



visual vectoring

# Product Description

**vvapproach**<sup>TM</sup>

Terminal Area sequencing and traffic management

Version 3.0

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## Summary

*VV Approach™* is a self-contained PC-based training program for Air Traffic Controllers. Specifically, it teaches the sequencing of jet and Turboprop aircraft onto a runway with any alignment and in any wind conditions using radar vectoring and speed control techniques. It assumes zero knowledge of Air Traffic Control at commencement, so it is ideal for *ab initio* students. It is equally suitable for controllers in other streams transferring to a Terminal Area Radar environment.

*VV Approach™* contains a total of approximately twenty hours of training materials and over one hundred hours of structured practice exercises, including Task Trainers, ATC skills games and realistic simulation.

## Preamble

Traditionally, Air Traffic Control has been taught using a heuristic, or problem-solving approach whereby various air traffic scenarios are presented in a simulator environment and the student is required to effectively manage those scenarios in real time. Strategies for coping with each scenario are learned by exposure to the traffic, rather than through organised instruction.

In contrast, *VV Approach™* uses an algorithmic or step-by-step approach, which provides students with a developmental sequence of proven air traffic management strategies devised by experts in the field. This structural framework of strategies ensures that students have a solid foundation of skills that can be applied to an extensive range of traffic scenarios.

The algorithmic training approach means that students no longer need to devise their own strategies whilst training, only to find that later they may not be as appropriate or effective in a practical environment. Instead, students can now benefit from an expert, step-by-step model in *VV Approach™*, enabling them to develop their own cognitive framework of coping strategies to take to sector-specific training.

The course itself is practical rather than theory based. While learning content does have a theoretical foundation, it aims to teach the actual skills required to perform the Terminal Area Radar function. These techniques are taught primarily using positive visual cues as a stimulus for control actions. Once these visual cues are learned, Radar Control becomes a subconscious process.

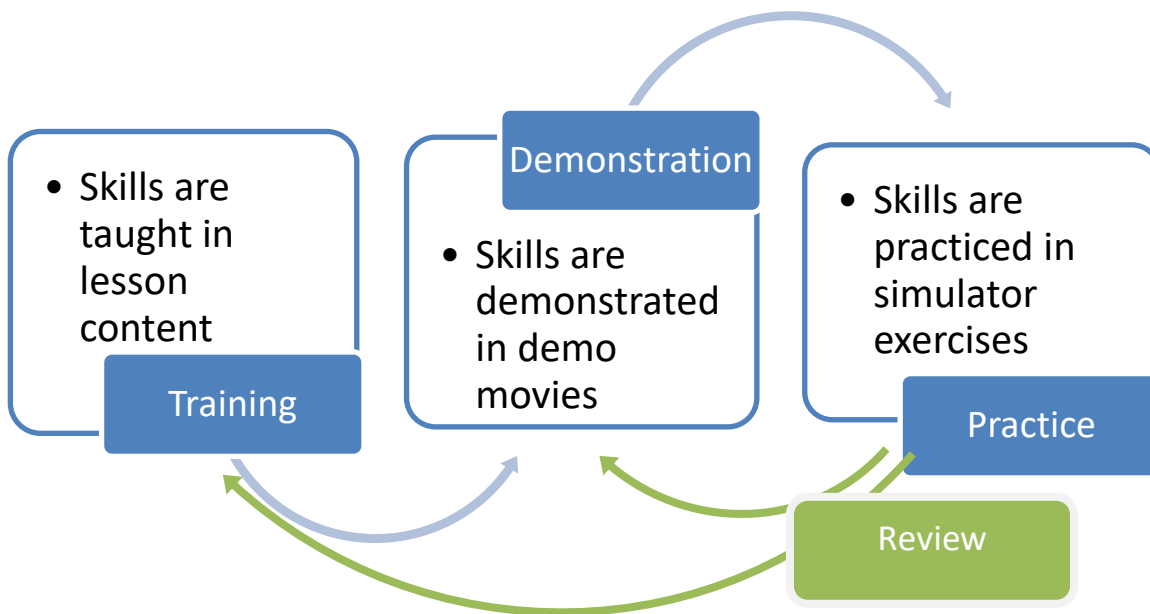
## Skills taught by *VVApproach™*

- Aircraft callsign formats and usage.
- Aircraft operations in a typical Terminal Area.
- Operation of a typical modern Air Traffic Control radar workstation.
- Measurement of bearing and distance on a radar screen by eye alone.
- Interpretation of radar information and its relation to aircraft movement.
- Assessment, implementation, monitoring, and correction of aircraft turns.
- Basic radar vectoring techniques, with an emphasis on Terminal Area traffic.
- Separation of aircraft by their radar position and movement.
- Separation of aircraft by application of a vertical buffer between their levels.
- Wake turbulence separation.
- Vectoring aircraft around typical visual and ILS circuit patterns.
- ILS intercept techniques.
- Aircraft performance characteristics on descent.
- Correct spacing between aircraft for landing and its achievement.
- Aircraft performance: Speeds, turn rates, climb and descent rates and profiles.
- Radiotelephony phrases for control of aircraft in Terminal Area operations.
- Sequencing of inbound aircraft in all configurations onto a runway by radar vectoring and speed control, to a high level of precision and over lengthy periods of time.
- Effects of wind on aircraft operations and techniques for recognising and compensating for drift.
- Acceptance and Hand-off procedures.
- HMI (Human Machine Interface) skills.
- Techniques for assuring aircraft safety in the event of communications failure whilst under Radar Control.

## Training structure

Training is done in six phases, each of which contains lessons, demonstrations and simulator exercises that form a *Learning Step*. Skills acquisition is cumulative as the Phases progress – each adds to what has been learned earlier. Training is self-paced and done in private or under instructor supervision. Instruction elements can be reviewed at will and unlimited practice simulation is provided at each Learning Step, ensuring positive rates of development.

The learning step structure is depicted in the diagram below.



### Training Lessons

Instruction is presented as a movie, with information presented on a radar display overlaid with graphics and spoken instruction. Full control of the flow of information is available by pausing and repositioning the movie player.

### Demonstrations

Screen capture movies of actual simulator performance of a selection of traffic scenarios from the upcoming exercise series, with audio. Graphic overlays reference and contextualise the lesson content.

### Practice Simulation

A series of exercises to be performed on the incorporated simulator provides unlimited practice opportunity to establish control techniques to the level required to progress to the next Learning Step. The exercises are structured to increase in complexity as the student's skill levels rise. At the conclusion of each exercise series a Test Exercise is presented to allow the student to test for readiness to move to the next Learning Step. Test Exercises must be run at normal clock speed and in real time – the simulator cannot be paused. See Page 10 for a list of simulator features.

### Review

The student is free to revisit the training and demonstration content to review and consolidate. All lessons, demonstrations and exercise series are preceded by a written *Student Brief* (PDF document), accessed from the main menu. A written checklist is provided for completion by the student after every exercise series to assist self-assessment of performance and readiness to progress to the next Learning Step.

## Training Phases

There are six training phases on the *VVApproach™* course.

### Phase 1: Vectoring aircraft around the circuit, and to join a circuit for landing.

At the end of this first phase of the course the student will be capable of:

- Approving departure of jet and prop-jet aircraft and vectoring them around the circuit for a visual approach and landing; and
- Vectoring to any location within the TMA to rejoin the circuit for landing.



### Phase 2: Vectoring for an intercept of the Instrument Landing System (ILS)

At the conclusion of this phase the student will have extended the vectoring skills acquired in Phase 1 to vector circuit aircraft for a landing via an ILS Approach.



### Phase 3: Setting the landing spacing between two aircraft

On completion of this phase the student will be able to vector the circuit aircraft into a precisely controlled landing sequence onto the runway, with a prescribed landing spacing.



### Phase 4: Sequencing aircraft inbound from multiple directions

On completion of Phase 4, the student will be able to vector complex traffic into a prescribed landing sequence onto Runway 27.



## Phase 5: Sequencing from difficult directions

The module builds on previous content and includes the sequencing of aircraft from the more difficult directions. The angle an aircraft's inbound track makes with the runway extended centreline gradually reduces to zero ("straight-in"). Finally, the skills are consolidated in simulation of typical ILS sequences.



## Phase 6: Ancillary skills development

On completion of this phase of the course, the student will have adapted the vectoring skills acquired in the earlier phases to situations different to the standard platform on which they have learned those skills. Details such as drift, different runway alignments, and the use of speed control as a sequencing tool will be mastered.





## Application to Aviation English

The lessons and demonstrations in *VVApproach™* contain a total of approximately 140,000 words of spoken English in an Air Traffic Control context. The VVSIM speech recognition program requires the user to speak in correct Aviation English. These two factors present ideal tuition for students who are not fluent in English. The spoken English instruction can be replayed at will to assist understanding. The course can be supplied with printed script of all the spoken content to assist further. The script is arranged in paragraphs with an on-screen numbering system that facilitates the correlation of spoken and written words.

## Performance Tracking

A set of up to 200 performance metrics are measured and are available for and performance monitoring and analysis. Custom reports can be generated and outputted to text files. A range of visualisations are available.

## Delivery

### Academy Environment

Visual Vectoring training differs from traditional delivery methods in that it is done independently by the student at his/her own pace and without the constant need for the physical presence of an instructor. The overarching training philosophy is directed at the development of strong formative skills rather than fixed performance milestones, and independent learning towards this end is encouraged. Subject to local resources and preference, within the Academy environment, courseware may be completed either at scheduled times, or using a more flexible arrangement.

### Online Delivery

VV Courseware is available with the use of an online Learning Management System (LMS). This enables remote and distributed learning delivery with all performance information uploaded from the simulator to the cloud. The LMS incorporates teleconferencing for desktop sharing, consultation, and performance appraisal. Other features, such as gamification, badges and leaderboards will promote a collaborative learning environment.

## Simulation

The Visual Vectoring simulator ([VVSIM](#)) emulates a modern radar workstation and provides a very realistic teaching and practice platform. Its principal features include:

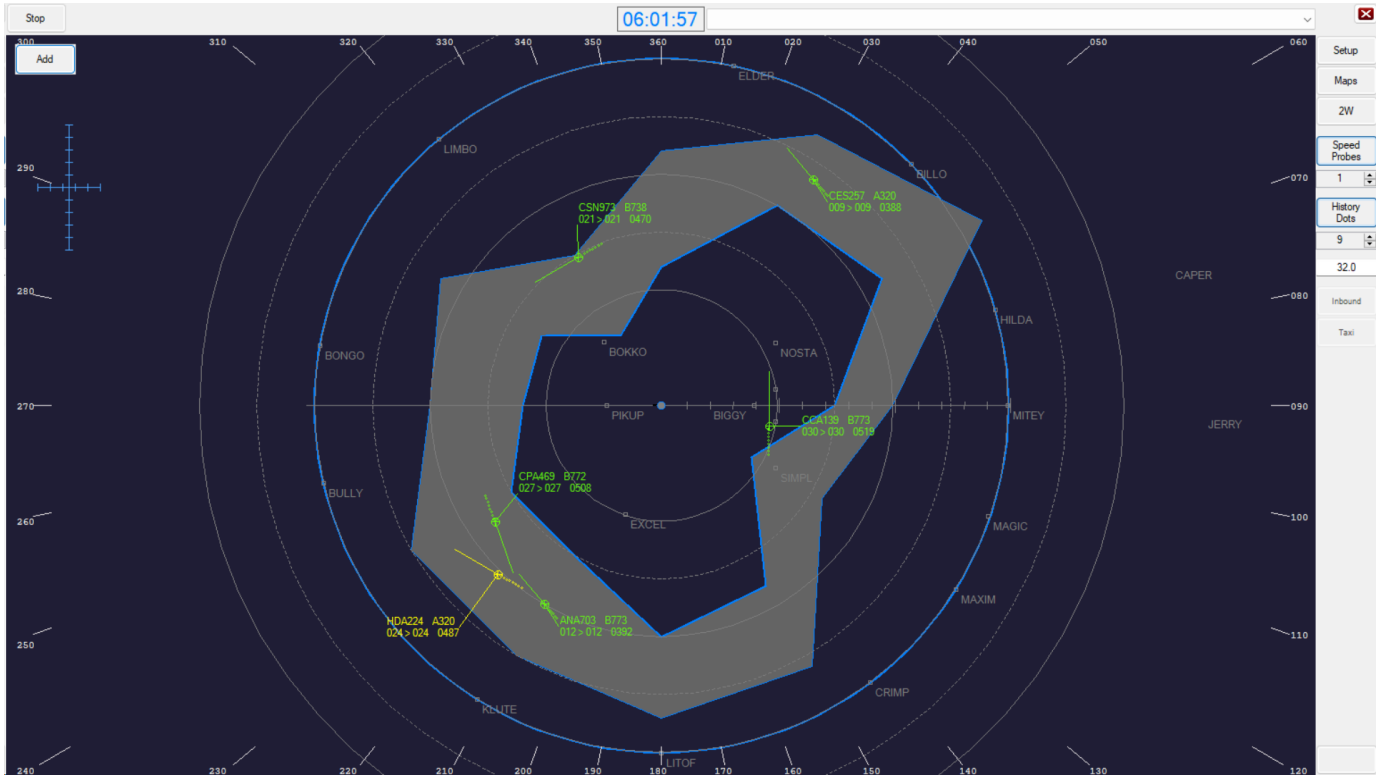
- PC-based. Laptop machines are ideal and low-cost machines are adequate
- Speech Recognition operation with synthesised aircraft replies.
- Realistic pilot prompts: Illogical control instructions are queried.
- Variable clock speed from x0.5 to x2.
- Instant clock speed change between x1 and x2 (F keys) 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.

## Frequently Asked Questions

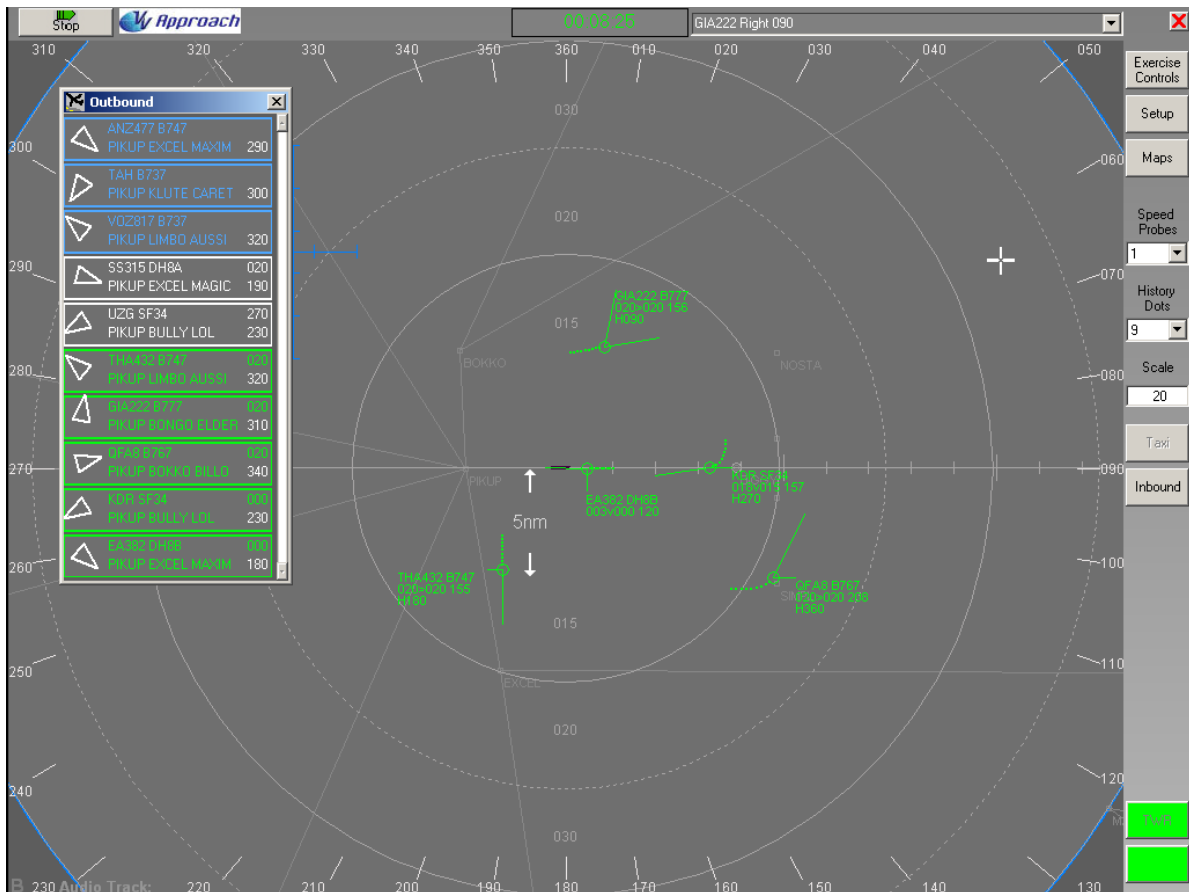
Who will benefit from <i>VVApproach™</i> training?	<i>VV Approach™</i> is intended for delivery to abinitio and cross-stream conversion students in the Terminal Radar stream.
How is the training delivered?	The program may be delivered in an instructor-led classroom environment, or from the cloud using the Control Zone LMS.
What does it teach?	<i>VVApproach™</i> teaches complex Approach Radar Control, including vectoring, vertical and lateral separation and jet and propjet sequencing onto runways of any alignment and in any wind conditions. See Page 2 for a full list of skills that are covered.
What doesn't it teach?	The course does not cover the processing of departing and very slow inbound aircraft. These are available in the <i>VVDepartures™</i> course.
Can extra content be added?	Where the Control Zone is in use, instructional material and quizzes can be added by instructors. Specific simulator exercise may be added on request.
Does the training content support regional variations in procedures and phraseology?	Yes. The instruction content in <i>VVApproach™</i> is designed to be generic in nature but may be customised to local phrasings and procedures. Similarly, the VVSIM can be programmed with specific speech and data parameters to support any local requirements.
How is <i>VV Approach</i> supplied?	The <i>VVApproach™</i> training course is delivered from the Control Zone LMS. Simulation requires the installation of the VVSIM application.
How much does it cost?	<i>VVApproach</i> is licensed to training organisations for use on an annual basis or by user. Fees depend on the number of students that will be using the program and whether they are abinitio or cross-stream. Customised features that may be required are extra. The overall cost of the use of <i>VVApproach™</i> will be a small fraction of the cost of delivering the same training by traditional methods. Contact us on <a href="mailto:sales@visualvectoring.com">sales@visualvectoring.com</a> for more information.
Is a trial version available?	Yes, a trial version is available for testing by ANSPs, Universities, Colleges, and ATC Training providers.

# Screen Captures

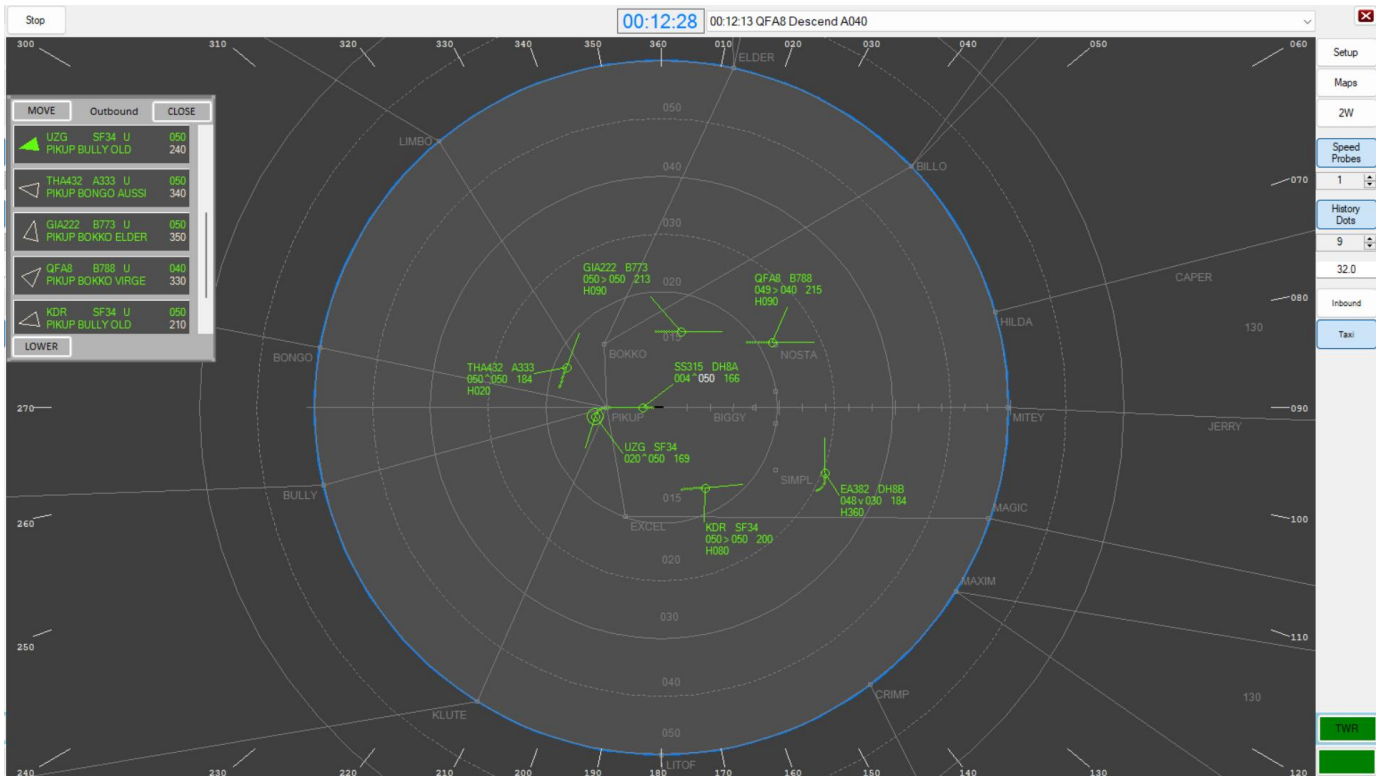
## Simulator Exercise 3a (Maze)



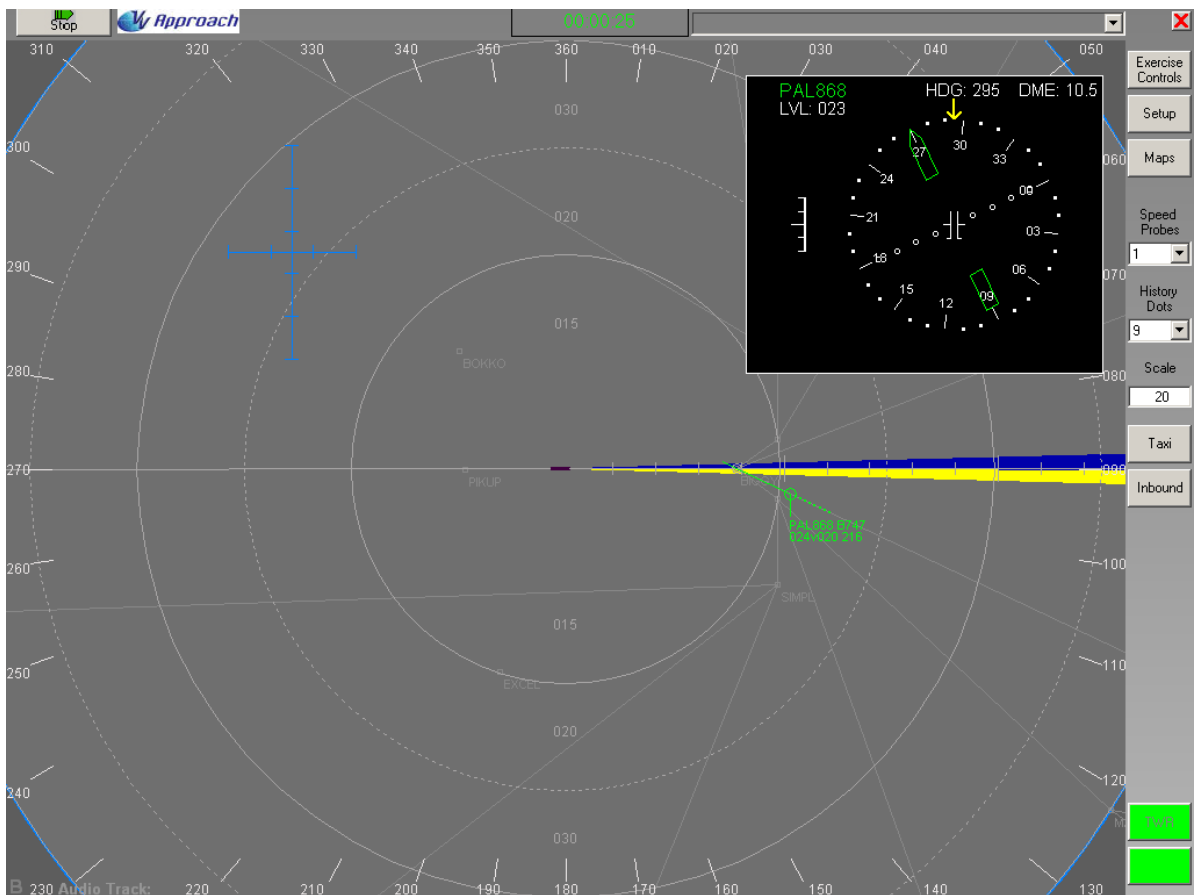
## Lesson 5 Demonstration: Standard pattern



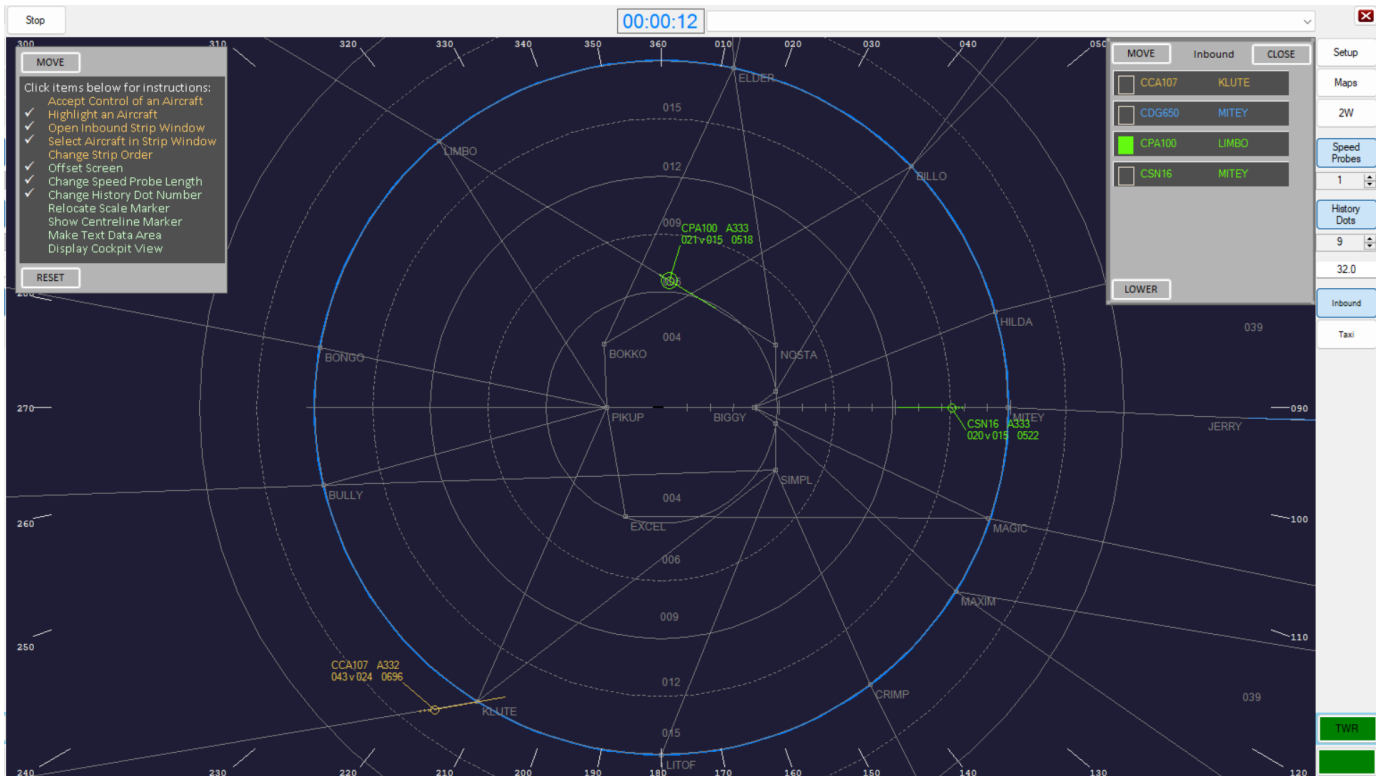
### Simulator Exercise 6b (Circuit Vectoring)



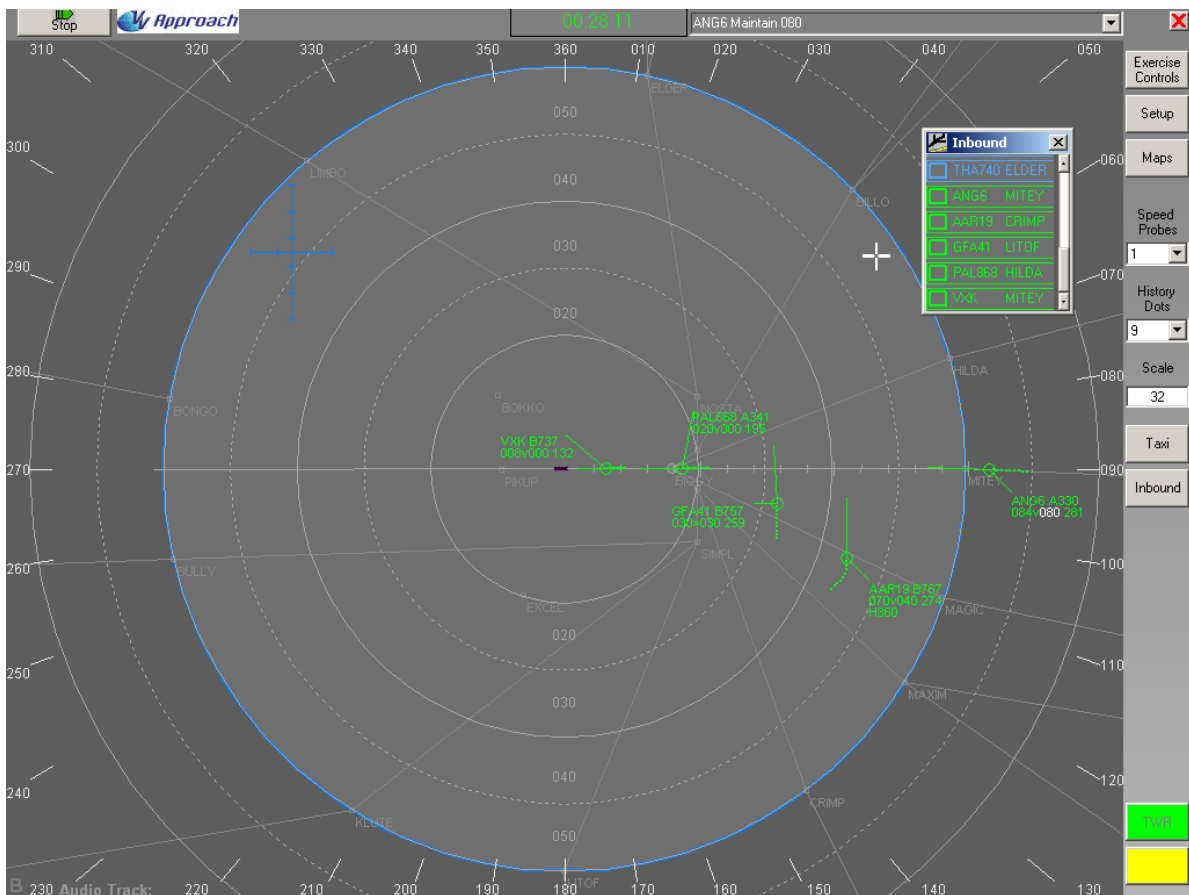
### Lesson 6: Intercepting the ILS



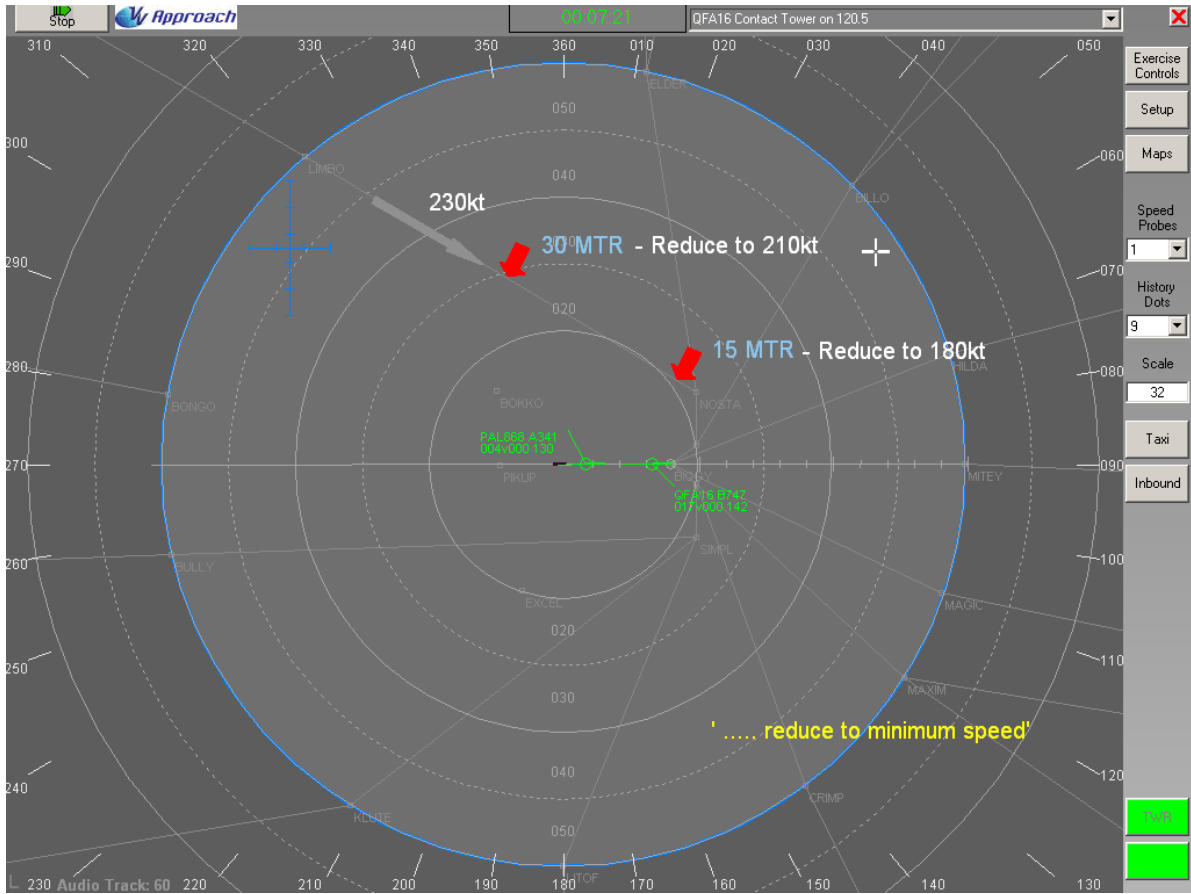
### Simulator Exercise Task Trainer 3



### Lesson 17 Demonstration: Sequencing straight-in aircraft



## Lesson 20: Speed Control as a sequencing tool



## Simulator Exercise 26g (metric)

