SCI-2k

Portable Signature Imaging System

An Innovative Product from

Sensor Concepts Inc.

The **SCI-2k** is the only Portable RCS Imaging System designed specifically for use in the field for aircraft, ship and component imaging.

Fielding aircraft with controlled signatures provides a dimension of difficulty for maintenance. Normal repair and maintenance procedures, such as simply opening and closing an access door, can create signature defects. Signature degradation can also develop from normal wear and tear of splices, joints, seals and their associated bond lines as the aircraft flexes and ages.

Repair of battle damage brings another dimension to the problem, where signature control of the airframe can be violated by a major repair at the depot.

SCI addresses these problems by providing the best portable imaging solution: the SCI-2k. The SCI-2k is the only system which combines whole body and zone evaluation regimes with full data accumulation and manipulation software suites into one package. The ability to allow the maintainer or engineer to measure the target area and review that information with an intuitive overlay, or store for later evaluation, is critical to any program's signature health, both short and long term.

The SCI radar design is particularly well suited for field based diagnostic measurements because of the inherently less complicated design that employs a continuous frequency sweep that generates all frequencies within a designated range. This takes advantage of advancements in digital signal processor (DSP) technology. The sensor, based on very successful architecture, is a relatively simple and robust radar concept that uses a lightweight, low cost, linear frequency modulated (FM) homodyne radar. Perhaps the most important fact is that armed services and defense contractors have successfully employed the SCI radar for applications in aircraft, ship and component imaging.

Client Applications

Standard Rail Configuration

Hanger Measurements

Elevation Measurements

Helicopter & Fixed Wing Applications

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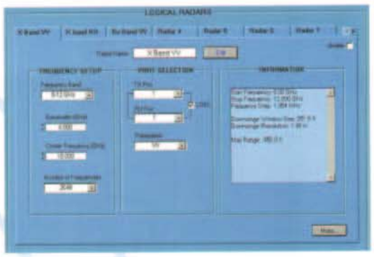
SCI provides expertise in RCS measurements with emphasis on imaging system, data reduction and analysis, algorithm development and most importantly, field measurements. The SCI team defines the best possible technical approach to maximize program success. SCI has provided the optimal hardware, software and measurement methodologies in order to adapt to each program's individual needs.

The **SCI-2k** introduces the "Logical Radar" which allows the user to define up to 16 logical radars, each of which can be separately configured for:

- Frequency, span, center
- Gate size (both hardware and software)
- Attenuators
- Input/output ports.

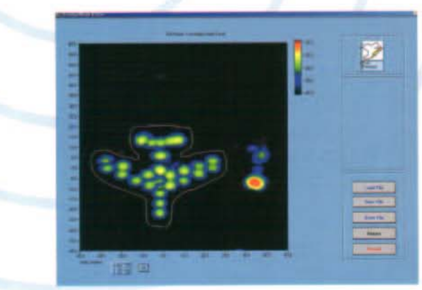


Each frequency band is configured independently and user-definable setups are available for saving all radar settings. These system setup files can be recalled to automatically configure the radar.

This system supports subband frequency sweeps that are optimal for the fastest possible measurements and includes a random PRF capability. The **SCI-2k** incorporates hi-speed RF switches and RF attenuators that allow the collection of multiple frequency sweeps "on the fly." All Logical Radars use common acquisition parameters such as angle sample increment and measurement speed. During data acquisition, the Logical Radars are switched sequentially in the order they appear in the tabs shown above.

User Friendly Interfaces

SCI excels in developing and providing a user-friendly software package that includes data acquisition and data reduction. Emphasis is placed on creating a simple user interface to allow the system to be operated by the customer with minimal training.



The mask filtering option, often referred to as Image Edit and Reconstruct Package allows the user to define a region, or a series of regions within an image. The information in this region can either be included or excluded during the filtering process.

The mask may be a predetermined element, i.e. landing gear or inlets, or an intuitive mask generation tools such as freehand, lines, rectangles, ovals. Alternately, point by point geometric definition masks may be applied to the imaged region of interest. The defined zones may be included or excluded. Mask filtering can be automated for use in repetitive measurement scenarios such as defect determination zonal datasets.

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Sensor Concepts Inc.

Data Reduction Software:

X-Y Plots
- RCS vs. Aspect
- RCS vs. Frequency
- RCS vs. Downrange/Crossrange
- Global RCS
- Global Downrange

Imaging
- Polar Reformat Algorithm
- Data Windows:
  - Rectangular
  - Hanning
  - Hamming
  - Kaiser-Bessel
- Zero Padding (x1, x2, x4)
- Image Comparison
- Image Overlay

Data Manipulation
- Motion Compensation
- Mask Filtering
- Near Field to Far Field
- Auto Registration

System Specifications

Frequency Coverage	2.0-18.0 GHz in 3 bands (2.0-8.0, 8.0-12.0, 12.0-18.0 GHz) (0.2-2.0 GHz optional)
Receiver Type	Homodyne
Modulation Type	Linear FM (with continuous phase lock)
# of Channels	1 (with up to 8 TX/RX ports)
RF Power Output	+ 15dBm (Nominal)
Hardware Gating	PRF: 2.0 MHz max
Transmit Pulse Width	10 ns min, 500 ns max
Receive Gate Width	10 ns min, 500 ns max
Random PRF Variation	±10% of center PRF max
Attenuators	0-40 dB minimum (RF, TX, & RX) 0-30 dB in 1 dB steps (IF)
Frequency Chirp Rate	80/sec max (2GHz or less Bandwidth)
Bandwidth	4 GHz max
# of Frequencies	2048 max
A/D Converter	10 MHz 12 bit (resides in computer)
Measurement Distance	400' max
Receiver Sensitivity*	-130 dBm (normal; 16.0 ms chirp)
Frequency Stability	±0.1 ppm
System Stability**	±0.5 dB amp /±1 deg phase over 2 hrs
Size	20" x 17" x 7" (4U) nominal
Weight	32 lbs nominal
Power	120V/60Hz @ 1 amp nominal

*Assumes a 20 ft. target zone extent.
**After one hour warm-up at 25° C.

Computer

Processor:	Pentium class (500mHz or greater)
Internal bus:	PCI/ISA
RAM:	256 Mbytes or greater
Operating System:	Windows ® 2000
Onboard DSP:	Analog Devices 21060 (single PCI card with A/D converter and 6 processors)
Storage Device:	2ea. Removables (9 Gbyte or greater)
Case Style:	Tower, desktop or rackmount
Power:	120V/60Hz @ 1 amp nominal