

vSTARS

Version 1.0

Facility Engineer's Guide

Table of Contents

Introduction	3
The Facilities Window	3
Facility Configuration	4
Airspace Tab	4
Data Blocks Tab	5
Positions & Aliases Tab	6
Airports Tab	7
Radar Sites Tab	8
Video Maps Tab	9
CRDA Tab	10
Scratchpad Rules	11
System Processing Volumes	12
Configuring Radar Sites	13
Configuring Arrival Filters	14
CRDA Configuration	15
The RDVS Panel	18
RDVS Pages	18
Configuring RDVS	19
Appendix A – Alias Variables and Functions	20
Variables	20
Functions	20

Introduction

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

After creating a facility configuration, you will be able to export it as a single compressed file including any video maps that you have imported. You can post this exported file on your ARTCC's web site for controllers to download and import into vSTARS. vSTARS will automatically overwrite any older version of the facility provided the facility ID stays the same.

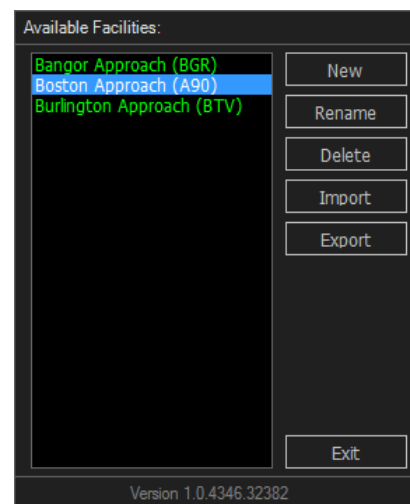
The Facilities Window

Each time you run vSTARS, you'll see the Facilities Window, shown at right. Obviously, the first time you run vSTARS, 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 A90 for the Boston TRACON, or BTV for the Burlington, Vermont ATCT. 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 vSTARS 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 Approach' window with the 'Airspace' tab selected. The window contains the following fields and lists:

- Center Latitude: 42.36338
- Center Longitude: -71.00295
- Transition Altitude: 18,000
- Magnetic Variation: 15.20000
- Visibility Range: 150
- IFR Squawk Range: 3000 - 6777
- VFR Squawk Range: 1000 - 2777
- CA Lateral Min: 3.0
- CA Vertical Min: 1,000
- CA Floor: 0
- RNAV Patterns list:
 - BLZZR#
 - BRUWN#
 - CELTk#
 - HYLND#
 - LBSTA#
 - PATSS#
 - REVSS#
 - SSOXS#
 - WYLYY#
 - KRANN#
 - OOSH#
 - QUABN#

Buttons at the bottom: OK, Apply, Cancel.

The "Center Latitude" and "Center Longitude" settings shown here are used to initially center your scope when the facility is loaded. Normally you would input the center point of your airspace or the location of your primary airport.

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

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

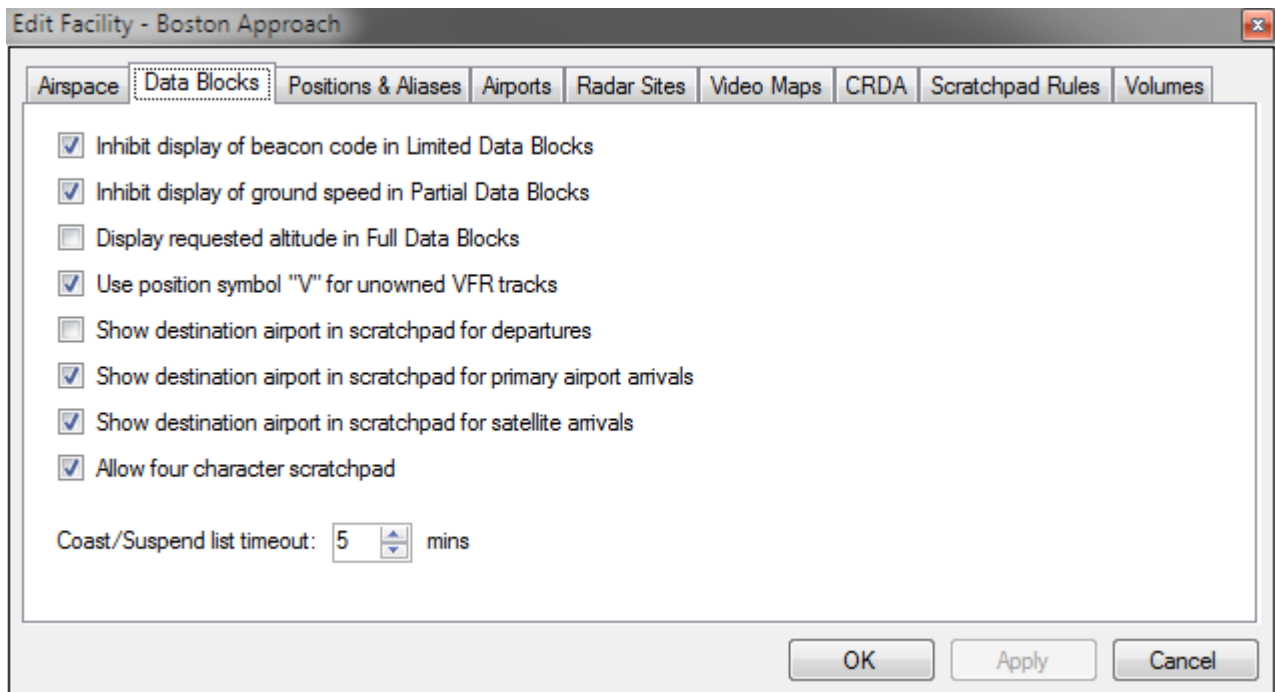
The two squawk ranges are used when vSTARS chooses a squawk code to assign to an aircraft.

The RNAV Patterns are used to detect flight plans which include an RNAV procedure. Such aircraft will have a different category indicator in the data block, which tells the controller that the track is on an RNAV flight plan. The RNAV indicators are as follows:

- L – B757
- M – Jumbo
- B – Heavy
- R – Other

-

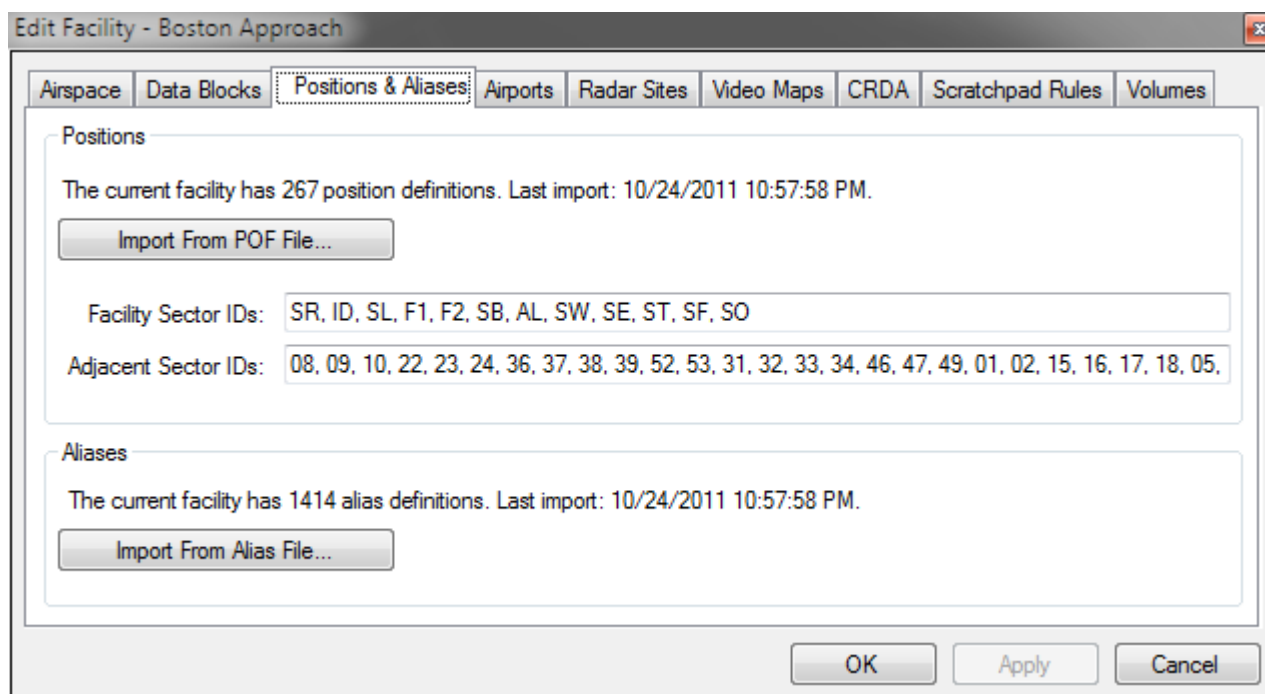
Data Blocks Tab



These settings allow you to customize target data blocks. Most settings here are self-explanatory.

The Coast/Suspend list timeout determines how long aircraft remain in the Coast/Suspend list before vSTARS will automatically terminate control on the track.

Positions & Aliases Tab

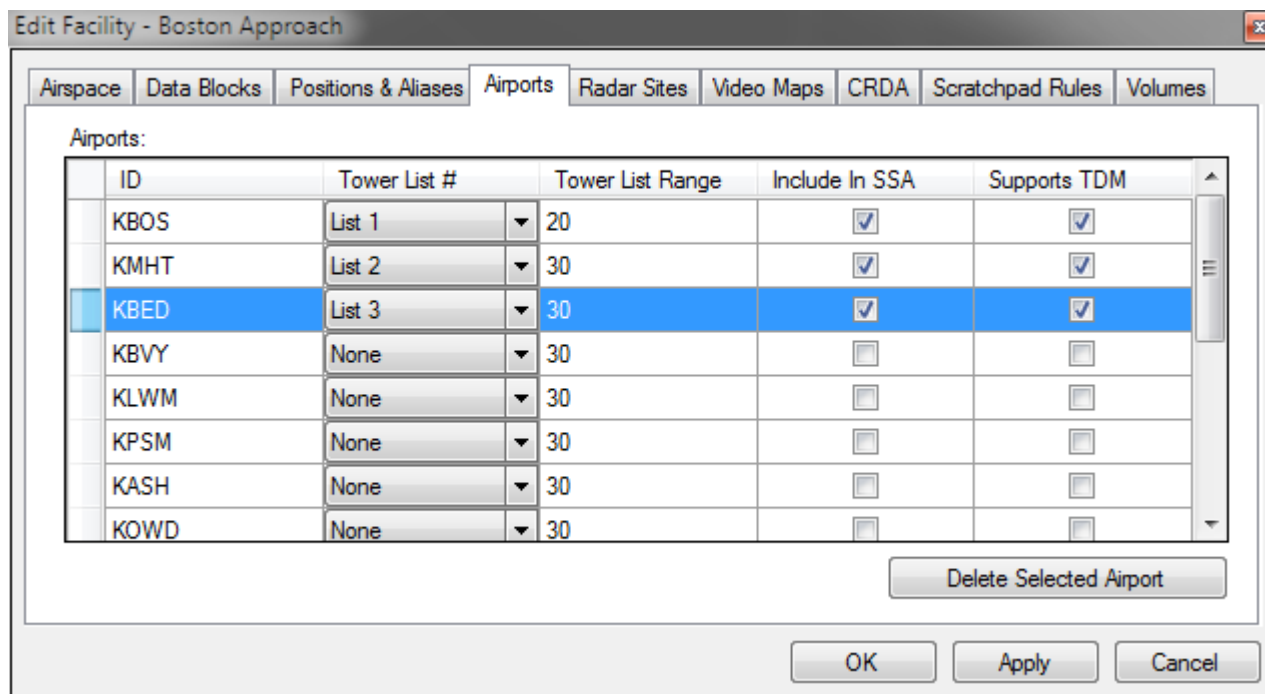


vSTARS stores all position data and aliases within the facility configuration itself. It does not use separate POF or Alias files like VRC uses. However, vSTARS does support importing position information from a POF file. In fact, this is the only way to define positions.

vSTARS supplements the POF file information by allowing you to specify which positions are considered “In-Facility”, and which are considered part of an “Adjacent Facility”. These settings are currently used to determine which controllers appear in the on-screen sign on list, and which positions can be “Quicklooked”. In the future, these settings may be used to enable facility-specific functionality.

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.

Airports Tab

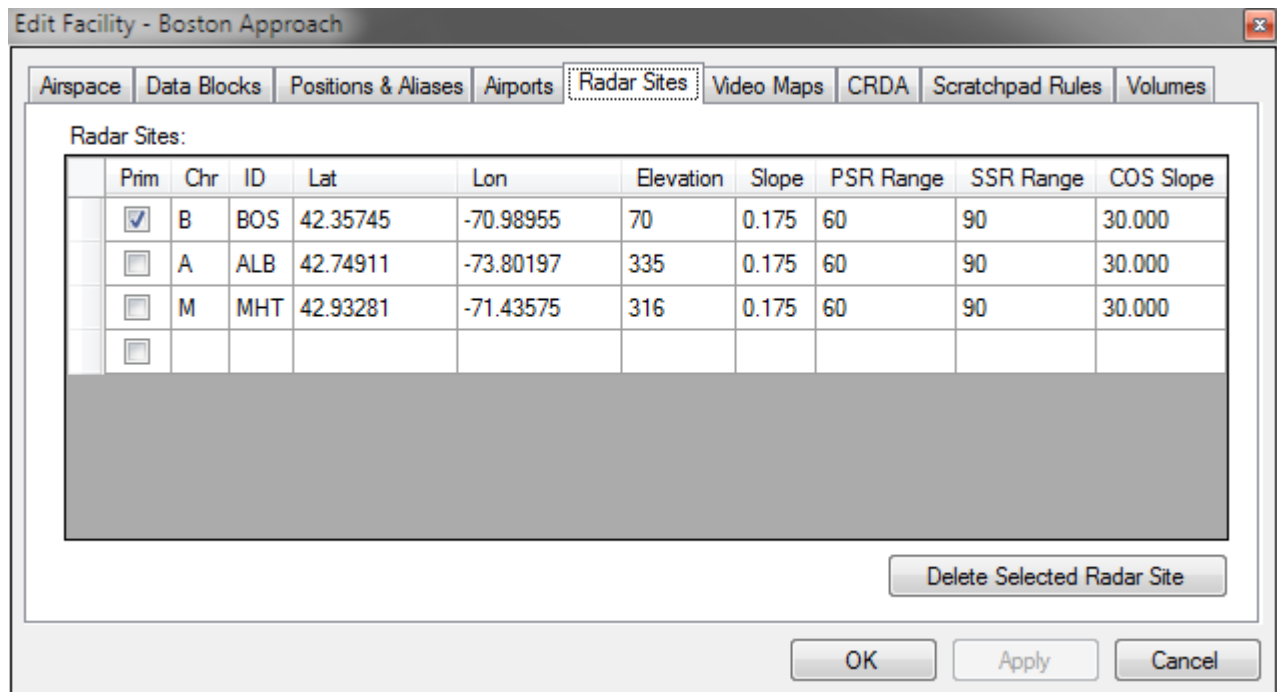


The airports tab is where you specify all of the airports within the facility airspace. You can also determine which airports appear in the SSA, and which airports support Top-Down Mode. (See [Top-Down Mode](#) for more information.)

The Tower List # column allows you to choose which airports will have a tower list on the scope. The tower list for an airport shows aircraft arriving at that airport. You can have up to three tower lists. The airport assigned to tower list #1 is also your "primary" airport, the altimeter for which is displayed near the top of the SSA.

The Tower List Range value determines the distance from the airport at which an arrival will be added to the tower list.

Radar Sites Tab



vSTARS 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.

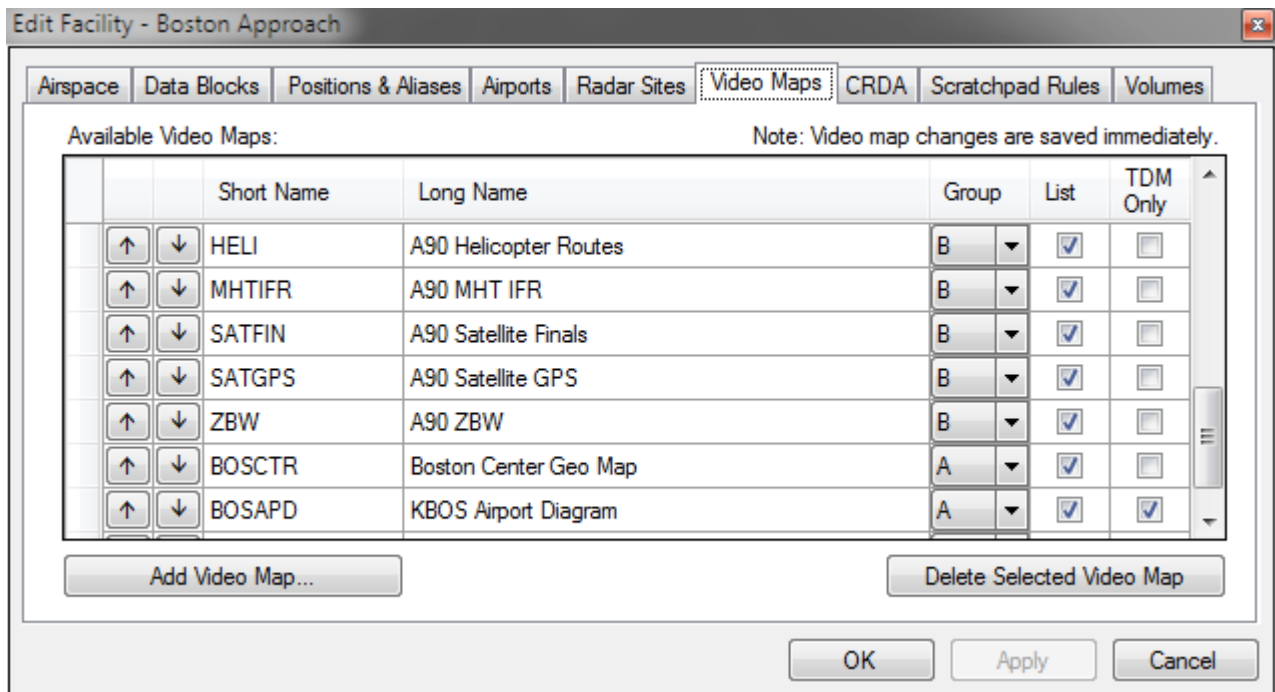
vSTARS can run in either multi-site or single-site mode. In single-site mode, the controller's visibility center is set to the location of the selected radar site. Also, the size and orientation of primary targets is relative to the selected radar site. The further a target is from the radar site, the larger its primary target will be. Only targets that are within the volume of coverage for the selected radar site will be displayed.

In multi-site mode, the controller's visibility center is set to the center point of the facility, and primary targets are all the same size and are oriented perpendicular to the target's ground track. Only targets that are within the volume of coverage for at least one of the radar sites will be displayed. In multi-site mode, targets that are beyond 40 NM from the primary radar site will be rendered with a hollow primary target.

In both single-site and multi-site modes, targets must be within visibility range of the visibility center in order to be displayed. The visibility center and range determine for which targets the VATSIM server will send position reports to vSTARS. The radar site coverage determines which of those targets are actually displayed on the radar screen.

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

Video Maps Tab



This tab is where you select all of the video maps that you want to make available for display on the scope. Press the “Add Video Map” button to locate an XML file on your hard drive. The video map will be imported into the facility configuration and the video map name will be added to the list. If you import a video map that has a name matching one already in the list, it will replace the existing map.

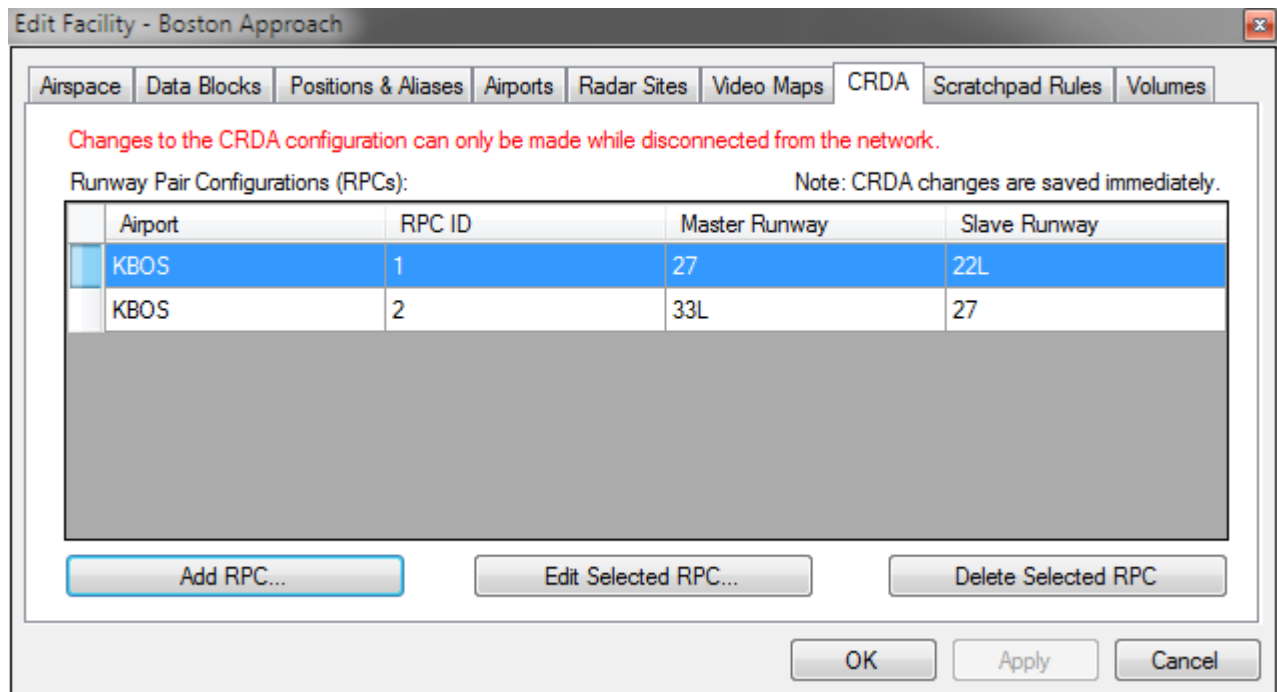
You can place video maps into one of two groups: the A group and the B group. The reason for having these two groups is because vSTARS allows you to set the brightness of each group independently. For example, you might want your traffic flow maps to be brighter than your MVA maps.

The maps you enter here will appear on the map buttons on the DCB. Use the arrows to reorder the maps in the grid. The order you set in the grid will determine the order in which the maps appear on the DCB buttons. Even though there are only 28 map toggle buttons in the DCB, you can have as many as 99 video maps in a single facility. Maps 29 through 99 can be toggled using keyboard commands. Refer to the Command Reference for details. If the List checkbox is checked, the video map will appear in the video maps list on screen. If the TDM Only checkbox is checked, then the video map will only appear when vSTARS is in Top Down Mode. This is useful for airport diagrams and other maps that are only useful when providing tower cab service.

vSTARS includes a utility program for converting portions of a sector file into video maps. The program is called SectorFileToVideoMap and a shortcut to start the program can be found in the vSTARS entry of your Programs list on the Start Menu.

After running SectorFileToVideoMap and selecting a sector file to work from, you can select one or more sections of the sector file to include in the video map. Enter a short name and a long name for the video map, and press the Save Video Map button. The short name you enter will be used as the button label in the **MAPS** DCB sub-menu. The long name will be displayed in the video maps list, also accessible from the **MAPS** DCB sub-menu. Once you have saved the video map, you can import it into the facility configuration using the Video Maps tab on the Edit Facility window.

CRDA Tab



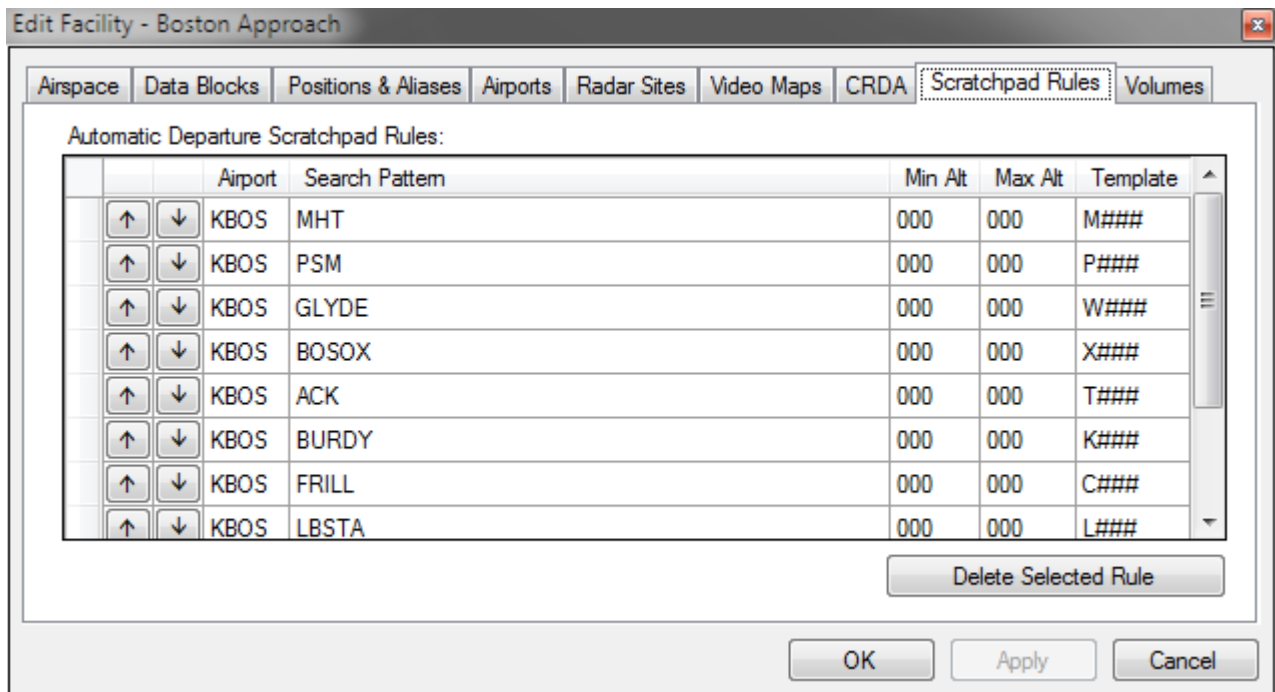
This is where you can configure the Converging Runway Display Aid (CRDA) settings. CRDA is covered in detail in a later section.

To add entries to the list of Runway Pair Configurations (RPCs,) click the “Add RPC” button.

To edit an RPC, select the RPC in the list, and click the “Edit Selected RPC” Button.

To delete an entry from the list, click anywhere in the row to select that entry, then press the “Delete Selected RPC” button.

Scratchpad Rules



The Automatic Departure Scratchpad Rules are used to automatically set a track's scratchpad when the controller performs an INIT CTRL command on the target. If the target has a flight plan where the departure airport matches one of the airports defined on the Airports tab, and the destination airport is not one of those airports, then the flight plan route is compared against the Search Pattern field in each scratchpad rule defined here. The minimum and maximum altitudes are also checked against the aircraft's filed cruise altitude. (Use zero to indicate no minimum/maximum altitude.) If the route contains the search pattern, and the track does not already have a scratchpad assigned, then a new scratchpad is set based on the value in the Template field.

Note that if you use the pound sign (#) in the Search Pattern, it will match one or more digits. This allows you to define a scratchpad rule based on SIDs in the route. For example, "LOGAN#" will match "LOGAN1", "LOGAN5", "LOGAN12", etc.

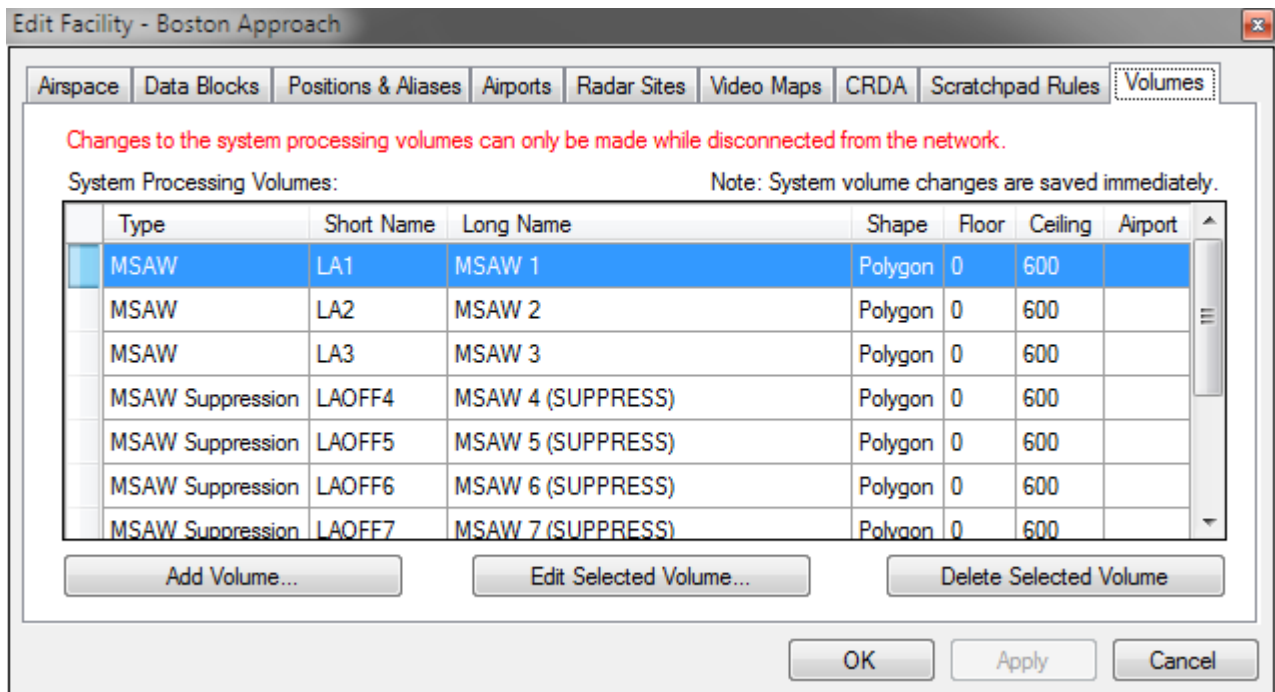
If the Template field contains three pound signs in a row, they will be replaced with the track's requested altitude in hundreds of feet. If the Template field contains two pound signs in a row, they will be replaced with the requested altitude in thousands of feet.

For example, using the scratchpad rules shown in the screenshot above, if a departure from KBOS filed for FL240 along the following route:

GLYDE BAF IGN IGN2

It would be given a scratchpad value of "W240".

System Processing Volumes



Several vSTARS features involve checking if a given target is within a certain volume of airspace. These airspace volumes are defined as either a polygon (made up of a series of latitude/longitude points) or a circle (centered at a given latitude/longitude with a defined radius.) Each volume also has a defined floor and ceiling. These volumes are used for the following functionality:

1. **Minimum Safe Altitude Warning (MSAW) processing** – If an aircraft is about to enter an MSAW volume, a Low Altitude alert will be displayed in the data block and an alarm will sound.
2. **MSAW suppression zones** – These volumes can be used to suppress MSAW alerts in areas where aircraft are commonly descending to low altitudes, such as the approach path to a runway.
3. **Conflict Alert (CA) suppression** – These volumes can be used to suppress “nuisance” conflict alerts in areas where aircraft typically fly very close together, such as around a localizer or traffic pattern.
4. **Arrival Filters** – These volumes can be used to automatically drop track on aircraft that are arriving at their destination. See the section on [Configuring Arrival Filters](#) for more details.

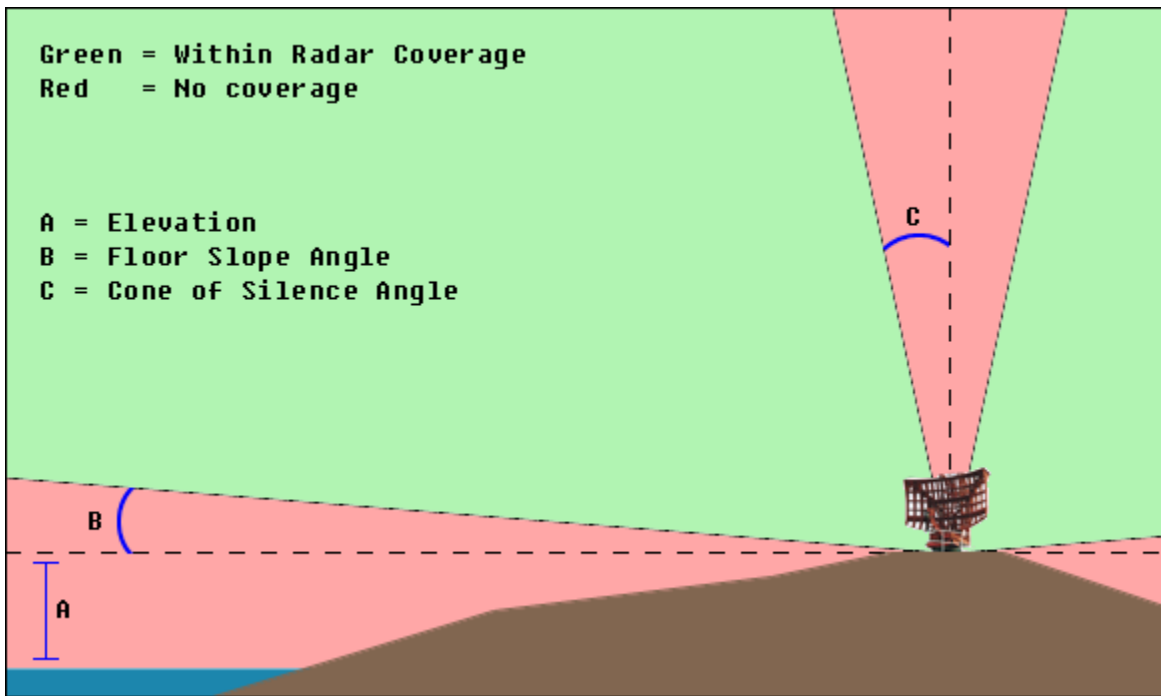
When you add or edit a volume, a new window will be shown where you can specify the geographic shape of the volume. System processing volumes can be displayed on screen similar to regular video maps. To view a list of the system processing map groups, press the SYS PROC button in the MAPS DCB sub-menu.

Configuring Radar Sites

vSTARS 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:



Configuring Arrival Filters

Arrival Filters allow vSTARS to automatically drop track on an aircraft that is arriving at one of the airports listed in the current facility configuration. This is useful because otherwise the aircraft would simply begin to coast once it descends below radar coverage during final approach.

To define arrival filters for an airport, use the Volumes tab in the Facility Settings window. You can define one or more arrival filter volumes for a given airport.

Each time a position report is received from the server for an aircraft that the controller is tracking, vSTARS checks to see if track should be dropped for the target due to the flight arriving at its destination through an arrival filter volume. For this to happen, all of the following must be true:

- The aircraft must have a flight plan.
- The flight plan destination must match one of the airports in the current facility configuration.
- The aircraft must be within one of the arrival filter volumes associated with the airport.
- The aircraft must be traveling below 180 knots.

If a target meets these criteria, vSTARS will automatically drop track on the aircraft and the data block will appear in the unowned color (green) with an asterisk for the position symbol.

Generally, you will want to define the arrival filter volumes such that track will be dropped on the aircraft just prior to when it will descend below radar coverage for the airport.

CRDA Configuration

The CRDA system makes use of Runway Pair Configurations or RPCs. An RPC consists of all CRDA configuration parameters for a single pair of runways. When you add or edit an RPC, you will see the following window:

The screenshot shows the 'Edit CRDA RPC' window with the following configuration:

- Airport:** KBOS
- RPC ID:** 1
- Position Symbols:** Tie /
- Stagger:** 0
- Copy Master to Slave:** (button)

Master Runway (ID: 27):

- Heading Tolerance: 90 (deg.)
- Label Orientation: W
- Target Reference Point: Latitude 42.36024, Longitude -70.98742
- Image Reference Point: Latitude 42.37716, Longitude -70.99916
- Target Reference Line Direction: 271.80 (deg.)
- Image Reference Line Direction: 214.90 (deg.)
- Target Reference Line Length: 25 (nm)
- Image Reference Line Length: 25 (nm)
- Tie Mode Offset: 2.50 (nm)
- Descent Point Distance: 10.10 (nm)
- Target Reference Point Altitude: 0 (100s ft)
- Descent Point Altitude: 30 (100s ft)
- Above Path Tolerance: 8 (100s ft)
- Below Path Tolerance: 5 (100s ft)
- Scratchpad Patterns: 27

Slave Runway (ID: 22L):

- Heading Tolerance: 90 (deg.)
- Label Orientation: S
- Target Reference Point: Latitude 42.37716, Longitude -70.99916
- Image Reference Point: Latitude 42.36024, Longitude -70.98742
- Target Reference Line Direction: 214.90 (deg.)
- Image Reference Line Direction: 271.80 (deg.)
- Target Reference Line Length: 25 (nm)
- Image Reference Line Length: 25 (nm)
- Tie Mode Offset: 2.50 (nm)
- Descent Point Distance: 10.10 (nm)
- Target Reference Point Altitude: 0 (100s ft)
- Descent Point Altitude: 30 (100s ft)
- Above Path Tolerance: 8 (100s ft)
- Below Path Tolerance: 5 (100s ft)
- Scratchpad Patterns: 22L

Qualification Region:

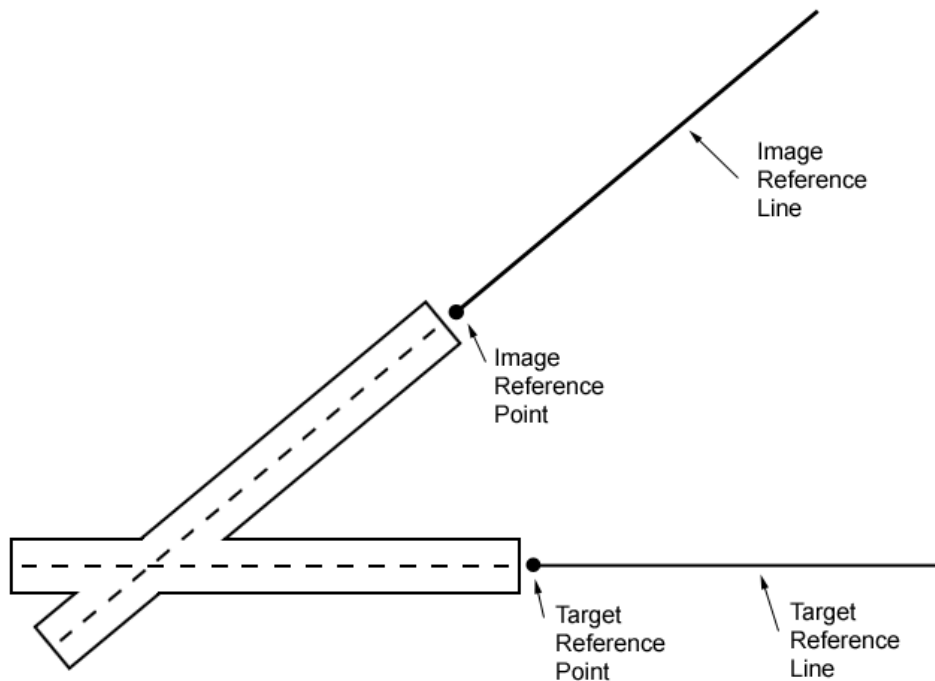
- Near Side Distance: 3.00 (nm)
- Near Side Half Width: 1.50 (nm)
- Region Length: 20.00 (nm)
- Far Side Half Width: 5.00 (nm)

Buttons: Save RPC, Cancel

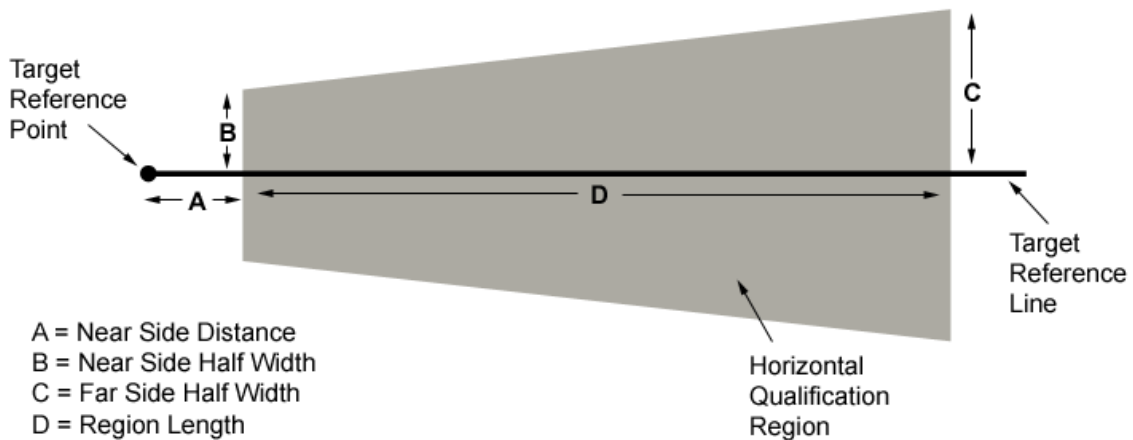
The airport list will contain all airports defined on the Airports tab. The RPC ID must be unique for the specified airport. An airport can have up to 8 RPCs. The position symbol boxes are used to define the character that vSTARS will use as the position symbol for ghost tracks generated when this RPC is enabled. See the Controller's Guide for details on the difference between the tie and stagger modes.

The rest of the window is divided into two areas; one for the master runway, and one for the slave runway. Each runway has the same set of configuration options. These options describe both the horizontal and vertical qualification rules that determine which aircraft will generate a ghost target on the other runway when this RPC is enabled.

Two lines are defined which allow the CRDA system to determine the location of the qualification regions and where to plot the ghost targets on the associated runway. These lines are referred to as the Target Reference Line (TRL) and the Image Reference Line (IRL.) These lines start at the Target Reference Point (TRP) and Image Reference Point (IRP,) respectively. Refer to the following illustration to for an example of how these lines may be defined:

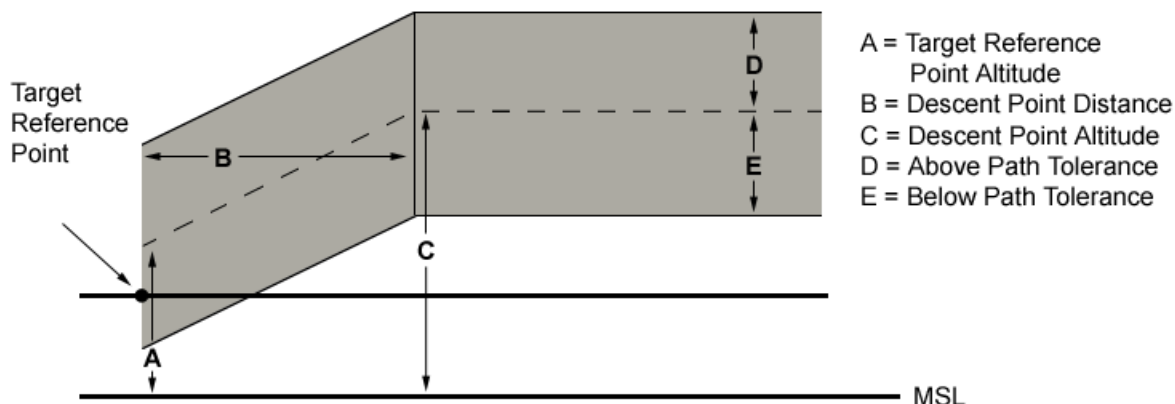


The TRP and TRL determine where the qualification region is located. The following illustration shows how the various parameters define the location and shape of the qualification region:



Note that the length of the qualification region is determined by the "Region Length" parameter, not by the TRL length parameter. The TRL length parameter is only used to determine how long the TRL is when drawn on the radar display.

The following illustration shows a side view of the descent path area:



The gray shaded area indicates the nominal approach and descent path. Targets approaching the runway must be within the boundaries of the horizontal qualification region, and within this approach and descent path in order to be eligible to create a ghost target on the associated runway. Targets must also have a ground track that varies from the TRL heading by no more than the defined Heading Tolerance.

Optionally, you can define scratchpad strings, one of which must exist in the target's scratchpad in order for it to generate ghost targets. If the scratchpad patterns box is left empty, then a target can qualify for ghosting regardless of the contents of its scratchpad. You can enter multiple scratchpad strings by separating them with commas. The scratchpad pattern is a partial search. In other words, if the scratchpad patterns box contains "27" and the target's scratchpad is "I27", then that target can generate a ghost if all other qualification parameters are met.

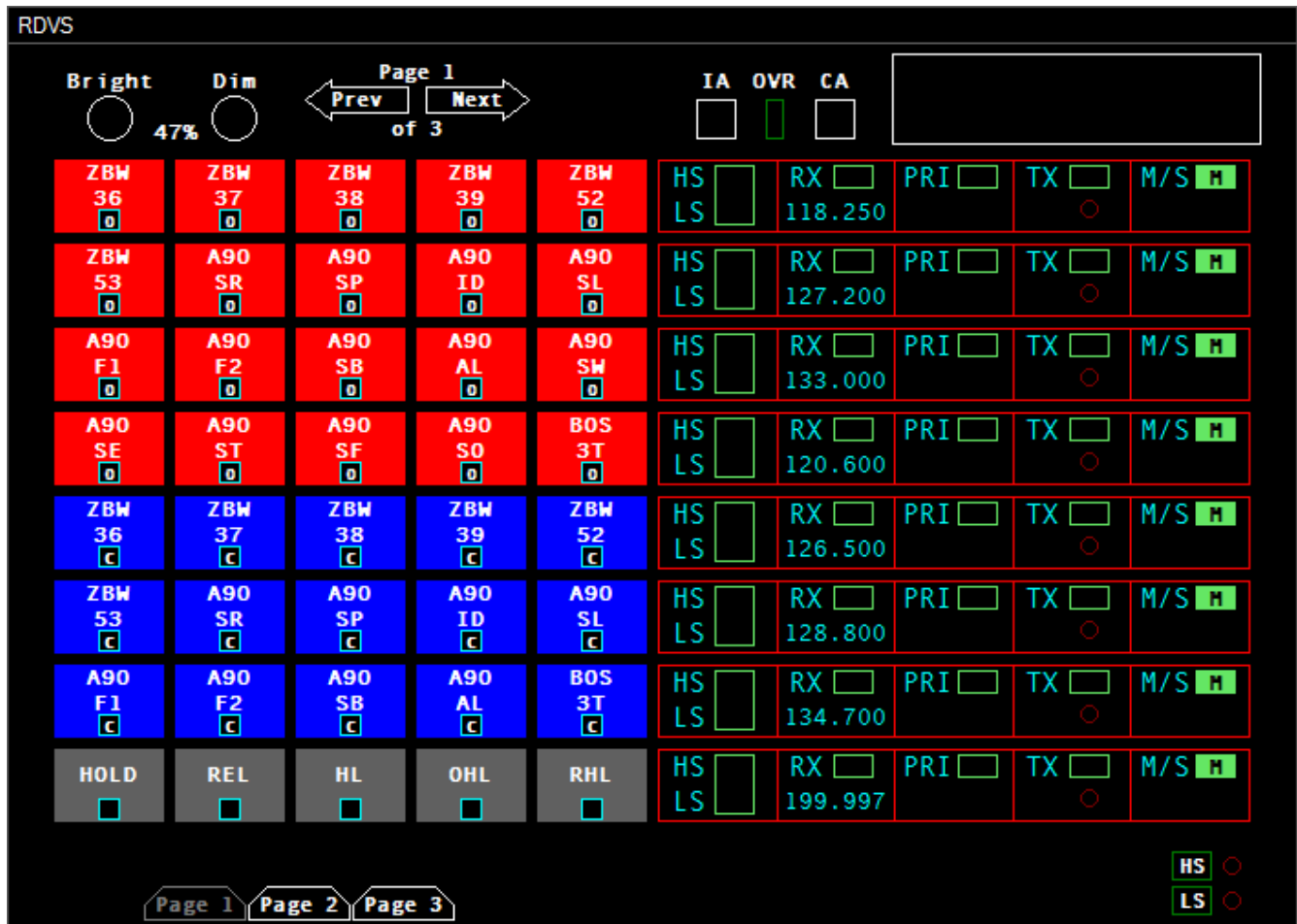
The Label Orientation dropdowns are used to specify in which direction the ghost track data blocks will be oriented.

The "Copy Master to Slave" button is a shortcut for duplicating the parameters from the Master Runway to the Slave Runway. The Master Runway's TRP will become the Slave Runway's IRP, the Master Runway's IRP will become the Slave Runway's TRP, and so on.

By default, when the user enables an RPC, ghosting is activated only for the master runway. Targets approaching the matching runway will be evaluated for ghost eligibility using the defined horizontal and vertical qualification parameters, and if all parameters are met, then a ghost will be generated along the Image Reference Line. The ghost track will be located the same distance from the Image Reference Point as its parent track is from the Target Reference Point.

The user can also activate ghosting from the Slave Runway to the Master Runway if desired. Refer to the Command Reference for details.

The RDVS Panel



RDVS Pages

The real RDVS system provides facility engineers with the ability to configure any number of pages, with any combination of land line and radio function buttons on each page. In vSTARS, there are always 3 pages, and the left side of each page is dedicated to land line functions, and the right side of each page is dedicated to radio frequency panels. The land line buttons are called Direct Access (DA) buttons. Furthermore, the bottommost row of the left side on page 1 is always configured for the HOLD/REL/HL/OHL/RHL buttons. These buttons are covered in greater detail in a later section.

To switch pages, you can either press the Prev/Next arrows at the top of the screen, or press the direct access buttons across the bottom. The current page's direct access button is shown in gray, and the other page buttons are shown in white.

Configuring RDVS

When you first create a facility in vSTARS, the left side of each RDVS page will be empty, because by default there are no DA buttons configured. Also, all of the radio frequency panels will be configured for 199.998 with no voice server info.

To configure a radio panel, simply right click anywhere on the panel. (You must be disconnected from the network in order to configure radio panels.) You will see a window similar to the following:

The screenshot shows a dialog box titled "Configure RDVS Radio Panel". It has three input fields: "Voice Server:", "Voice Channel:", and "Frequency:". The "Frequency:" field is set to "199.998". There are "OK" and "Cancel" buttons at the bottom right.

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 RDVS configuration are saved in the current facility configuration immediately.

To configure a DA button, right click in the spot where you wish the DA button to appear. Or, if you wish to edit the configuration of an existing DA button, right click the button. If you are creating a new button, you will see the following window:

The screenshot shows a dialog box titled "Configure RDVS Direct Access Button". It has a "Function:" section with four radio buttons: "Override", "Intercom", "Monitor", and "None" (which is selected). Below this are three input fields: "Label:", "Prefix:", and "Suffix:". The "Frequency:" field is set to "100.000". There are "OK" and "Cancel" buttons 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 no longer appear on the RDVS page.

The label is the text that appears on the button itself. It is limited to 8 characters. The text will wrap on the button if there is a space between the two lines.

The 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 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.

\$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.