

SAAM(IR) Demonstration Engagements (Air to Air Passive Infrared Homing)

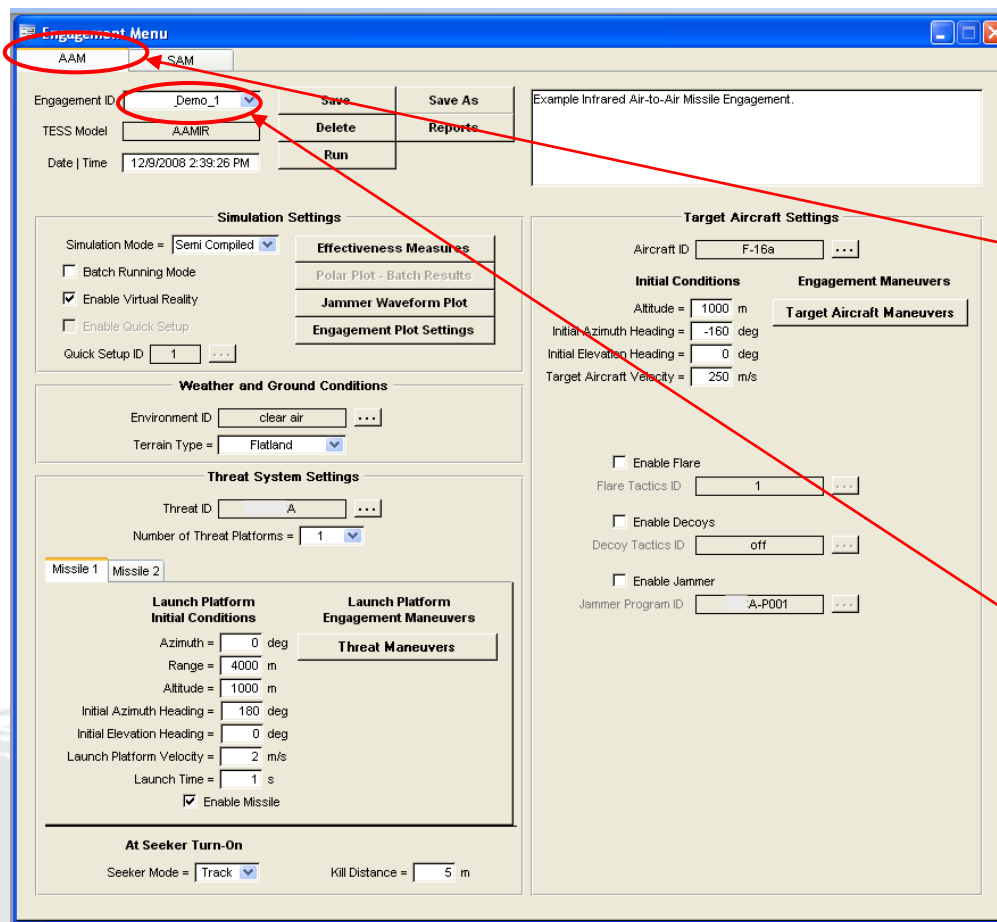
- The demonstration scenarios are:
 - 1) AA_Demo_1: Air-to-Air missile versus target aircraft executing an evasive maneuver
 - 2) AA_Demo_2: Air-to-Air missile versus target aircraft launching flares and executing an evasive maneuver (the engagement geometry is identical to AA_Demo_1 but has added a sequence of 4 flare launches)
- A brief interpretation of the major events occurring in each engagement is provided by reference to the time and spatial plots.
- Critical input parameters are shown.
- Selected output graphics are shown including time plots, Virtual Reality and 3D Plots.

AIR IR Master Interface



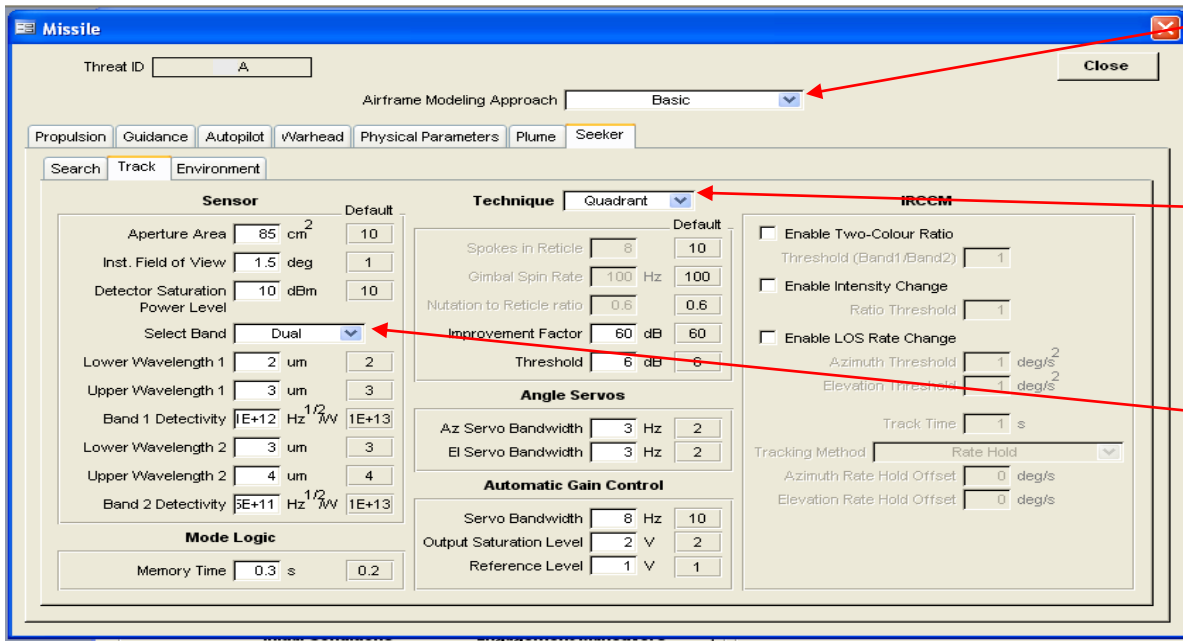
- The main screen of the AIR IR Master Interface is shown
- Clicking on the Engagements button opens the Engagement menu shown next page

AIR IR Master Interface Engagement Menu



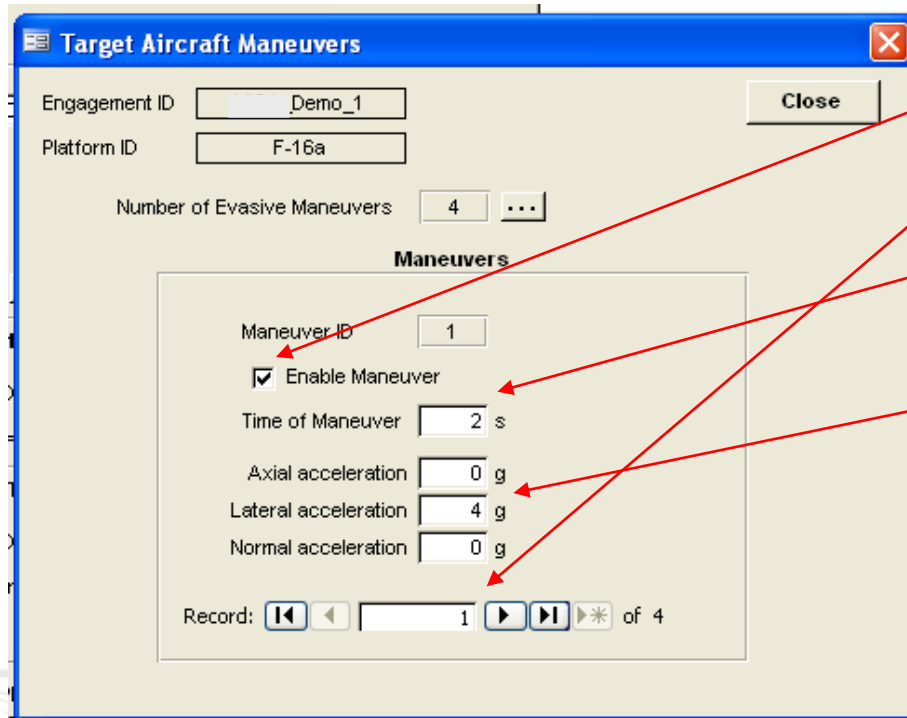
- The Engagement menu of the AIR IR Master Interface is shown
- The Engagement Type may be selected as either type AAM or SAM by clicking on one of the highlighted tabs – in this case AAM is selected
- The sample Engagements Demo_1 and Demo_2 are listed in the Engagement ID menu

All Demos - Select Missile Seeker Parameters



- Airframe Modeling Approach is set as Basic type
- Missile seeker is set as Quadrant Tracker type
- Missile seeker is set as Dual Band type with indicated limits

All Demos - Select Target Aircraft Parameters



Target Aircraft Maneuvers

Engagement ID: Demo_1

Platform ID: F-16a

Number of Evasive Maneuvers: 4

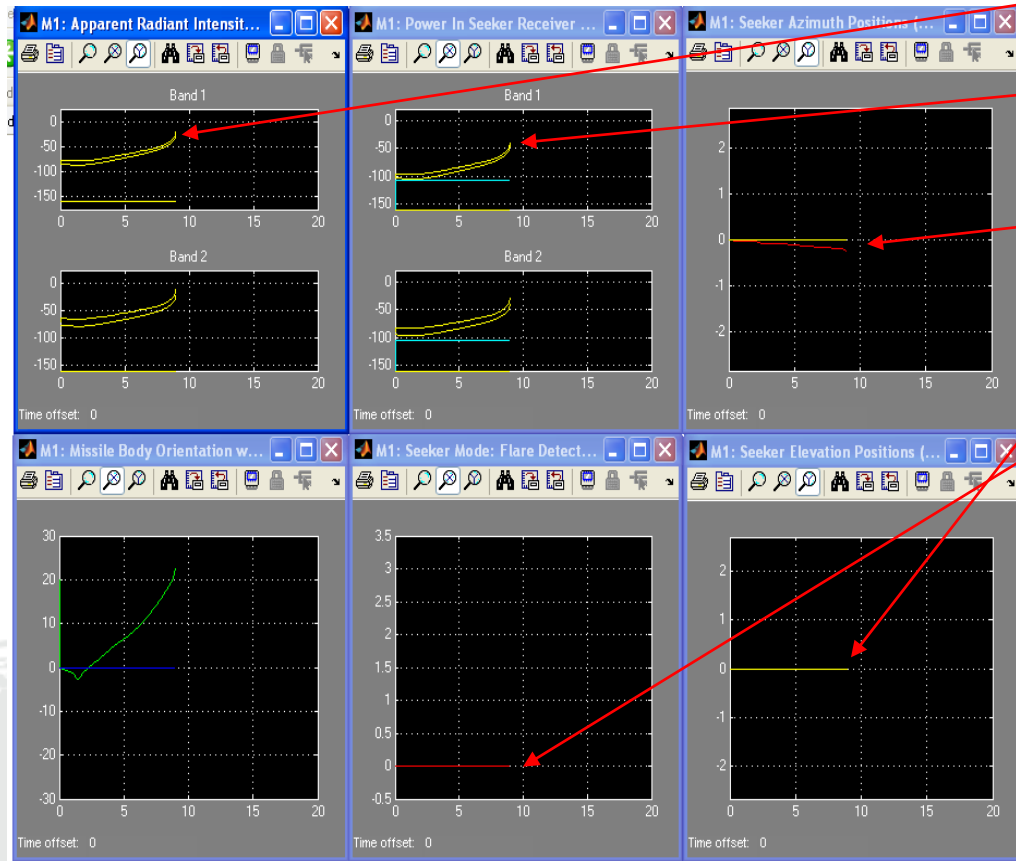
Maneuver ID	Enable Maneuver	Time of Maneuver	Axial acceleration	Lateral acceleration	Normal acceleration
1	<input checked="" type="checkbox"/>	2 s	0 g	4 g	0 g

Record: 1 of 4

- Target Aircraft employs a single evasive maneuver
- Time of maneuver is set to 2 seconds
- Maneuver is a Lateral Acceleration of 4 g

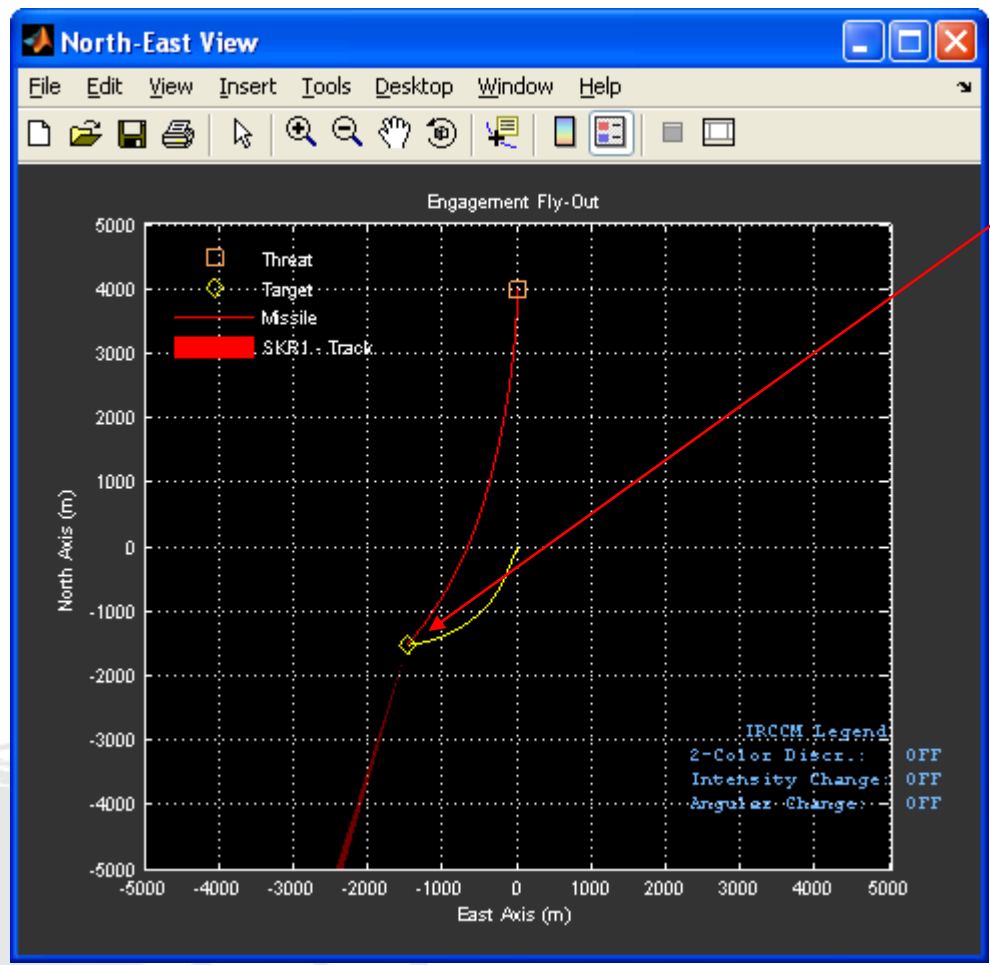
Demo 1 - Select Engagement Output

Target Aircraft and Engine(s) =Yellow
Flares = dark blue Seeker Track Point=Red



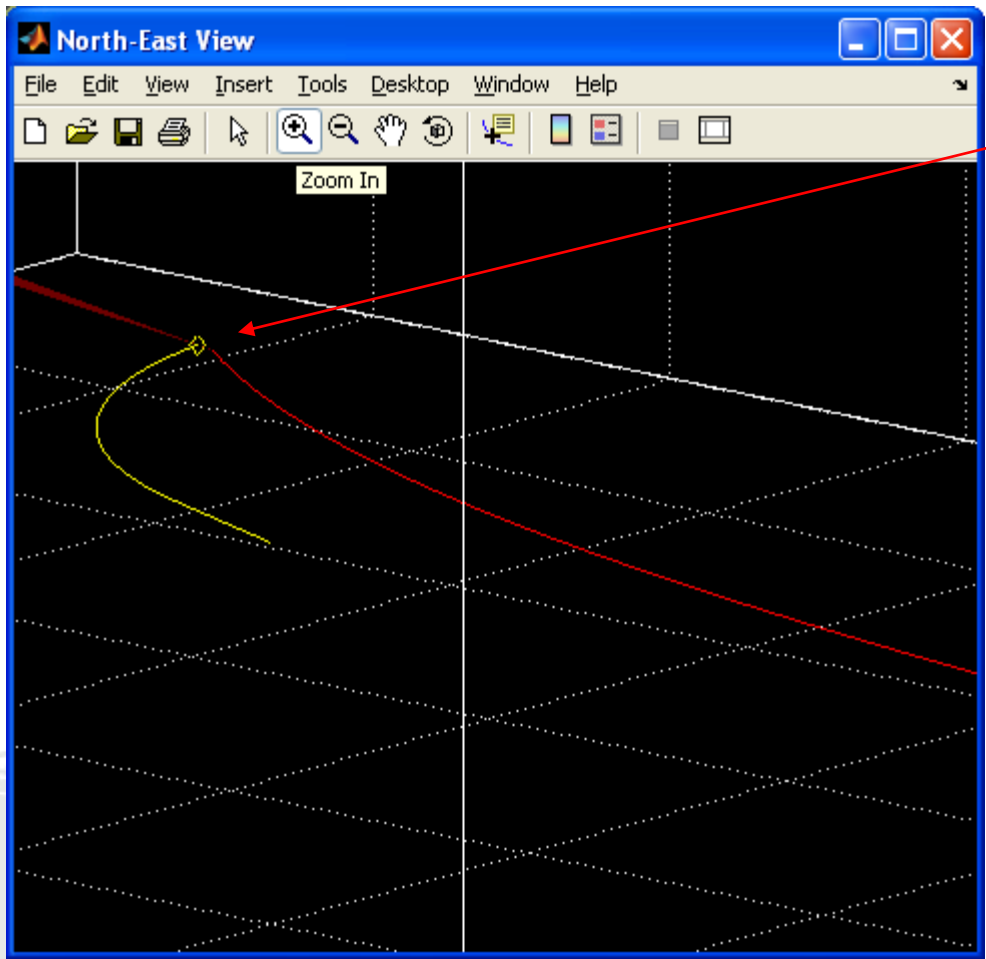
- Target aircraft and engine radiating in Band 1 and Band 2
- Target aircraft and engine in seeker receiver in Band 1 and Band 2
- Seeker tracking aircraft and engine in azimuth
- Seeker tracking aircraft and engine in elevation
- Seeker remains in Track Mode throughout engagement
- Missile hits target aircraft (see plots on following pages)

Demo 1 - Select Engagement Output



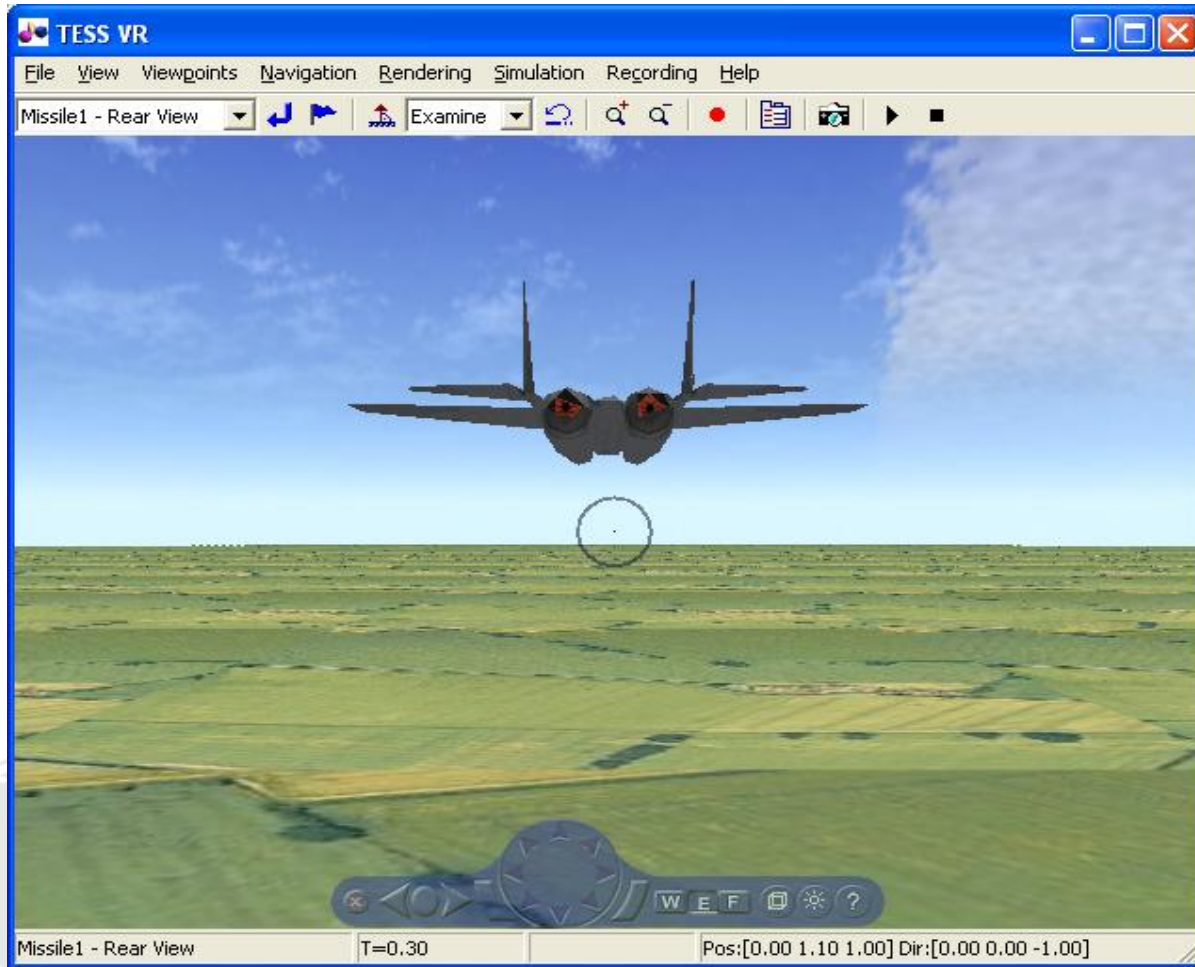
Missile hits target aircraft

Demo 1 - Select Engagement Output



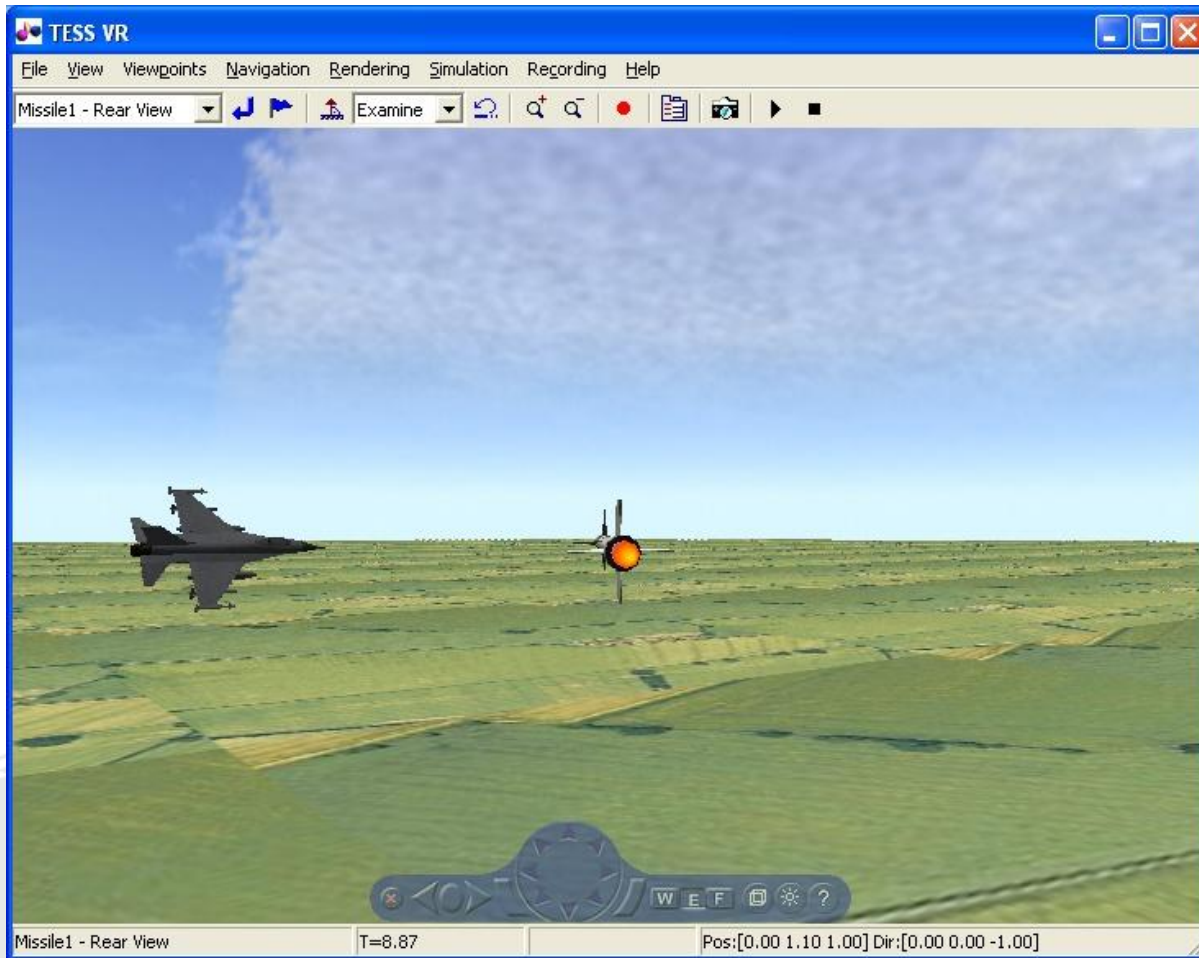
Missile hits target aircraft

Demo 1 - Select Engagement Output



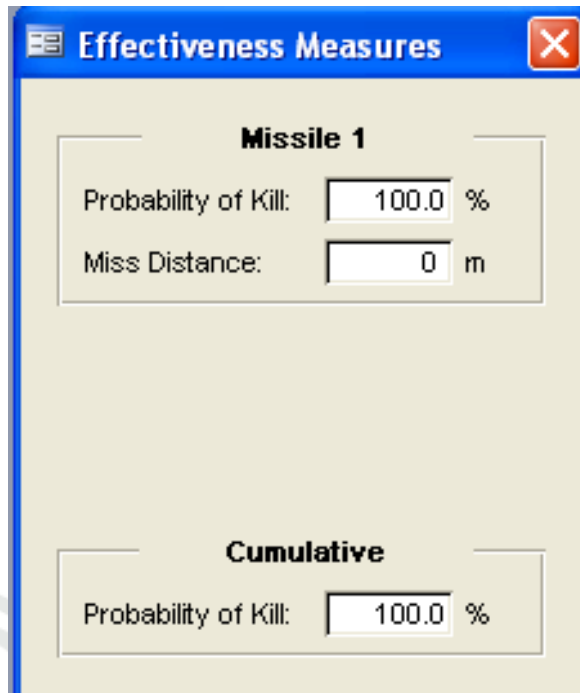
- Virtual Reality display shows missile launch from threat aircraft at simulation start
- Ring icon indicates position of target aircraft

Demo 1 - Select Engagement Output



- Virtual Reality display shows missile closing on target aircraft near end game

Demo 1 - Select Engagement Output



Effectiveness Measures

Missile 1

Probability of Kill: %

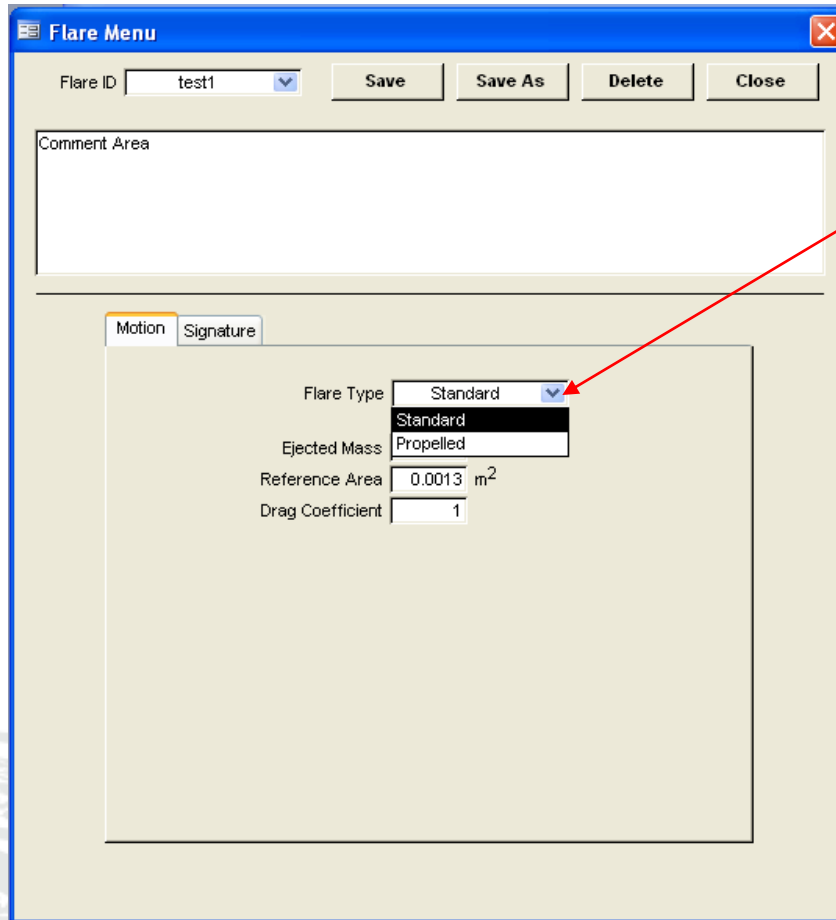
Miss Distance: m

Cumulative

Probability of Kill: %

- Missile to Target Platform miss distance = 0 meters
- Probability of Kill = 100 %

Demo 2 - Selected Parameters All Flares



Flare Menu

Flare ID: test1

Save Save As Delete Close

Comment Area

Motion Signature

Flare Type: Standard

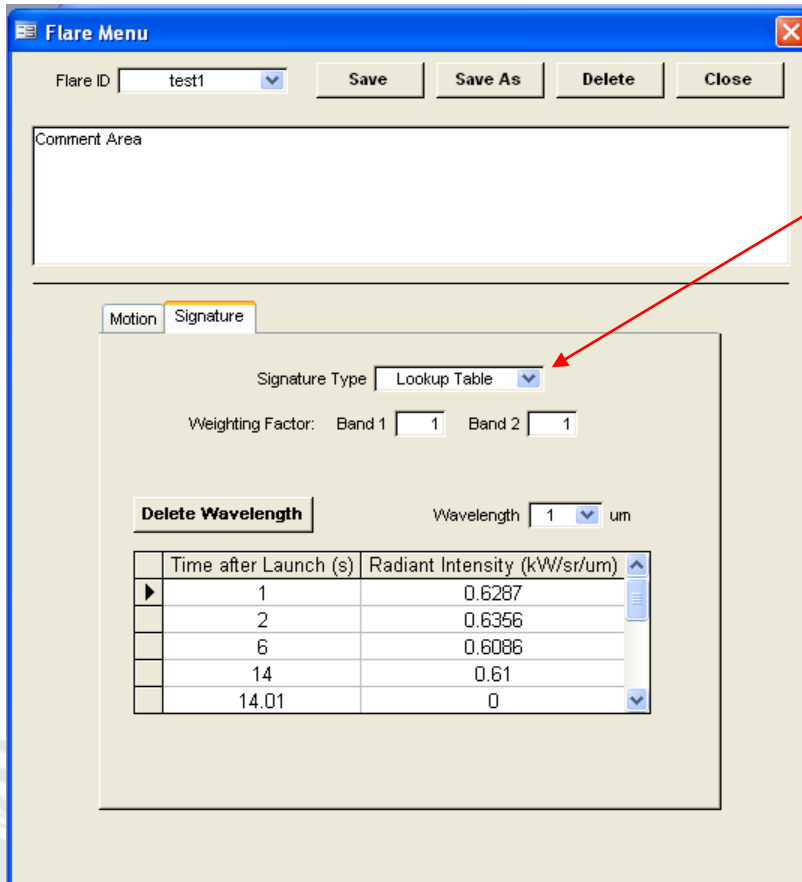
Ejected Mass: Propelled

Reference Area: 0.0013 m²

Drag Coefficient: 1

Flares Motion Type
set as Standard

Demo 2 - Selected Parameters All Flares



Flare Menu

Flare ID: test1

Save Save As Delete Close

Comment Area

Motion Signature

Signature Type: Lookup Table

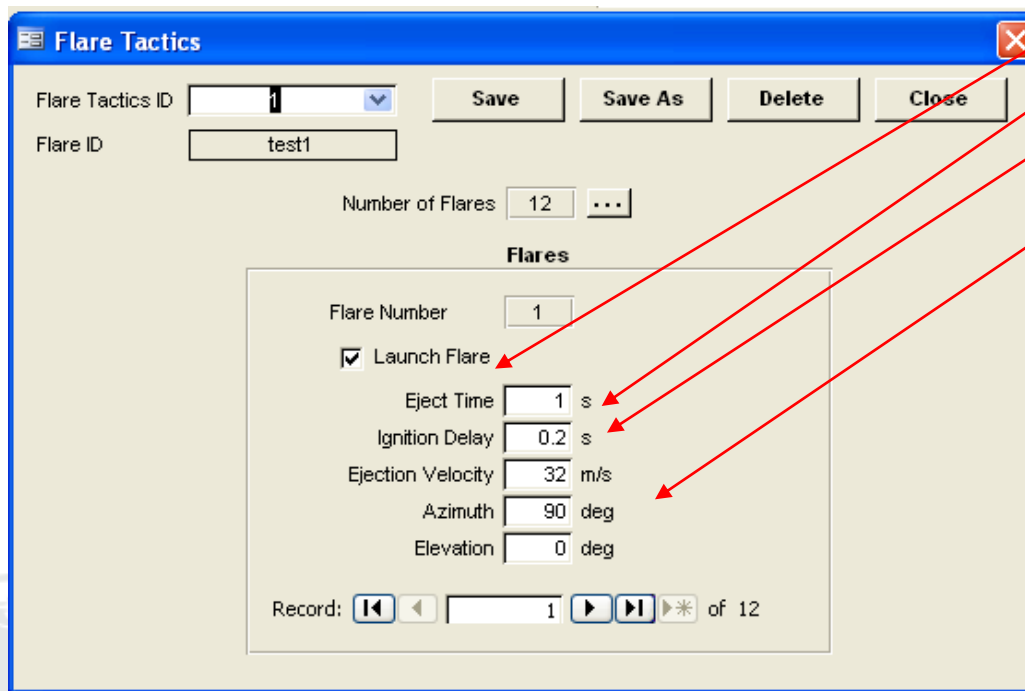
Weighting Factor: Band 1: 1 Band 2: 1

Delete Wavelength: Wavelength: 1 um

Time after Launch (s)	Radiant Intensity (kW/sr/um)
1	0.6287
2	0.6356
6	0.6086
14	0.61
14.01	0

Flares Signature Type
set as Lookup Table

Demo 2 - Select Flare 1 (of 4) Parameters



The screenshot shows the 'Flare Tactics' software window. At the top, there are fields for 'Flare Tactics ID' (set to 1) and 'Flare ID' (set to test1). Below these are buttons for 'Save', 'Save As', 'Delete', and 'Close'. The 'Number of Flares' is set to 12. The main section is titled 'Flares' and contains a 'Flare Number' field set to 1. A 'Launch Flare' checkbox is checked. Below this are several parameter fields: 'Eject Time' (1 s), 'Ignition Delay' (0.2 s), 'Ejection Velocity' (32 m/s), 'Azimuth' (90 deg), and 'Elevation' (0 deg). At the bottom, there is a 'Record' section with navigation buttons and a counter showing '1 of 12'.

Flare 1 enabled

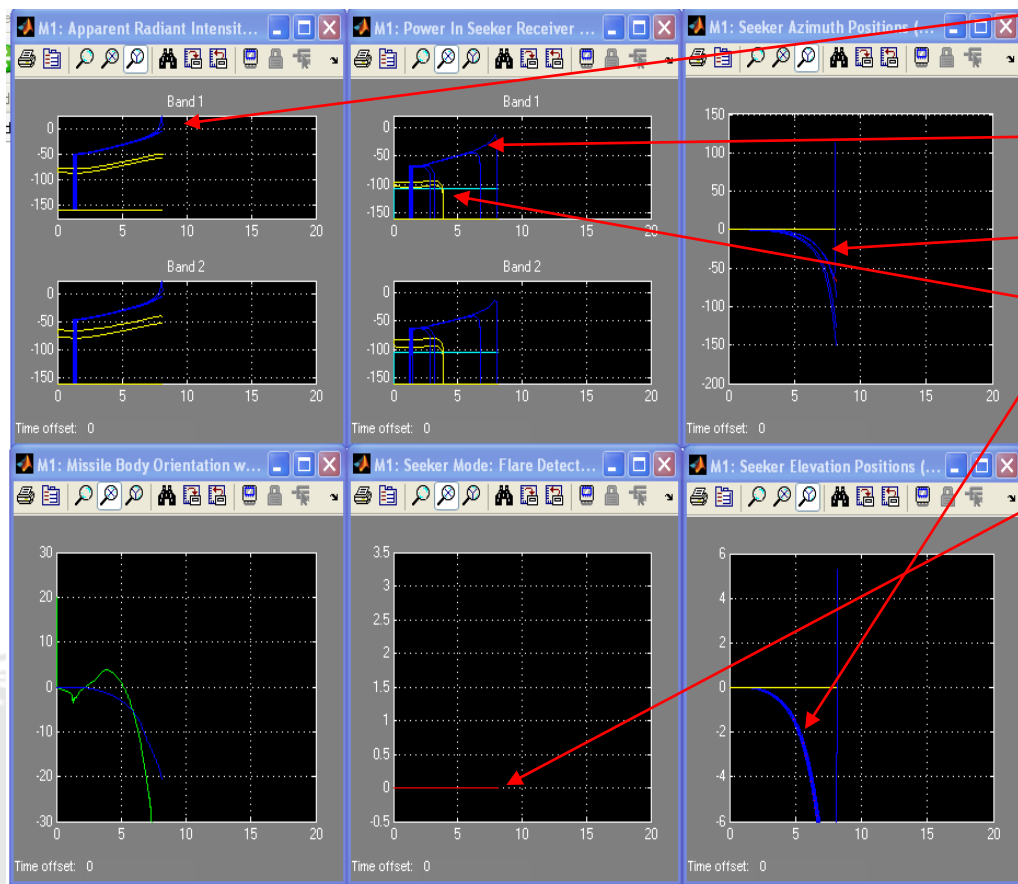
Eject Time is set to 1 second

Ignition Delay is set to 0.2 seconds

Eject parameter group as set

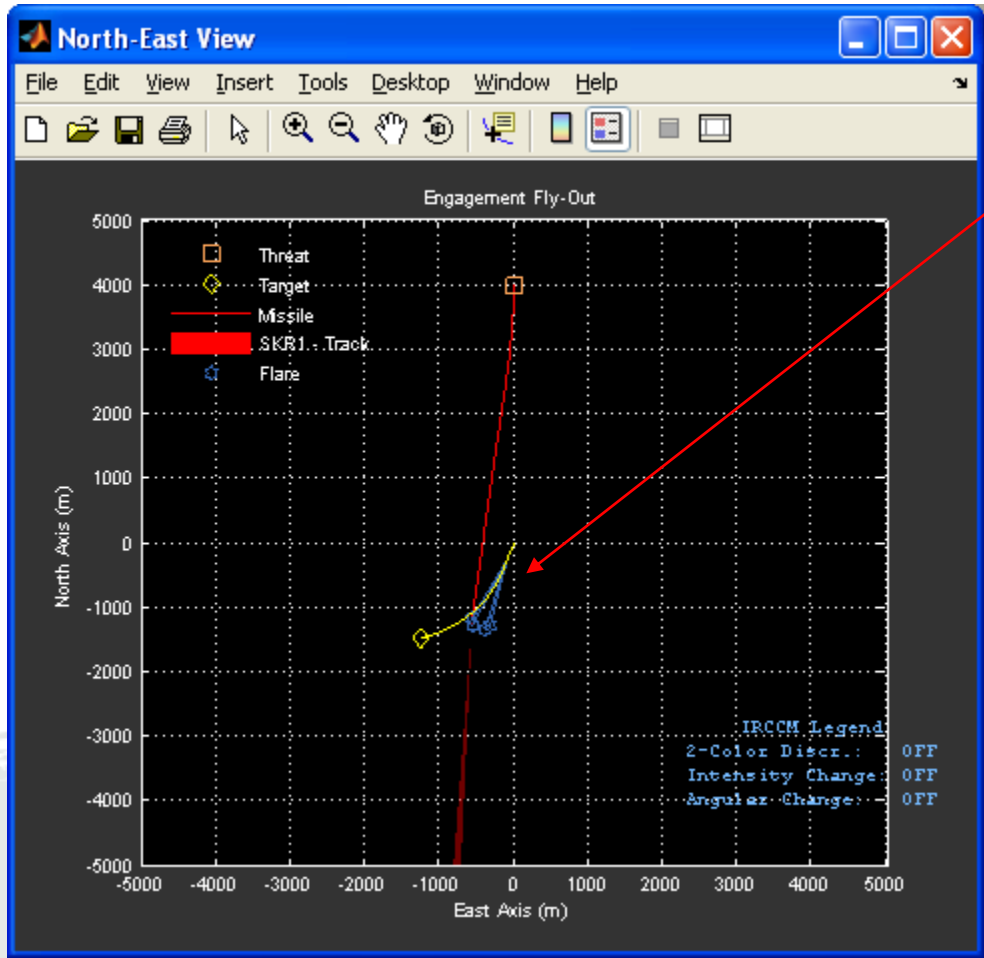
Demo 2 - Select Engagement Output

Target Aircraft and Engine(s) = Yellow
 Flares = dark blue Seeker Track Point=Red



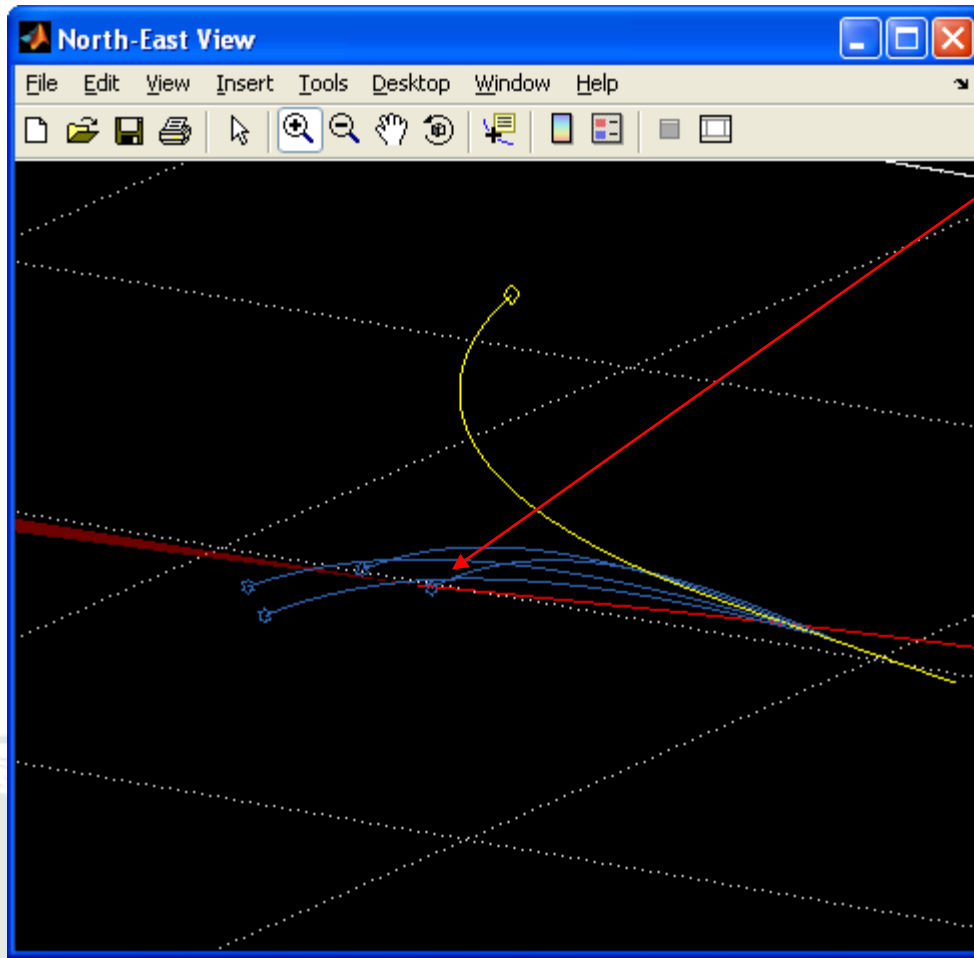
- Intensity of radiating flares exceeds target aircraft and engine in Band 1 and Band 2
- Flare 3 captures seeker receiver track
- Seeker tracks Flare 3 in azimuth and elevation
- Aircraft, single engine and flares 1, 2 and 4 drop out of seeker FOV as engagement proceeds
- Seeker remains in Track Mode throughout engagement (indicates transition to track on Flare 3 without breaklock)
- Missile hits Flare 3 (see plots on following pages)

Demo 2 - Select Engagement Output



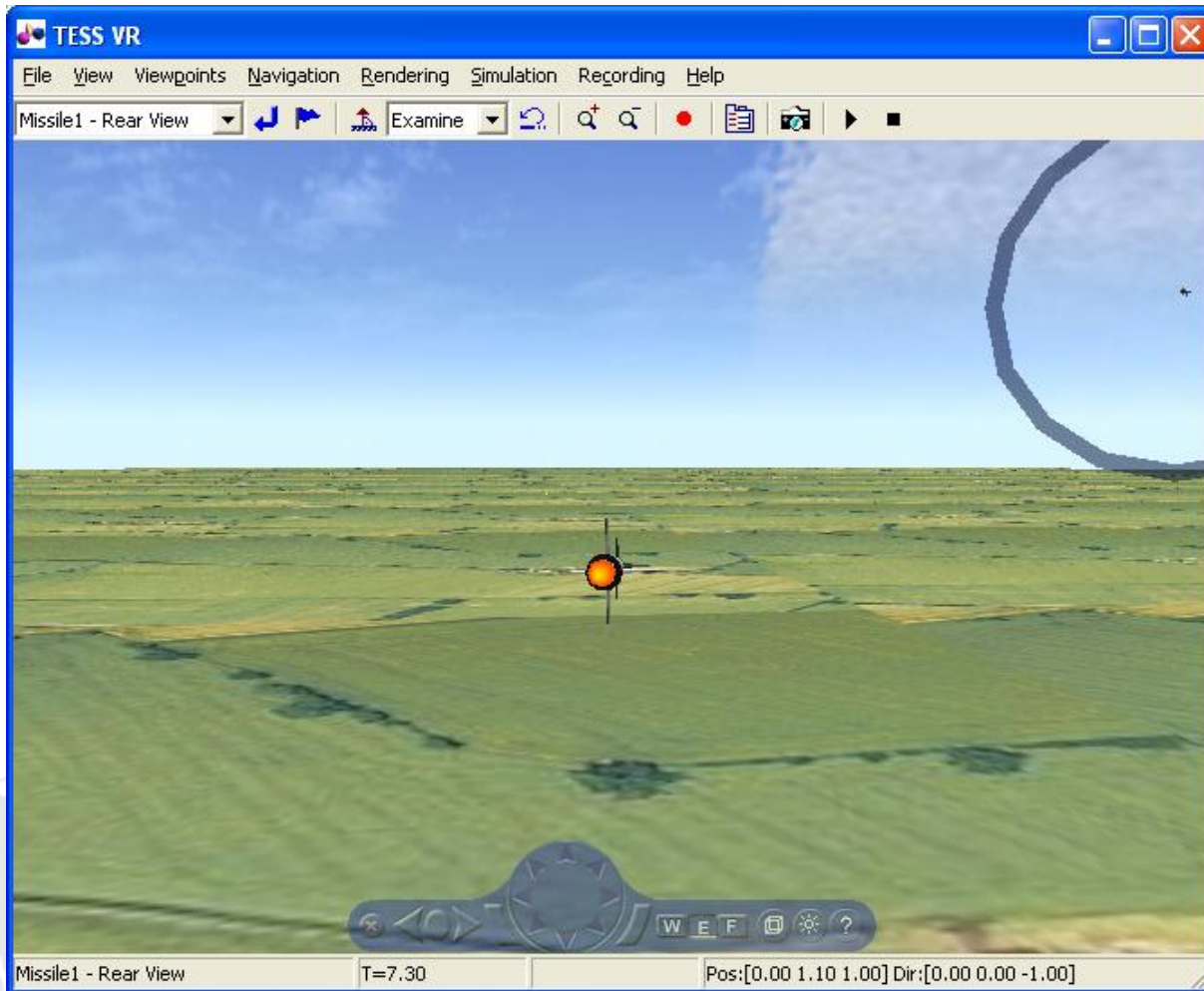
Missile hits Flare 3

Demo 2 - Select Engagement Output



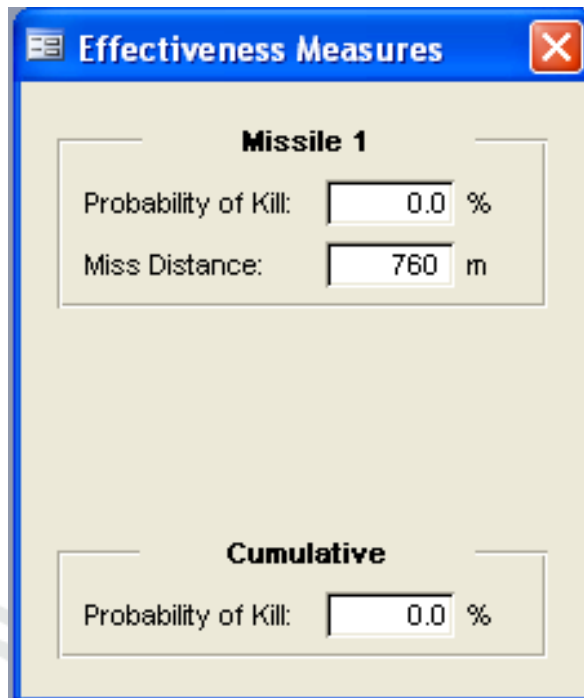
Missile hits Flare 3

Demo 2 - Select Engagement Output



- Virtual Reality display shows missile closing in on Flare 3 near end game
- Target aircraft visible at upper right of VR Display

Demo 2 - Select Engagement Output



The screenshot shows a dialog box titled "Effectiveness Measures" with a close button (X) in the top right corner. The dialog is divided into two sections: "Missile 1" and "Cumulative".

Missile 1

Probability of Kill:	<input type="text" value="0.0"/>	%
Miss Distance:	<input type="text" value="760"/>	m

Cumulative

Probability of Kill:	<input type="text" value="0.0"/>	%
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- Missile to Target Platform
miss distance = 760 meters
- Probability of Kill = 0 %