

ViSAR Program Test Plan  
For Radar operation in El Segundo and Palos  
Verdes California

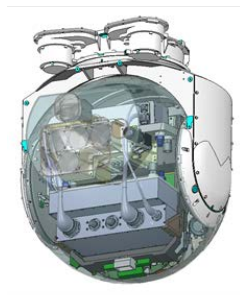
## 1.1 Scope of this document

This document is intended to provide an overview of the proposed testing of the Video Synthetic Aperture Radar (ViSAR) system in El Segundo California.

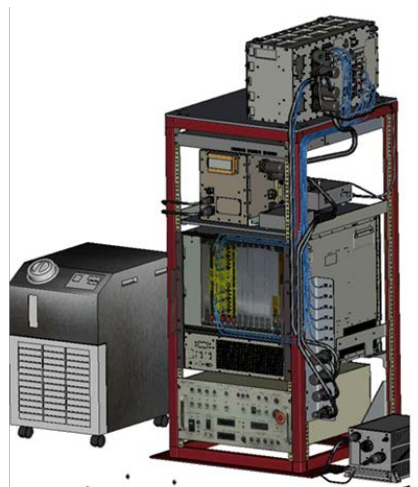
## 1.2 Background

The ViSAR Radar System is millimeter wave radar that operates from 231.5 GHz to 235 GHz. The purpose of the ViSAR Program is to develop an all-weather air to ground imaging and Dismount Moving Target Indication (DMTI) millimeter radar system. The objective ViSAR Radar System will operate in an AC-130 gunship and will be used to identify and track vehicles and dismounts through fog, smoke and clouds. Additional goals of the objective ViSAR Radar System are fire control and friend or foe identification, using RF ID. The demonstration ViSAR Radar System was designed to be installed in a DC-3 aircraft, to detect moving dismounts, moving ground vehicles and produce SAR images at an update rate of at least 5 Hz through fog, smoke and clouds. The ground testing of the ViSAR system will be performed installed on the Raytheon Mobile SIL which is a 25' trailer with equipment bays and analysis workstations.

The ViSAR hardware consists of sensor hardware mounted on a Gimbal and back-end processing hardware mounted in racks. The gimbal mounted hardware includes the: Gaussian Optical Antenna (GOA) Array, Up/Down Converter, Medium Power Amplifier (MPA), High Power Amplifier (HPA), Inertial Navigation System (INS) and a Spotting Camera. The back-end rack mounted hardware includes an X-Band Receiver/Exciter (REX) a Common Integrated Signal Processor (CISP), an Annapolis Signal Processor and a Radar Power Supply (RPS). The system transmits 50 Watts through a mechanically scanned GOA. The gimbal, and the Gimbal mounted hardware will observe the ground from the side of the aircraft. The gimbal mounted hardware is shown in Figure 1.



**ViSAR Turret**



**Rack Electronics**

## Figure 1 The Gimbal and Rack Mounted ViSAR System

### 1.3 Facilities Location

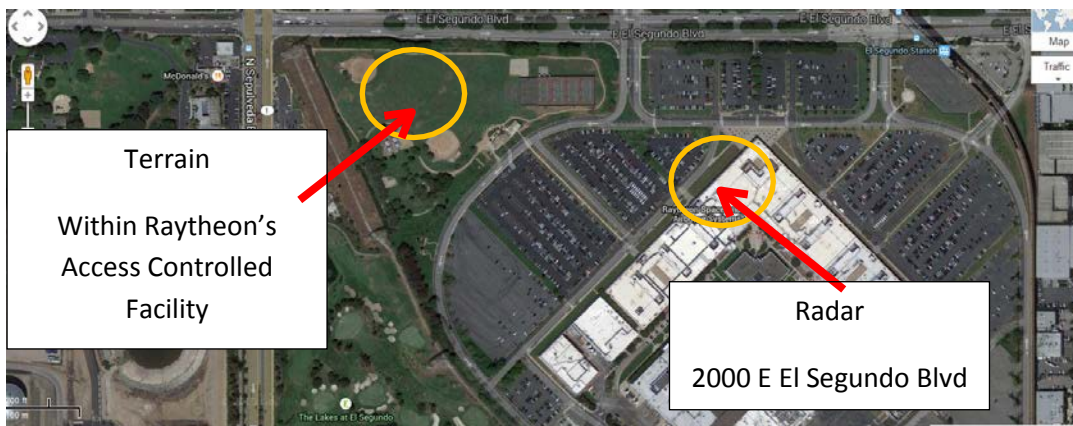
ViSAR integration and test activities will be performed primarily within the Radar System Integration Laboratory (RSIL) located in the E1 building at Raytheon Space and Airborne Systems, El Segundo CA, at 2000 E. El Segundo Blvd

Test targets will be installed on the roof of another nearby Raytheon facility (R9) located approximately 2 kilometers to the north of the RSIL at 2222 E. Imperial Hwy. See Figure 2.

The ViSAR system will also image some of the terrain located within the confines of the Raytheon facility as shown on figure 3.



Figure 2 Location of the Radar and Targets



### Figure 3 Location of Terrain to be Imaged

Dynamic ground testing will be performed in Palos Verdes, CA utilizing the Raytheon Mobile SIL. A photo of the Raytheon Mobile SIL is shown in Figure 4. The Mobile SIL will operate on shore power and generator power with the gimbal and rack mounted electronics equipment installed inside. The Mobile SIL will be used to collect dynamic navigation data and radiate to collect radar data. The candidate roads for useful data collections are elevated and provide an unobstructed view of image areas at a depression angle in the tens of degrees to steeper at stand off ranges of 1-3 km. The potential regions for testing the ViSAR in the Mobile SIL are shown in Figure 5.



Figure 4: Raytheon Mobile SIL



Figure 5: Potential areas for Mobile SIL Operation

## **1.4 Radar Specifications**

Center Frequency: 233.25 GHz

Bandwidth: 3.5 GHz (231.5 to 235.0 GHz)

Modulation type: Linear Frequency Modulation

Peak Power: 50 Watts

Transmit duty: 45 %

Antenna Azimuth Beamwidth: 1.4 degrees Antenna

Elevation Beamwidth: 1.4 degrees

## **1.5 Points of Contact**

The following personnel are available in the event that the ViSAR system needs to shut down or remain powered off.

Brian Lloyd 310 616 1264 lab phone 800 316 0410 pager

Fred Dominski 310 334 6378 desk

Seong Kim 310 647 4113 desk