Compromised Separation Training

Simulator Version: 8.12

Contents

1. About this Module

The VV CompSep simulator module has been developed to allow controllers and student controllers to practice and perfect their response to a compromised separation event in a surveillance environment.

Pairs of aircraft are presented, each in a state of imminent or immediate loss of separation. Candidates are required to formulate a response involving a turn/climb/descent instructions and/or a traffic statement. Scenarios may be repeated for training purposes and all responses are logged to file. Transmissions may be recorded for review, and screencaps can be taken.

Conflict pairs within the scenarios have been designed to comply with the product specifications laid down by Airservices Australia. These specifications are attached in Appendix 4. Note that, because of feedback from, and with the agreement of Airservices experts there have been some minor variations from the specifications in the final product.

This document contains general information about the Compromised Separation Module and is intended for use as reference material for Check and Training Supervisors.

2. Glossary

A glossary for the terms used in this document is provided in Appendix 1. Terms included in this glossary will be emboldened.

3. Installation

The VV CompSep program has been installed centrally on the Airservices network environment and distributed on request to nominated nodes. Primary contact for arranging the software to be included on a node is:

Nick Carthew - Application Packager
Desktop Delivery

Ph: +61 2 6268 4894, Fax: +61 2 6268 5613

4. Security

Previously, any PC running VV CompSep would require a security dongle (Unikey brand) for the program to function. To allow flexibility in the use of this program, this requirement has been removed as part of this installation. Any node on the Airservices Desktop environment may run this software.

5. The Main Display

5.1 User View

Upon launching the program, the main interface will be displayed (Figure 1) in **User View**. This is the normal view for a controller undertaking the training.
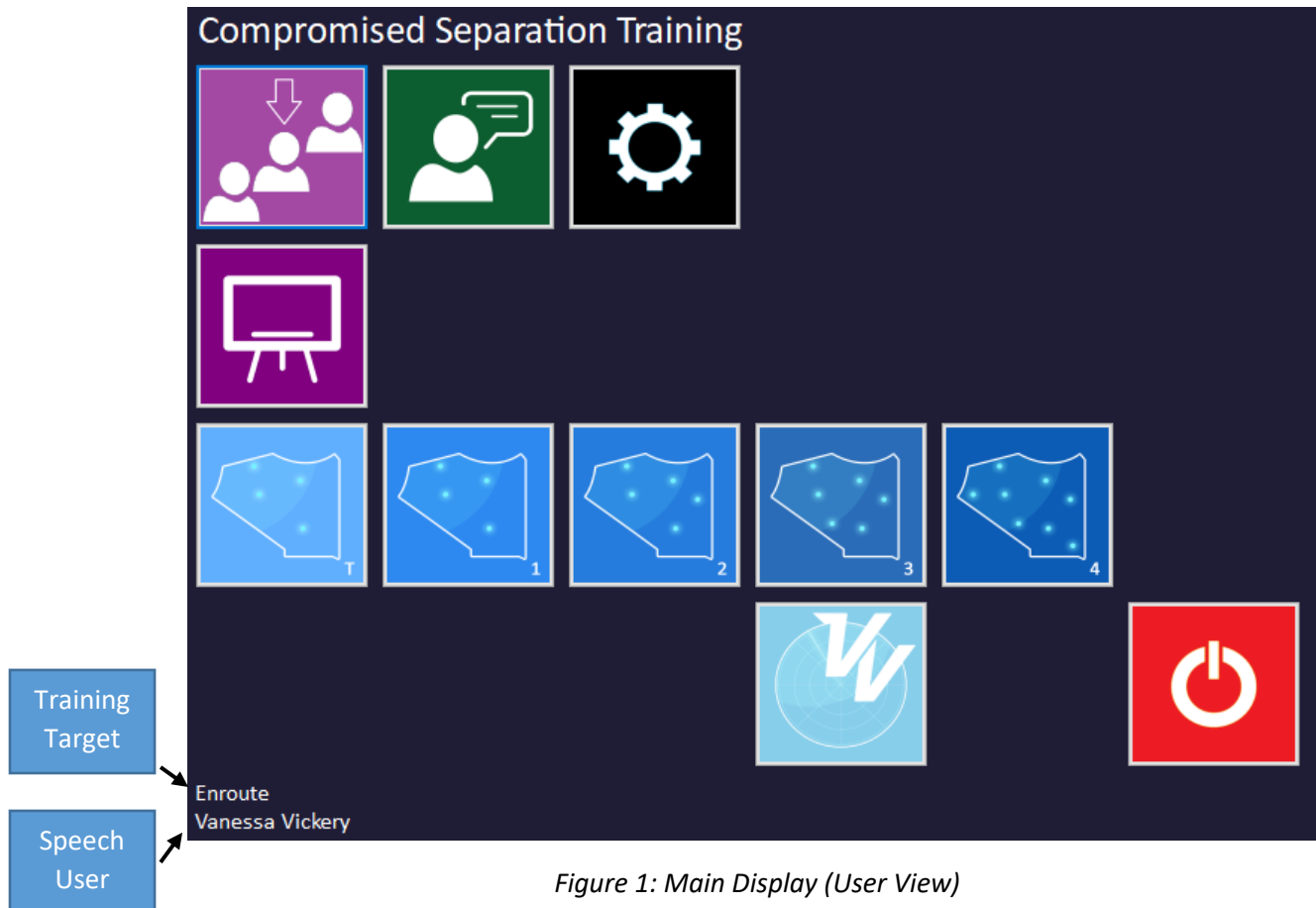
Figure 1: Main Display (User View)

Note, to the bottom left of the display, the **Training Target** and **Speech User** information. The **Training Target** may be toggled between Enroute, TMA and YSSY by clicking on the text.

The **Speech User** is an indication of which speech profile is being used in simulation. For best recognition outcomes, it is important that the correct name be displayed in this area. The **Speech User** may be changed either in the Speech Properties interface (green icon) or in the Program Settings panel (cog icon). Further details on this process is outlined below.

 Upon entry of the administrator password, the main display will be in **Admin View** (figure 2). This view makes more features available that might be used by a supervisor or checking officer. The password entry process is detailed in section 5.5.

5.2   Admin View

Figure 2: Main Display (Admin View)

5.3   Icons
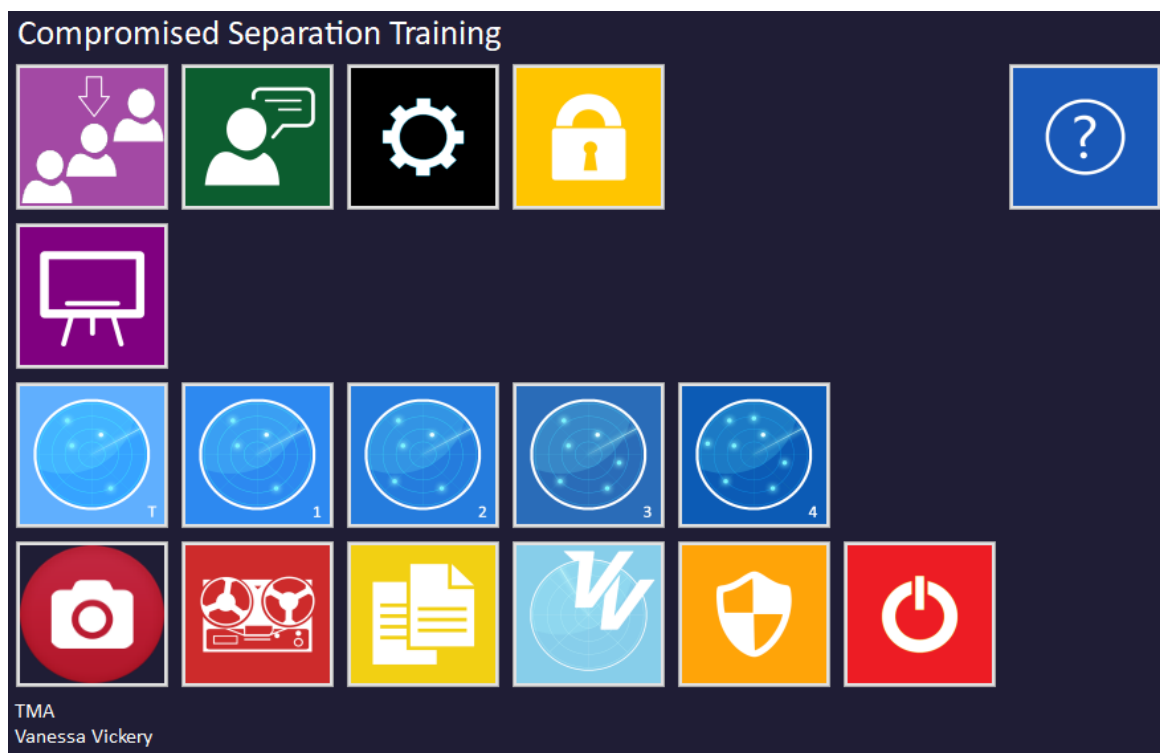
The following table describes the function of each icon:

	Speech Properties	Clicking this icon will open the **Speech Properties** applet (see Figure 5) from the Windows Control Panel. This interface will allow addition of new **Speech Users**, and audio setup.
	Speech Trainer App	Clicking this icon will open a speech trainer application that will allow training of the speech recognition engine using a customised script.
	Program Settings	Clicking the settings icon will open a panel interface that will allow access to other features and settings - an appropriate password is required. Existing **Speech Users** may be selected here.
	User Guide	This icon will open a training User Guide. This contains information about setting up and running the module.
	Enroute Exercise	Clicking one of these icons will launch a Task Trainer or a Simulator exercise containing several Compromised Separation scenarios targeting the Enroute environment.
	TMA Exercise	Clicking one of these icons will launch a Task Trainer or a Simulator exercise containing Compromised Separation scenarios targeting the TMA environment.
	YSSY Exercise	Clicking one of these icons will launch a Simulator exercise containing Compromised Separation scenarios targeting on Sydney airspace.
	About the Module	This icon will open a panel containing copyright and licencing information about this Module. Licence expiry information is displayed here.
	Exit Program	Closes the program.

Under Admin View, the following icons are also available:

	Module Documents	Clicking the documentation icon will open a provide access to this document and other supporting information for the VV CompSep module.
	Snapshots Folder	Opens the folder containing screen snapshots that have been taken.
	Recordings Folder	Clicking this icon will open the folder containing audio recordings of controller transmissions.
	Logs Folder	Clicking this icon will open the folder containing user performance and program logs.
	Update Licence Date	Opens an updater application that will change the expiry date programmed in the security device. This requires a licence key file which will be provided. This application is currently disabled on the Airservices desktop.
	Lock Settings	Returns the interface to **User View**.

5.4   Program Settings Panel

Clicking the program settings (cog) icon on the main display will open the Program Settings Panel (Figure 3).

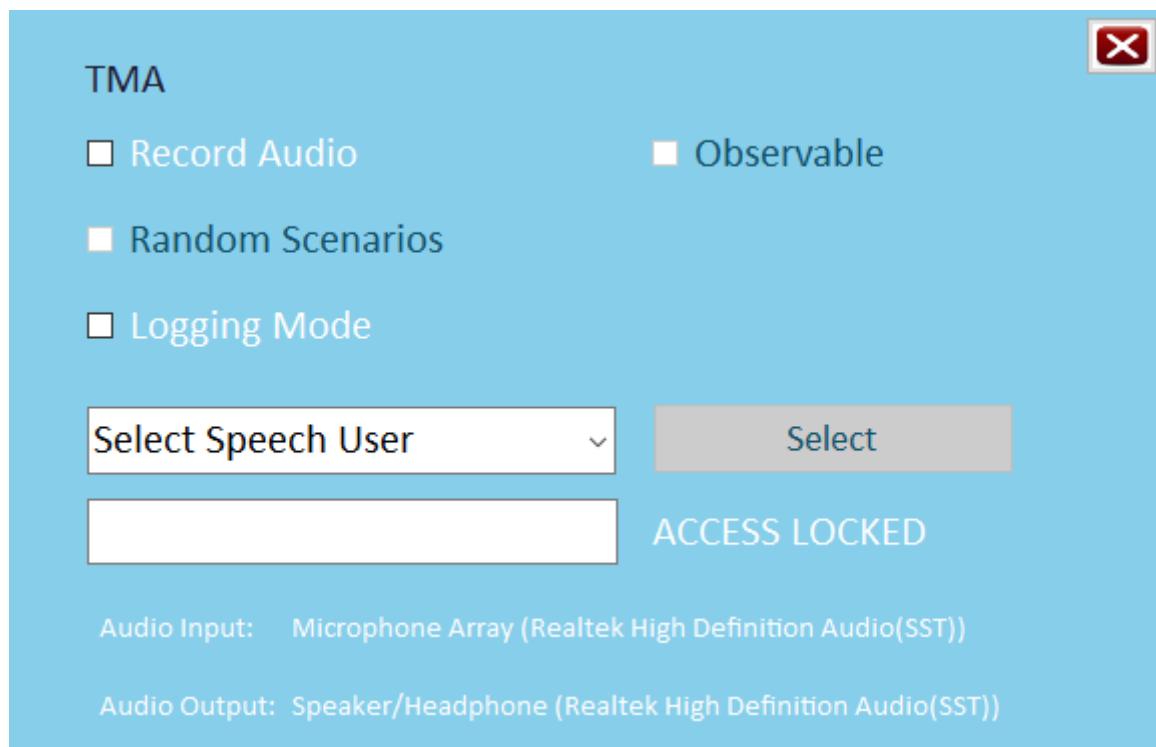*Figure 3: Program Settings Panel*

Accessible Settings include:

- Training Target: Clicking the blue Enroute (or TMA) indicator will toggle the training target between Enroute and TMA exercises.
- Record Audio: On selection, transmissions made in simulation by the controller will be saved to file. These are saved in the **Windows User Area** for privacy purposes.
- Random Scenarios: This feature is disabled in this version because scenarios may be directly selected.
- Logging Mode: Selecting this feature will result in the simulator reporting performance data to a log-file for debugging purposes.
- Observable: If this setting is selected, the simulator session will be configured for remote observation across the network by an observer. Note that this requires enabling of the computer's LAN connection. This feature is disabled in this version.
- Speech User Selection: **Speech users** that have previously been added may be chosen from the dropdown list. Click **Select** to confirm the selection.

5.5   Unlocking Access to Program Settings and Features

The program will open with the basic level of functionality. This is **User Access**. Unlocking access to **Administrator Access** is available by entering the Administrator Password: **<u>admin!!</u>** Extra icons on the Main Display will allow access to administrator features, such as licence updating and module documentation.

5.6   About Panel

Clicking the VV icon on the main display will open the **About** Panel (Figure 4). It contains information about the product version, and dongle expiry status

Figure 4: About Panel

6. The User Guide

Clicking the Blackboard icon will open a short movie demonstrating the functionality of this product.

It is intended to be used by a controller who require an induction into using the program and no supervisor is available to complete this induction.

The User Guide movie runs for about 11 minutes and will take a user through all actions required to successfully use the CompSep product.

7. Speech Recognition and Audio

7.1 Speech User Creation

For Airservices users, a default **Speech User** (and associated profile) is generated for each **Windows User**. This is normally in the form surname_xx. In instances where a controller may want to use the account of another Windows User, for example when a trainee is making use of a communal computer, a new **Speech User** should be created. This is done by clicking the Speech Properties Icon on the Main Display:

This icon will open the **Speech Properties** applet. Switch to the Speech Recognition Tab (Figure 5).
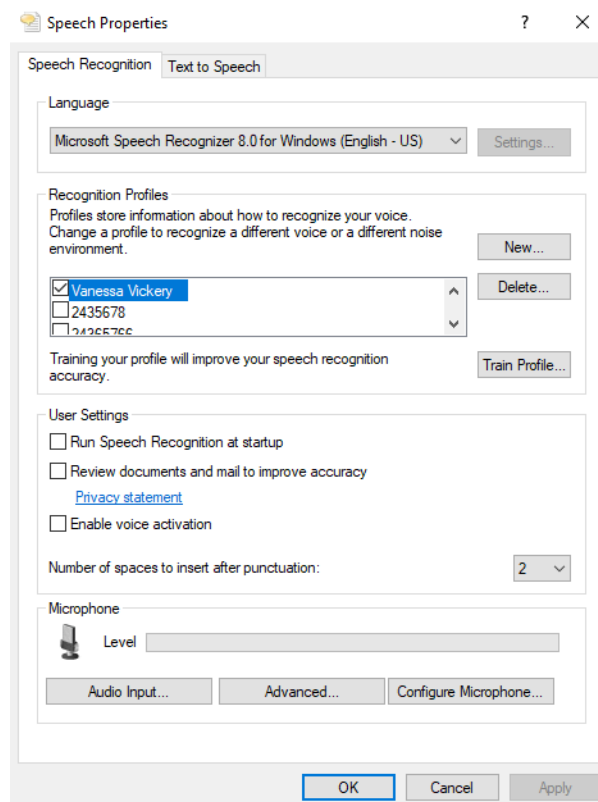

Figure 5: Speech Properties > Speech Recognition Tab

Left-click the New… button to create a new **Speech User**. There will then be a short setup of the microphone and the Speech User will be ready for use. There is no need to train the speech recognition at this point.

Close the **Speech Properties** applet by clicking the OK button. You will be returned to the Main Display. The newly created Speech User should be displayed to the bottom left of the Main Display (see Figure 1).

7.2   Speech User Selection

Different Speech Users can be selected either from the **Speech Properties** applet (see Figure 5) or from the Program Settings Panel (see Figure 3).

7.3   Changing Speech Input

Most Airservices desktop machines only have one option for speech recognition audio input. Laptops will often have more than one input, and for these computers it is imperative that the audio be received through a headset microphone.

To ensure that this is the case, open the **Speech Properties** applet by clicking purple icon on the main display.

Switch to the Speech Recognition tab (Figure 5).

A useful quick test (the 'scratch test') may be conducted to ensure sound is being received from the headset. Simply scratch the microphone boom and observe movement of the microphone level slider (Figure 6)
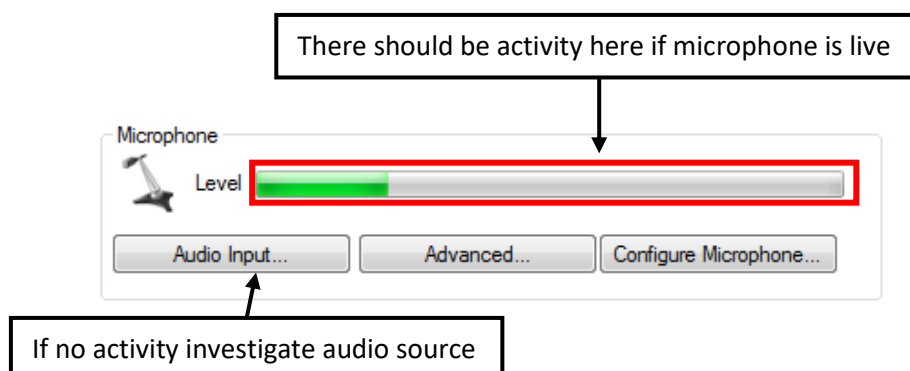
Figure 6: The 'Scratch Test'

If no movement is observed, click the Advanced button to open the Audio Input Settings panel (Figure 7). Ensure **Use this audio device** is selected, and ensure the correct input is selected from the dropdown of available inputs.
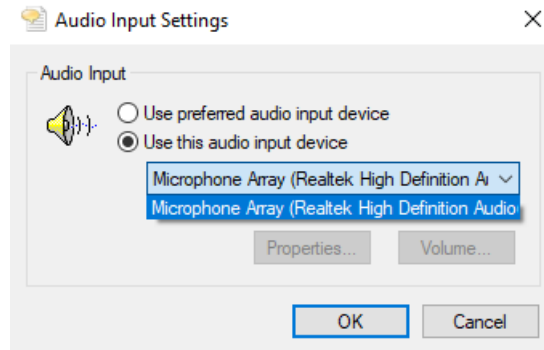
Figure 7: Audio Input Settings

Click **OK**, and then **Apply**. Reopen the Speech Properties applet and conduct the scratch test to ensure the input is correct.

7.4　Changing Speech Output

Some Airservices desktop machines have speakers attached and Speech Synthesis (Text to Speech) may be configured to come out of the speakers or the headset. To change this setting, open the **Speech Properties** applet by clicking purple icon on the main display.

Click **Advanced** on the Speech Synthesis Tab (Figure 8).
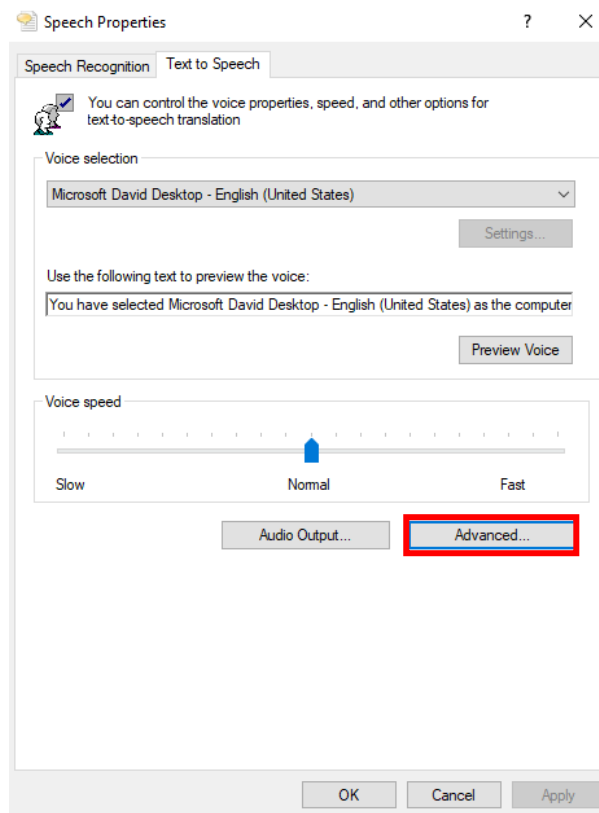
Figure 8: Speech Properties Speech Synthesis Tab

The Text to Speech Sound Output Settings Panel will open (Figure 9). Ensure that Use this audio output device is selected and choose the appropriate output from the dropdown combo.

Click OK. You can test the output is correct by clicking the Preview Voice button on the Speech Properties applet (Figure 8).
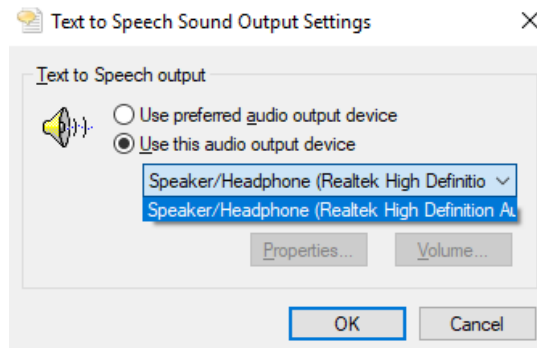
Figure 9: Text to Speech Sound Output Settings

7.5   Changing Alert Output

The output device for audio alerts (such as STCA alerts) uses a different setting to that of Speech Synthesis output.

To change the output for alerts, right-click the Speaker/Headphones icon located on the Windows Taskbar:

Then click Playback Devices. If the icon is not present or can't be found, type Windows+S and type "sound" into the search area. Select the Sound/Control Panel entry.

The Control Panel Sound panel (Figure 10) should open.
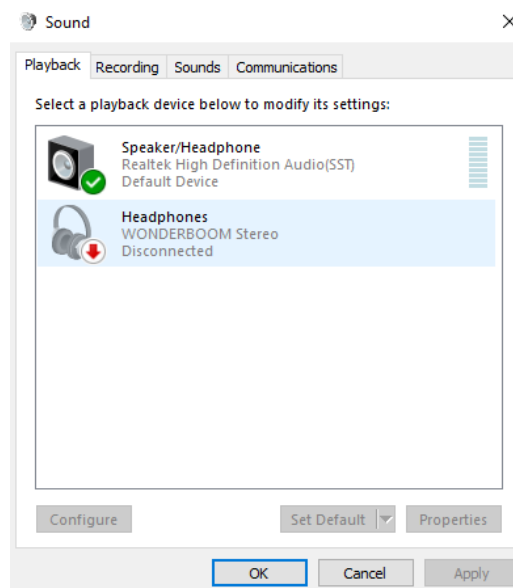
Figure 10: Control Panel Sound settings

The audio output for alerts can be changed from this window. Click OK to apply.

7.6   Speech Recognition Training

For improved speech recognition performance, a training application targeting ATC phrases has been included.

Open the app by clicking the green icon on the main interface.

A screen will open describing the process to be followed (Figure 11).
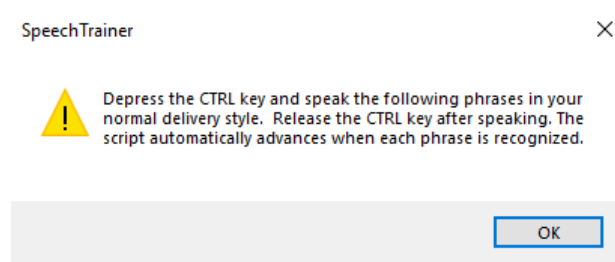
Figure 11: Speech Trainer App instructions

Click OK. The Speech Trainer App (Figure 12) will open. The user speaks a series of phrases while holding the CTRL key depressed.

When a phrase is correctly recognised, the next will be automatically displayed. When an incorrect phrase is recognised, **(FALSERECO)** will be displayed in the menu bar.
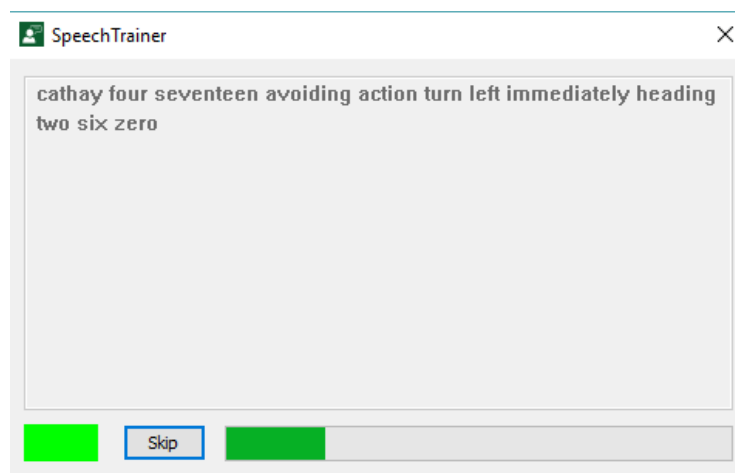
Figure 12: Speech Trainer App

The speech engine is updated after each recognised phrase and the entire script need not be completed if good recognition is apparent. Completing the entire script takes eight to ten minutes.

The Speech Trainer app may also be run from Windows explorer or from a web borwser by entry of a custom URL. See the

7.7   Speech Recognition Settings

Two settings are available on the **Exercise** tab of the Simulator's b panel:

- The **Emulate Speech** setting allows the speech engine making a best guess at phrase that would otherwise be rejected. This setting should be disabled if false recognitions are consistently occurring.
- Acceptance and rejection of recognitions can be further tuned using the **Apply Confidence** setting. Setting the value to a high value, such as 95%, will result in the speech engine rejecting recognitions at a lower confidence level.

7.8   Improving Speech Recognition Performance

In addition to experimenting with the settings described in the previous section, here are some general tips for the use of the speech recognition function:

- Speech Recognition Training is more a process of training yourself than it is one of training the system. Learn to speak clearly and steadily. Be patient and develop discipline in the way you speak into the microphone.
- Learn to be aware of the Speech Recognition Window (top right of Radar screen) in your peripheral vision during simulation. There is no need to read what has been recognised. If the aircraft has misunderstood an instruction, it should become evident to you when it reads it back incorrectly (this is also very good training in monitoring pilot readbacks for correctness). The appearance of text in the window is sufficient to tell you that you have been recognised; non-appearance of text indicates you have not been understood and that you should repeat the instruction. This monitoring of the Speech Recognition program becomes subconscious after some practice.
- Eliminate pauses and extraneous sounds such as 'umm' and 'ahh'.
- You cannot correct yourself mid-transmission. If you make a mistake or stumble in delivering an instruction release the Press-to-talk button and start again.
- **Do not run words together**; pronounce each clearly. For example: 'Singapore eight six seven', not 'Singaporeate six seven'
- Be very careful to say the aircraft callsign clearly at the start of each transmission, that is what the program is listening for when the Press-to-talk is pressed.
- Position the microphone carefully – to the side of your mouth so you are not breathing directly into it.
- Eliminate ambient noise where possible.
- If you are experiencing poor recognition check that you do not commence a transmission before the PTT light illuminates. The computer sound card takes a fraction of a second to become fully functional after the PTT is pressed.

7.9   Speech Recognition Phrases

The simulator is programmed with specific phrases associated with Compromised Separation scenarios. Other common phrases are not included but could be added on request.

A full list of allowed phrases is included in Appendix 3.

8. The Simulator

The simulator is launched by clicking on one of the exercise icons on the main display. The simulator version used for this Compromised Separation training is a cut-down version of the VV Simulator with many functions disabled. These include flight data processing, strip windows, network functionality and some speech recognition components.

8.1 Access to Simulator Settings

Any user settings changed during a simulator session will be stored for each **Windows User**, and loaded when the simulator is launched for a later session. Note that the system does not distinguish between different **Speech Users** who make use of the same **Windows User** account. For these users settings are shared. In Airservices it is unlikely that there will be more than one user of a Windows account.

8.2 The Simulator Settings Window

The Simulator **Settings** Window provides access to a wide range of system parameters and may be used to change aspects of speech recognition, speech synthesis, display features, aircraft performance and network communications. Basic features pertaining to the simulator exercise, (**Exercise Settings**) may be accessed and changed by any user. Access to more advanced settings requires entry of a password, which is supplied to training administrators - to prevent changes affecting all other **Speech Users** that may be on the same **Windows User** account.

Open the Simulator Settings Window by clicking the icon to the top right of screen:

8.2.1 The About Tab

The Settings Window will open at the About Tab (Figure 13). This contains copyright and version information and allows all settings to be unlocked by entering a password. In the picture below, exercise settings are locked. The unlock password is **settings!!**

Figure 13: The Simulator About Tab
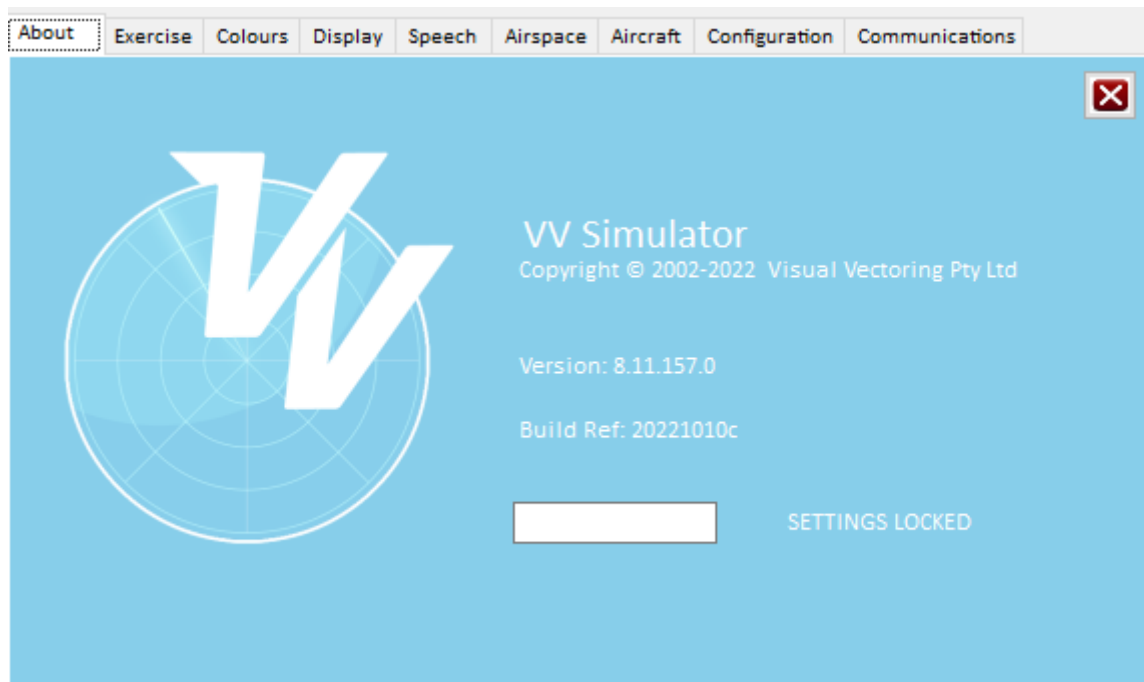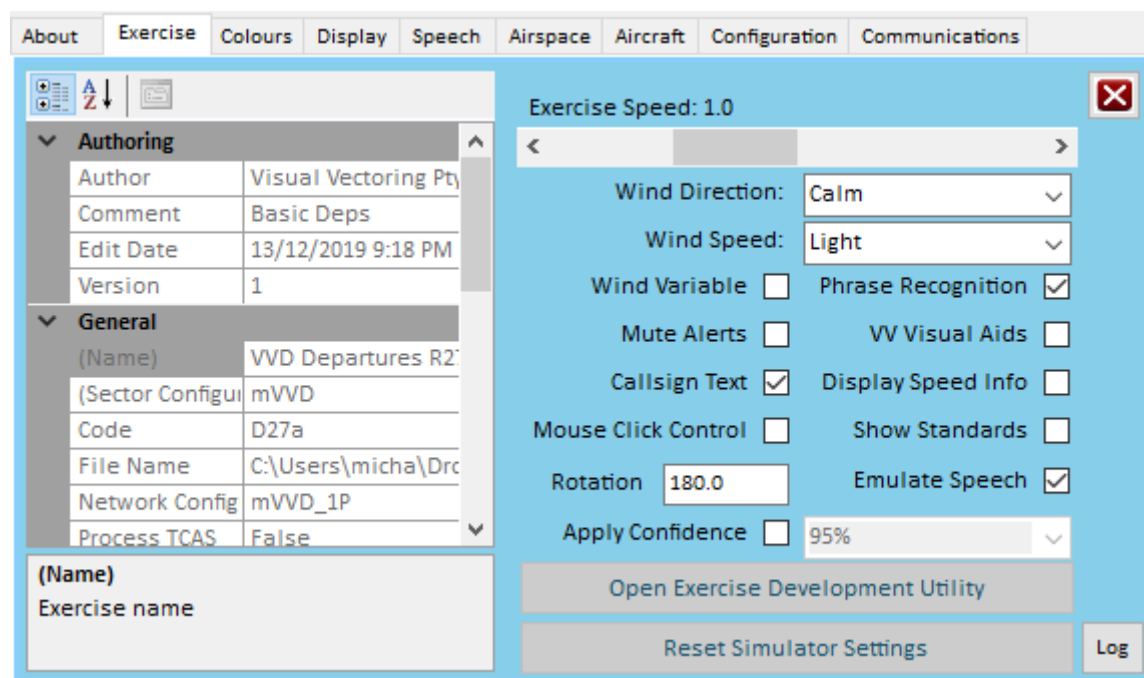
8.2.2   Exercise Tab

Figure 14: The Simulator Exercise Tab

The Exercise Tab (Figure 14) contains information about the exercise configuration. Basic **Exercise Settings** may be changed here by any user including:

- The wind settings for the exercise; the wind direction and speed may be set. The wind may also be made variable around the direction and speed settings;

- The audio of system alerts may be muted;
- The display of recognition events on screen can be disabled to promote active listening to readbacks;
- The display of text for callsign telephony information may be disabled;
- Fine-tuning of speech recognition accuracy can be changed using the **Emulate Speech** and **Apply Confidence** settings.
- Clicking the **Log** button will put the simulator into log mode for error analysis. This may only be done prior to commencement of simulation.

To the left, there is a *read only* property panel containing details of the exercise data, including versioning and other configuration information.

The **Reset Simulation Settings** button will reset all settings to default values, even those settings that have been changed with the administrator password.

8.2.3 Non-Exercise Settings

Program settings on other tabs of the Settings Window are locked by default because the deployment of this product may involve many users having access to the simulator under the same **Windows User** account. Access to these settings will be available when the correct password has been entered.

8.3 Simulator Functions

This version of the VV Simulator has been optimised for delivery of training in the recovery of Compromised Separation events. Accordingly, many simulator functions have been disabled. Of the available functionality, the following features are relevant to this module:

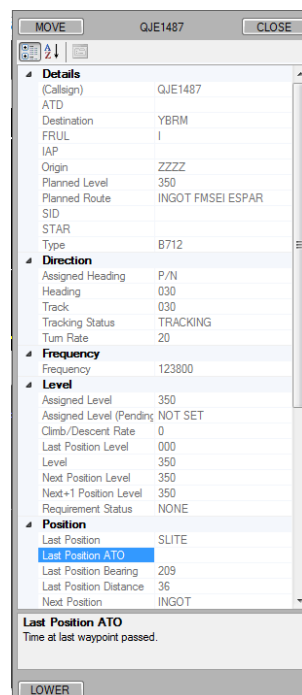### 8.3.1 Aircraft Properties View

Figure 15: Aircraft Properties Panel

The Aircraft Properties panel (Figure 15) is opened by selecting an aircraft track and pressing **ALT-P**. It provides a snapshot of the current aircraft status, including speed, tracking and position information. The data is updated with every surveillance update. This view may be useful for checking compliance with product specifications.

8.3.2   Pilot (FMS) View

The Pilot (FMS) panel (Figure 16) enables the display of an FMS/TCAS display as presented to the pilot. It may be opened by selecting an aircraft track and pressing **SHIFT-P**.
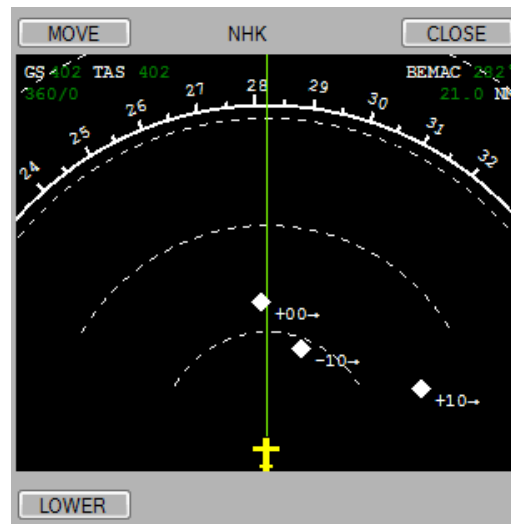
Figure 16: Pilot (FMS) Panel

The display range may be altered by left and right-clicking on the display.

8.3.3   Airspace Rotation

For generic sectors such as are used in the VV CompSep program, the simulator has the capability of rotating the airspace to present different orientations to scenarios, or to mimic a runway direction more closely. To do this, the Exercise Settings will need to be unlocked in the About Tab of the settings window (see above).

A bearing of between -360 and 360 may be entered into the Exercise Tab (see Figure 17). The airspace will be rotated by the difference between the entered value and the north to south bearing of 180°. For example, if 190 is entered, the airspace will rotate clockwise by 10°.
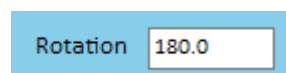
Figure 17: Rotation entry on Exercise Tab

Airspace rotation is only available at the start of the exercise. In addition, only one value may be entered. If an incorrect or undesirable value is entered in the first instance, then the simulator should be closed down and restarted.

8.3.4   Keyboard Functions

The following table details the keyboard functions available in this version of the VV Simulator.

| Key	Function
F1	Time of Passing Function
F2	Move Scale Marker to cursor position
F4/Shift-T	Enables entry of Text on Screen (Text Area)
F5	Bearing and Range Line Function
F8/Shift-R	Graphic Route Function for selected aircraft
F11	Clocks to normal speed
F12	Clocks to double speed
Home	Restore default range and scale
Page Up	Decrease map scale
Page Down	Increase map scale
Shift-P	Pilot/FMS Display for selected aircraft
Alt-P	Aircraft Properties View for selected aircraft
Alt-S	Skip to next Compromised Separation Scenario
Arrow Keys	Off-centre map
CRTL	Press-to-talk

9.   Launching Apps with a Custom URL

9.1   Summary

This installation includes the capability of launching applications with the use of a custom URL to provide the capability of LMS and remote delivery.

The URL may be embedded into an HTML link on a webpage, Word document, PDF document or in any application that has the capability of launching a URL. It may also be entered directly into the browser (shown below for Chrome).
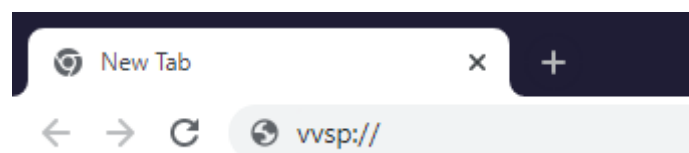

Figure 18: Launch of a custom URL with Chrome

The URL may also be entered into Windows File explorer (below)
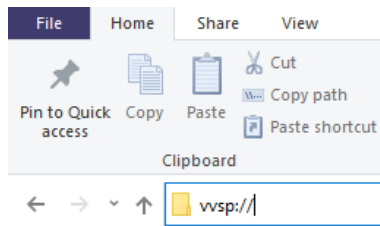
Figure 19: Launch of a custom URL with File Explorer

9.2   Security Approval

Depending on the mechanism by which the app has been launched, it is likely that a dislog will open requiring approval for launching the app (below).
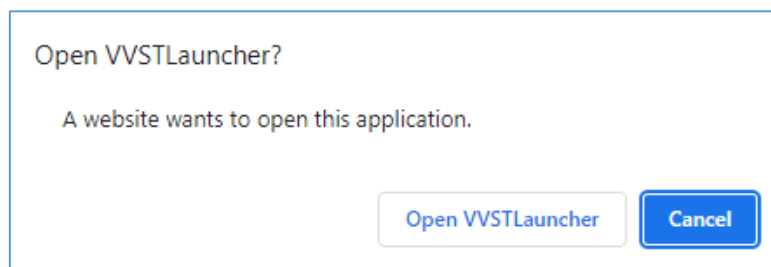
Figure 20: Security warning on launch of a custom URL with Chrome

9.3   URL Link Details

The three custom URL applications are detailed in the table below. Note that the VV Simulator launcher requires folder and exercise parameters to be set. All links to exiting exercise provided with *VVCompSep* are included.

Application	Custom URL	Example Usage
VV Speech Trainer	vvst	vvst://
Windows Speech Properties	vvsp	vvsp://
VV Simulator	vvsim	vvsim://folder=asacs/ex=ENR_STT
		vvsim://folder=asacs/ex=ENR_01
		vvsim://folder=asacs/ex=ENR_02
		vvsim://folder=asacs/ex=ENR_03
		vvsim://folder=asacs/ex=ENR_04
		vvsim://folder=asacs/ex=TMA_STT
		vvsim://folder=asacs/ex=TMA_01
		vvsim://folder=asacs/ex=TMA_02
		vvsim://folder=asacs/ex=TMA_03
		vvsim://folder=asacs/ex=TMA_04
		vvsim://folder=asacs/ex=YSSY_A16
		vvsim://folder=asacs/ex=YSSY_A34
		vvsim://folder=asacs/ex=YSSY_D16
		vvsim://folder=asacs/ex=YSSY_D34

The execution of the VV Simulator with a Custom URL requires an internet connection to download exercise and airspace data from the https://visualvectoring.com website.

9.4 Additional Content

Additional links will be provided for access by Airservices personnel for the purposes of testing and evaluation VV courseware.

10. Continuous Improvement

Visual Vectoring Pty Ltd welcomes feedback on the functionality and effectiveness of our products. Please email us at admin@visualvectoring.com with any feedback.

Appendix 1 – Glossary

Admin View	A higher level of access to the main display that allows checking staff to access other information, such as audio recordings and scenario screencaps.
Speech Properties	Windows Applet that allows adjustment of audio settings for speech recognition and synthesis. It is opened by clicking the purple icon on the main interface.
Exercise Settings	Basic simulator settings, such as wind, scenario speed that may be changed by any user. These are located on the Exercise Tab of the simulator Settings panel.
Non-exercise settings	Advanced simulator settings that require an unlock code to access.
Speech User	This is the speech profile currently being used by the computer for recognition and displayed to the bottom left of the main display. For each **Windows User** account, any number of speech recognition profiles can be created.
Training Target	Simulator exercises are included for both Enroute and TMA sectors. These are toggled by clicking the text on the Main screen.
User View	A basic level of access that is used by Controllers/Trainees undertaking training.
Windows User	A user with credentials to log onto Windows. Each Airservices employee will have logon credentials and, having done so, becomes a Windows User. A default **Speech User** is automatically created for each Windows User.
Windows User Area	Hard disk drive folders that have been allocated by Windows for the sole use of the current Windows User. Other users of the same PC do not have access to the information in this area.

Appendix 2 – FAQ

What are the passwords?	To unlock **Admin View** in the Program Settings panel on the main interface, the password is **admin!!** To unlock settings in the simulator, the password, used in the Exercise Tab of the Settings window is **settings!!**
The sector looks skewed in simulation. How do I change the aspect ratio of the screen?	1. First unlock the simulator settings by entering **settings!!** Into the password area on the About Tab of the simulator settings panel (see Figure 13). 2. Change the **Aspect Ratio** setting in the second column until the airspace is correct. Note that this setting will be retained for this **Windows User**.
How do I make the label font bigger?	1. First unlock the simulator settings by entering **settings!!** Into the password area on the About Tab of the simulator settings panel (see Figure 13). 2. Change the **Font Size** setting in the third column to the desired value. Note that this setting will be retained for this **Windows User**.
Where do I find the screencap summary of all the scenarios?	1. First change to Admin view on the main interface by entering **admin!!** Into the Program Settings panel (see Figure 3). 2. Close the Program Settings panel. 3. Click the blue question mark icon to open the folder containing module documentation. PDFs containing screencaps for all the Enroute and TMA scenarios are located here.
How may Speech Recognition performance be improved?	Review sections 6.6 and 6.7 about training the speech recognition and adjusting delivery for better outcomes.
How do I make the STCA alerts come out through the headset and not the speakers?	This process is described in section 6.5
A message appears saying "Security Device not detected. Program will terminate in 15 seconds." What do I do?	This means that there is no security dongle plugged into the PC. Contact your administrator for assistance. If there is a dongle plugged in it may be faulty. Seek another dongle or contact Visual Vectoring for a replacement: admin@visualvectoring.com

Appendix 3 – Phraseology

Vertical manoeuvres:	AIP Phrasing
Avoiding Action (Climb or Descent)	AVOIDING ACTION, [SUGGEST] CLIMB/DESCEND IMMEDIATELY TO (level) (Traffic Statement)
Increase Climb Rate or Descent Rate	EXPEDITE CLIMB/DESCENT [UNTIL PASSING (level)]
Go Around Instruction	GO AROUND
Stop Climb/Descent	STOP CLIMB/DESCENT AT (level)

Turn manoeuvres:	AIP Phrasing
Avoiding Action (Turn)	AVOIDING ACTION, [SUGGEST] TURN LEFT/RIGHT IMMEDIATELY HEADING (three digits) (Traffic Statement)

Traffic Information:	AIP Phrasing
Traffic Statement	TRAFFIC [LEFT/RIGHT] (number) O'CLOCK (distance) MILES OPPOSITE DIRECTION/ CROSSING LEFT TO RIGHT/RIGHT TO LEFT (SAME LEVEL/ABOVE/BELOW)
Traffic Alert	SAFETY ALERT (followed by) – (Traffic Statement)

General control:	AIP Phrasing
Reports	REPORT HEADING REPORT PRESENT LEVEL REPORT PASSING (level)
Level instructions	CLIMB/DESCEND TO (level) CLIMB/DESCEND TO AND MAINTAIN (level)
Vectoring	TURN LEFT/RIGHT HEADING (three digits) [reason]
Reasons	FOR SEPARATION DUE TRAFFIC DUE CROSSING/OPPOSITE DIRECTION/CONVERGING TRAFFIC
Direct Tracking	[RESUME OWN NAVIGATION] TRACK DIRECT TO (location)

Version 1.3 July 2017

Appendix 4 – Product Specifications

Scenario Design for Enroute

- At least 60 scenarios of varying complexity with aircraft at levels above F120.
- Varying aircraft types at varying level bands (ie mix of turbo prop and jet at lower levels; jet only at higher levels)
- Resilience and vigilance training: consider a sequence of conflicts. i.e resolve one only to have to resolve another part of airspace
- Half the scenarios should involve aircraft at the same standard level on north/south tracks or converging
- Aircraft changes to include level, or heading instruction or both; both requires longer lead time for response
- Aircraft only to respond if controllers use the correct phraseology in accordance with **ASA** procedure.
- Aircraft to respond to change in level and heading with read backs in accordance with AIP.
- Conflict alert (STCA) to activate with 90 seconds look ahead to point of conflict.

Scenario Design for TMA

- At least 60 scenarios of varying complexity with aircraft at levels between A070 and F150.
- Varying aircraft types at varying level bands (ie mix of turbo prop and jet at lower levels; jet only at higher levels)
- Resilience and vigilance training: consider a sequence of conflicts. i.e resolve one only to have to resolve another part of airspace
- Aircraft changes to include level, or heading instruction or both; both requires longer lead time for response
- Aircraft only to respond if controllers use the correct phraseology in accordance with **ASA** procedure.
- Aircraft to respond to change in level and heading with read backs in accordance with AIP.
- Conflict alert (STCA) to activate with 60 seconds look ahead to point of conflict.

Phased Training for Enroute:

- ENR Phase 1 – >90 second response time - conflict detection outside of 90 seconds and appropriate resolution; ideal scenario, with appropriate detection and resolution
- ENR Phase 2 – 60-90 second response time - conflict detection via STCA (ie within 90 seconds); system detection support and appropriate resolution
- ENR Phase 3 – 30-60 second response time - Conflict detection via STCA (alert presented within 60 seconds); delayed system detection and then appropriate resolution

- ENR Phase 4 – Imminent conflict – within 30 seconds of collision (startle response; to resemble the scenario of aircraft deviation, weather phenomena induced conflict)
- For Phase 1, 2, and 3 based on the feedback from airlines, aircraft to commence pilot response instructions at not less than 47 seconds from the time of acknowledgement
- For Phase 4 – preferred resolution is effective turn instruction for a minimum of one aircraft, with immediate pilot resolution
- For Phase 3 and 4, include scenarios where aircraft respond to airborne collision avoidance systems

Phased Training for TMA

- TMA Phase 1 – Imminent conflict – within 30 seconds of collision (startle response; to resemble the scenario of aircraft deviation, weather phenomena induced conflict)
- TMA Phase 2– 30-60 second response time - Conflict detection via STCA (alert presented within 60 seconds); delayed system detection and then appropriate resolution
- For both phases include scenarios where aircraft respond to airborne collision avoidance systems