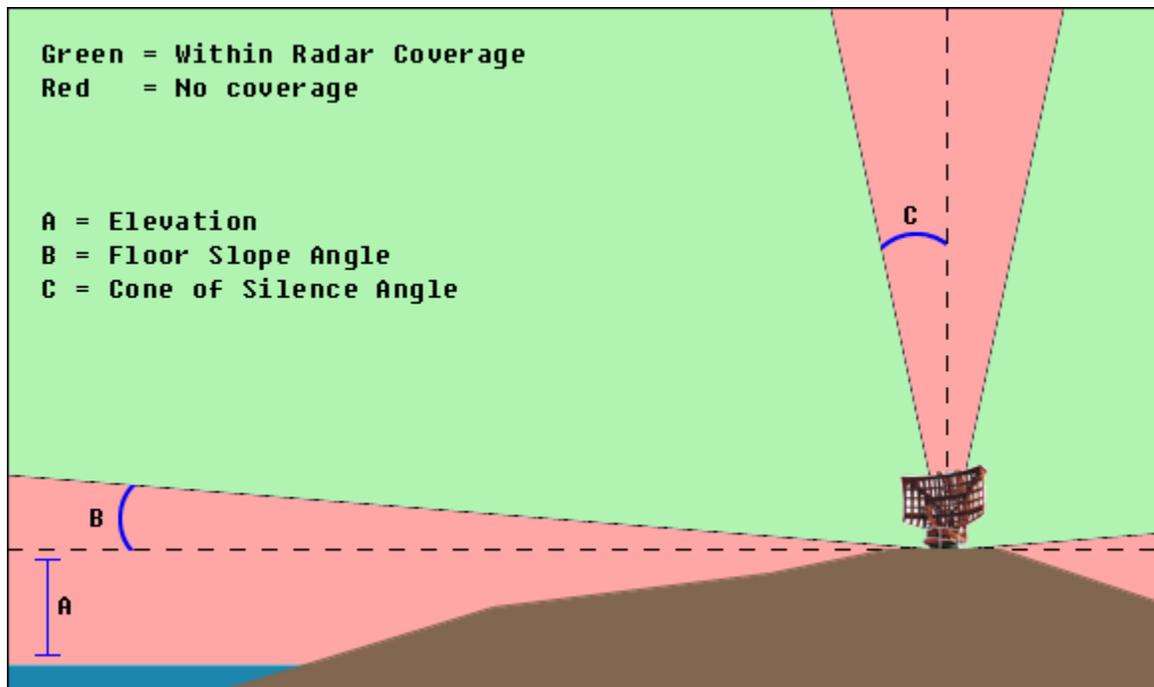
This tab is where you define the Emergency and Position Relief checklist entries. Refer to the Checklists section of the Controller's Guide for more information. You can leave entries blank if you do not need all ten entries for your checklist.

## Configuring Radar Sites

vERAM provides the user with the ability to define multiple radar sites, each with a set of parameters that determines the volume of airspace within which the radar site can detect aircraft. These parameters are as follows:

- **Latitude/Longitude** – The radar site location.
- **Elevation** – The radar site's height in feet above sea level (MSL.)
- **Slope** – The angle at which the floor of the radar site's coverage slopes up away from the site. This can be a negative value if the radar is “looking down” from it's elevation.
- **Primary Range** – The maximum distance (in NM) at which the radar site will acquire a target on primary search radar. A target must be within this distance in order to have a primary target rendered on screen.
- **Secondary Range** – The maximum distance (in NM) at which the radar site will acquire a target's transponder signal. A target must be within this distance in order to have the beacon target rendered on screen. Obviously, if an aircraft does not have its transponder turned on, it won't show up on secondary radar at all.
- **Cone of Silence (COS)** – This angle defines the size of the Cone of Silence, which is an inverted cone directly above the radar site where targets cannot be “seen” by the radar.

The following diagram illustrates how these parameters define the volume of radar coverage for the site:



## GeoMaps

When loading a facility configuration, vERAM looks for an XML file which contains the GeoMap data for that facility. This file is stored in the GeoMaps folder under the folder where vERAM is installed. The file is named using the facility ID. For example, the GeoMaps file for the ZBW facility is called "ZBW GeoMaps.xml". The full path to this file would be:

```
C:\Users\<<USERNAME>\AppData\Local\vERAM\GeoMaps\ZBW GeoMaps.xml
```

When you create a vERAM facility, you will use the GeoMapSetEditor.exe application which installs with vERAM, and you will save the file using the file name convention described above. The editor allows you to create GeoMaps and import line segments and text labels from traditional sector files. You can also edit the XML file using a text or XML editor. This will be necessary in order to create some elements that cannot be created by importing from a sector file, such as Symbol elements. (More on that below.)

Here are some term definitions:

- **GeoMap Set** – A single GeoMap XML file represents a GeoMapSet, which is simply a collection of GeoMaps.
- **Map Filter** – A filter is simply a number from 1 to 20 that can be assigned to objects within a GeoMap. This allows the user to toggle the display of those objects by pressing the associated button on the master toolbar map sub-menu.
- **Filter Menu** – A filter menu contains the textual labels which appear on the filter buttons in the master toolbar map sub-menu. Real-world ERAM facilities typically define multiple Filter Menus, such as one for operational positions, one for TMU, etc. VATSIM facilities will likely only need a single Filter Menu.
- **Brightness Control Group** – A Brightness Control Group (BCG) is simply a number from 1 to 20 that can be assigned to objects within a GeoMap. This allows the user to control the brightness of those objects using the buttons on the master toolbar MAP BRIGHT sub-menu.
- **BCG Menu** – A BCG (Brightness Control Group) menu contains the textual labels which appear on the brightness buttons in the master toolbar MAP BRIGHT sub-menu. Real-world ERAM facilities typically define multiple BCG Menus, such as one for operational positions, one for TMU, etc. VATSIM facilities will likely only need a single BCG Menu.
- **GeoMap** – A vERAM user can have one GeoMap loaded at a time. In a real ERAM facility, there is typically one GeoMap for each main area within the ARTCC. (Such as "AREA A", "AREA B", "AREA C", etc.) Facility engineers on VATSIM will typically create a single GeoMap for the whole ARTCC since a single controller is often covering the entire airspace by himself. A GeoMap references one of the Filter Menus defined in the GeoMap set. A GeoMap also references one of the BCG Menus defined in the set. A GeoMap contains many GeoMap Objects.
- **GeoMap Object** – A GeoMap Object is a collection of Elements and Element Defaults. GeoMap objects can be tagged as "TDM Only" so that they will only appear when Top-Down Mode is enabled for the radar display.
- **Element** – An element is a single thing to be rendered as part of the GeoMap. Element types include Line, Symbol, and Text. Elements can be assigned to multiple map filters by specifying the "Filter" attribute as a comma-separated list of filter numbers. Elements can belong to a single BCG by specifying the BCG number in the "Bcg" attribute.
- **Line** – A line segment, defined by start and end locations, style, and thickness. Available styles are Solid, LongDashed, ShortDashed, and LongDashShortDash. Thickness is 1, 2, or 3. The Start and End Lat/Lon properties are required. The other properties are optional and their value will be taken from the LineDefaults for the GeoMap Object to which the Text element belongs.

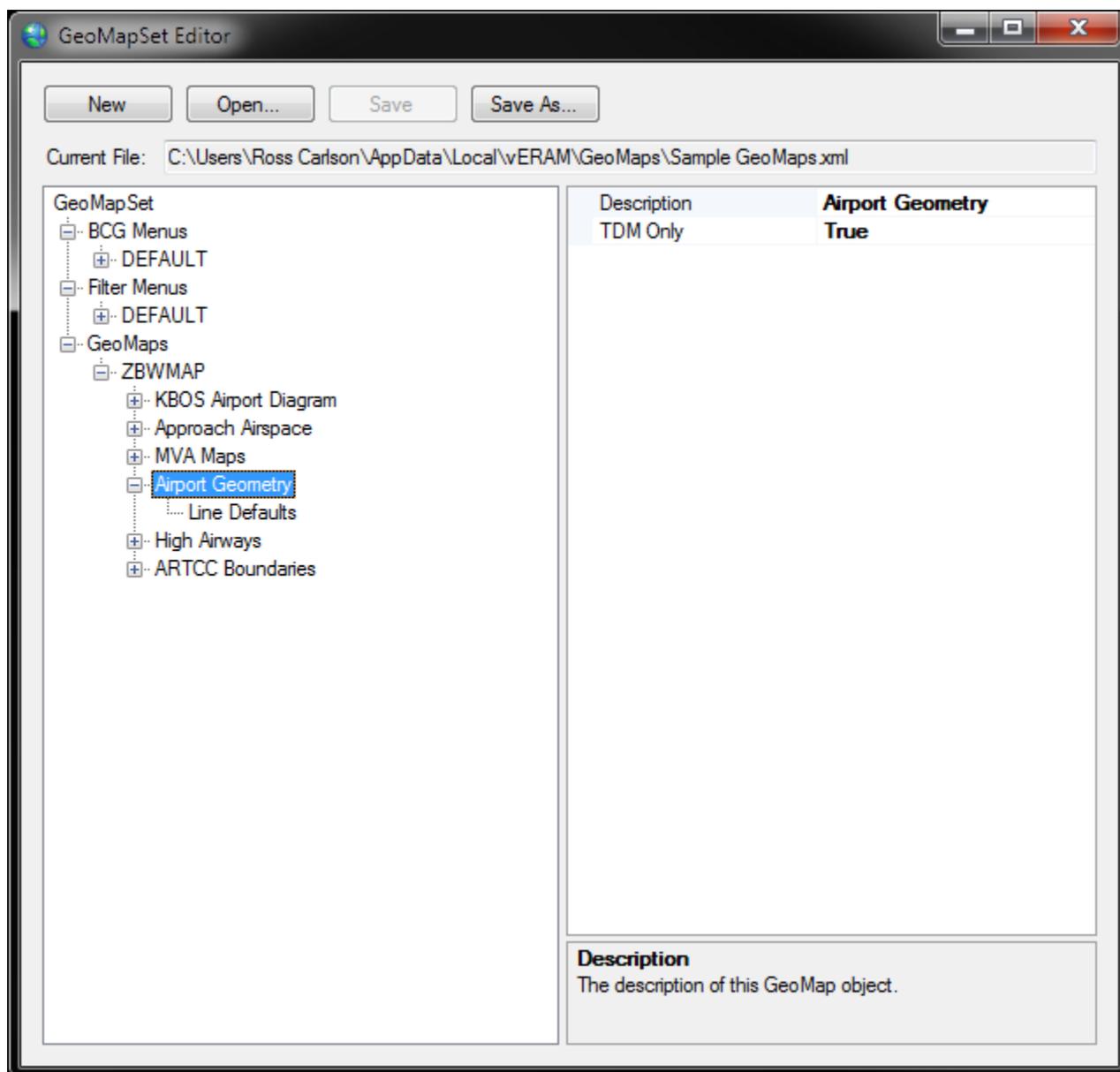
- **Symbol** – Symbols are defined by their style, size, and location. The size ranges from 1 to 4. The location is specified as latitude and longitude in decimal degrees. The styles are listed in the GeoMapSet.xsd XML schema file which can be found in the vERAM installation folder. The Lat/Lon properties are required. The other properties are optional and their value will be taken from the SymbolDefaults for the GeoMap Object to which the Text element belongs.
- **Text** – You can place textual labels on the map using this type of element. Text elements are defined by their size and location. The size ranges from 1 to 4. The location is specified as latitude and longitude in decimal degrees. Text elements can span multiple lines, with the lines separated by the pipe character. Text elements can optionally be rendered with an underline as well as an optional opaque background. Text elements can also have X and Y offsets to allow you to reposition the text relative to the lat/lon location on the scope. This is useful for adding a text label to a symbol. Without the X/Y offsets, the text would be drawn in the same location as the symbol, and the symbol would be obscured by the text. The Lat/Lon and Lines properties are required. The other properties are optional and their value will be taken from the TextDefaults for the GeoMap Object to which the Text element belongs.
- **LineDefaults** – Each GeoMap Object can have a single Line Defaults definition. This defines the default BCG, Filters, Style, and Thickness for all Line elements within the GeoMap Object.
- **SymbolDefaults** – Each GeoMap Object can have a single Symbol Defaults definition. This defines the default BCG, Filters, Style, and Size for all Symbol elements within the GeoMap Object.
- **TextDefaults** – Each GeoMap Object can have a single Text Defaults definition. This defines the default BCG, Filters, Style, Size, Underline, Opacity, and X/Y Offsets for all Text elements within the GeoMap Object.

Refer to the GeoMapSet.xsd XML schema file (found in the vERAM installation folder) for details on how the GeoMap Set XML file should be formatted. You will also find a sample XML file for reference.

## GeoMap Set Editor

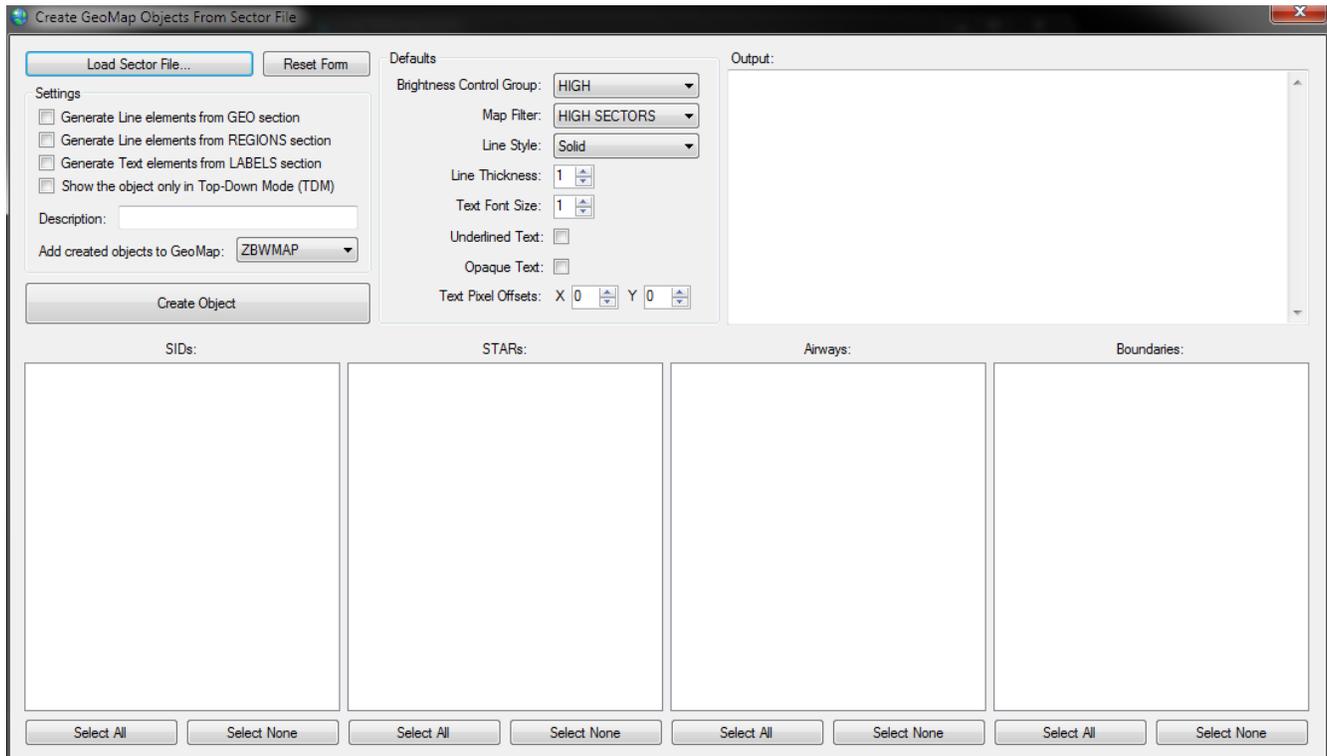
vERAM comes with a simple application for creating GeoMap sets and performing some basic editing operations on the Filter menus, BCG menus, and GeoMaps. This is not a graphical tool for drawing lines on the actual map, rather it is a tool for modifying the overall structure of the GeoMap set. You can also use the tool to import lines and text from a sector file. The imported sector file elements will be saved as GeoMap Objects.

Here's a screenshot:



Everything contained in the GeoMap set can be found in the expandable/collapsible tree on the left hand side of the editor window. Right-click on an item in the tree to add or delete child elements. Clicking on an item in the tree will allow you to edit the properties of that item in the right hand side of the window.

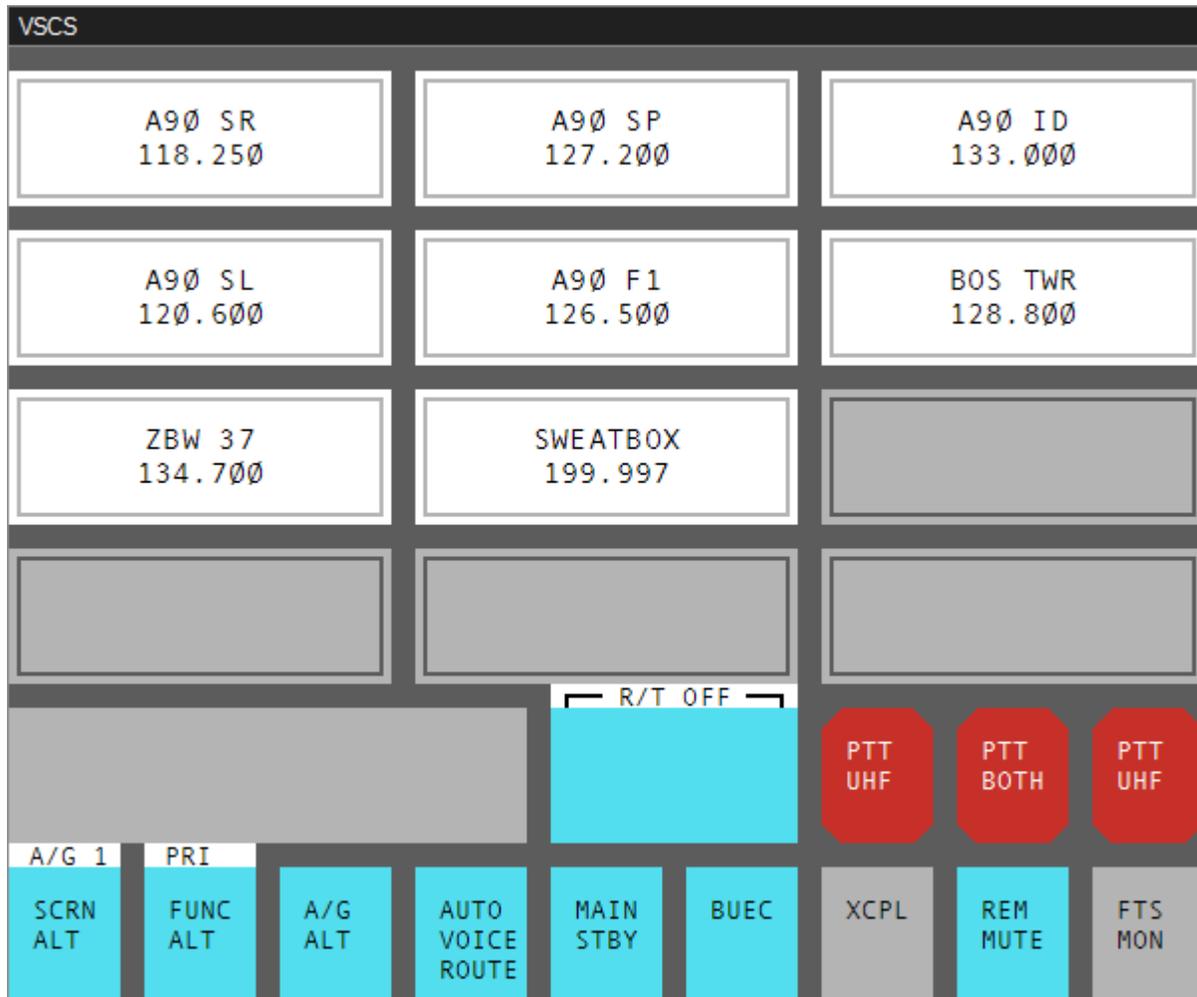
To import a GeoMap Object from Sector File data, right-click on a GeoMap node in the tree, and choose “Create Object From Sector File” from the menu that appears. You will see the following screen:



Press the “Load Sector File” button and choose a sector file from your hard disk. After the sector file is loaded, you can select which items from the file you want to import as a GeoMap Object. You can set the line and text defaults in the “Defaults” section. Provide a description for the object so that you can easily identify it later.

When you have finished making selections, press the “Create Object” button. The object will be added to the selected GeoMap. You can then change your selections and press the “Create Object” button again to create another object. Repeat this process as many times as necessary.

## The VSCS Panel



### VSCS Pages

The VSCS contains two pages for Air-to-Ground (A/G) radio frequencies, and two pages for Ground-to-Ground (G/G) or Direct Access (DA) buttons. DA buttons are used to initiate and answer land line calls.

To switch pages, press the "SCRN ALT" button and select a page from the resulting menu.

See below for information on configuring A/G radio panels and G/G DA buttons.

## Configuring VSCS

When you first create a facility in vERAM, the VSCS pages will contain gray buttons, indicating that they have not yet been configured.

To configure a radio panel, simply right click anywhere on the panel. Frequencies that are currently in use cannot be configured. You will see a window similar to the following:

The screenshot shows a dialog box titled "Configure VSCS Radio Panel". It has four input fields: "Label" with the text "ZBW 37", "Voice Server" with "rw.bostonartcc.net", "Voice Channel" with "ZBW\_134.700", and "Frequency" with "134.700" and a spinner control. At the bottom right are "OK" and "Cancel" buttons.

Enter a label for the frequency. This label will appear on the panel while it is not in use.

Enter the voice server and channel name (if applicable) and select the frequency. Press the OK button (or the Enter key) to save your changes. Changes made to the VSCS configuration are saved in the current facility configuration immediately.

To configure a new DA button, right click on the gray box in the spot where you wish the new DA button to appear. Or, if you wish to edit the configuration of an existing DA button, right click the button. You will see a window similar to the following:

The screenshot shows a dialog box titled "Configure VSCS Direct Access Button". It features a "Function" section with radio buttons for "Override" (selected), "Intercom", "Monitor", and "None". Below are fields for "Facility ID" (ZBW), "Sector ID" (36), "Frequency" (123.750 with a spinner), "Callsign Prefix" (BOS), and "Callsign Suffix" (CTR). "OK" and "Cancel" buttons are at the bottom right.

First, select which type of land line function you wish this DA button to invoke. The choices are Override, Intercom, or Monitor. If you wish to remove an existing DA button, select "None" as the function, and the button will revert to an empty gray box on the VSCS page.

The facility ID and sector ID determine the label shown on the button.

The Callsign Prefix field is where you enter the prefix for the callsign you wish to match to this button. For example, if you are creating a button to open a land line connection with BOS\_HI\_CTR, enter "BOS" in the prefix field.

The Callsign Suffix field is where you enter the suffix of the callsign you wish to match to this button. In the previous BOS\_HI\_CTR example, the suffix is "CTR".

Enter the frequency that will be used to match a controller for this button. When you press the button, the land line function will be initiated for the controller that matches the prefix, suffix and frequency configured for the button. If no matching controller is found, no land line connection will be made.

## Appendix A – Alias Variables and Functions

The following variables and functions are available for inserting text into radio messages sent to pilots using aliases defined in the current alias file. Many of these variables and functions require that you have an aircraft radio-selected.

### Variables

\$squawk	Inserts the assigned squawk code for the selected aircraft. Inserts the aircraft's current squawk code if none assigned.
\$route	Inserts the aircraft's full route.
\$arr	Inserts the aircraft's destination airport.
\$dep	Inserts the aircraft's departure airport.
\$cruise	Inserts the aircraft's filed cruise altitude.
\$calt	Inserts the aircraft's current altitude.
\$callsign	Inserts your callsign.
\$aircraft	Inserts the aircraft's callsign.
\$com1	Inserts your primary frequency.
\$myrealname	Inserts your full name. (From the settings window.)
\$winds	Inserts the winds at the aircraft's departure field if the aircraft is not airborne, otherwise inserts the wind at the destination airport.
\$time	Inserts the current Zulu time.
\$alt	Inserts the aircraft's assigned temporary altitude, if assigned, otherwise the aircraft's filed cruise altitude.
\$temp	Inserts the aircraft's assigned temporary altitude.
\$atiscode	Inserts your current ATIS code as specified in ATISMaker.

### Functions

\$metar(airport)	Inserts the current METAR for the specified airport. Note that the METAR must have been retrieved previously either by having the airport contained in the SSA, or by having previously retrieved the full METAR with the .metar or .wx commands.
\$altim(airport)	Inserts the current altimeter setting for the specified airport.
\$wind(airport)	Inserts the current winds for the specified airport.
\$type(callsign)	Inserts the ICAO aircraft type for the specified aircraft.
\$radioname(SectorID)	Inserts the radio name (from the POF file) for the specified controller. If you don't specify a Sector ID, your Radio Name will be inserted.
\$freq(SectorID)	Inserts the primary frequency for the specified controller. If you don't specify a Sector ID, your primary frequency will be inserted.
\$atccallsign(SectorID)	Inserts the callsign for the specified Controller List entry.

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\$dist(fix)	Inserts the aircraft's distance to the specified fix in nautical miles. A fix can be an intersection, VOR, NDB or Airport.
\$bear(fix)	Inserts the aircraft's bearing to the specified fix, expressed as a cardinal compass direction. A fix can be an intersection, VOR, NDB or Airport.
\$oclock(fix)	Inserts the clock direction relative to the aircraft to the specified fix. A fix can be an intersection, VOR, NDB or Airport.
\$ftime(offset)	Adds the specified offset (in minutes) to the current Zulu time and inserts the results. If you don't specify an offset, the current Zulu time will be inserted.
\$uc(text)	Converts the specified text to upper case.
\$lc(text)	Converts the specified text to lower case.