



Course Manual

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Preamble

VV Stack™ is a Windows-based Air Traffic Control trainer that teaches intermediate skills in surveillance-based Enroute/Area control. The primary focus of the training concerns the management of traffic outside the Terminal Area arriving to an aerodrome through an entry gate, teaching the skills required to manage delays to effect a smooth flow of traffic. The course is designed for *ab initio* students, or for controllers transferring from another stream, such as Tower or non-surveillance control.

VV Stack™ is structured in incremental learning steps that will enable students to learn to manage intense and challenging traffic scenarios in a realistic environment. It is designed to be delivered following completion of the *VV Enroute™* course. Skills taught include:

- Processing an inbound arrivals sequence.
- Issuance of pressure information.
- Transmitting changes to pressure information.
- Issuance of holding instructions.
- Separating traffic inbound to a holding pattern.
- Maintenance of vertical separation within the holding pattern.
- Processing of traffic exiting the holding pattern, based on
 - A required longitudinal spacing and/or
 - A required gate time.
- Workload management.
- Holding phraseology.
- Interface usage
- Interpreting the AMAN system
- Applying control techniques such as vectoring, holding, speed control and time issuance to effect an AMAN (Maestro) sequence

The course includes a choice of regional airlines, to allow local preferences for aircraft callsigns to be selected in simulation. This enables familiarity with the telephony likely to be required for local traffic to be developed. Metric and imperial measures of distance, height and speed are available.

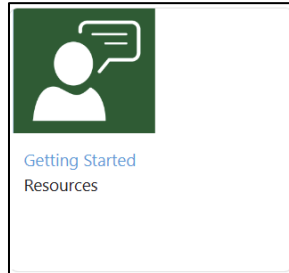
Within each module of the course, traffic levels and complexity rise as the student progresses through the simulator exercises. The portable and modular nature of the training package delivered through an online LMS, means that it can be used in a classroom or computer laboratory environment, or for learning in private. Like other Visual Vectoring courses, the training is student-paced.

VV Stack™ contains about 3.5 hours of lesson content and around 15 hours of simulation.

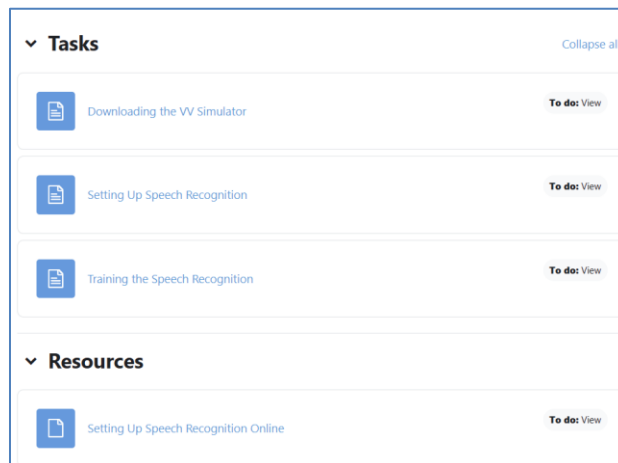


Getting Started

Prior to commencing simulation in the course, the VV Simulator must be installed, and the speech recognition trained. A guide to completing these processes is contained in the **Getting Started** course, available on the main page of the Learning Management System (below).



The **Getting Started** course contains several tasks that will need to be completed prior to simulation. A typical sample is shown below but this list may differ between installations. In a corporate or networked environment, some these will likely need to be managed by the IT department.



Simulator Installation

Where training is to be conducted on networked computers in a corporate or institutional environment, the IT department will need to perform the installation process. On private computers, the process may be completed by the user as described in the **Downloading the VV Simulator** module of the **Getting Started** course.

Speech Function

Audio Input/Output

The speech recognition function needs to be configured and trained for use in simulation. This is performed using the **Speech Properties** panel in Windows. Full details on configuration of audio input



and output, as well as creating an individual speech profile are included in the **Setting Up the Speech Recognition** section of the **Getting Started** course. The **Resources** section of this course also contains documents that will help in this process.

Training the Speech Engine

Training of the speech recognition function uses the **VVSpeechTrainer** app. The **Training the Speech Recognition** section of the **Getting Started** course describes this process.

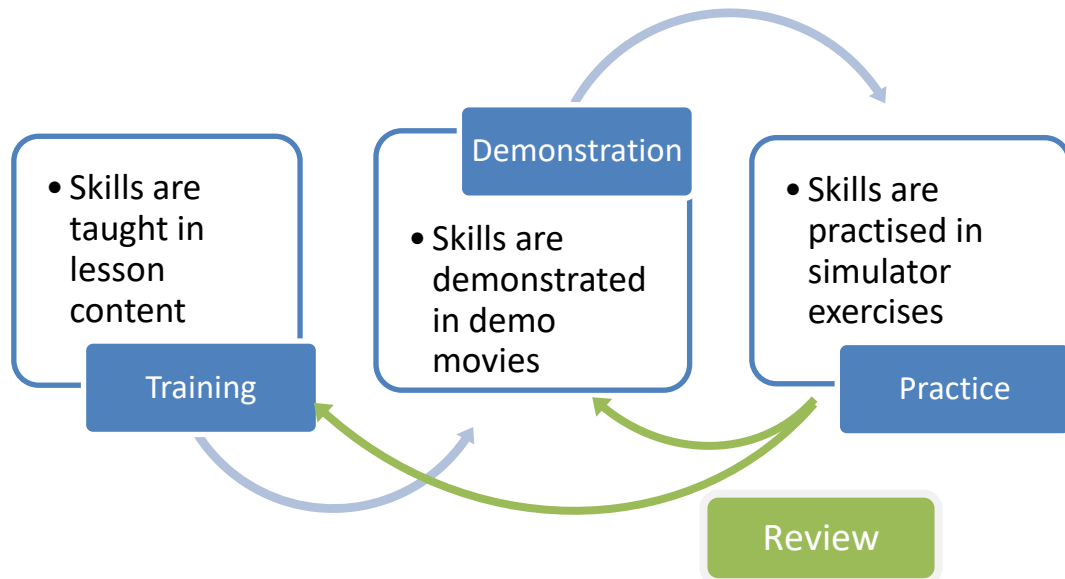
Custom URL Shortcuts

Note that URL Shortcuts are available for easy access to the use of the **Speech Properties** panel and the **VVSpeechTrainer** app. Simply type into a web browser bar, the Windows Explorer navigation bar, or the Windows Run dialog (opened with **Windows+R**). The Custom URLs are tabulated below.

Speech Properties	vvsp://
VVSpeechTrainer	vvst://
VVSpeechStarter	vvss://

Training Methodology

All Visual Vectoring training follows the “learn-see-do” approach commonly used in the training of complex practical skills. This process is illustrated in the diagram below.





Lessons

Instructional content presented as slideshows and run as MP4 movies. Full control of the flow of information is available by pausing and forward/reverse scanning the movie player. Specific skills are targeted and contextualised using carefully designed scenarios.

Demonstrations

Each demonstration is created as a screen-capture MP4 movie of actual simulator performance of a selection of traffic scenarios from the upcoming exercise series, including audio. Explanatory graphic overlays relating the demonstrated techniques to the lesson content are included. The movies can be paused and reviewed at will.

Practice Simulation

The practice exercises, performed on the VV Simulator, are targeted at the skills covered in the training content. Ample practice opportunities to establish control techniques to the level required is available. A performance assessment is provided at the end of each exercise to allow the student to self-assess his/her readiness to progress to the next part of the course. These reports are uploaded to the LMS and are available for review by the student and instructors.

As the *VV Simulator* has been designed as a practice tool to support the acquisition of specific traffic management skills, a range of learning tools are included that not normally present in operational systems is included. Examples are:

- Task-trainer functionality.
- Task completion prompts.
- Scoring functionality.
- On-screen feedback of sequencing and separation performance.
- Reporting on performance outcomes.

A full description of the operation of the simulator is available in the **VV Simulator Operating Manual**.

Review

Following self-assessment, the trainee is free to revisit the lesson and demonstration content to review and consolidate. The simulator is available for as much practice as is needed.

Reporting and Tracking

The simulator collects up to 200 individual metrics for each exercise performed. All performance data is uploaded and stored in the cloud and is available for review. The **Simulator Performance Measurement** section of this document contains a full list of the measured parameters.



Course Summary

Structure

The course is divided into four modules each of which contains several activities, typically lesson movies or simulator exercises. A summary of the content of each module is included in the tables below, with a more detailed description in the next section.

Note that there will be minor variations between content offerings depending on end-user requirements. In addition, Visual Vectoring courses are completely modular and allow for extra activities such as optional simulation exercises, quizzes and informational content to be added.

Module	Activity Name	Activity Type	Abbreviation	Duration (mm:ss)
Arriving Traffic	Introduction	Lesson	INTRO	07:37
	Lesson: Airspace	Lesson	ASP	11:15
	Lesson: Procedures	Lesson	DISP	07:52
	Lesson: Sequencing	Lesson	SEQ	27:59
	Demonstration: Sequencing	Demonstration	DSEQ	30:47
	Simulator Task Trainer (STT):	Exercise (STT)	SSTT	05:00+
	Arrivals 1	Exercise	A01	30:00
	Arrivals 2	Exercise	A02	40:00
	Arrivals 3	Exercise	A03	40:00
	Arrivals 4	Exercise	A04	40:00
	Arrivals 5	Exercise	A05	40:00
	Arrivals 6	Exercise	A06	40:00

Module	Activity Name	Activity Type	Abbreviation	Duration (mm:ss)
Holding	Lesson: Holding	Lesson	HOLD	37:42
	Demonstration: Holding	Demonstration	DHOLD	23:43
	Holding Phraseology Primer	Exercise (Primer)	PHRTF	10:00+
	Exit 1	Exercise (Scenario)	EX1	30:00
	Exit 2	Exercise (Scenario)	EX2	30:00
	Exit 3	Exercise (Scenario)	EX0	20:00
	Exit 4	Exercise (Scenario)	EX4	20:00
	General Holding 1	Exercise	GH1	30:00
	General Holding 2	Exercise	GH2	30:00
	General Holding 3	Exercise	GH3	30:00
	General Holding 4	Exercise	GH4	40:00
	General Holding 5	Exercise	GH5	50:00
	General Holding 6	Exercise	GH6	50:00



Module	Activity Name	Activity Type	Abbreviation	Duration (mm:ss)
AMAN Sequencing	Lesson: Arrivals Management System	Lesson	AMAN	05:29
	Demonstration: AMAN	Demonstration	DAMAN	49:26
	AMAN Sequencing 1	Exercise	F01	50:00
	AMAN Sequencing 2	Exercise	F02	50:00
	AMAN Sequencing 3	Exercise	F03	50:00
	AMAN Sequencing 4	Exercise	F04	50:00
	AMAN Sequencing 5	Exercise	F05	55:00
	AMAN Sequencing 6	Exercise	F06	60:00

Extra Modules and Activities

The above tables and the next section detail the content in the standard VV Stack course. Depending on the installation, other modules may be present as detailed below.

Announcements

This section provides an online forum for discussion about the course, announcements, student queries and general administrative issues.

VV Stack Room

This activity provides a link to a screen sharing app that allows students to connect with instructors and other students for performance management, mentoring, demonstrations and assessments. This feature would typically be used in a remote delivery environment.

Documents

Where present, this section would contain downloadable documentation providing information on local phraseology variations, simulator functionality and the course manual.

Local Information Pages

In some locations, information on custom simulation and interface usage is provided so that the student is made aware of specific uses of phraseology and control techniques that are required.



Course Content

The following section details the content of the VV Stack course.

Arriving Traffic

The Arriving Traffic Module contains content on the airspace, procedures and phraseology used on the course, followed by training in sequencing with the use of vectoring and speed control.

Lesson: Introduction

This lesson introduces the course content and describes the course structure, modes of delivery and available resources.

Lesson: Airspace

This lesson provides an overview of the airspace managed by the Stack controller on this course, including airspace dimensions, descent altitudes, air-routes, frequencies and holding patterns. **Duration: 07:37.**

Lesson: Procedures

This lesson provides information on the procedures for managing inbound and crossing traffic through the airspace, including transfer levels, QNH issuance, interface usage and strip windows. **Duration: 11:15.**

Lesson: Sequencing

This lesson provides training in the application of procedures for managing inbound and crossing traffic through the airspace, including the use of track-shortening, speed control, jet vectoring and turbo-prop vectoring. **Duration: 27:59.**

Demonstration: Sequencing

This movie is a screen capture demonstration of an upcoming simulator exercise. **Duration: 30:47.**

Simulator Task Trainer

This simulator exercise provides a walk-through of the commonly used simulator functions. **Duration: 05:00+.**

Arrivals Exercises

This set of six simulator exercises provides practice in the sequencing of jet and turbo-prop aircraft through a TMA gate. Students are required to process the aircraft for descent, maintain separation and achieve a defined distance trail through the arrival gate.



Tasks

In all exercises in this set, the following tasks are required to be performed:

- Acceptance of inbound aircraft prior to the boundary
- Issuance of timely descent
- Issuance of QNH for the first altitude assigned and reissue any changes to the QNH
- Sequencing of aircraft through the arrival gates such that any following aircraft requiring a delay is positioned in a 9NM-12NM trail if via CARGO, or in a 10NM-12.5NM trail via ELDER.
- Hand-off and transfer of aircraft to the correct sector and frequency.

HMI

Note the specific HMI requirements:

- The aircraft track must be selected when a transmission is made to that aircraft
- The IQL must be selected on handover
- The XPrompt must be activated on handover
- The XPrompt must be promptly removed after readback of the frequency change
- The CFL must be promptly de-highlighted after an initial call or level readback

Holding

The Holding module introduces the use of holding as a delay tool, and culminates in the processing of aircraft that are holding with an unknown delay.

Lesson: Holding

This lesson covers the rationale behind the use of holding as a delay strategy. The dimensions and legs of the holding pattern, the various entry procedures and the control strategies for managing the entry and exit from the hold are discussed. **Duration: 37:42.**

Demonstration: Holding

This demonstration contains a screen capture of the processing of traffic in exercise General Holding 3. IN this exercise, there is an aerodrome closure, requiring all aircraft to be delayed. Following the reopening of the aerodrome, the inbound aircraft must be processed through the inbound gates without delay. **Duration: 23:43.**

Exercise: Holding Phraseology Primer

This primer exercise teaches and tests the phrasing and interface actions required as part of the process of holding aircraft. A script is presented explaining the required tasks, which must be performed correctly in order to proceed to the next task. There are ten separate sub-scenarios in this exercise. **Duration: 10 minutes.**



Exit Exercises

In each of this set of exercises several sub-scenarios are presented containing two or more holding aircraft.

Tasks

In each sub-scenario, aircraft must be removed from the holding pattern and sequenced through the arrival gate in the correct order.

General Holding Exercises

In this set of exercises an aerodrome closure event results in a requirement to delay aircraft indefinitely. That is, they must be processed into the holding pattern and then sequenced through the gate once the aerodrome opens.

Tasks

The six exercises increase in complexity. On completion of holding, aircraft must be processed in the correct order and at an appropriate level through the gate.

In addition to the deductions described for previous exercises, penalties are applied as follows:

- Where an aircraft passes the gate prior to the reopening message;
- Where an aircraft passes a gate at a level greatly different from the profile level at that position;
- Where an aircraft has not passed the exit gate at the end of the exercise (where it was possible to achieve this).

AMAN Sequencing

This module builds on skills in sequencing and holding to teach the development and implementation of a control plan to manage a time-based arrivals sequence.

Lesson: Arrivals Management System

This lesson introduces the interpretation of the Arrivals Management System display, and how this information is used to effect the control strategy. **Duration: 05:29.**

Demonstration: AMAN

This demonstration is a screen-capture of Exercise AMAN 5. The traffic is processed according to the AMAN information, with vectoring, holding, time issuance and speed control strategies all being used. **Duration: 49:26.**

AMAN Exercises

This section contains six exercises increasing in complexity.



Tasks

In each exercise the arrival sequence must be processed according to the AMAN arrival times. All jet and DH8D aircraft that have been issued any delay by the AMAN system must be issued a speed of 250 KIAS at the gate.

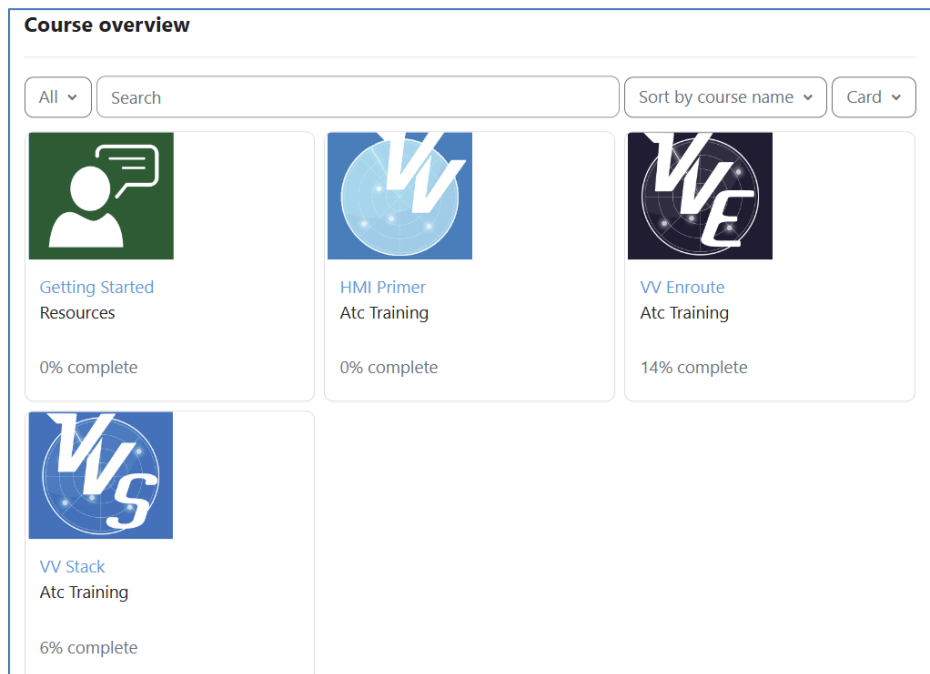
In addition to the deductions described for previous exercises, other penalties are applied as follows:

- Where an aircraft passes a gate more than one minute early;
- Where an aircraft passes a gate more than one minute late;
- Where an aircraft has not been issued a required speed at the gate.

Student Interface

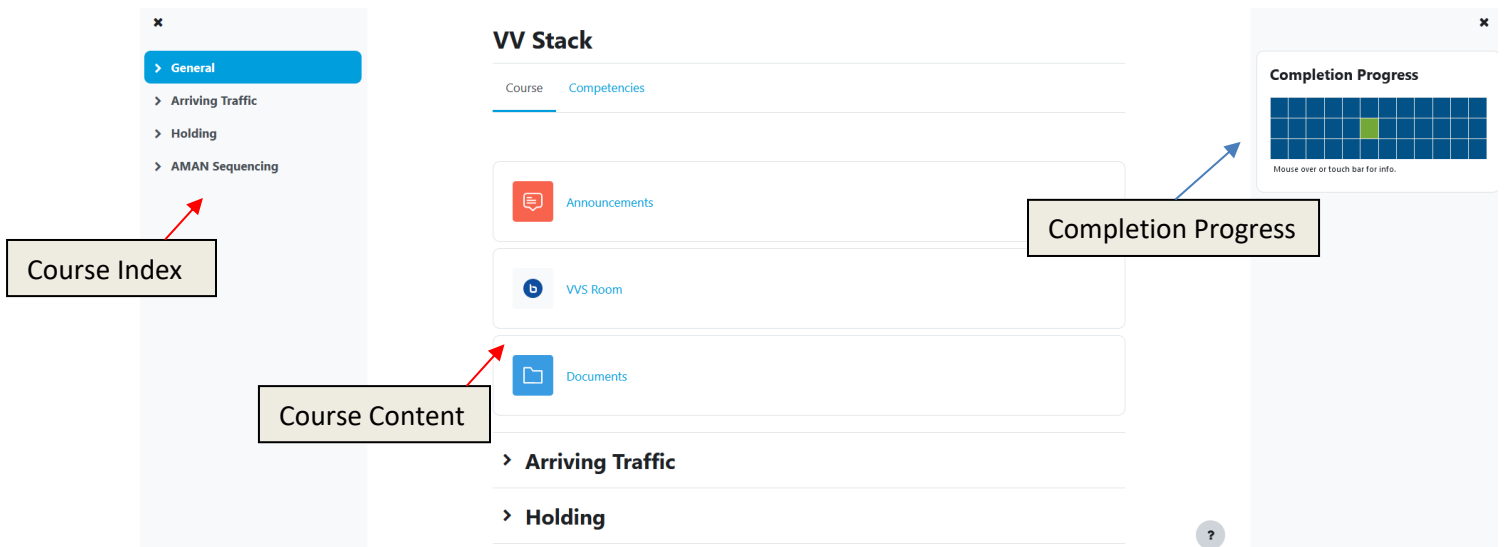
Homepage

Once a student user has logged in using their credentials, a homepage containing an array of icons will be displayed as shown below. The number of icons displayed on the students' homepage will depend on the courses in which the student has been enrolled. The VV Stack course is opened by clicking on the blue link below the icon.



Course Page

Once the course has been opened, the main **Course Page** is displayed. It is divided vertically into three sections: the **Course Index**, **Course Content** and **Completion Progress** sections (below).

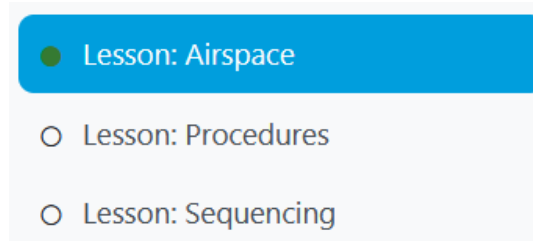


When a course activity is selected, such as a simulator exercises, lesson or demonstration, then an **Activity Page** will be displayed.

Course Index

The **Course Index** is a collapsible menu that displays the course structure. It may be closed by clicking the X symbol to the top left.

The Course Index remains open when an **Activity Page** is open, and highlights the current activity in blue, as well as indicating when an activity has been completed or passed. For example, based on the image below, the **Lesson: Airspace** activity is currently open, and has been completed. The **Lesson: Procedures** and **Lesson: Sequencing** activities have not been completed.





Course Content

The **Course Content** section is also a collapsible menu but can only have one sub-section open at once. When a module is selected, the **Course Content** section disappears and is replaced by the **Activity Page**, from which a lesson movie or simulator exercise may be launched. **Activity Pages** are discussed in the next section.

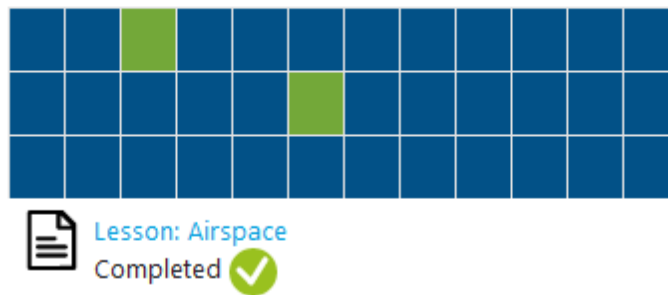
Completion Progress

The **Completion Progress** section to the right gives a graphical indication of the progress through the course. Colour coding is as follows:

- Blue squares indicate that an activity has not been attempted.
- Green squares indicate that an activity has been completed or passed.
- Red squares indicate that an activity has been attempted and failed.

Clicking on a square will navigate to that activity.

Completion Progress



The name of the activity will be displayed when the mouse is positioned over a square. Note there is no colour coding as to the type of activity (such as simulator exercises and lessons) represented by the square.

Note that the Completion Progress section is not visible when an **Activity Page** is open.



Activity Pages

Simulator Exercise Page

When a Simulator Exercise activity is launched, a page is shown that contains information about the exercise and any previous attempts that have been made. It is divided into sections as shown below.

Sim Task Trainer

[Back to 'Arriving Traffic'](#)

✓ Done: Complete the activity

This is a simple exercise designed to be an [introduction](#) to the use of the simulator. It contains a list of tasks that will provide information about how to use various simulator functions. At least **80%** of all tasks must be completed to pass the exercise.

Duration: 5 minutes.

Sim Task Trainer

Badges:	
Previous Attempts:	1
Completed:	1
Passed:	1
Click Launch when ready:	Launch Simulator

Leaderboard

Leaderboard		
1	Ahmed Ali	100.00
1	Daler Varma	100.00
1	Ravendra Bhat	100.00
4	Nehta Ibrahim	96.43
5	Carmen Beltran	92.86
6	Ben Yeung	89.29

Badges and Exercise Attempts **Launch Button** **Leaderboard**

Previous Attempts

Previous Attempts		
February 15, 2024, 6:05 pm	Passed	Show Summary...

Previous Feedback

Briefing Information

On each Simulator Exercise page, a short explanation is given as to the nature of the exercise with any details required that may affect exercise completion and scoring.

Badges and Attempts

The section to the left contains information about the number of previous attempts as well as how many were completed and passed. Where the badge feature is enabled, any badges that have been previously awarded for this exercise are displayed. A summary of the badges available for the VV Stack is available on the LMS.

Launch Button

Clicking the Launch Button will launch the **VV_NET** executable to run, and after the airspace data is downloaded, the simulator will be displayed. See the **Running Activities** section later in this document for more information about launching the simulator.



Leaderboard

Where this feature is enabled, the leaderboard will contain a list of the best overall scores performed by students within the same cohort. The following criteria apply for viewing the leaderboard.

- A student must have completed the exercise to view entries on the leaderboard. If the exercise has not been completed, then the leaderboard will be empty.
- Only attempts that have been passed will appear on the leaderboard.
- For any student, the leaderboard will be populated with other students within the same course cohort. Students not in the same cohort who are undertaking the course will not be visible.

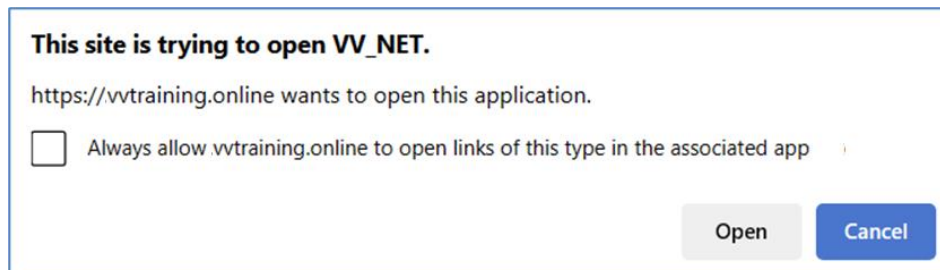
Previous Feedback

This section contains list of previous attempts, the date they were performed and the status of the exercise result in terms of passing and completion. See the next section for details on these terms as they apply in this course.

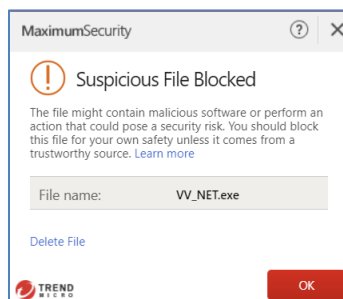
Clicking the **Show Summary** link will expand out a report containing a detailed summary of the previous attempt. It contains all the information provided in the **Termination Panel** of the simulator.

Running Simulation

Simulator exercises are run from within an activity page by clicking on the **Launch** Button. Depending on the browser in use, the message like the one below may be displayed. Clicking **Open** will allow the simulator to launch.



Note that any antivirus software installed may need to be configured to allow the executable to run. The dialog below is from Trend Micro.





Where the software is running on a corporate network, the IT department will need to manage this conflict. When a personal computer is in use, consult the documentation for the antivirus software.

Lesson/Demonstration Page

These pages, as shown below) contain a short briefing on the content of the lesson/demonstration movies, as well as the direction (minutes:seconds). The movie itself is shown in reduced size and is launched by clicking the play button.

VVS / Lesson: Holding



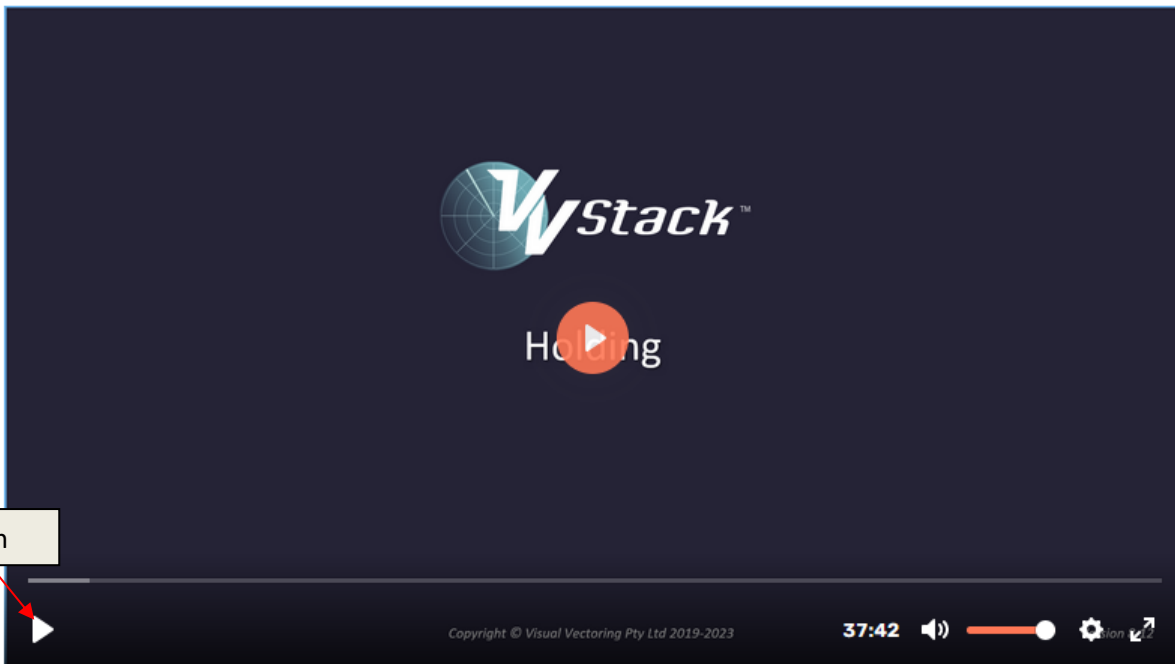
Lesson: Holding

[↑ Back to 'Holding'](#)

✓ Done: View

This lesson covers the rationale behind the use of holding as a delay strategy. The dimensions and legs of the holding pattern, the various entry procedures and the control strategies for managing the entry and exit from the hold are discussed.

Lesson Briefing



Play Button



Running Lesson Movies

Playback is provided by the browser's media player and user controls may depend on the browser in use. A typical set of controls is displayed below.



In most browsers, the movie playback can be paused and restarted by clicking on the screen and/or tapping the space bar.

Simulation Performance Measurement

The evaluation of performance of ATC Radar Control is a very complex process. Ultimately, it is the observance of students' actions by a qualified instructor or professor that determines overall performance. The aim of the scoring system of the VV Simulator is to measure some of the definable aspects of performance for comparison and assessment of progress in learning, both by a student and between students. No claim is made by Visual Vectoring that the scoring system gives an absolute indication of the suitability or otherwise of a student for live Air Traffic Control without confirmation from a -qualified training expert.

Performance Records

Each time a simulation exercise is run, details about the exercise outcomes are stored in a Performance Record and displayed to the student and uploaded to the Learning Management System. These files contain information about the student's performance during the activity.

Results Display


Termination Panel

After the simulator exercise has been completed the simulator **Termination Panel** (below) will display feedback on performance, provided the exercise has been run for at least two minutes.

More granular information is available by clicking the **Detailed Feedback** button on the **Termination Panel**. Here, a detailed summary of metrics captured during the exercise is displayed.



Exercise Terminated: Manual

 User: 123456
Organisation:
Group:
Sector: Diamond
Exercise: D4
Elapsed Time: 8.7 minutes

Results

ATC Score:	100.0
Interface Score:	70.3
Separation Score:	100.0
Sequencing Score:	96.0

Overall: 92.3

[Detailed Feedback](#)

[Click To Close](#)

LMS Interface

Once data has been uploaded, this information is available on the **Simulator Exercise Page** of that exercise..

Instructors may search for and view any student's results from the **Reports** menu. More information is available in the VVS Instructor Manual.

Competencies

Depending on the exercise type, a score will be reported in up to five competencies. Given that so many metrics are reported for each exercise, dividing the outcomes into these competency categories allows deficiencies in a particular aspect of performance to be recognised and remedied. The five competencies are listed below and described in detail in the **Competencies** section of this document.

Note that the Vectoring competency is not scored in VV Stack simulation.

- ATC.
- Interface.
- Separation.
- Sequencing.
- Vectoring.

The score for each competency is weighted and combined to produce an overall score. Algorithms for calculating the score in each of these competencies later in this document.



Overall Results

Scoring in Visual Vectoring simulation is based on the application of penalties when required tasks are not completed or when undesirable outcomes occur. Because this type of scoring represents a decremental process, in addition to the requirement that a pass score is achieved the exercise must have been for enough time to ensure that the student has performed at the required level for a long enough period.

With Visual Vectoring training, the term '**Completion**' refers to the situation when an exercise has been run for a suitable time such that the result is reflective of performance. The term '**Success**' means that score deductions were such that the performance was above the required level. The term '**Pass**' means that both **Completion** and **Success** has occurred, as shown in the diagram below.



Completion

For an exercise to be completed, the following criteria must apply:

- For Task Trainer and Primer exercises, at least 80% of the tasks must be completed;
- For other exercises, the simulator must be run for 80% of the design length of the exercise. This does not include repeated time from backstepping the simulator.

Success

For an exercise to be marked as successful, the following criteria must apply:

- Score in each individual competency (ATC, Interface, Sequencing and Separation) must not be less than 70%; and
- Overall score must not be less than 80%.

Passing

For a student to be deemed as having passed the exercise, the following criteria must apply:

- The exercise must be Completed; and



- The exercise must be Successful.

Weights

Weightings are applied by default as described below. Depending on end-user preference, these weights may be varied.

Sim Task Trainers:

For Sim Task Trainers, there are no individual competencies scored only an overall score. The overall score is the percentage of tasks that have been completed. This score is used to determine Completion, Success and Passing.

Other Exercises

For the Arrivals, General Holding and AMAN exercises, the ATC, Interface, Separation and Sequencing competencies are scored. The weighting is:

Competency	Scoring Weight
ATC	0.8
Interface	0.8
Separation	1.0
Sequencing	1.0

Competencies

ATC Competency:

Description

The ATC Competency is designed to capture the student's performance in performing general ATC tasks, other than separation and sequencing. This is generally related to the service provided to the aircraft, such as ensuring that the aircraft is assigned appropriate descent, kept in controlled airspace and

Metrics

The following metrics are used in scoring the ATC competency:



Metric	Details
Pauses	The number of times the exercise was paused.
Aircraft 'Killed'	The number of aircraft removed from the exercise.
Requests	The number of aircraft requests made. This is normally when descent is needed because the aircraft is too high when close to the airport. This is unlikely to occur for VVE.
Bad Phrases	The number of bad phrases that were issued in the exercise. Examples: <ul style="list-style-type: none"> • An aircraft is cleared direct to a position that is not on its route. • An aircraft is cleared direct to a point it is already tracking to. • An aircraft is given descent to a level above. • An aircraft is given climb to a level below. • An aircraft is issued a level outside the Maze. • An aircraft is issued a right turn to a heading that is to the left. • An aircraft is issued a left turn to a heading that is to the right.
Frequency Changes Incorrect	The number of frequency changes (transfers) incorrectly issued in the exercise.
Exit Levels Incorrect	The number of outbound aircraft tracks that were transferred to the next sector assigned an incorrect level.
Handovers on Vector	The number of handovers with aircraft still on a vector.
Updates ALT	The number of individual radar/surveillance updates when an aircraft was outside controlled airspace. This is unlikely to occur for VVE.
Updates Outside Maze Vertically	The number of individual radar/surveillance updates outside the vertical confines of the Maze, and not assigned a level inside.
Updates Slow	The number of individual radar/surveillance updates for which the simulator clock speed has been slowed.

Algorithm

The following table describes how the ATC score is calculated:

Metric	Deduction	Note
Pauses	0.25% for each Pause during the exercise.	One Pause is allowed without penalty.
Aircraft 'Killed'	7.5% is deducted per aircraft removed.	Max deduction: 40%.
Bad Phrases	1.5% is deducted for each Bad Phrase detected.	
Freq Changes Incorrect	1.5% is deducted for each incorrect frequency change.	
Handovers on Vector	2.5% is deducted for each time an aircraft was handed over while still being vectored.	
Exit Levels Incorrect	1.5% is deducted for each incorrect exit level.	
Updates Outside Maze Vertically	0.1% is deducted for each surveillance update detected outside the Maze vertically (and not assigned a level within).	Maze exercises only; Max deduction: 25%.
Updates Slow	15% is deducted if more than 25% of the exercise time was conducted at a reduced clock speed.	



Interface Competency:

The Interface Competency is designed to capture the correct interaction with the label interface, such as keeping label contents up to date, and handing off and accepting aircraft in a timely fashion.

Metrics

The following metrics are used in scoring the Interface Competency: This is a subset of the full range of metrics recorded by the VV Simulator. A list of these is available in the Operating Manuals for the VV Simulator and for VV Management.

Metric	Description
Handovers Incorrect	The number of outbound aircraft tracks that were handed over to the incorrect sector.
Updates CL Incorrect	The number of individual radar/surveillance updates for which Cleared level in the label did not match the assigned level.
Updates CL Highlight	The number of individual radar/surveillance updates for which Cleared level highlight in the label was on. This is an indication that level readbacks and initial calls are not being monitored.
Acceptances Late	The number of inbound aircraft tracks that were accepted too late (after crossing the airspace boundary).
Updates off Frequency Inside Sector	The number of individual radar/surveillance updates for which the aircraft was inside the sector but not on the user's frequency. This is an indication of a late acceptance or an early handover. Updates are ignored for exiting aircraft within three minutes of the boundary.
Assumptions	The number of aircraft tracks that were assumed (forced acceptances without a handover).
Updates on Frequency Outside Sector	Individual radar/surveillance updates for which the aircraft was outside the sector but on the user's frequency. This is an indication of a late handoff/transfer.
IQL not activated on handover	The number of times an aircraft was handed over without the IQL being set. This metric is disabled for some installations.
X Prompt not visible on handover	The number of times an aircraft was handed over without the X-Prompt visible. This metric is disabled for some installations.
X Prompt not removed after frequency transfer	The number of times the X-Prompt was not removed after a frequency change. This must be done within 8 seconds of the change. This metric is disabled for some installations.
IQL not selected for handover	The number of times an aircraft was handed over without the track being selected. This metric is disabled for some installations.
Aircraft track not selected during transmission	The number of times a transmission was made to an aircraft without the track being selected. This metric is disabled for some installations.
Bad CFL clicks	The number of times a left- or right-click for CFL entry was used incorrectly. This metric is disabled for some installations.



Algorithm

The following table describes how the Interface score is calculated:

Metric	Deduction	Note
Handovers Incorrect	1.5% is deducted for each incorrect handover.	
Updates CL Incorrect	0.1% is deducted for each individual aircraft surveillance update detected when the assigned level does not match the level in the label.	Two updates are allowed for each level change; Maximum deduction: 15%;
Updates CL Highlight	0.05% is deducted for each individual aircraft surveillance update detected when the CL is highlighted.	Allowance is applied of 2 updates per level change, and 5 updates per acceptance; Maximum deduction: 15%;
Acceptances Late	1% is deducted for each late acceptance.	Maximum deduction: 15%
Updates off Frequency Inside Sector	0.1% is deducted for each individual aircraft surveillance update detected inside sector and off frequency (and not within three minutes of exit).	Maximum deduction: 20%
Assumptions	1% is deducted for each Assumption.	Maximum deduction: 10%
Updates on Frequency Outside Sector	0.1% is deducted for each individual aircraft surveillance update detected outside sector and on frequency.	Maximum deduction: 15%
IQL not selected for handover	1.5% is deducted for each time an aircraft track is handed over without the IQL selected	Maximum deduction: 20%
X Prompt not visible on handover	1.5% is deducted for each time an aircraft track is handed over without the X-Prompt selected.	Maximum deduction: 20%
X Prompt not removed after frequency transfer	1.5% is deducted for each time the X-Prompt is not deselected after a frequency change.	Maximum deduction: 20%
Aircraft track not selected during transmission	0.1% is deducted for each occasion the aircraft track is not selected when a transmission is made to that aircraft.	Maximum deduction: 20%
Bad CFL clicks	1% is deducted for each time a CFL was clicked using the incorrect mouse button.	Maximum deduction: 20%



Separation Competency:

The Separation Competency is designed to measure the ability to detect conflicts and apply (or regain) separation.

Applicability

The Separation Competency not scored in Task Trainer or Target exercises. It is scored in all other exercises.

Metrics

The following metrics are used in scoring the Separation Competency:

Metric	Description
Updates Loss of Separation	The number of individual radar/surveillance updates for tracks subject to a loss of separation.
Losses of Separation	The number of losses of separation during the exercise.
Updates Loss of Separation Assurance	<p>The number of individual radar/surveillance updates for tracks subject to a Loss of Separation Assurance (LOSA). A LOSA occurs when:</p> <ol style="list-style-type: none"> 1. The distance between the projected positions of the aircraft over a lookahead time (typically 2 minutes) is predicted to reduce below the lateral separation standard, and 2. There is no vertical separation based on present and assigned levels. <p>This metric is disabled in some installations.</p>
Losses of Separation Assurance	The number of individual losses of separation assurance as described above.

Algorithm

The following table describes how the Separation score is calculated:

Metric	Deduction	Note
Losses of Separation	10% is deducted for each individual CA event (loss of separation).	
Updates Loss of Separation	0.5% is deducted for each individual aircraft surveillance update subject to a CA (loss of separation).	
Updates Loss of Separation Assurance	0.1% is deducted for each individual aircraft surveillance update subject to a Loss of Separation Assurance.	Separation Assurance is not scored in some installations
Losses of Separation Assurance	4% is deducted for each individual LOSA.	



Sequencing Competency:

The Sequencing Competency is designed to measure the ability to correctly space arrivals through a gate.

Metrics

The following metrics are used in scoring the Sequencing Competency: In the table below, the reference distances make use of the default target sequencing trail distances. If the trail distance is changed from default, then the reference distances will change proportionally. These reference distances are saved in the performance record.

Metric	Description	Reference Distance (Km)	Reference Distance (NM)
Trails Very Low	The number of sequencing trails through a gate that were measured as 'Very Low'.	<36.1	<18.1
Trails Low	Trails measured as 'Low'.	36.1-40.0	18.1-20.0
Trails Ideal	Trails measured as 'Ideal'.	40.0-45.0	20.0-22.0
Trails High	Trails measured as 'High'.	45.0-55.0	22.0-25.0
Trails Very High	Trails measured as 'Very High'.	55.0-65.0	25.0-30.0
Trails Low and Vector	The number of sequencing trails through a gate that were below 'Ideal' and the following aircraft was under a vector.	<40.0	<20.0
Trails Ideal and Vector	Trails measured as 'Ideal' and the following aircraft was under a vector.	40.1-45.0	20.1-22.0
Trails High and Vector	Trails measured as above 'Ideal' and the following aircraft was under a vector.	>45.0	>22.0
Missed Gate	The number of aircraft that were directed to miss a sequencing gate.	-	-



Algorithm

The following table describes how the Sequencing score is calculated:

Metric	Deduction	Note
Trails Very Low	4% is deducted for each 'Very Low' trail	
Trails Low	2% is deducted for each 'Low' trail	
Trails Ideal	1% bonus is applied for each 'Ideal' trail	Maximum score limited to 100%, not applied in AMAN exercises
Trails High	1.5% is deducted for each 'High' trail	Not applied in AMAN exercises.
Trails Very High	3% is deducted for each 'Very High' trail	
Trails Low and Vector	1% is deducted when the following aircraft is below 'Ideal' distance in trail and still under a vector.	
Trails Ideal and Vector	0.5% is deducted when the following aircraft is at an 'Ideal' distance and still under a vector.	
Trails High and Vector	4% is deducted when the following aircraft is above 'Ideal' trail distance and still under a vector.	
Missed Gate	4.5% is deducted for each time an aircraft is tracked to miss a sequence gate.	
Early Arrivals	8% is deducted for each time an aircraft passes a gate prior to the allowed time in the event of an aerodrome closure.	Not applied in AMAN exercises
Incorrect Strip Order	3.5% is deducted for each aircraft that passed the exit gate in the wrong order based on the strip window.	
Unsequenced Aircraft	8% is deducted for each aircraft that was not processed to pass the exit gate prior to the end of the exercise.	
Arrivals one to two minutes early	2.5% is deducted each time an aircraft passes the gate between one and two minutes early.	AMAN Exercises only
Arrivals one to two minutes late	4% is deducted each time an aircraft passes the gate between one and two minutes late.	
Arrivals more than two minutes early	3.5% is deducted each time an aircraft passes the gate more than two minutes early.	
Arrivals more than two minutes late	7.5% is deducted each time an aircraft passes the gate more than two minutes late.	
Arrivals within 20 seconds	2% is added for every aircraft that passes the gate within 20 seconds of the flowed time	



Continuous Improvement

Visual Vectoring is committed to providing the best and most effective ATC training experience possible. If you have any questions or suggestions for improvement, please contact your VV representative or reseller. Alternatively, contact us as support@visualvectoring.com or on +61738991173.

Thanks for using Visual Vectoring technology.



Appendix 1: Frequently Asked Questions:

Who will benefit from VV Stack™ training?	VV Stack™ is intended for delivery to <i>abinitio</i> and cross-stream conversion trainees who have completed the VV Enroute™ course.
How is the training delivered?	The program may be delivered from a cloud-based LMS in an instructor-led classroom environment or distributed on desktop or laptop computers for self-paced learning..
What does it teach?	VV Stack™ teaches Area/Enroute Radar sequencing, including vectoring, speed control, flow time issuance and holding. The use of an AMAN (Maestro) system is covered.
What doesn't it teach?	Airspace specific services, including clearance requirements, aeronautical information services such as meteorological advice and Inflight Emergencies are not covered.
Can extra content be added?	Yes. With the collaboration with local training experts, extra theory content may be added by the construction of PowerPoint-style lessons (run as movies) which can be uploaded to the LMS. Quizzing and other rich learning components may also be added.
Does the training content support regional variations in procedures and phraseology?	Yes. The instruction content in VV Stack™ is designed to be generic in nature but may be customised to local phrasings and procedures. Similarly, the VV Simulator can be programmed with specific speech and data parameters to support local requirements.



Appendix 2: Computer specifications

- A PC with Windows 7, 8, 8.1, 10 or 11 operating system (English version) is required for simulation. Training content can be consumed on any device.
- Minimum (and recommended) screen resolution: 1366x768 pixels
- Minimum screen size: 15.6"
- PDF reader
- Headset: 2 earphones + microphone. Common types are usually suitable, but USB devices are recommended.

In Academy training it is highly recommended that computers dedicated to VV training be used, and that they be made accessible to students for practice during otherwise unutilized hours. Monitors with 22"-24" screen and 1366x768 pixel resolution are ideal.

