

## RISS: Real-time IR/EO Scene Simulator

### RISS Programmable Sensor Emulator

A programmable interface for direct signal injection into IR/EO sensor systems

**RISS Programmable Sensor Emulator (PSE)** is a real-time image processing system that provides an interface between a real-time image generator and sensor system hardware. The PSE provides synchronous real-time image processing for EOIR sensor emulation, direct sensor signal-injection formatting, and sensor scene projection pre-processing.

#### PSE Features

The capabilities of the PSE were developed to satisfy the unique requirements associated with real-time EOIR sensor emulation, graphics systems interfaces, and hardware-in-the-loop testing. The PSE provides all of the tools needed to develop a complete digital emulation of by-passed sensor components; the fidelity of the emulation is data-driven. The precision and dynamic range of the input imagery is preserved by the PSE processing pipeline, unlike sensor simulators used for cockpit trainers and other operator displays. Because the PSE is programmable, only the specific electrical interface to the sensor processing subsystem needs to be customized in a Signal Injection Module (SIM).

PSE Features Include:

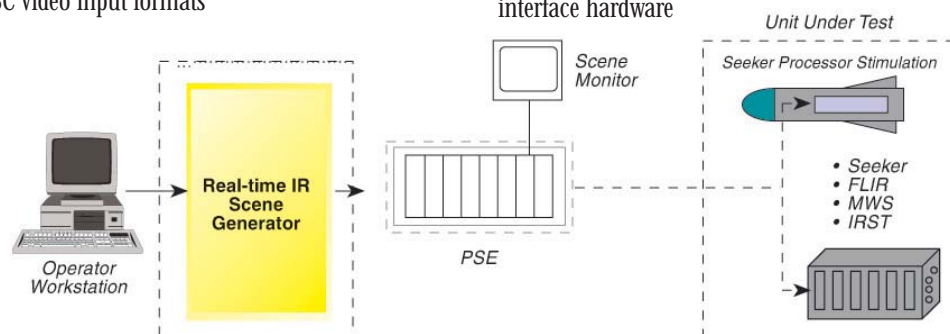
- Precision convolution, displacement and pixel processing
- Low latency, synchronous, high-throughput image processing
- User-configurable frame rate, frame sizes, processing functions, resolution, and fidelity
- Sensor optics distortion modeling
- Compatibility with the FLIR92 sensor modeling tool
- Compatibility with SGI's DDO2 and the Digital Visual Interface (DVI) standards for image input and output
- Also supports Fiber-optic output and SVGA and NTSC video input formats



#### PSE Benefits

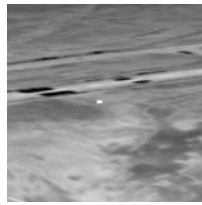
The **Programmable Sensor Emulator** offers a number of benefits to hardware-in-the-loop laboratories, system integration laboratories, installed system test, production, maintenance and training facilities.

- Programmability and reuse - The graphical user interface (GUI) control and configuration software allows the operator to reprogram the image processing pipeline for various sensor and hardware-in-the-loop test configurations
- Reduced HWIL facility costs the PSE can be configured to support many different sensor systems. The design of the PSE pipeline provides re-useable high performance processing hardware at significant cost savings compared to other off-the-shelf systems
- Improved customer response time - Test facilities can quickly respond to customer needs and requirements through PSE reprogramming and SIM development
- Easy integration with custom interface hardware - The use of COTS interfaces, bus architectures, and open standards allows for easy development and integration of custom-built and sensor-specific interface hardware



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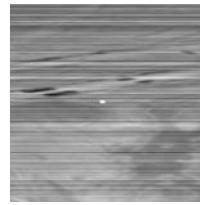
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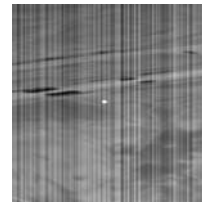
*Input Image*



*Pixel Noise*



*Row Noise*



*Column Noise*



*Non-uniform Response*

### PSE Real-Time Processing Functions

Functionally, the PSE includes off-line modeling tools, an operator interface, a real-time processing pipeline, and instrumentation capabilities. The core of the PSE system is the real-time processing architecture, which provides the following capabilities:

Real-Time Functions	Modeled Effects	PSE Capabilities
Modulation Transfer Function (MTF) Optical Distortion	Window/optical MTF Detector MTF Electronics MTF Pin-Cushion, Barrel or custom distortion	High-speed, high fidelity image convolution with per-pixel spatial translation MegaPixel image size Up to 16x16 kernel size Kernel variation over the FOV Up to 75 Mpixel/sec throughput
Noise and Pixel Effects Pixel Transfer Functions	Detector/electronic noise	High-speed, high-fidelity pixel processing Fixed noise Signal dependant noise 3-D (temporal) noise modeling Temporal integration Per-pixel gain/offset functions Fixed-word pixel quantization
Gain Control	AGC-automatic gain control	Sensor gain and offset updates via interface options (e.g. SCRAMET, Ethernet, etc.)

#### ***For more information, please contact:***

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