

# SIROCCO

## *HIGH PERFORMANCE DIGITAL VIDEO RECORDING SYSTEMS*

High Speed .....	<input checked="" type="checkbox"/>	500 to 4,000+ frames per second
<i>Smaller Point Six systems Available for frame rates starting at 200 fps.</i>		
High Resolution .....	<input checked="" type="checkbox"/>	HD-SDI; up to 4Kx4K
Long Duration .....	<input checked="" type="checkbox"/>	15 minutes to 10+ hours
Simultaneous Play-Back ....	<input checked="" type="checkbox"/>	<b>While Recording!</b>
Uncompressed.....	<input checked="" type="checkbox"/>	Standard

**In ONE integrated package**

**Introducing the Sirocco High Performance Digital Image Capture, Control, Management and Storage system from PsiTech.**

**Now: Capture High Definition Slow Motion for *HOURS*, non-stop beginning at 500 frames per second, 1280x1024 resolution.**

***ABSOLUTELY NO IMAGE LOSS – Images Are Not Compressed!***



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Image Capture Without Compromise™*  
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## PERFORMANCE FEATURES INCLUDE:

- **Ability to fully modify the camera configuration, remotely.**
- **Ability to control the camera lens by remote GUI (graphical user interface).**
- **Ability to control the camera over the internet (via encrypted link). You can be *continents* away from the test site**
  - **Control – focus, zoom, exposure, iris, pan & tilt**
- **Lens is fully controllable by programmable production controllers (i.e. “Shot Box”, or “Cue Controller”).**
  - **Control – focus, zoom, exposure, iris, pan & tilt**
- **HD output formats available:**
  - **720I, 720P, 1080I**
- **Bandwidth power: Recording levels start at 1.2 GigaBytes per Second. Can easily scale up to 8<sup>+</sup> GigaBytes per Second.**
- **TCP/IP Control.**
- **The control system (Real Time Storage System or “RTSS”) can be 6 miles away from camera (Interface Converter or “ICON”) without repeaters, 30 miles away with repeaters.**
- **Non-volatile storage – streams straight to disk, not RAM.**
- **Scalable Data Retention Modules: Mag-Carts™ from 750 GBytes to 12 TBytes. *Dimensions Remain the Same for Any Capacity!***



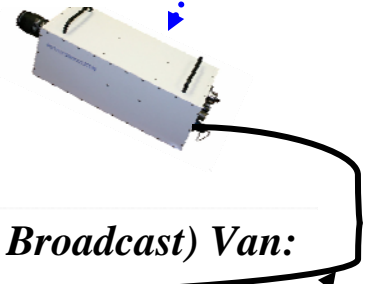
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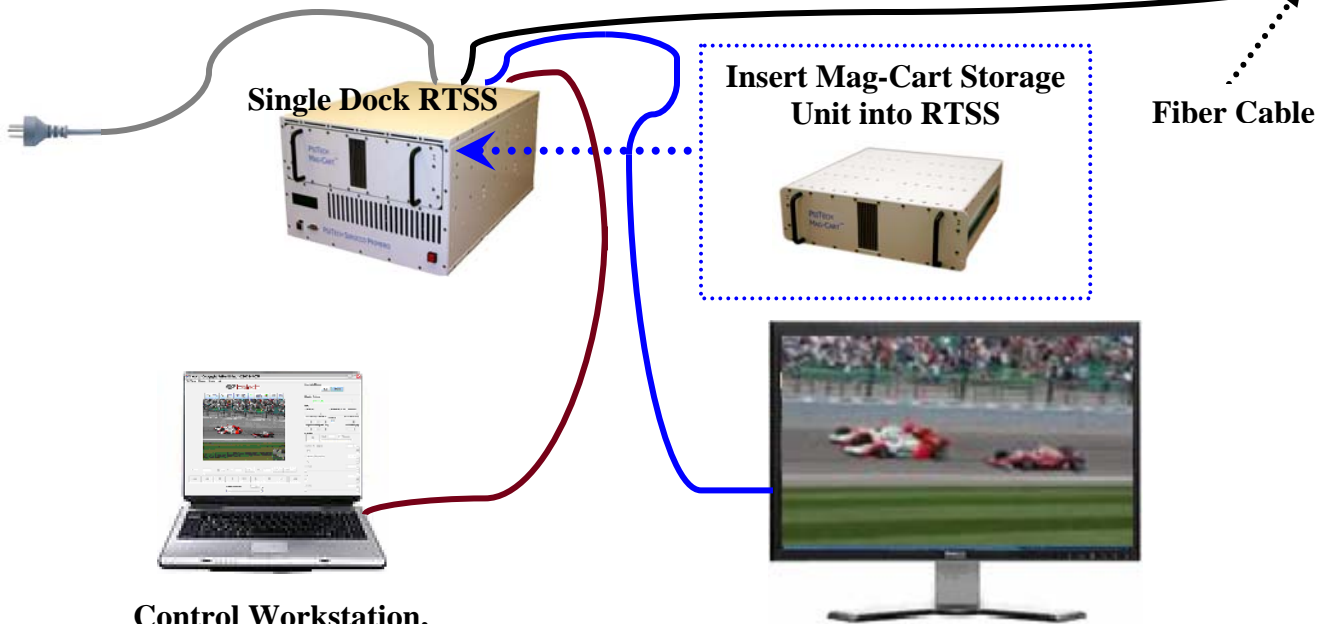
# REPRESENTATION OF SYSTEM - EXAMPLE APPLICATION



**ICON Interface Converter.**  
Includes Camera Lens and Imager  
embedded in sealed unit.



*Away from camera location – e.g. OB (Outside Broadcast) Van:*



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- **Great for Super Slow Motion – record for long periods of time (hours ...) at high frame rates; replay at one millisecond intervals (or less).**
- **Convenient Copies for Digital Dailies.**
- **Real Time Broadcast and Data Transfer.**

**Efficient for Test Range Applications – Economical, Fast & Long Duration.**

When the Space Shuttle Discovery returned to flight in 2005, two of the cameras tracking the launch were the Sirocco cameras made by PsiTech. The Siroccos captured high resolution images of the spacecraft for 4 minutes from launch, at a breath-taking 500 frames per second (fps).



**Sirocco Primero 2.10 on tracking mount at Kennedy Space Center**

Applications for the Sirocco system include those data intensive applications where more recording speed and resolution is needed than is available through standard systems, and where image analysis is critical. These applications include high speed imagery, slow motion HD, special effects design for feature film and television productions, sports broadcasting, target detection and identification, vehicle crash testing, vehicle and weapons tracking (as was demonstrated by the tracking of Discovery’s 2005 launch) and critical surveillance applications. The ability to move vast amounts of data at high speeds from remote areas to central processing sites or production studios opens the way for tremendous capability and efficiency gains.



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*Sirocco is **turnkey** ready – just attach your lens of preference, attach to your personal computer and you are ready to capture, review and evaluate high-speed events!*

PsiTech's Sirocco captures digital imaging data at the highest possible rates and makes it available both as a real time HD (or SD) Broadcast Feed and as Non Linear Storage on Removable/Replaceable Mag-Carts™. Mag-Carts™ can be read by any other editing or analysis system using industry standard protocols.

Use the Sirocco digital system to eliminate the environmental damage caused by film, and the expense to dispose of film, and gain immediate control over the images – no film processing.

Sirocco is more than a high performance camera system; it is a high speed digital imaging suite.

**The Sirocco Imaging Suite:**

1. **ICON** – a remote camera interface converter;
2. **RTSS** - real-time storage system & memory management;
3. **Mag-Cart™** – storage device.

Based on Supercomputer hardware, Sirocco's image resolution is limited only by the characteristics of the imaging sensors that are available. As the capability of the imaging chips increases, so to does Sirocco resolution.

Sirocco's architecture is designed to prevent bandwidth from ever being a bottleneck through the use of a proprietary switch on its data buses, so that digital information can be moved at more than 1.2 GBytes a second. In plain English, traditional bus systems function like single lane freeways; fine when you've got one car (data byte), but prone to traffic jams when too many vehicles (data bytes) are trying to use the same road. By using PsiTech's switching technology, the Sirocco results in a multi, multi lane freeway where cars (data bytes) can be switched to clear lanes as needed. This is why its digital recording systems can operate at more than 1.2 GB/second. Actually, the 1.2 GB speed only exists if you are using one module. Add more to the Sirocco system and the data rates go up!

**Graphical User Interface (GUI):**

The Sirocco system can be controlled by the Local GUI mode, and remotely via an Ethernet connection. Any GUI on the network can control the Sirocco system. However, only one can be the master (i.e. take active control of the camera and recording operations). Any other GUI can access the disks and display images, etc.



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# The Sirocco Digital Imaging Suite:

## I. ICON (“Interface Converter”) – Remote Camera Interface

The ICON interfaces to high-speed cameras and converts the camera output data to a single channel fiber communication link (VSR192, SR192 or LR192).

**There are four versions of the ICON available. Each of the four versions comprises the following basic features:**

- GPS/IRIG Time Stamp
- Thermal Electric Coolers for Harsh Environments
- GByte Fiber Interface
- Exposure Control
- Frame Rate Control
- Gain Control
- Lens Control Option – Focus and Iris
- Dual RS422 Control Ports
- Sealed Connection Housings
- Fiber Communication Link (Dual-fiber, single mode 6-mile (9.7 km) link standard, capability to upgrade to 24 or 48-mile link (38.6 or 77.2 km).
- Local “Viewfinder” Option



The four versions of the ICON are –

ICON-C	ICON-CBW	ICON-HD	ICON-CL
High-Speed Color Imager	High-Speed Gray Scale Imager	HD/SDI Single Link Input	Camera Link Input
Up to 4,000 Frames per Second (fps)	Up to 500 fps	Formats Available: ➤ 720 I ➤ 720 P ➤ 1080 I	Base & Full
1280 x 1024 pixel resolution	1280 x 1024		



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## II. RTSS (“Real-Time Storage System”) - High Speed Digital Imaging Memory Management

PsiTech’s Sirocco RTSS was the first High Speed Digital Imaging Memory Management System specifically designed for *long duration, high resolution* digital video.

The RTSS provides variable rate real time monitoring, recording and playback of camera images. It receives OC192 image frames from the ICON via fiber cable and displays these on a system monitor while simultaneously storing the images to disk. Once the images have been recorded to disk, the RTSS can present the images via its Graphical User Interface. Similarly, the images can be transferred via a Gigabit Ethernet Port.

### Four versions of the Sirocco are available – one for every speed!

1. The **SIROCCO 2.10 PRIMERO** records at 1.2 gigabytes per second, capturing 1000fps. The RTSS is the data management controller and serves as the network adapter. It streams images directly to disk - the removable /replaceable Mag-Cart™ storage cartridge.



2. The **SIROCCO Dual** matches the performance of the Primero, with added benefits including two docks for double the storage capacity of the Primero and the Dual allows for high-speed duplication of the Mag-Cart™ storage system.



3. The **SIROCCO 2.10 POINT SIX** records high resolution imaging at up to 500 fps. Like all of the **SIROCCO’s**, the **Point Six** uses the same user friendly GUI network controls and the same Imager Personality Modules. No additional training burden is required learning different controls. And, with identical Imager Personality Modules, you have the maximum flexibility and continuity.



4. The **NEW SIROCCO 2.10 QUATTRO** offers a blistering four times the bandwidth (up to 4000 fps) of the **SIROCCO 2.10 PRIMERO**. Ideal for image fusion (IR and Visible) and multi headed imaging, the **SIROCCO 2.10 QUATTRO** saves both rack space and budget when compared with other approaches. Now, one **SIROCCO** can capture high speed high resolution digital video data from all of the imagers on a tracking mount.



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### III. MAG-CART™ (Removable/Replaceable Digital Video Media) – Storage



Storage Capacity	
Standard Configuration	Available Options
750GB	1.5TB, 3TB, 9TB, 12TB

#### Key Features:

- Various Storage Capacities - Universal Interface
- 750GB; 1.5TB; 3TB; 9TB; 12TB
- Easy Transport from Range to Analytical Work Stations
- No Download Time Wasted
- Operates With Range Network Transport
- Real Time Analysis Option
- Duplicate Dataset
- Accelerated Analysis - Multiple Workstations
- Archive Media
- Hot-Swappable

STORAGE CAPACITY ALTERNATIVES			
MAG-CART™ SIZE	PRIMERO 1.2-1.6 GBytes/sec @ 500fps <sup>(1)</sup>	PRIMERO 1.2-1.6 GBytes/sec @ 400fps <sup>(1)</sup>	PRIMERO 1.2-1.6 GBytes/sec @ 200fps <sup>(1)</sup>
750 GBytes	15.0 Minutes	18.75 Minutes	37.5 Minutes
1.5 TBytes	30.0 Minutes	37.5 Minutes	75.0 Minutes
3.0 TBytes	60.0 Minutes	75.0 Minutes	150.0 Minutes
9.0 TBytes	(2)	225.0 Minutes	450.0 Minutes
12.0 TBytes	(2)	300.0 Minutes	600.0 Minutes

Notes: (1) – Performance levels are based on 1280x1024 resolution. Changes in frame rates or resolution have linear impact on duration.

(2) – 9.0 and 12.0 terabyte Mag-Carts are not available for frame rates above 400 frames per second.



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## Standard Features of Any Sirocco System You Select Include:

- Rugged, Reliable Design, Compact, Standard Bench Top or Rack Mount Data Systems
- No Compression or Calibration Data Loss
- Remote Operation, Gigabit Network
- HD-TV Format Data Streaming Options
- On Board Imager Calibration Option Provides Best Quality Images Over Entire Life
- Color or Grayscale B/W Options
- Range Annotations - Dynamic MetaData Input
- Mag-Cart™ Removable/Replaceable Hot Swappable Data Storage Modules
- 500-4000 FPS Ultra High Resolution for 3 Minutes to 20 Hours Continuous Operation
- Automatic Shutter Controls
- Internal Solid State Temperature Controls & Environmental Systems Monitors
- Raw Image Data Available for Analysis
- Java Native Controls/Network Ready Operating System Independence
- Field Upgradeable With New Imager Heads
- IRIG and GPS Coding on Each Frame Segment To Ease Data Analysis/Integration
- F-Mount or C-Mount Lens Options
- Dynamic Adjustments for Continuous Resolution Controls
- Multi Camera Controls Using Either Linux, Sun, SGI, MAC or MS Windows Mac, or MS Windows
- Utilities for converting the image files and single frame images into various standard formats such as DPX, TIFF, JPEG, MPEG, etc.



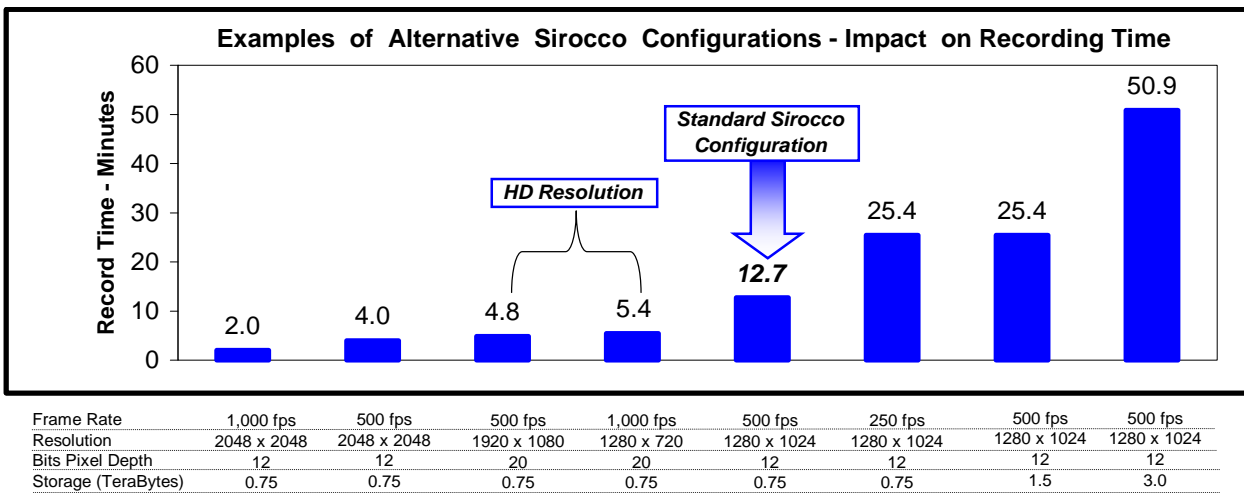
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## Optional Features - Sirocco System's Strength & Differentiation:

Tremendous flexibility is built into the Sirocco system. As the standard Sirocco Primero system records at 1.2 GigaBytes per second, key performance features can be expanded as needed. Whether we need to incorporate higher resolution levels, higher capture speeds in terms of frames per second, longer recording durations, increased pixel depth, or combinations of the above, the proprietary bandwidth management technology provides the user significant control over the specifications.

The following chart illustrates alternative scenarios available from the Sirocco system – some scenarios are achieved by adding additional modules to the standard, entry-level system.



The customer can state their preference for the various key performance features, and PsiTech can in turn deliver a Sirocco system specific to their needs.

Maximum frame rates for image capture, and maximum resolution, are only limited by Sirocco's bandwidth power. Based on entry-level recording speed of 1.2 GigaBytes per second, the customer can trade-off between expanded frame rates and resolution. More importantly, the system is highly modularized – multiple systems can be joined to linearly expand the capability.

For example, for the entry-level product, frame rates can increase to 8,000 frames per second, with resolution of 1280 x 64. Alternatively, at 500 frames per second, resolution of 4K by 4K can be achieved by linking 10 additional modules to the entry-level unit.



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## Typical Applications of the Sirocco System:

Applications for the Sirocco system include those areas where long duration recording at high frame rates is important, at more resolution than is available through High Definition systems, and where image analysis is critical. These applications include:

- high speed imagery
- ballistic missile testing
- special effects design for feature film and television productions
- slow motion HD
- Vehicle tracking
- weapons tracking (as was demonstrated by the tracking of a Space Shuttle launch)
- sports broadcasting
- vehicle crash testing,
- critical surveillance applications

The Sirocco system is a very flexible, modular system –there are a wide range of possible configurations and options.

Control the camera by looking through the lens using the control workstation. May be located continents away from the test site – anywhere an internet connection is available. Control over an encrypted link.

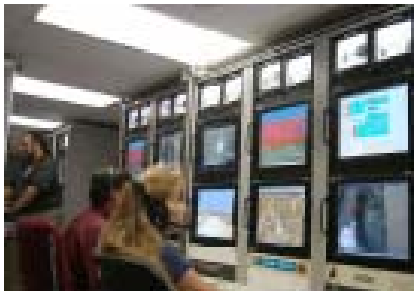
### Installation Examples



**ICON & RTSS on tracking mount at a ballistic missile test range**



**Sirocco 2.10 Primero in Range Van (~ OB Van) at ballistic missile test range.**



**Tracking Systems**



**Range Van RTSS (Real-Time Storage and Display)**



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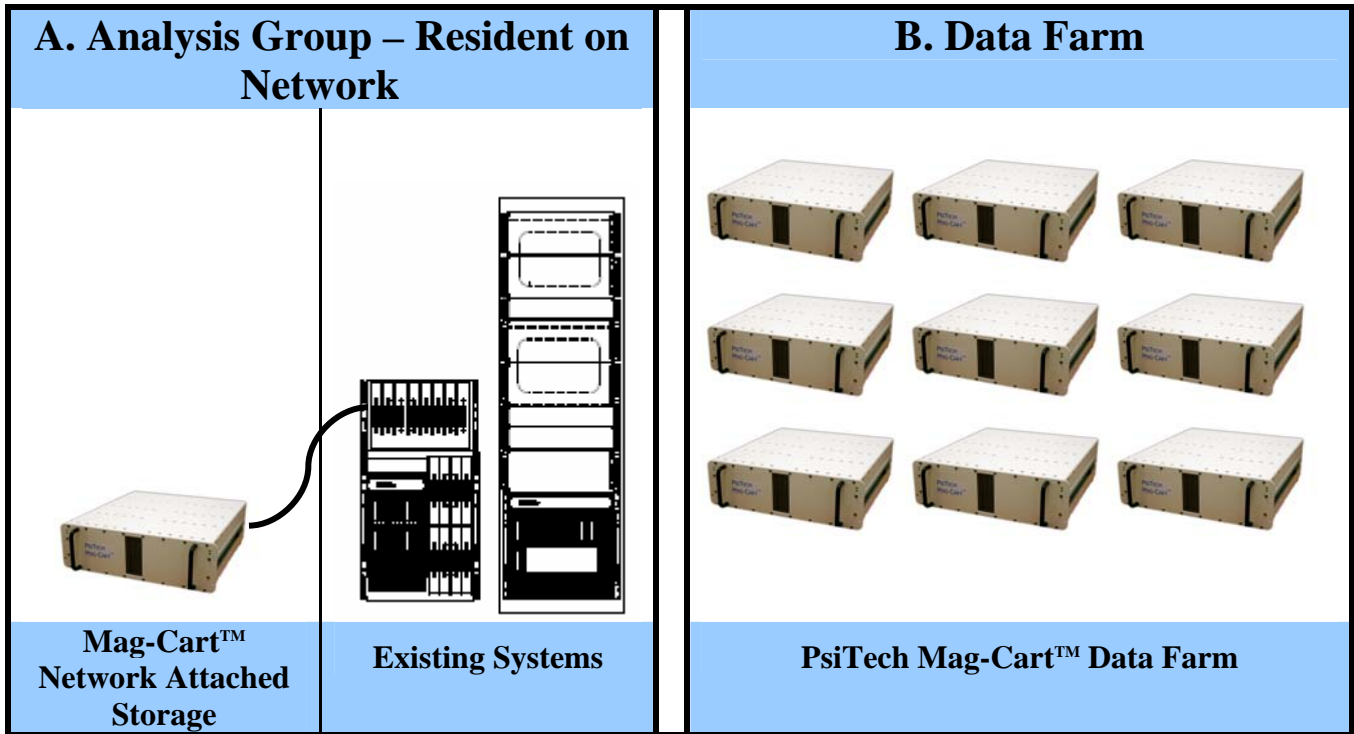
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## Further Discussion Regarding Applications:

In addition to an imaging system, Sirocco also functions as Network Attached Storage to allow you to widely use the system in a multiple of formats and to archive the image data as well, remaining in the same medium throughout!

Images captured during recording are fully integrated with the storage capabilities of the Sirocco system via a multi-tiered, scalable data storage array. This provides tremendous savings in time, money and efficiency – and also provides maximum data security ... there is no risk of lost or impaired data. i.e. no temporary storage! The same data cartridge is used for image capture and storage – images come right off the camera, streamed directly to disk (rather than much more expensive RAM, as is the case in traditional “CamRAM” based high-speed digital camera systems) and are available in the same device for the analysts.

Two alternative storage strategies among those available include A – Analysis Group, whereby the added PsiTech Mag-Cart™ can be integrated with existing systems so that full duplication can be achieved, and B – a Data Farm maximizing security, eliminating redundancy and cost:



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In the life of “filming” any event, there are two distinct tasks: the actual recording of the event, and the storage of the image data. Traditionally, the image data is handled very differently among these two tasks (i.e. data has to be moved from temporary storage to permanent storage – very time consuming, expensive and risky from a data loss perspective). In the case of the Sirocco system, both tasks are managed effortlessly and consistently. The data captured during the “shoot” is immediately streamed to the storage disks and available on the network for data analysis.

### DATA STORAGE MANAGEMENT

#### SIROCCO’S APPROACH

- **Access Dynamics – “2 Tiers”**
  - 100% Direct Access Speed
  - 100% Archive Access
  - No Need for Complex Data Migration Protocols
- **Security**
  - Absolute Physical
  - Sequestered by Classification
  - Back-up & Recovery Easy
- **Scalability**
  - Linear
- **Cost**
  - Almost No Overhead

#### TRADITIONAL METHOD

- **Access Dynamics**
  - Multi-Tiered Storage
  - Requires Complex Data Migration Protocol
- **Security**
  - Software Selection
  - “Controlled” by Classification
  - Back-up & Recovery
- **Scalability**
  - Dynamic
- **Cost**
  - High Systems Overhead

### *Sirocco - The PsiTech Family of High Performance Digital Video Recording Systems:*



General Specifications		
	Weight	Dimensions
ICON	35 lbs (15.9 kg)	9" (H) x 8" (W) x 22" (L) (22.9 x 20.3 x 55.9 cm) with connectors and handles
		7" (H) x 8" (W) x 20" (L) (17.8 x 20.3 x 50.8 cm) without connectors and handles
RTSS - Single	40 lbs (18.2 kg)	10.5" (H) x 17" (W) x 24" (L) (26.7 x 43.2 x 61.0 cm)
RTSS - Dual	45 lbs (20.5 kg)	17.5" (H) x 17" (W) x 24" (L) (44.5 x 43.2 x 61.0 cm)
Mag-Cart™	40 lbs (18.2 kg)	5" (H) x 17" (W) x 24" (L) (12.7 x 43.2 x 61.0 cm)

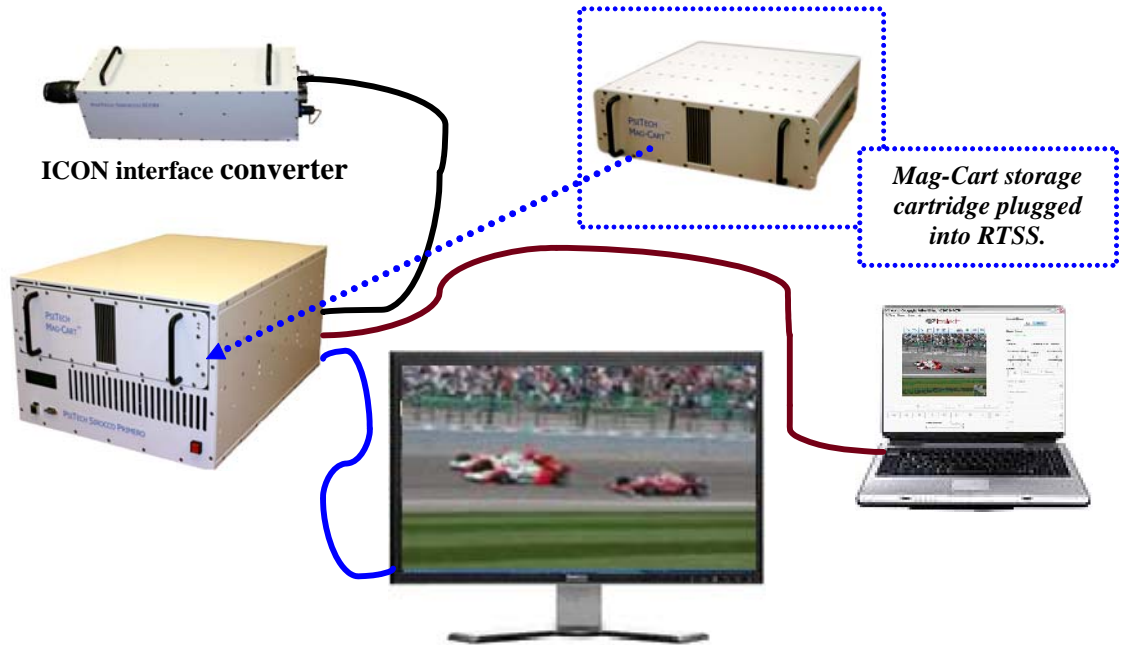


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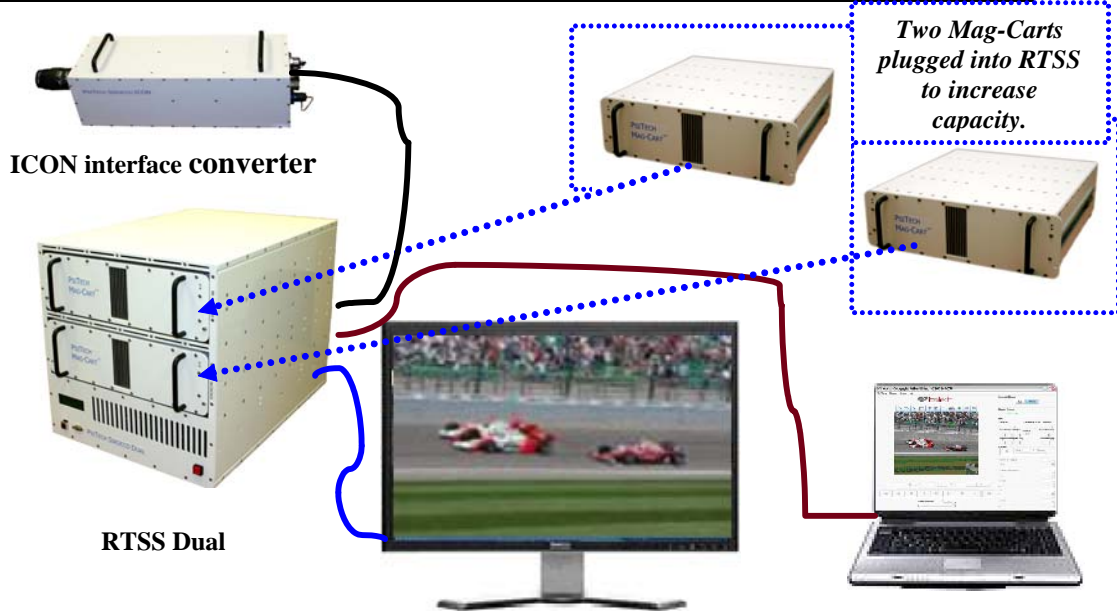
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## Two Alternative Sample Configurations:

### I. Sirocco Primero



### II. Sirocco Dual



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## **PsiTech – A Track Record of Performance**

PsiTech has been providing high performance imaging solutions for over 25 years.

We've built image display, capture and management systems for a number of mission critical applications including those in Strategic Air Command, Jet Propulsion Laboratory, and the U.S. Air Force.

Our imaging systems help sort the mail in the US, UK and Australia. And feature films have utilized our systems for the development of special effects.

We are committed to providing end-to-end turn-key imaging solutions to meet your specific requirements.

Contact us for more information.

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