



CREATE A ROUTE

Scope

The Tapestry system is a software suite developed by Navigation Laboratories Inc. to provide a user-friendly modeling and control gateway for the LABPRO GPS Constellation Simulator.

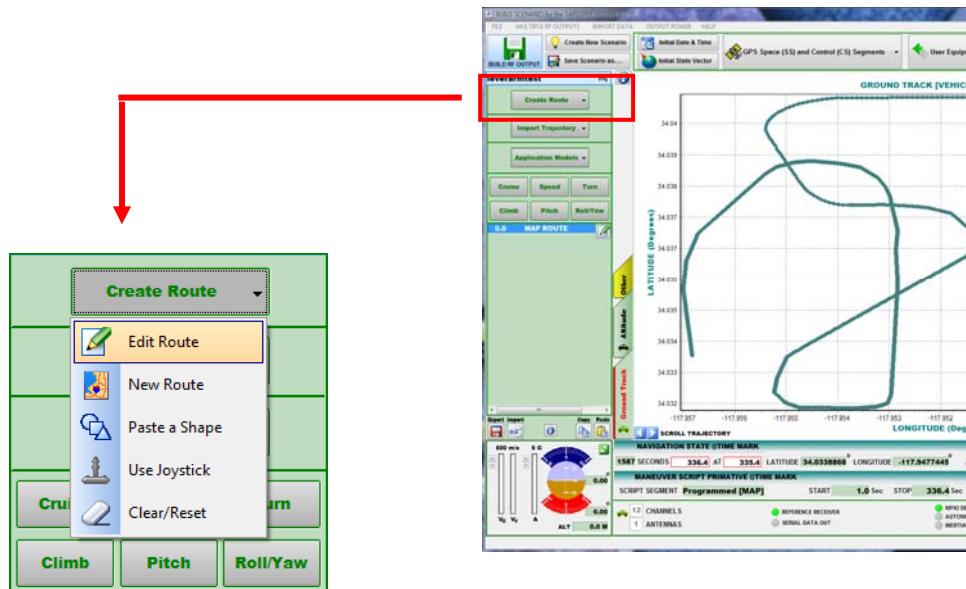
This document describes the use of the **Route Trajectory Generator [RouteMaker]**. RouteMaker is embedded within the ***Build Scenario*** Application as one of the choices available for generating a dynamic Vehicle Motion Trajectory.

In particular, RouteMaker is particularly suited for a Motion Trajectory that is best suited to a Street-map or Grid. This method is particularly well suited for the **Map-Matching** type systems.

CREATING A ROUTE

The **Build Scenario Application** provides a method for creating *dynamic* vehicle motion profiles utilizing a Street-map or Grid. This method is particularly well suited for the map-matching type systems.

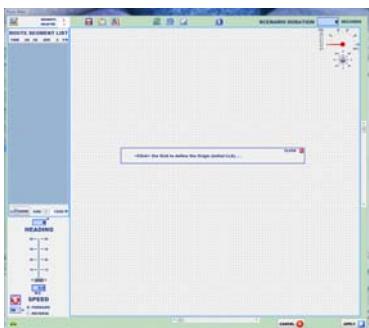
Start the Application from the **Build Scenario**
Main screen – select **CREATE ROUTE**



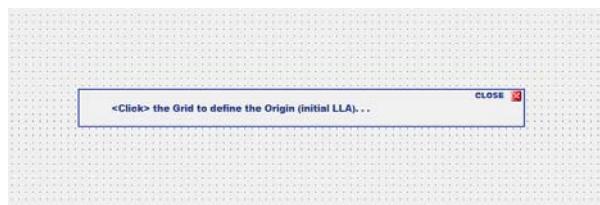
CONSTRUCTING SEGMENTS



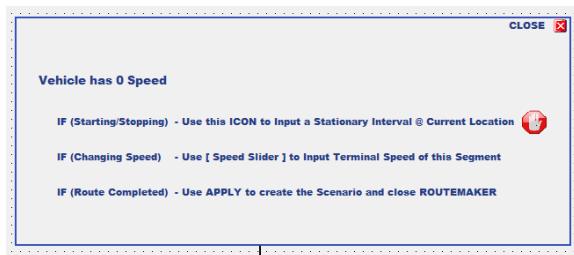
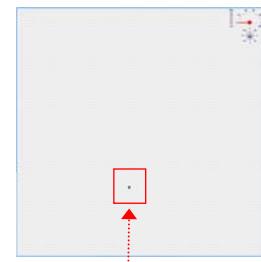
0 [start here]



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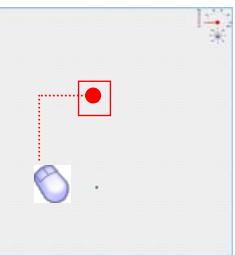


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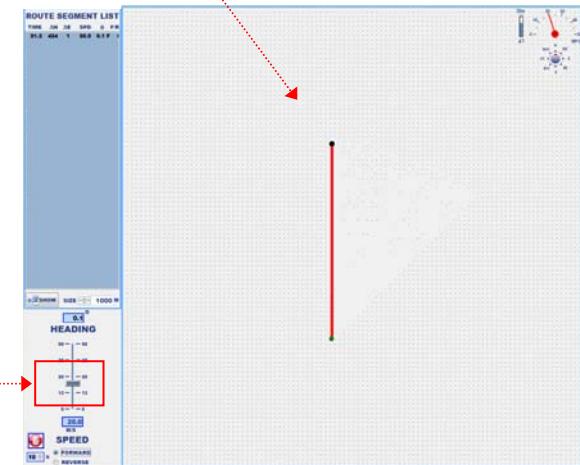


6 ...

SEGMENTS 10					
	TIME	AN	AB	SPO	D FRI
0.0	0	0	0.0	0.0 F	
21.3	424	1	20.0	0.1 F	
25.1	76	20	20.0	14.7 F	
27.8	44	18	20.0	22.2 F	
31.7	31	20	20.0	29.7 F	
31.7	31	31	20.0	45.0 F	
34.0	22	39	20.0	59.5 F	
35.9	11	30	20.0	69.9 F	
38.2	6	62	20.0	84.5 F	
40.2	2	41	20.0	87.2 F	

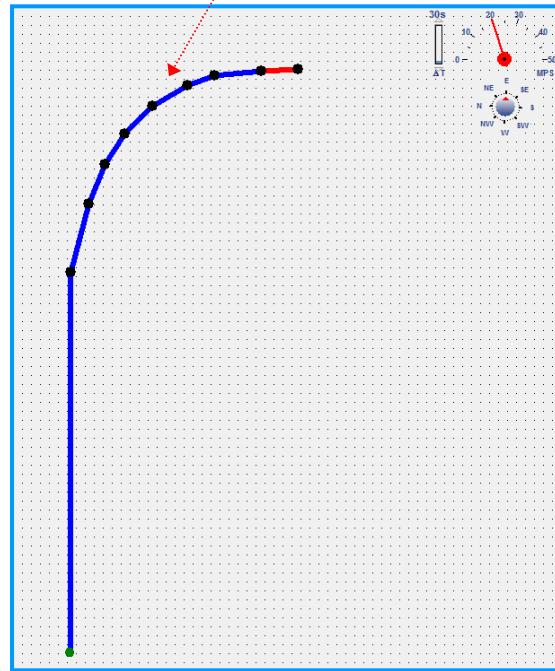
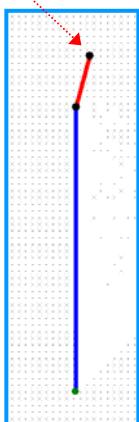


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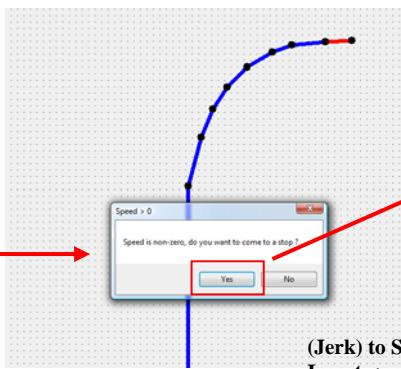
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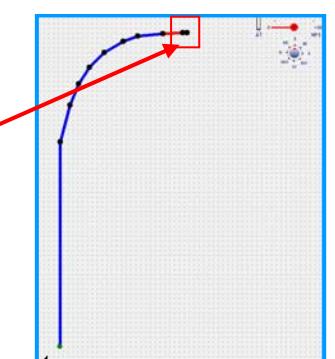


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8



(Jerk) to STOP
Insert < sec > stationary segment

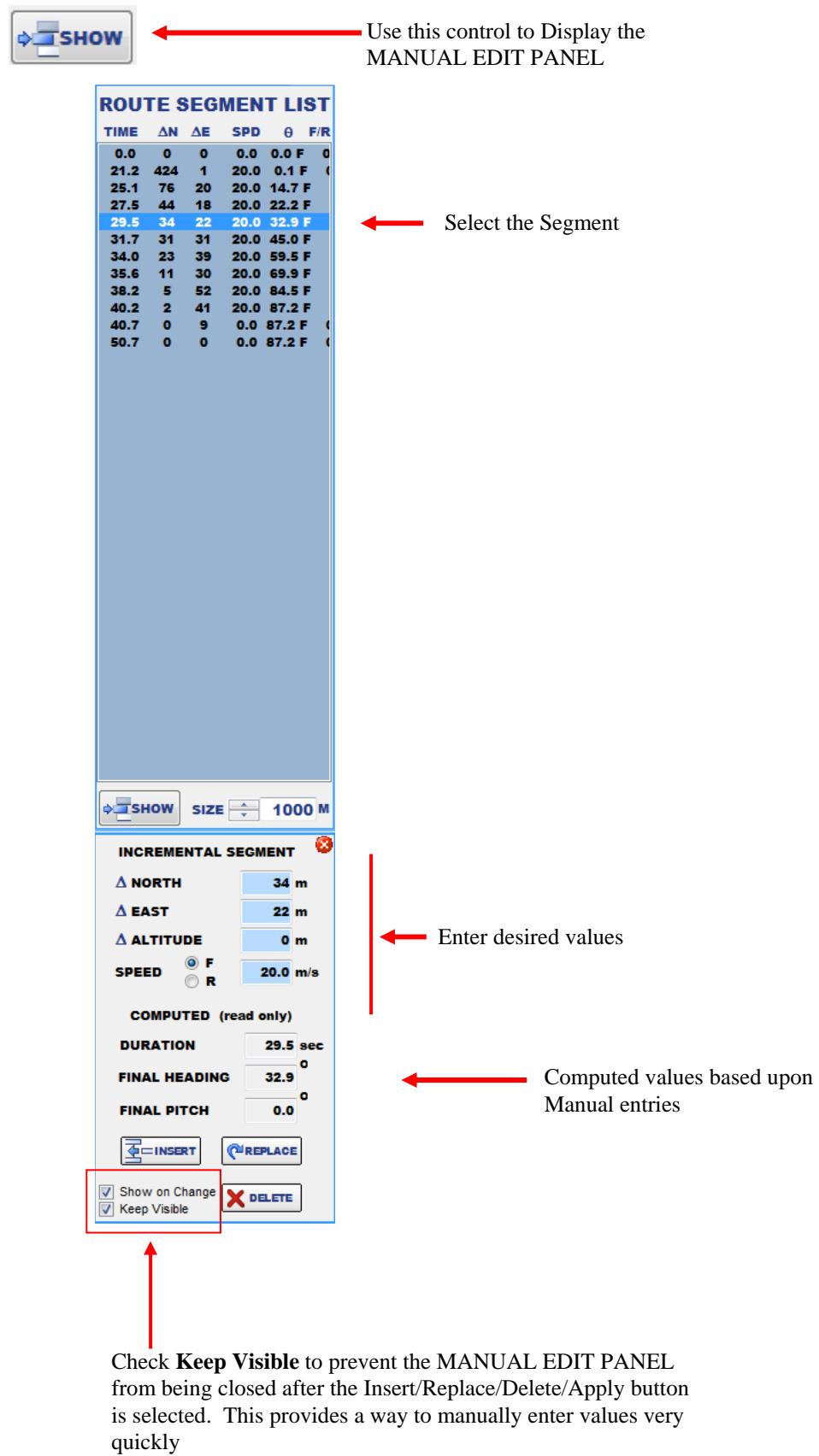


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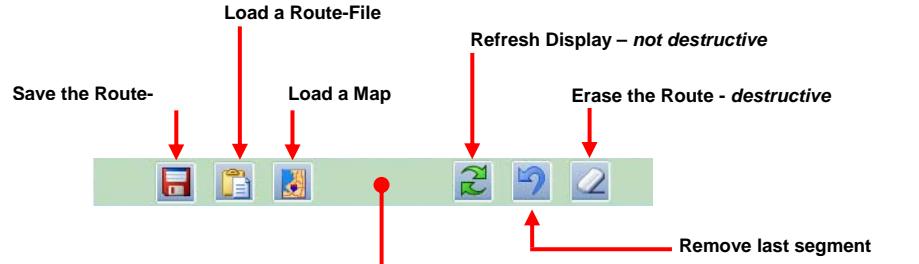
Route will be **imported** into the Scenario as a [Week, Sec, LLA] 10 Hz motion profile



MANUAL EDIT PANEL



THE CONTROLS



ROUTE SEGMENT LIST

ROUTE SEGMENT LIST

TIME	ΔN	ΔE	SPD	θ	F
0.0	0	0	0.0	0.0	F
19.4	199	-15	10.3	355.7	F
27.7	85	5	10.3	33.5	F
36.0	83	20	10.3	13.5	F
56.4	22	14	10.3	32.5	F
59.1	21	18	10.3	40.6	F
62.2	13	29	10.3	65.9	F
65.0	5	29	10.3	80.2	F
69.9	-5	50	10.3	99.1	F
73.2	-10	32	10.3	107.4	I
77.7	-31	30	10.3	119.3	I
80.3	-27	10	10.3	154.3	I
83.2	-29	8	10.3	164.6	I
87.3	-42	5	10.3	173.2	I
93.3	-61	8	10.3	172.5	I
98.8	-57	-3	10.3	183.0	I
108.9	-104	3	10.3	178.3	I
140.9	-329	-11	10.3	181.9	I
141.4	5	0	0.0	181.9	F
151.4	0	0	0.0	181.9	F
156.5	-28	-6	5.7	192.1	F
160.1	-10	-18	5.7	240.9	F
165.5	-4	-30	5.7	262.4	F
173.0	2	-102	13.5	271.1	I
175.5	15	-25	11.0	303.1	I
180.2	35	-18	11.0	303.1	I
185.9	42	5	7.5	329.0	F
194.5	62	16	7.5	14.5	F
196.0	31	24	10.3	24.2	F
217.7	300	300	20.2	45.0	F
221.2	70	9	20.2	352.7	I
224.2	51	-33	20.2	327.1	I
226.4	17	-41	20.2	292.5	I
228.5	6	-41	20.2	278.3	I
230.4	3	-39	20.2	274.4	I
233.1	-2	-54	20.2	267.9	I
243.1	0	-10	0.0	0.0	F

SHOW **SIZE** **1000 M**

Enter / Modify dynamic parameters associated with the Selected Segment

MANUAL EDIT PANEL

INCREMENTAL SEGMENT

△ NORTH: -104 m
△ EAST: 3 m
△ ALTITUDE: 0 m
SPEED: F R 10.3 m/s

COMPUTED (read only)

DURATION: 108.9 sec
FINAL HEADING: 178.3
FINAL PITCH: 10.3

INSERT **REPLACE** **DELETE**

Show on Change Keep Visible

This panel covers the DYNAMICS PANEL whenever you select a Route from the ROUTE SEGMENTS LIST. Use these controls to alter this behavior.

DYNAMICS

HEADING

178.3°

50 — 50
35 — 35
25 — 25
15 — 15
0 — 0

SPEED

10.3 m/s

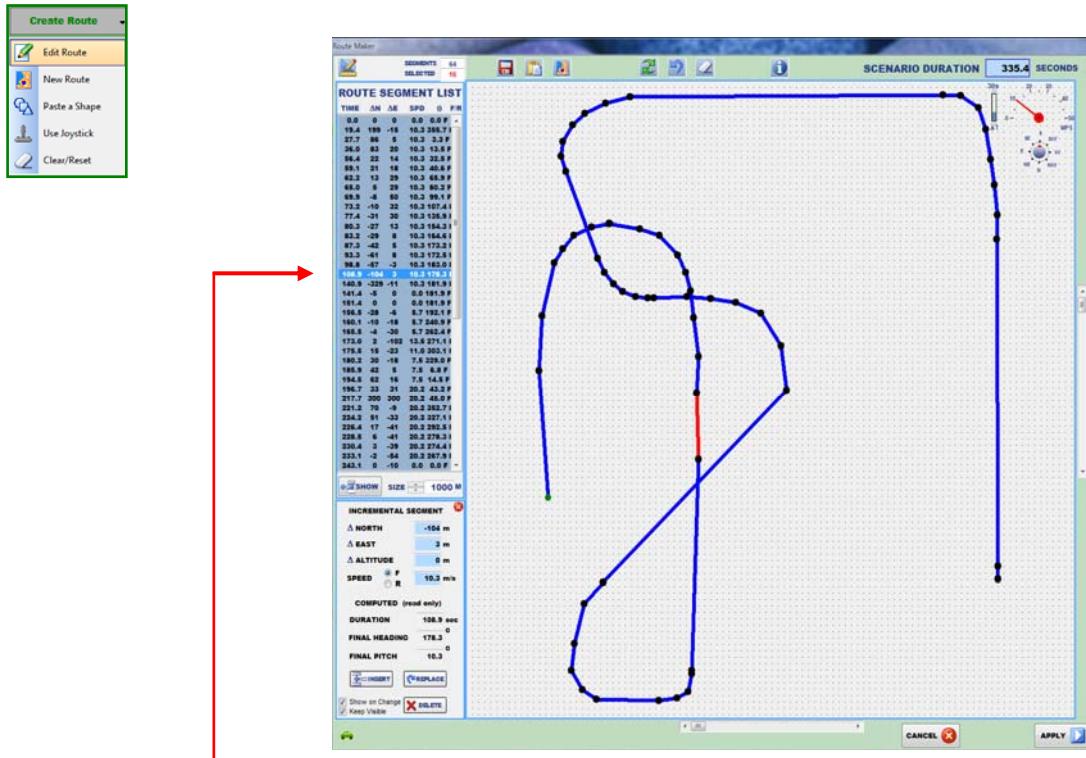
FORWARD **REVERSE**

Pull to desired SPEED or enter the value into the control

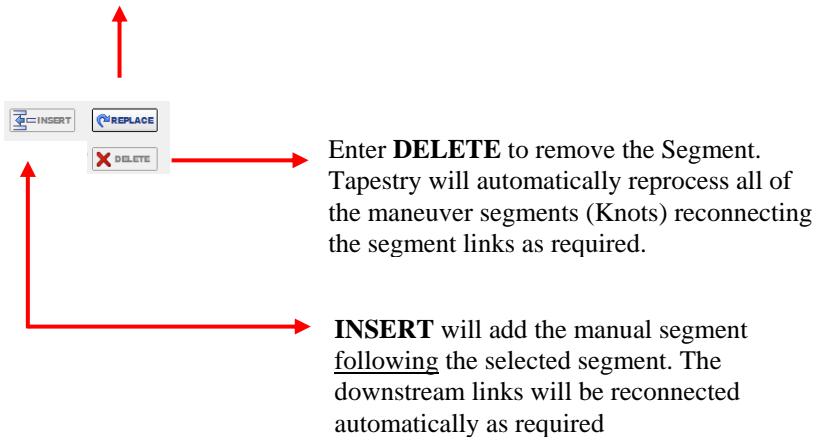
Click this ICON to insert a Stationary (STOP) segment. For this example the STOP lasts for 10 seconds. If you have a non-zero speed, Tapestry will bring the vehicle to a stop using step JERK

These parameters are computed based upon the Entered values above

MODIFYING A ROUTE



Click or select the desired Segment. Edit the parameters in the **MANUAL EDIT PANEL** select **REPLACE** to overwrite the segment

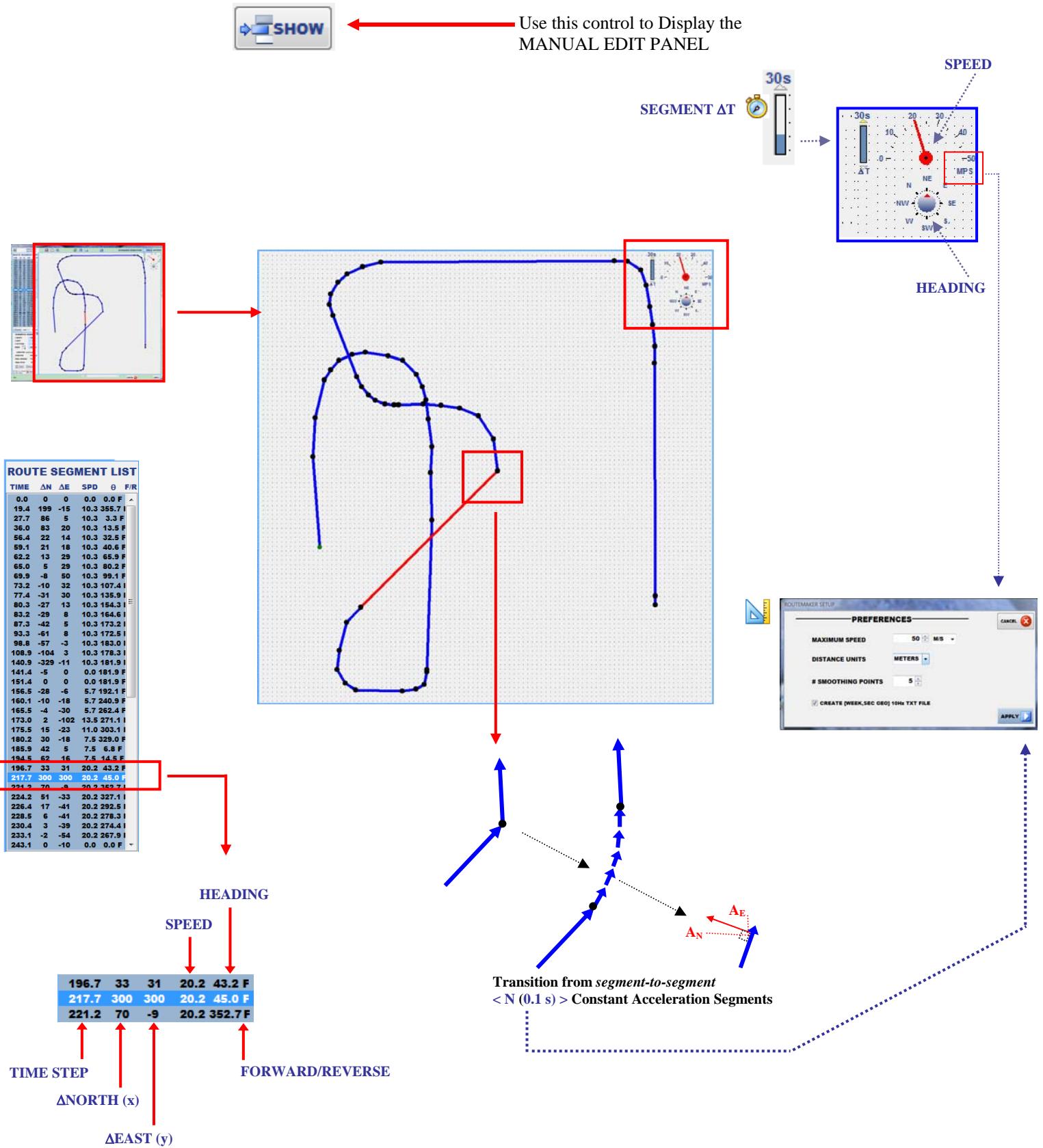


Note

Occasionally a deleted/Replace/Inserted segment will create a downstream error (for example removing a change of speed). Tapestry will inform the user of the problem and restore the Segment list to its state before the Delete/Replace action.

If you want to **DELETE** segments, start from the bottom of the list to avoid inconsistencies.

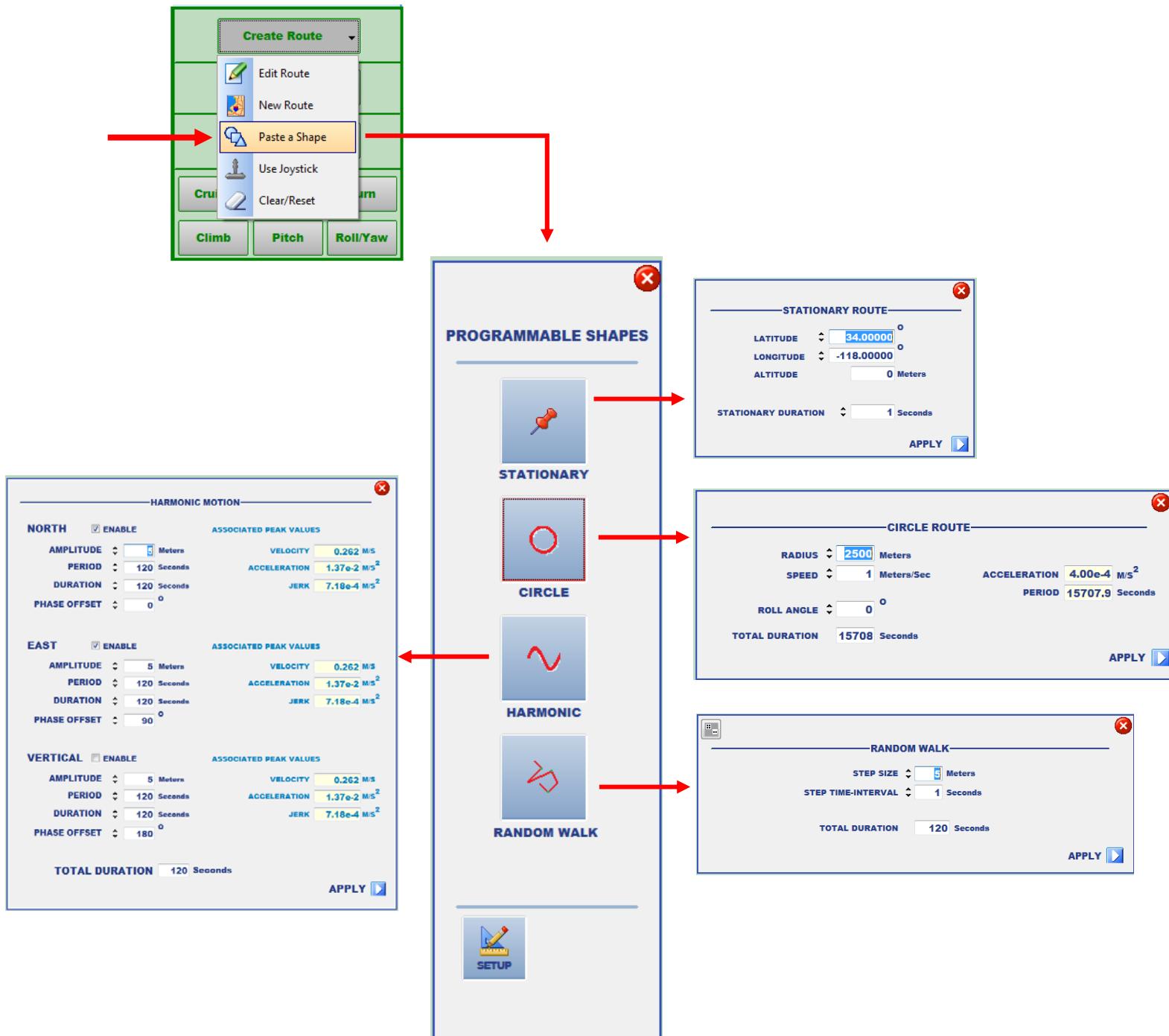
ROUTE MODELING



CREATING SHAPES

Shapes are provided in Tapestry as a method for subjecting the **Receiver Under Test** to a deterministic dynamic profile with precisely controlled Acceleration and Jerk. This is an excellent method to study navigation software under stress.

To select SHAPES, from the main Build Scenario form select **Create Route | Paste a Shape**;



EXAMPLES

TWO AXIS MOTION

RANDOM WALK

STEP SIZE □ 5 Meters
STEP TIME-INTERVAL □ 5 Seconds
TOTAL DURATION □ 500 Seconds

APPLY



HARMONIC MOTION

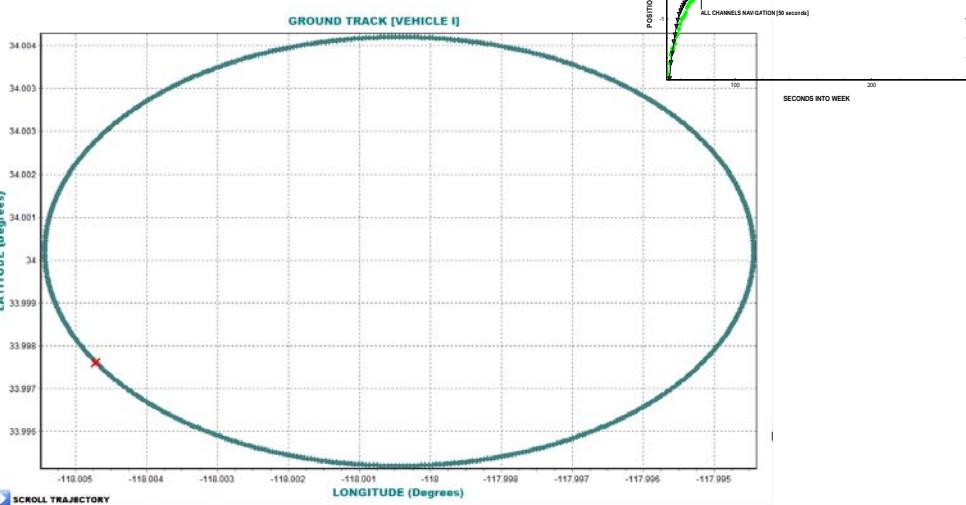
NORTH ENABLE ASSOCIATED PEAK VALUES
AMPLITUDE □ 500 Meters VELOCITY 26.180 M/S
PERIOD □ 120 Seconds ACCELERATION 1.37e+0 M/S²
DURATION □ 1000 Seconds JERK 7.18e-2 M/S²
PHASE OFFSET □ 0 °

EAST ENABLE ASSOCIATED PEAK VALUES
AMPLITUDE □ 500 Meters VELOCITY 26.180 M/S
PERIOD □ 120 Seconds ACCELERATION 1.37e+0 M/S²
DURATION □ 1000 Seconds JERK 7.18e-2 M/S²
PHASE OFFSET □ 90 °

VERTICAL ENABLE ASSOCIATED PEAK VALUES
AMPLITUDE □ 0 Meters VELOCITY 0.262 M/S
PERIOD □ 120 Seconds ACCELERATION 1.37e-2 M/S²
DURATION □ 120 Seconds JERK 7.18e-4 M/S²
PHASE OFFSET □ 180 °

TOTAL DURATION 1000 Seconds

APPLY



HARMONIC MOTION

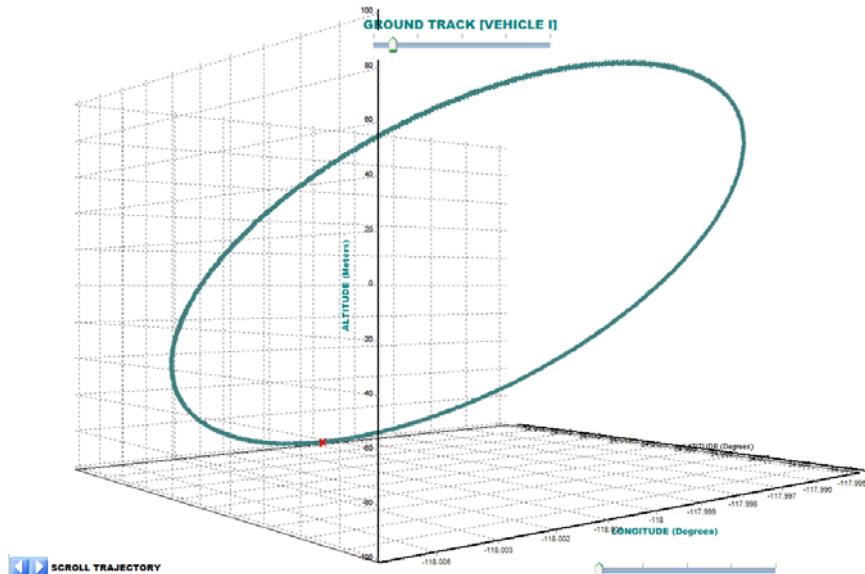
NORTH ENABLE ASSOCIATED PEAK VALUES
AMPLITUDE □ 500 Meters VELOCITY 26.180 M/S
PERIOD □ 120 Seconds ACCELERATION 1.37e+0 M/S²
DURATION □ 1000 Seconds JERK 7.18e-2 M/S²
PHASE OFFSET □ 0 °

EAST ENABLE ASSOCIATED PEAK VALUES
AMPLITUDE □ 500 Meters VELOCITY 26.180 M/S
PERIOD □ 120 Seconds ACCELERATION 1.37e+0 M/S²
DURATION □ 1000 Seconds JERK 7.18e-2 M/S²
PHASE OFFSET □ 90 °

VERTICAL ENABLE ASSOCIATED PEAK VALUES
AMPLITUDE □ 100 Meters VELOCITY 5.236 M/S
PERIOD □ 120 Seconds ACCELERATION 2.74e-1 M/S²
DURATION □ 1000 Seconds JERK 1.44e-2 M/S²
PHASE OFFSET □ 180 °

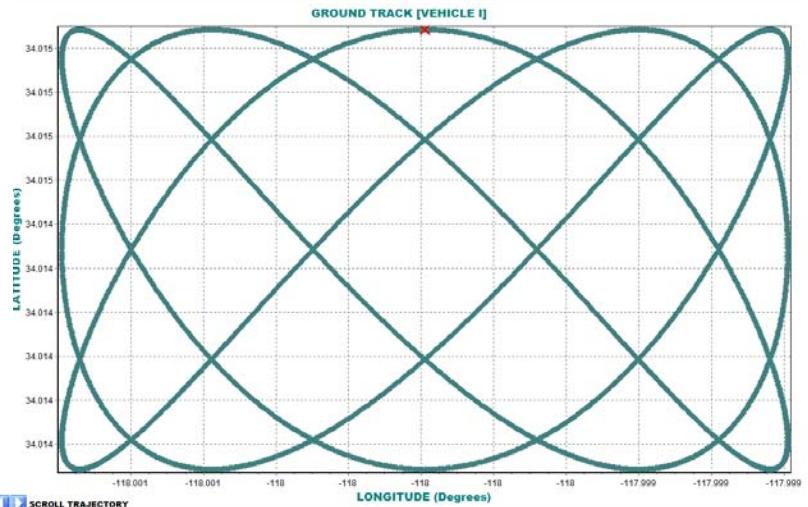
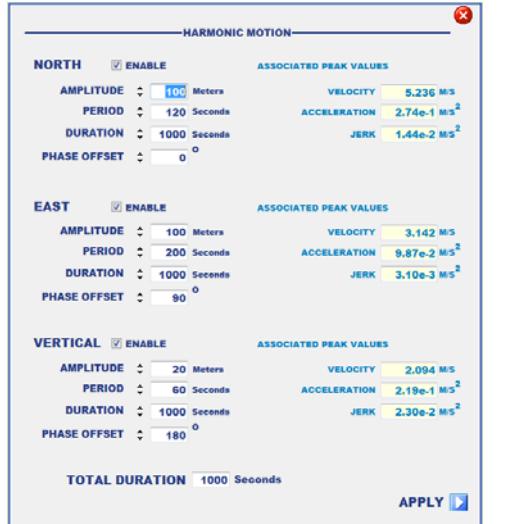
TOTAL DURATION 1000 Seconds

APPLY

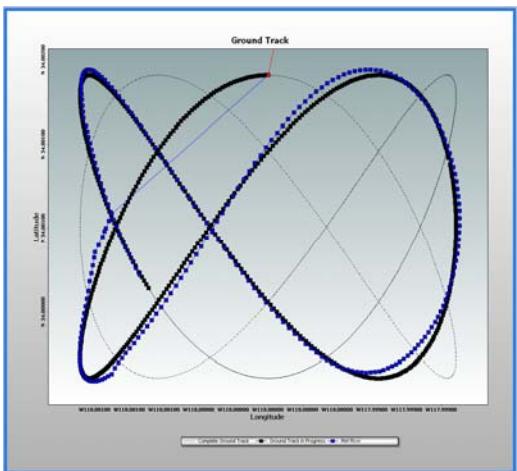


THREE AXIS MOTION

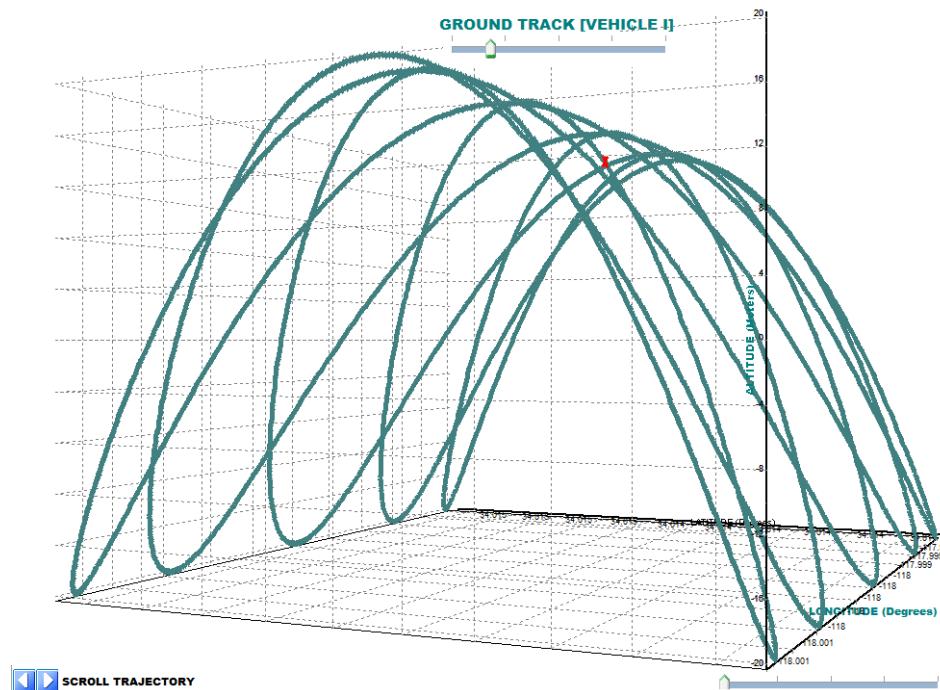
TWO DIMENSIONAL VIEW



RUN-TIME with REF-RCVR OVERLAY



THREE DIMENSIONAL VIEW



Shapes provide the best way to subject the Receiver Under Test into a deterministic acceleration profile. This is extremely useful if Time to First Fix (TFF) is desired under dynamics.

ROUTE MAKER SETUP



PREFERENCES

MAXIMUM SPEED 50 M/S

DISTANCE UNITS METERS

SMOOTHING POINTS 5

CREATE [WEEK,SEC GEO] 10Hz TXT FILE

APPLY

CANCEL



APPLY



This controls the transition model from one segment to the next. The acceleration required is divided by the # and applied over the interval that lasts # x 0.1 seconds

This creates a [Week, Seconds, GEO (LLA)] 10 Hz text file IMPORTEDTRAJECTORY.TXT that is automatically imported into the Scenario when the Route Form is closed through the APPLY control.