visual vectoring

Product Description

vvdepartures™

Managing departing traffic from a busy aerodrome

Version 3.0

Contents

Summary

VVDepartures™ is a self-contained PC-based safety training program for Air Traffic Controllers. Specifically, it teaches the management within the terminal area of departing traffic from a single-runway aerodrome. This includes identification and processing of arriving and departing aircraft to an exit gate, clearing them for climb and providing separation with inbound aircraft. Note that this is a surveillance course and does not cover considerations required in performing the Tower function.

Context

VVDepartures™ is an extension to the traffic processing and sequencing training provided in the *VV Approach™* (VVA) course which is the ideal starting point for training in Terminal Area control. Apart from managing circuit traffic, VVA focusses entirely on arrivals. In many ways, the processing of departures is a far easier proposition, especially when the aircraft are of similar performance types. The challenge increases when low performance aircraft are involved and also when arrivals and departures are processed simultaneously, which is the case at many aerodromes. All aspects of these configurations are covered in depth in *VVDepartures™*.

The final exercises in VVD present very realistic simulation of Approach/Departures operations at a busy aerodrome and are perfect preparation for continued training on real-world Terminal Area airspace. The is the capstone course in Visual Vectoring's range of surveillance-based ATC training courses.

Applicability

The course is suitable for use by ANSPs and ATC training providers for delivery to ab initio trainees who have completed the *VV Approach™* course. It may also be used for Colleges and Universities as part of a generalist ATC familiarization course, or as preparation for a career in ATC. *VVDepartures™* is also very well suited to prepare experienced candidates for a transfer to working in a busy Terminal Area environment.

Delivery

The course may be delivered in an on-site laboratory or computer lab, or from the Control Zone™, our cloud-based Learning Management System. These modes of consumption are suitable for instructor-led, supervised, semi-supervised and self-directed learning. *VVDepartures™* is completely self-contained, and includes instructional content and demonstrations supported by practical simulation exercises. Performance data is uploaded and stored in the Control Zone™, allowing monitoring of student performance and the generation of reports and visualizations.

Training content may be consumed on any device. Simulation requires a PC with Windows 7 or later (English language version).

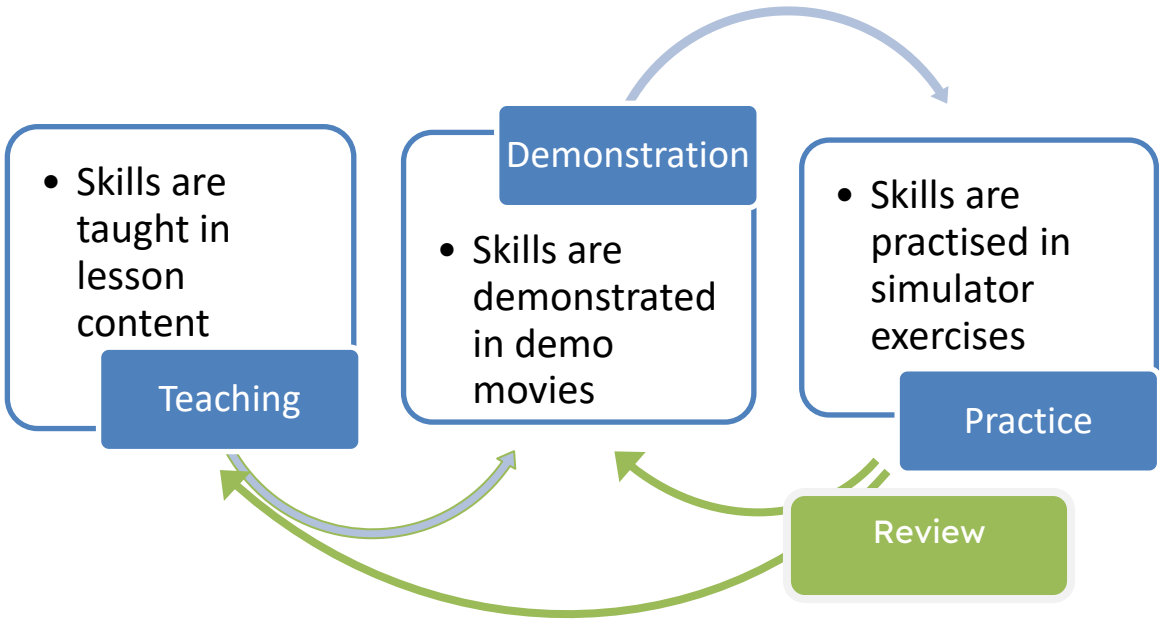
The Learning Process

The task of processing departing traffic as described, requires a solid understanding of aircraft performance, standard phraseology and required interface actions. Building on this foundational knowledge is the ability to visually interpret traffic scenarios, to make a traffic management plan organised strategies and then to apply correct control actions to achieve the required outcomes.

The *VVDepartures™* course teaches students how to perform these complex, time-sensitive tasks through a structured set of learning steps that enable students to establish essential skills in a manageable way. Each step begins with a lesson that teaches the context and application of a particular technique, followed by a demonstration of its practical application. These skills are then reinforced by practice simulation exercises designed to target what has been learned.

Finally, the student can review training content and perform practice simulation as needed before proceeding to the next learning step. Instructors can assist with this through access to participation and performance metrics automatically recorded by the VVSIM simulator.

The Visual Vectoring learning process used in all our courses is depicted in the diagram below.



Customisation

Teaching and simulation is presented on a neutral platform designed to generalise the learning process. The phraseology used is as specified in ICAO Procedures for Air Navigation Services - Air Traffic Management documents (Document 4444) and Manual of Radiotelephony (Document 9452).

Simulation on local airspace, and customisation of the interface functions is available and requires the assistance of local training experts.

Course Structure

The *VVDepartures™* course consists of four modules, each containing several lessons, demonstrations and simulator exercises:

Introduction to Departures

This module covers the airspace in use, SID procedures, selection of Departure Instructions, phraseology, and the required interface interactions for departures processing. It contains one hour of instructional content and up to three hours of simulation.

Jet Departures

This module presents a series of scenarios involving jet departures operating on Procedural and Radar SIDs. An emphasis is placed on traffic projection and the application of robust techniques to assure separation so as to process aircraft from liftoff to the departure gate. This module contains two hours of instructional content and up to three hours of simulation.

Mixed Departures

This module extends the skills acquired in the previous module to include the processing of traffic with lower performance profiles. Robust skills in planning and traffic project are reinforced. This module contains one hour of instructional content and up to four hours of simulation.

Combined Traffic

In this module, arriving traffic is added into the scenarios, with lessons explaining the visualisation, projection and prioritisation skills required to manage an inbound sequence and conflicting outbound traffic. The attendant simulation exercises are a culmination of the VVA and VVD courses and provide graduates with a comprehensive set of skills to carry into TMA sector training.

This module is the culmination of the *VVApproach™* and *VVDepartures™* courses, equipping graduates with a range of intractable skills required to manage complex traffic with the Terminal Area.

Simulation

The Visual Vectoring simulator (*VVSIM*) emulates a modern radar workstation and provides a very realistic teaching and practice platform. It is designed as a teaching simulator, and contains functionality to provide dynamic and post hoc feedback to the student to improve performance

The simulator's principal features include:

- PC-based. Laptop machines are ideal and low-cost machines are adequate
- Speech Recognition operation with synthesised aircraft replies.
- Realistic pilot prompts: Illogical control instructions are queried.
- Variable clock speed from x0.5 to x2.
- Instant clock speed change between x1 and x2 (F keys) to minimise 'dead' time.
- Clock may be paused and backstepped to afford re-processing and correction of situations not ideally handled.
- Electronic measurement of bearing and range.
- Conflict alerts.
- Conflict prediction tools.
- Graphic route function.
- Aircraft callsign text display.
- Route alerts.
- J-Rings.
- Electronic flight progress strips.
- On-screen text.
- Label display of aircraft callsign, type, Mode C Level, Cleared Level and groundspeed. Other data can be manually entered.
- Coordination prompts.
- Customisable interface (HMI).
- Aircraft speed performance prompts.
- Performance evaluation: The distance spacing achieved between pairs of landing aircraft is displayed and recorded for later analysis.
- Display of an aircraft's current Indicated Airspeed and the maximum and minimum speeds it can accept at its present distance from touchdown.
- Full mouse control for use when speech is not convenient.
- Performance measurement built-in and uploaded to the Control Zone LMS.

Skills Taught

The following skills are covered in the *VVDepartures*™ Course.

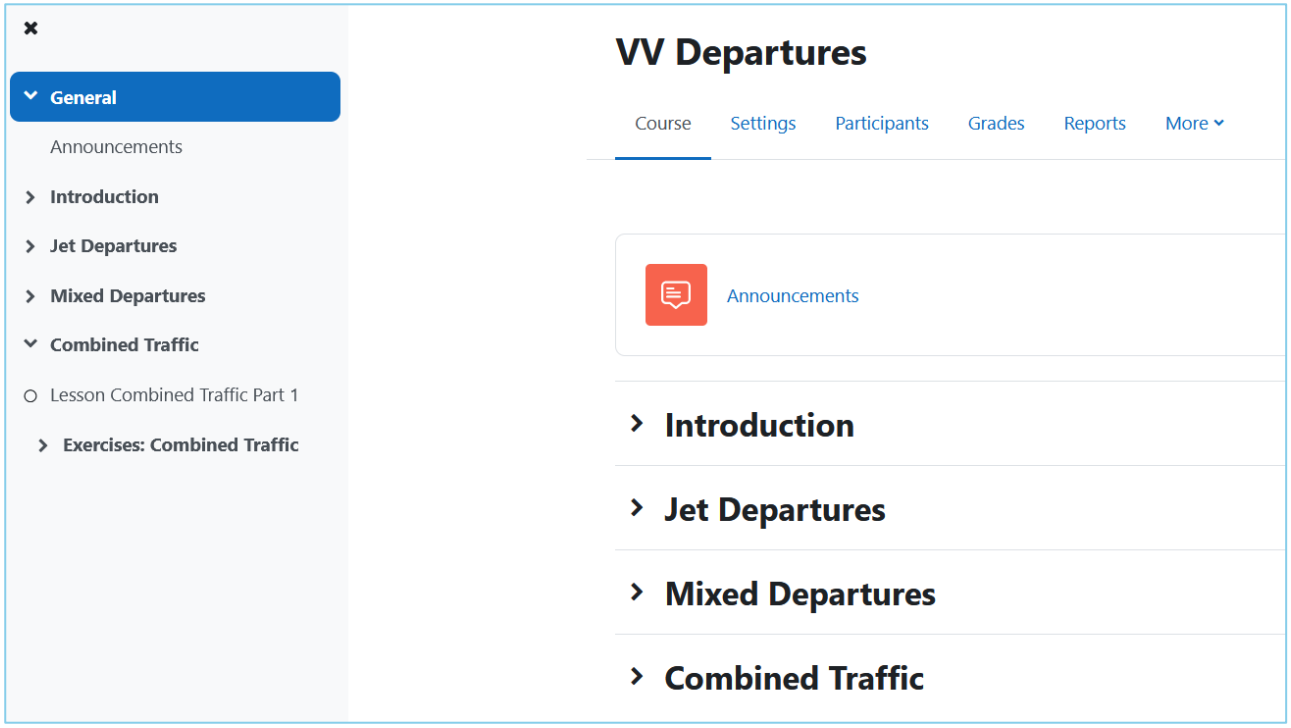
- Issuing a release instruction.
- Identifying aircraft on departure.
- Conducting an altitude check and verification.
- Issuance of climb instructions
- Pressure setting issuance.
- Aircraft performance assessment.
- Termination of services for aircraft leaving controlled airspace.
- Processing traffic to assure terrain clearance.
- Separating successive departures of similar performance characteristics.
- Separating successive departures of differing performance characteristics.
- Separating arrivals and departures without compromising descent profiles.
- Workload management.
- Interface usage.
- Information delivery.

Availability

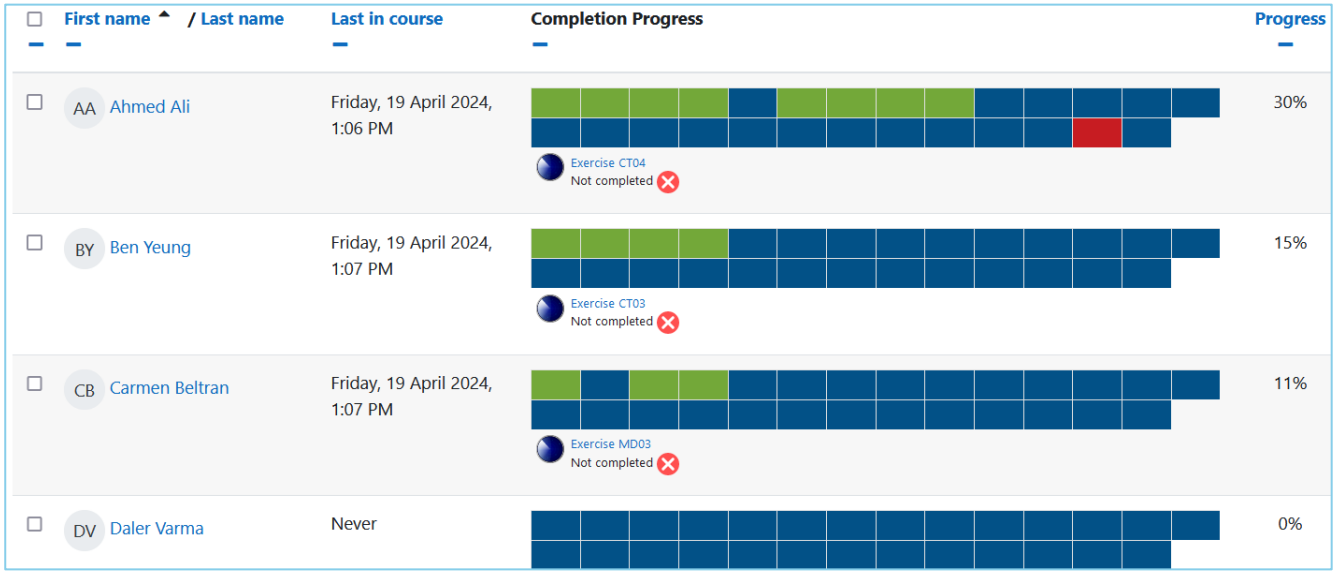
VVDepartures™ is currently available for evaluation through the Control Zone™ LMS.

Screenshots

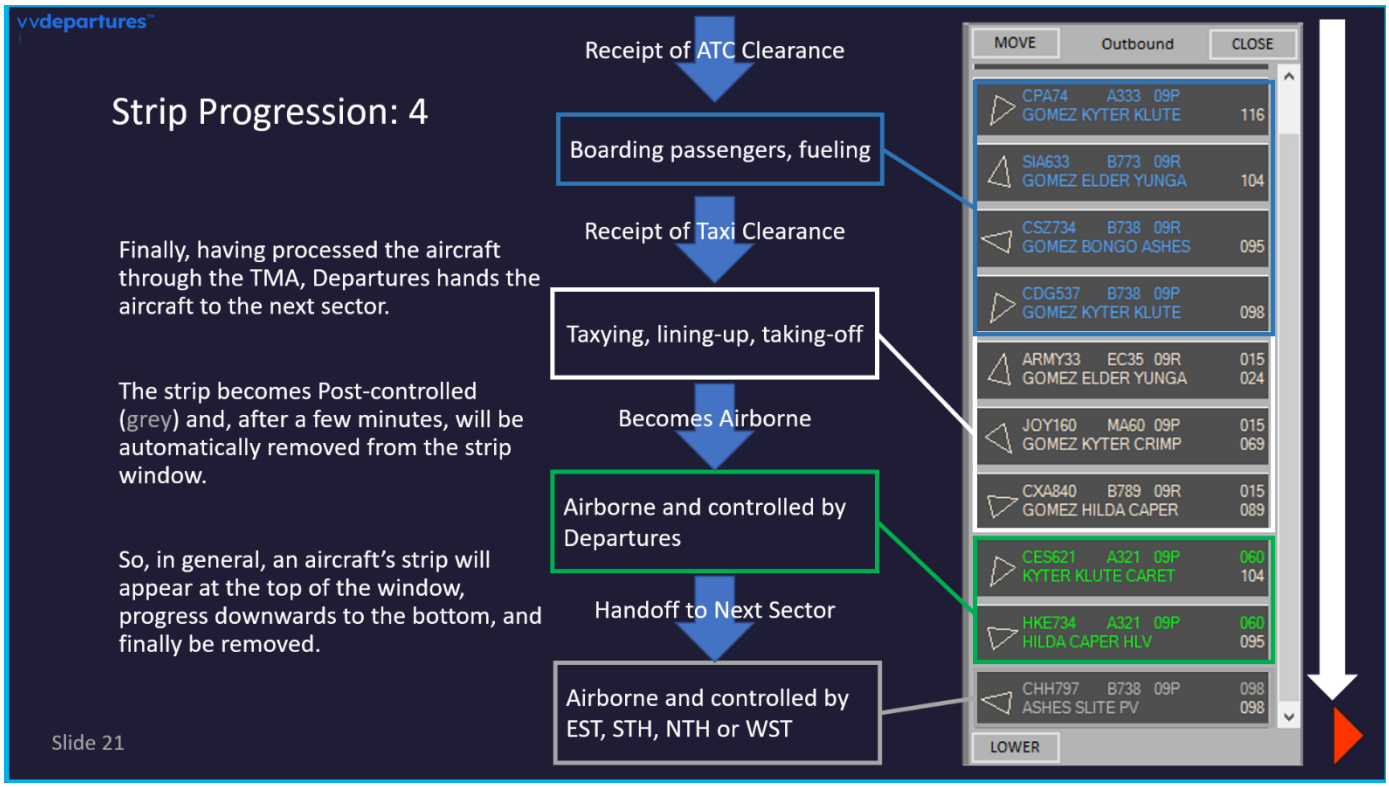
Main Display



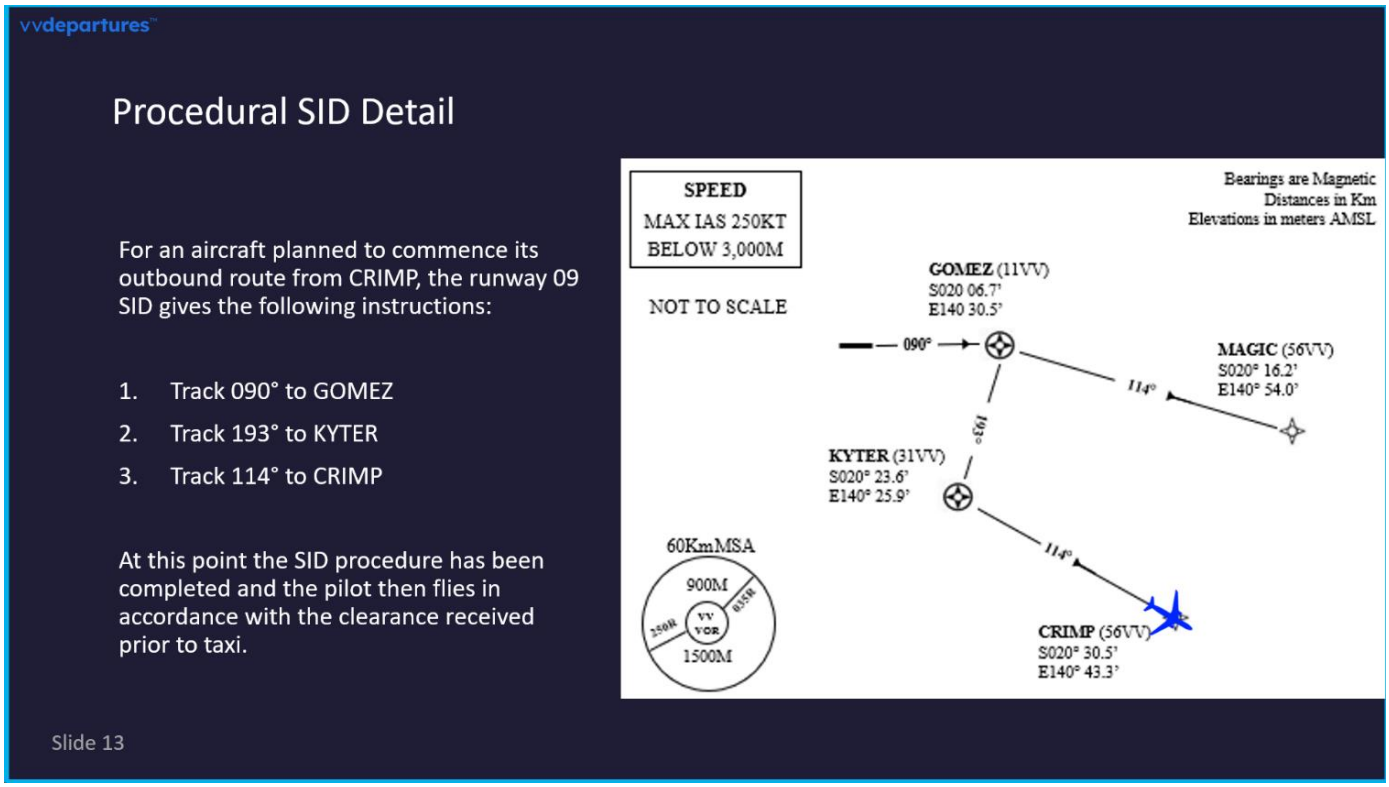
Student Tracking



Lesson: Strip Display



Lesson: Standard Instrument Departures

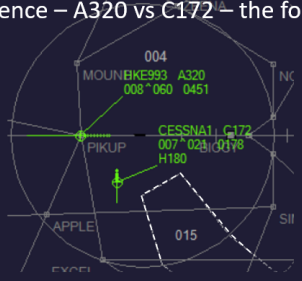


Lesson: Separation

vvdepartures™

Using Mode-C Levels for Separation *Continued*

The question could be asked 'why not simply allow both aircraft to climb and allow the crossover to happen?'. In cases like this of large performance difference – A320 vs C172 – the following aircraft will rapidly out-climb the leading one.

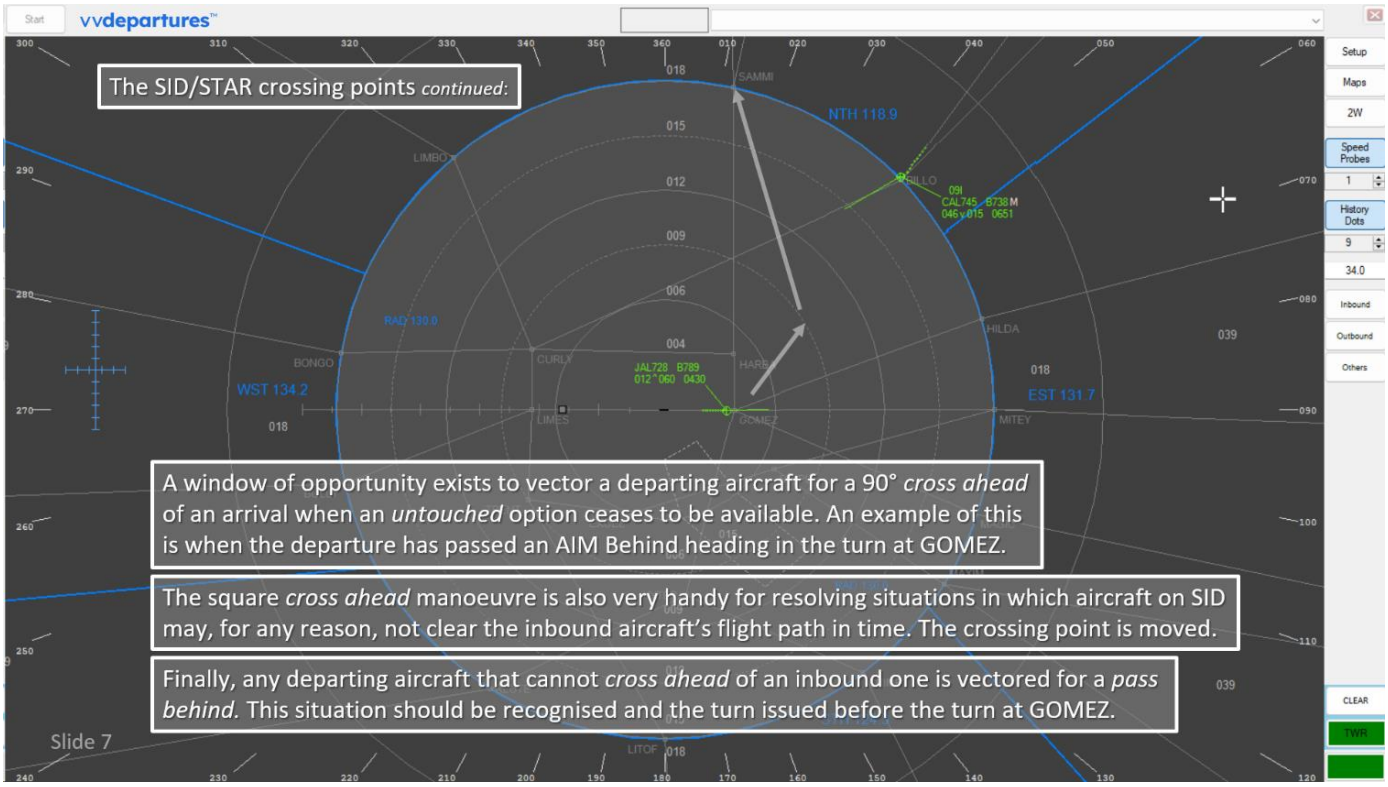


Separation would rely totally on the aircraft profiles – altitude gained vs km travelled or minutes climbed. This is called Profile Separation and it is NOT allowed. There is no way of knowing whether the jet's Mode-C level will be 400m above the Cessna when radar separation is lost, because that aircraft's altitude is also changing.

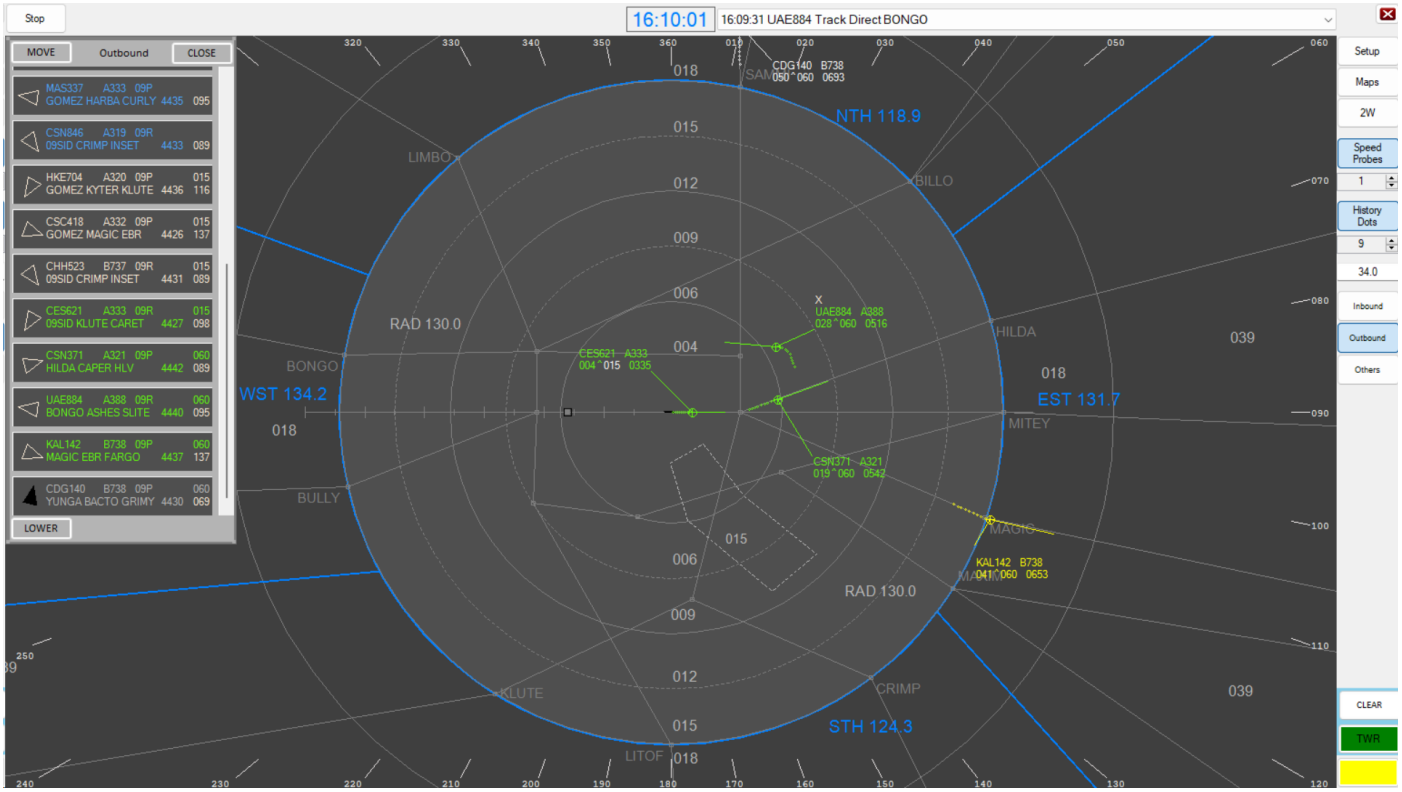
Separation must always be planned and assured, not just allowed to happen. The next slides shows two more examples of Profile Separation.

Slide 22

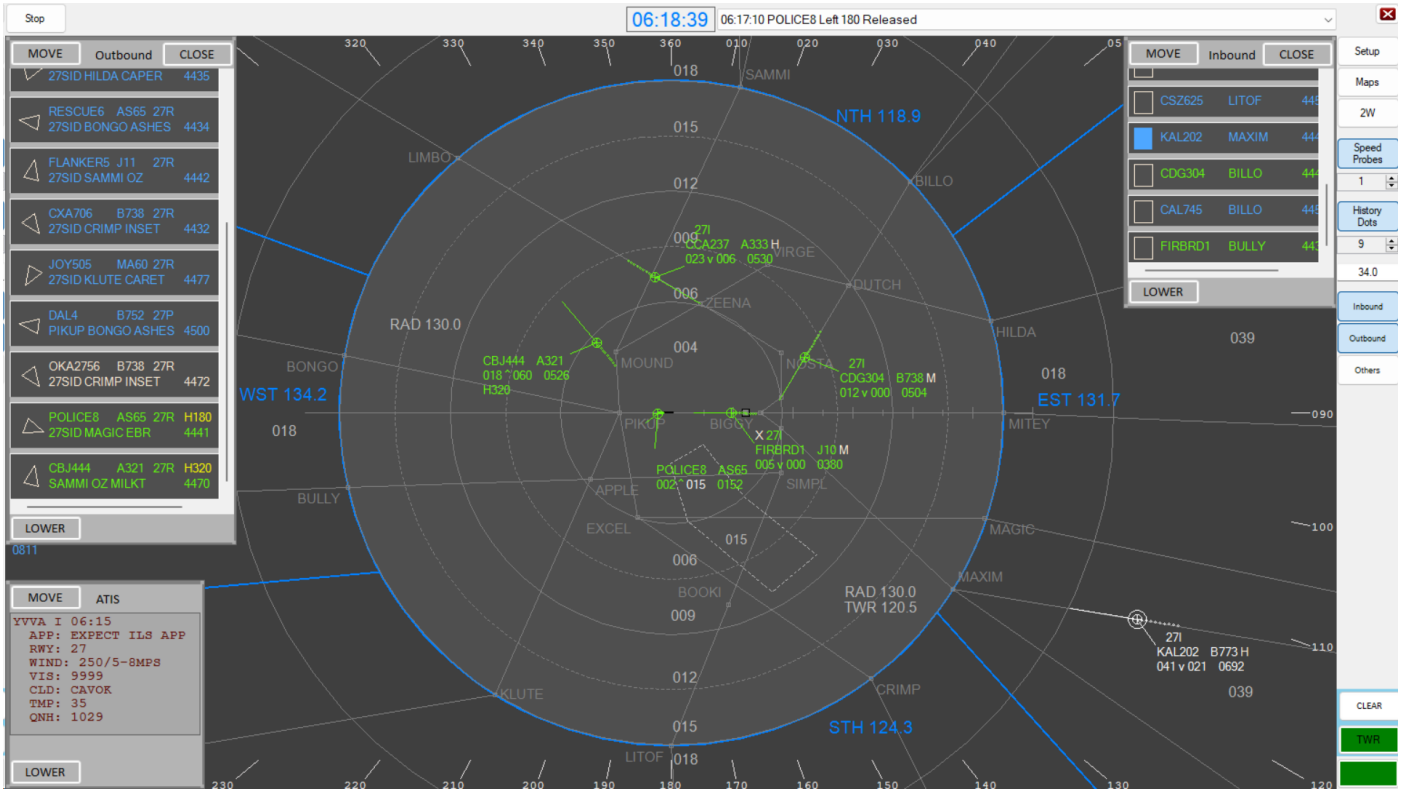
Lesson: Combined Traffic



Simulation: Jet Departures



Simulation: Combined Traffic



www.visualvectoring.com