Model 1107 Radar Target Simulator

Bringing the Test Range to Your Test Bench

Product Summary

Introduction

The Eastern OptX Model 1107 Radar Target Simulator is a true propagation path replicator. The 1107 will produce a moving target with appropriate target cross-section, propagation loss, with a dynamic range of over 100 dB.

The 1107 operates with pulsed, frequency hopping, or CW radars and with any encryption or modulation scheme. A high speed, user defined scenario may be triggered from the detected radar pulse or a user supplied external pulse.

Standard System Features

- Replicates target distance and speed.
- Target distances from 0 to 160 km in 100 m steps.
- Doppler frequencies from 0 to 50 kHz in 1 kHz steps
- High Speed Target scenario generation (All switching between radar pulses).
- Easy to use GUI
- Remote Control Interface
- Front Panel LCD Touch Screen Control
- Built-In Self Test
- Signal spectrum analysis
- Interferer Injection (Jammer)
- Programmable (SCPI Commands)
- Broadband performance (to 40 GHz)
- Synchronous and Free-Running Modes

Eastern OptX, Inc. A Veteran Owned Small Business

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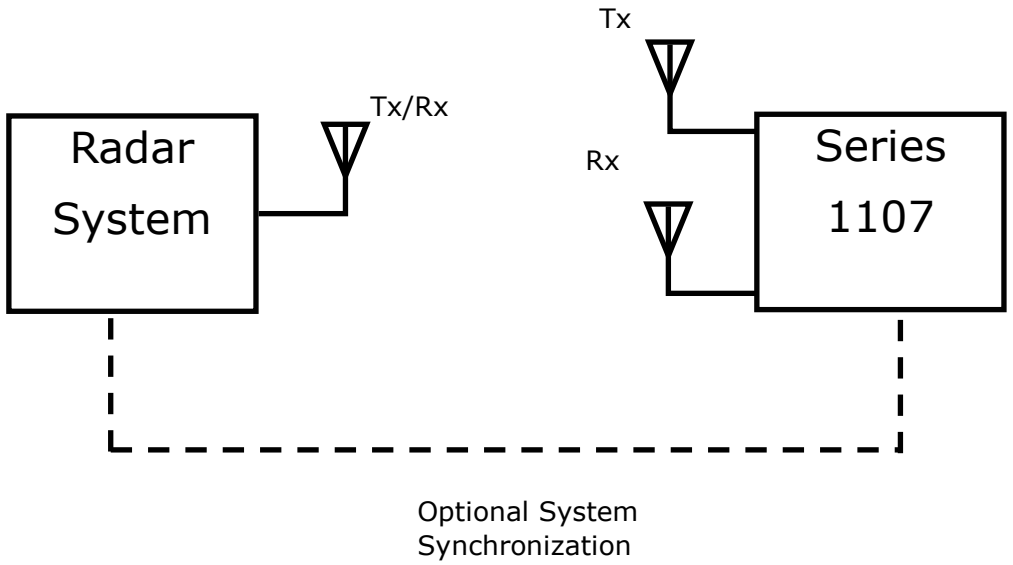
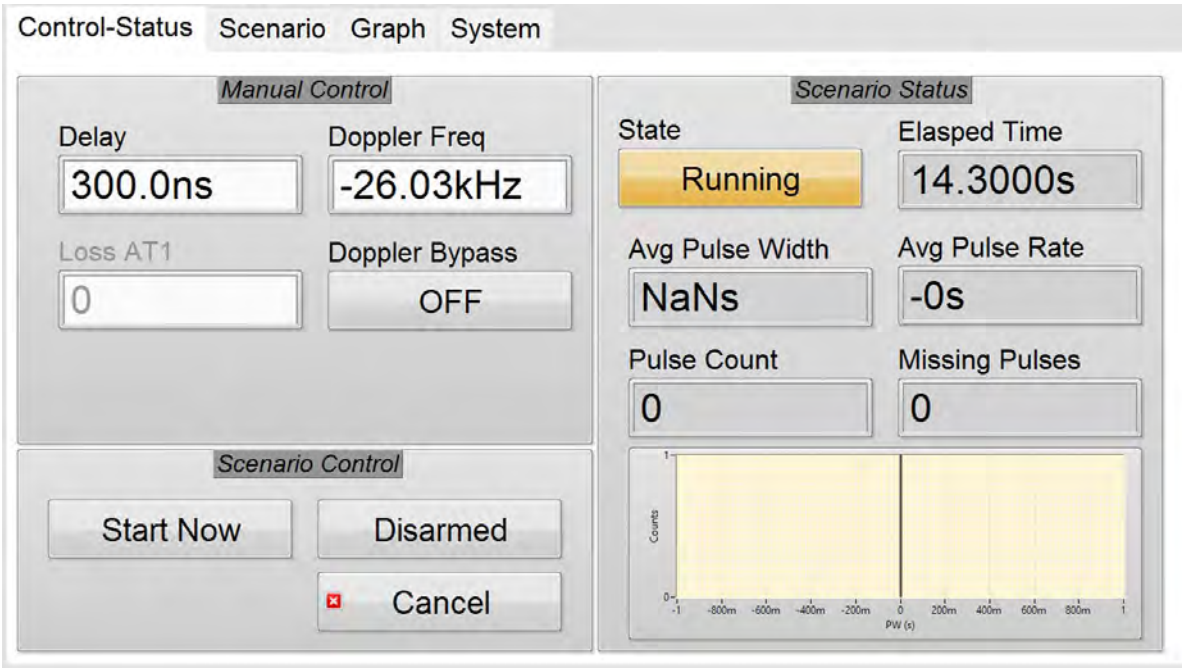
Radar Target Simulator

System Description

The block diagram below shows a typical 1107 System used with a common antenna radar system. The 1107 receives the signal transmitted from the radar, provides the necessary target delay, propagation loss, and Doppler, and then transmits back to the radar receiver. 60 dB of Input to Output Isolation is typical for most applications. Greater isolation is optional. Single antenna systems with octave band isolators are also available for specific radar bands. Direct RF connection to Radar and 1107 without external antenna is permissible and common. The System Operates with single antenna or phased array systems. Optional multiple target generation is available with single or multiple output emissions.

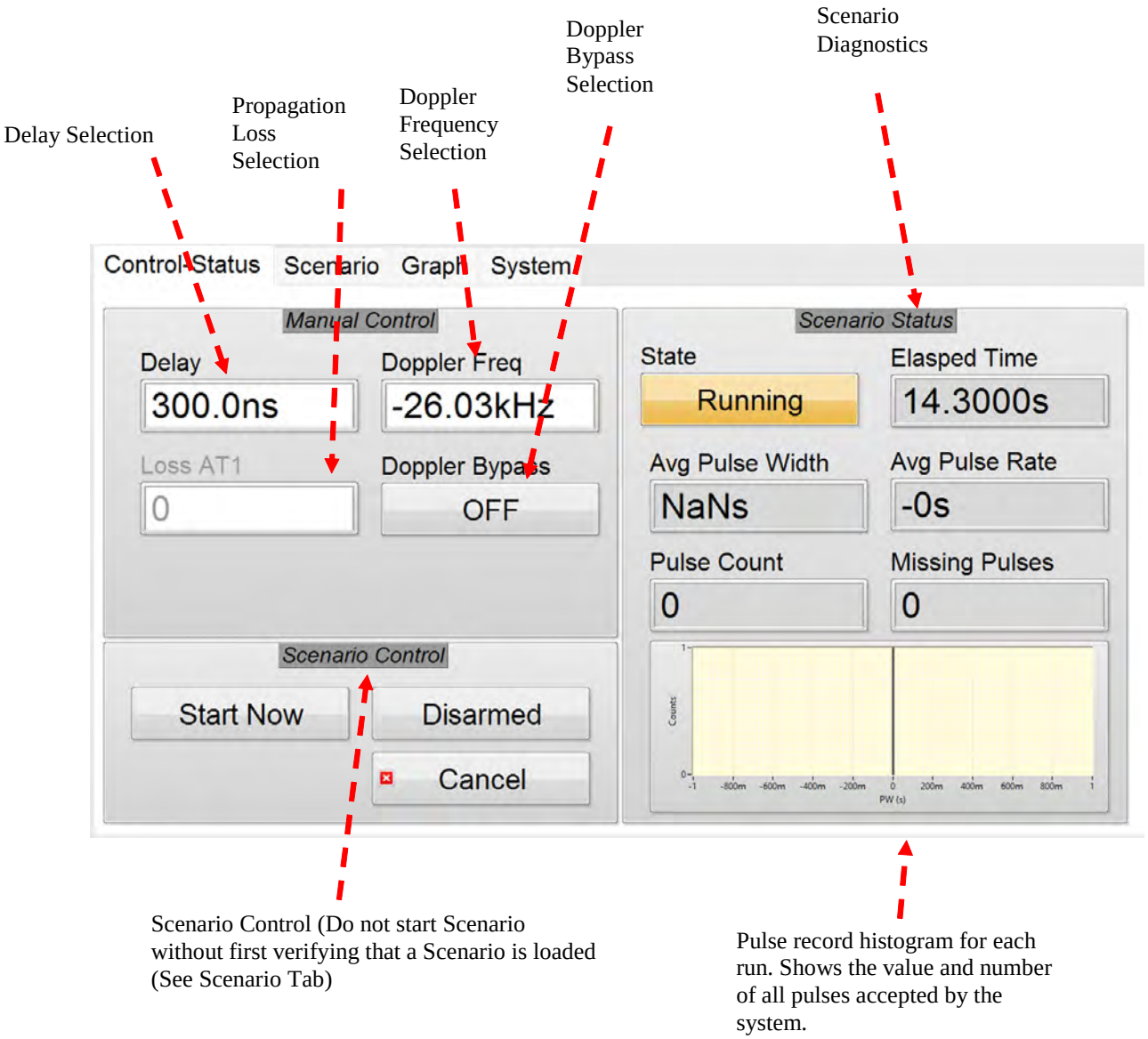


Typical User Interface



Main System Control Menu

Typical User Interface



Typical User Interface

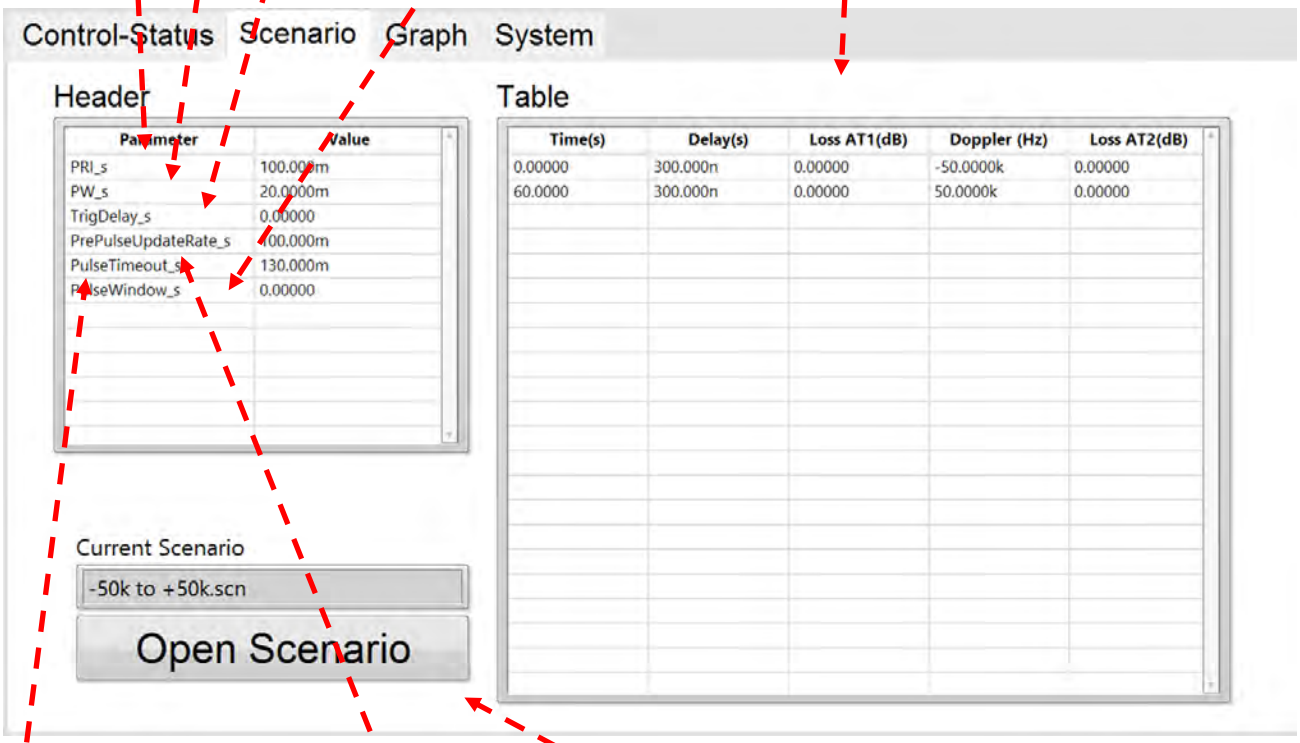
Pulse Repetition Interval

Pulse Width

Delay between trigger start and Scenario start

Pulse Width Buffer. System accepts any pulse = PW_s and + and – this value.

Scenario Definition



The system stops looking for a pulse after this time (Must be > PRI_s, 110% typical)

System update rate prior to first pulse detection (must be < PRI_s)

Load Scenario from file using this key.

Scenario Screen

This screen shows the Radar Target Scenario selected by the user in tabular form. The user may load new Scenarios from this screen. Be sure to load a Scenario before selecting the “Start Now” key on the Control-Status Tab.

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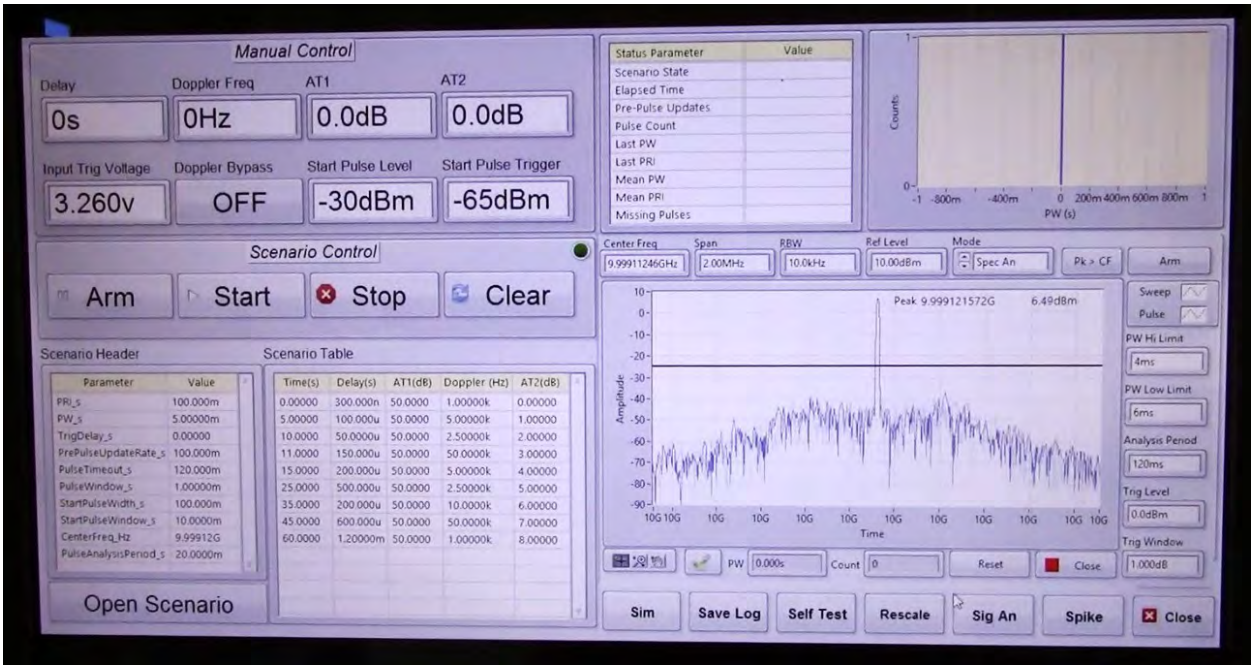

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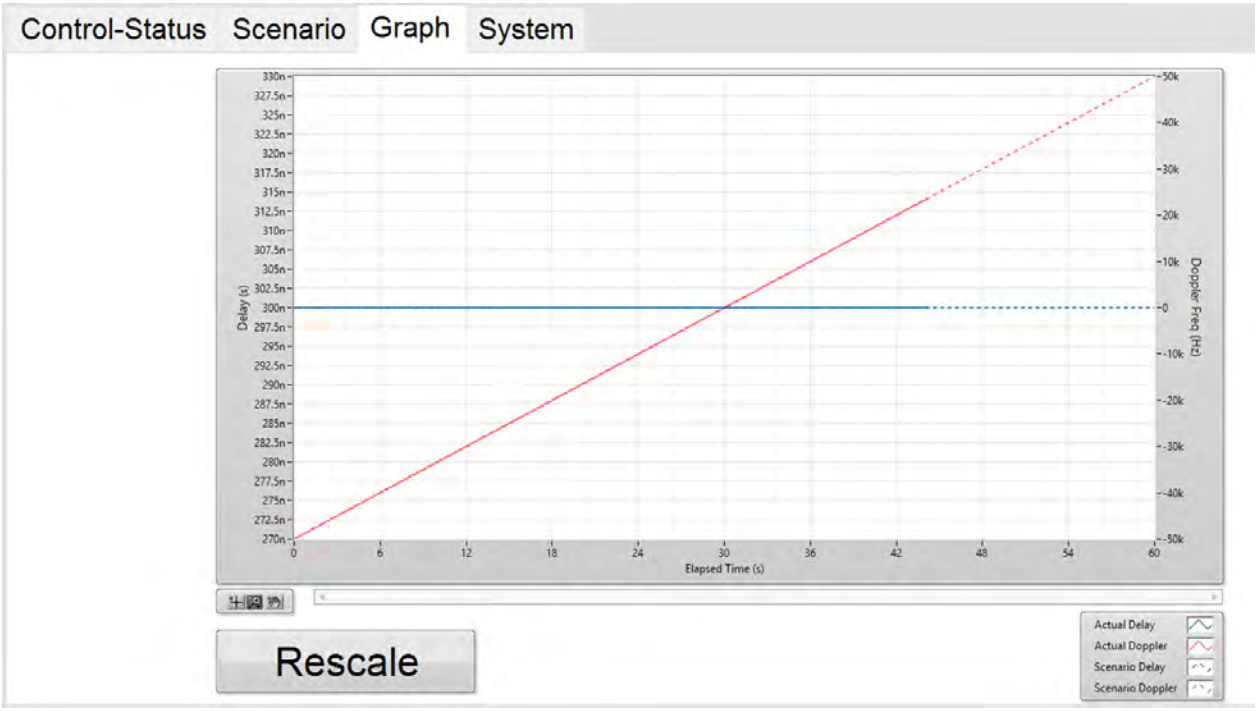

System Scenario Plan and Progress Graph

This plot shows graphically the user defined Scenario including Delay, Doppler, and Propagation Loss. Once the “Start Now” key on the Control-Status Tab is selected the plot will also show the actual values as the Scenario progresses.

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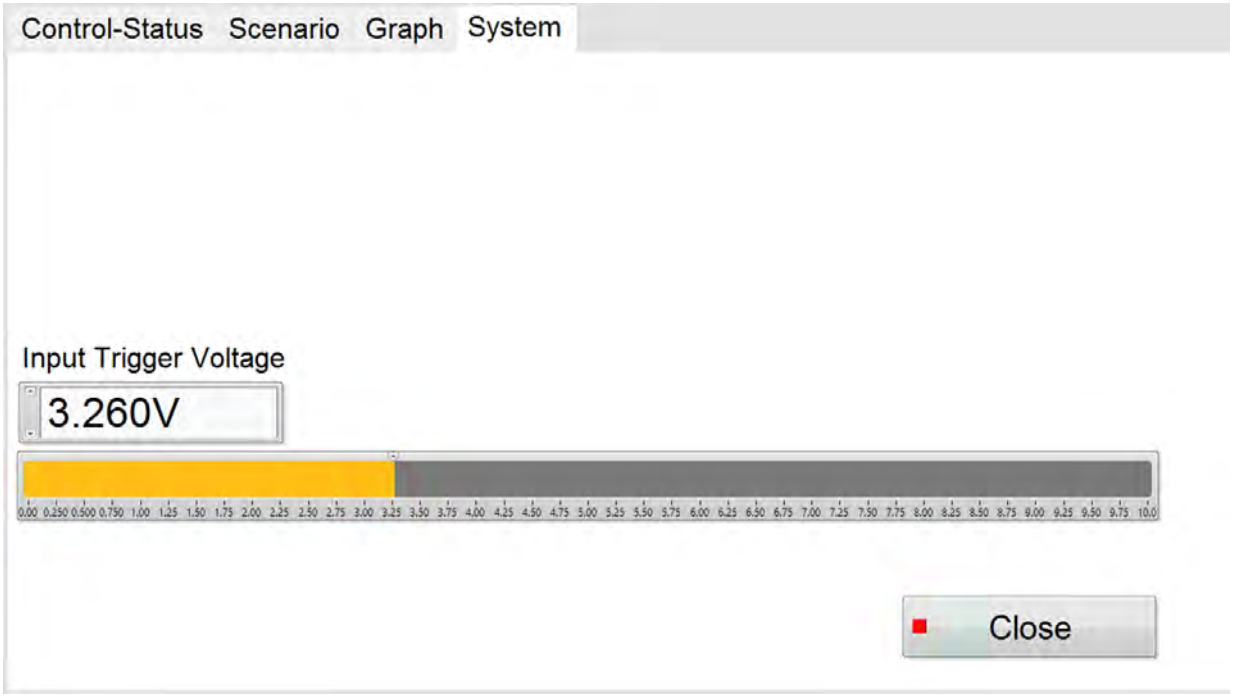
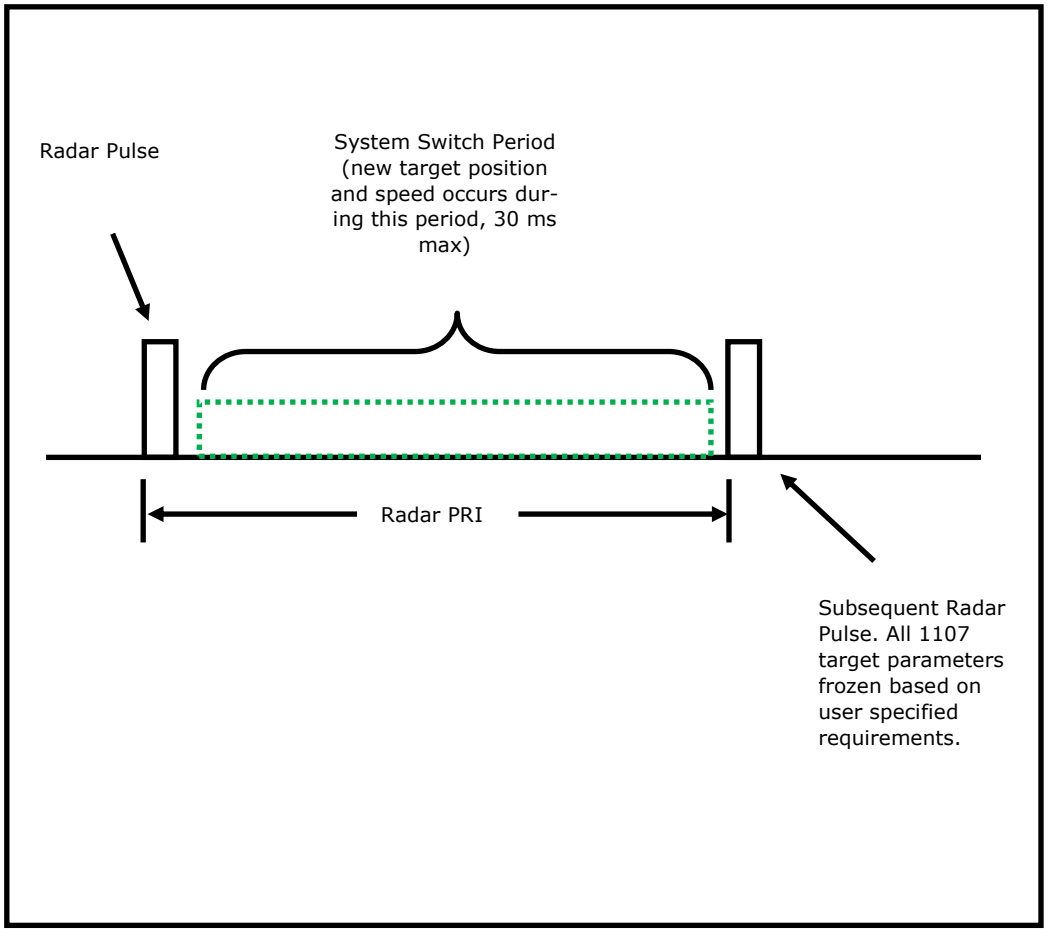


System Control Tab

From this tab the user may exit the software and also enter an input trigger voltage. This is the voltage level of the detected radar pulse, below which the system will ignore. The system will detect the radar pulse and perform all switching operations between the end of the detected pulse and the start of the next pulse based on the user-defined pulse repetition interval.

Simulator Timing Diagram

The following diagram shows the typical 1107 operation detecting the output of the radar under test and changing target characteristics (Speed and Position) in between radar pulses.



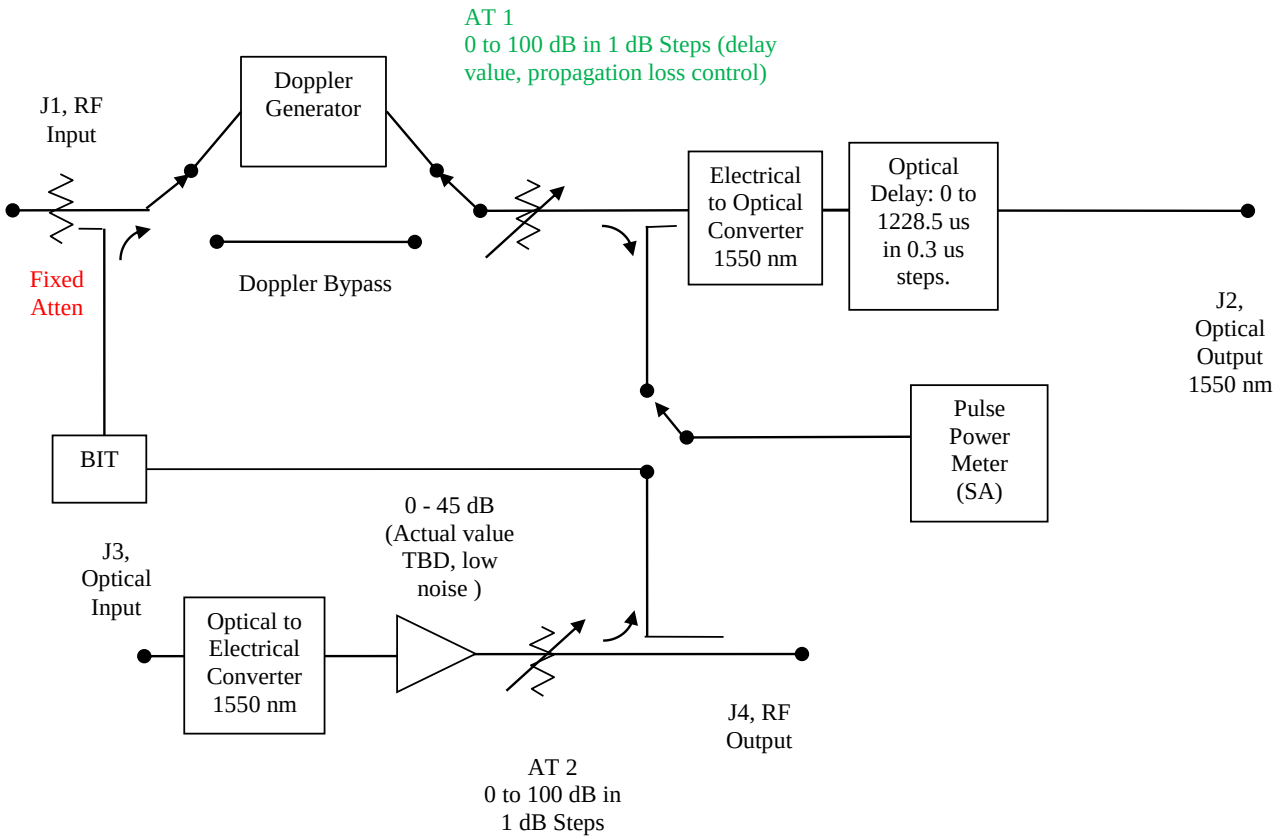
Parameter	Specification	Notes
Iput/Output Isolation	60 dB	Minimum
Accuracy	1 %	Optional 0.5%
Repeatability	0.1%	At constant temperature
Minimum System Loss	0.5 dB/km	Typical, @ 5 GHz
VSWR	2 : 1	Maximum
Spurious Free Dynamic Range	100 dB/Hz$^{2/3}$	Minimum
1 dB Input Compression	-15 dBm	Minimum
Noise Figure	25 dB (13 dB Typ.)	Maximum (Lower NF optional)
Input/Output Impedance	50 Ω	Nominal
Dimensions	19” Rack Per EIA-310-D	**12U, 18” - 22” depending on design**

Typical System Performance:

- **Frequency Range: 0.1 to 18 GHz**
- **Target Range: 0 to 160 km**
- **Step Size: 100 m**
- **Doppler: 0 to 50 kHz in 1 kHz steps**
- **Full spectrum analysis**
- **Optical Tap**
- **Removable Hard Drive**
- **Interferer Injection (Jammer)**
- **Target Speeds to 10,000 MPH**

Radar Target Simulator

Block Diagram



- Delay and Link Gain/Loss @ 11 GHz: + 6 dB – 0.1 dB/us fiber loss