

Model  
2547

500 MS/sec RF/IF

Talon RTR  
Rugged Recorder

Small Form  
Factor

## Features

- Housed in a small chassis: 5.25" H x 8.5" W x 14" D
- Weighs 17 lb (7.7 kg)
- Shock and vibration-resistant SSDs perform well in vehicles, ships and aircraft
- 500 MHz 12-bit A/Ds or 400 MHz 14-bit A/Ds
- 800 MHz 16-bit D/As
- 200 MHz record and playback signal bandwidths
- Real-time aggregate recording rates of up to 2.0 GB/sec
- DDC decimation and DUC interpolation range from 2 to 65,536
- Up to 200 MHz record and playback signal bandwidths
- Recording and playback of IF signals up to 700 MHz
- Up to 61 terabytes of SSD storage
- Windows® workstation with Intel® processor
- SystemFlow® GUI virtual instrumentation panel
- File headers include time stamping and recording parameters
- Optional GPS time and position stamping



## General Information

Optimized for SWaP (size, weight and power), the Pentek Talon® RTR Small Form Factor (SFF) product line provides the performance and storage capacity previously only possible in much larger rack-mountable chassis. Measuring 5.25" H x 8.5" W x 14" D and weighing only 17 pounds (7.7 kg), this small package can hold up to 61 TB of SSD storage. Configured with two A/Ds and two D/As, the 2547 provides the ability to play back two channels of real data or one channel of complex data with the available DUC.

Built-in digital downconverters and upconverters allow for IF signals to be converted to baseband and reproduced at the original IF frequency. A/D sampling rates, DDC decimations and bandwidths, D/A sampling rates, and DUC interpolations are among the GUI-selectable system parameters, providing a fully programmable system capable of recording and reproducing a wide range of signals.

An ATX power supply accepts 110 to 240V AC, drawing under 170 W and typically around 115 W. SFF models have the option for a 12 to 28V DC power supply. Eight front panel data drives can be easily removed along with a front panel removable OS drive to allow all non-volatile memory to be removed from the system in seconds. An optional GPS receiver allows for precise GPS time and position stamping.

## Rugged Chassis with SSD Storage

The SFF system is configured with hot-swappable SSDs, front-panel USB ports, and I/O connectors on the rear panel. It is built in an extremely rugged steel and aluminum chassis and is tested for shock and vibration.

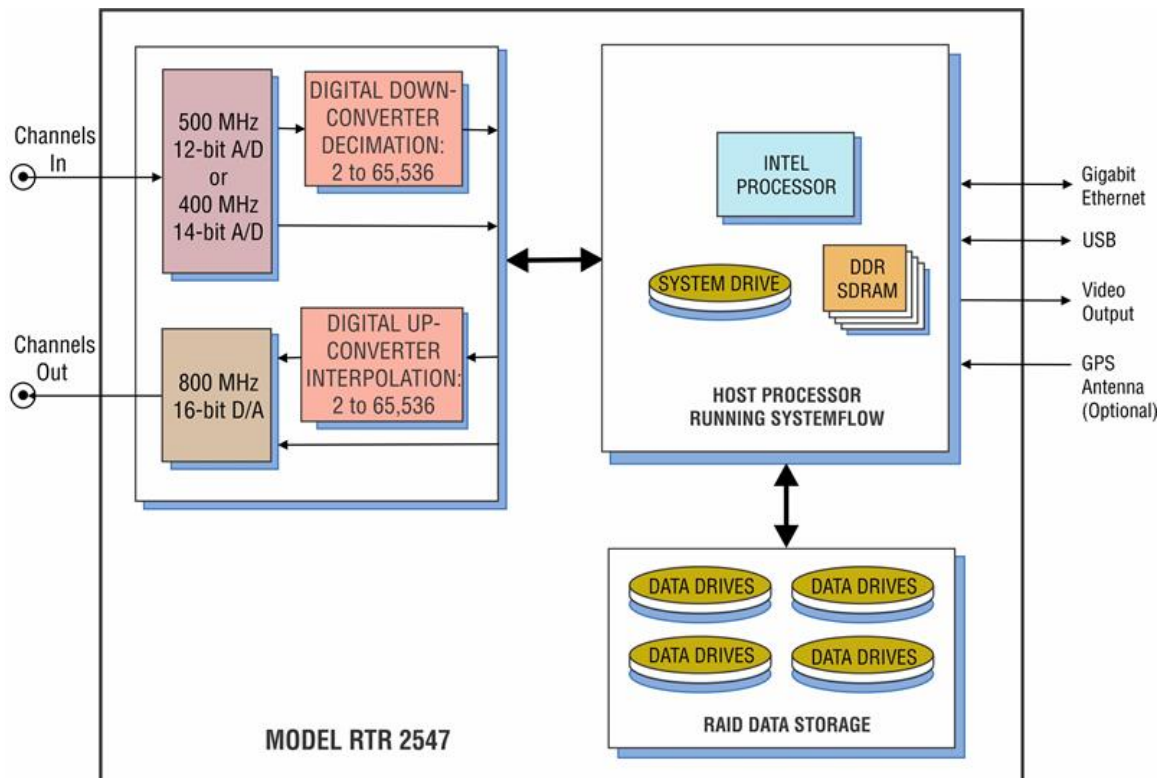
The SSDs provide storage capacities of up to 61 TB. Drives can be easily removed or exchanged during or after a mission to retrieve recorded data. Multiple RAID levels, including 0, 5, and 6, provide a choice for the required level of redundancy.



A push of a button unlatches each of the data drives and the OS drive. Drives are mounted on sleds and can be easily transferred to an offload system while the recorder stays in the field.

PC and signal I/O is available on the rear panel with standard connectors.

## 2547 Block Diagram



## SystemFlow Software

All Talon recorders include the Pentek SystemFlow® recording software. SystemFlow software provides three ways for users to configure and control a Talon recorder:

- The [SystemFlow GUI](#) provides an easy out-of-the-box experience which allows the operator to open the box and begin recording with a point and click user interface.
- The [SystemFlow API](#) provides a set of C-callable libraries that allow engineers to develop their own user interface to configure and control their Talon recorder.
- The [SystemFlow Telnet](#) interface provides a simple set of commands to configure and control the recorder. This eliminates the need for any software development and is most suitable for unmanned operation.

SystemFlow software allows the recorder to be set up to run autonomously by implementing scripts using the API or telnet interface. All three interfaces can be run from a remote connection over Gigabit Ethernet.

A simple header that holds the recording parameters is added to the beginning of the file. An optional GPS receiver allows the user to precisely timestamp files and optionally track the recorder's position throughout a mission. The system records all data to the native NTFS file system, allowing for quick and easy access to the data from any computer.

Click below to view a video about SystemFlow.



## SystemFlow Simulator

To learn more about the SystemFlow Software, you can [download and install the free SystemFlow Simulator](#) to your desktop or laptop PC. The [SystemFlow Simulator](#) allows you to learn how to use the Talon recording system's SystemFlow software interface before you acquire a recorder or while you are waiting for delivery of a Talon recording system.

The Simulator can simulate the operating environment of all the different Talon recorder models. The Simulator also demonstrates the [SystemFlow Signal Viewer](#) by playing recorded signals to simulate the appearance of live signals being digitized and recorded by a Pentek analog signal recorder.

### Features

- Provides real-time recording system simulation
- Demonstrates SystemFlow signal & file viewer tools
- Capable of simulating all Talon analog and digital recording systems
- Full Talon SystemFlow GUI
- Simulator can be used to develop Talon system profiles for use in the final system
- Can be used with the [SystemFlow API](#) to develop and test custom user interface

## SystemFlow Recorder Interface

The RTR 2547 GUI provides the user with a control interface for the recording system. It includes Configuration, Record, Playback and Status screens, each with intuitive controls and indicators. The user can easily move between screens to set configuration parameters, control and monitor a recording, play back a recorded signal and monitor board temperature and voltage levels. The signal viewer, integrated into the recording GUI, allows monitoring of real-time signals or recorded signals on disk.

The screenshot displays the RTR2546 GUI with the following components:

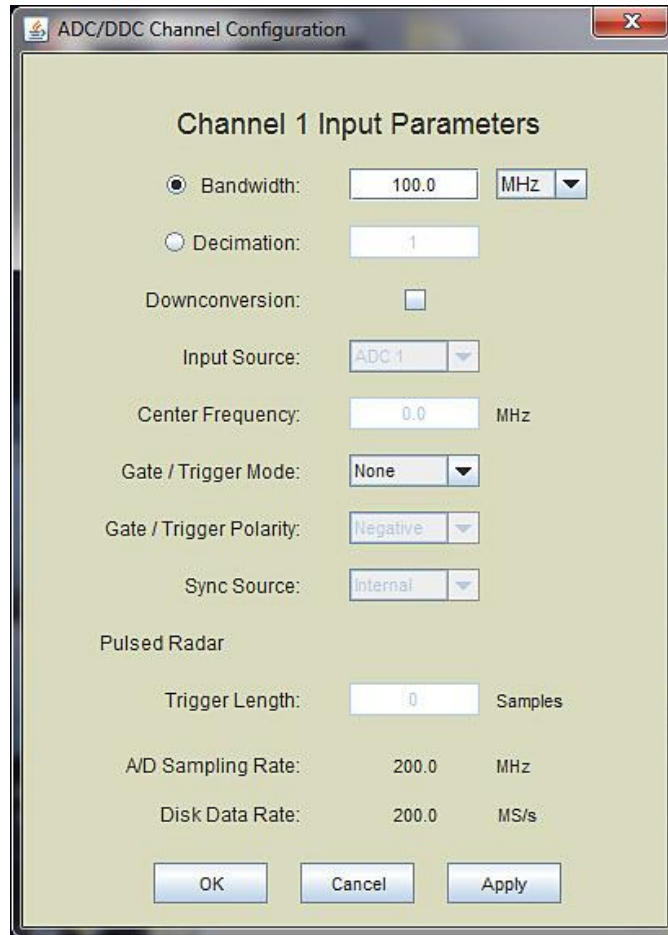
- Navigation Tabs:** Configure, Record, Play, Status, About.
- Header:** PENTEK TALON RF/IF Recording and Playback System.
- Profile Configuration:** Load Profile, Save Profile buttons.
- Remote Server Configuration:** Server Name (dropdown), DNS Name/IP Address (text input), Connect button.
- Local Section:**
  - 78621\_1 Pentek Model 78621:**

Channel	Channel Parameters	Board Status
CH1 IN	<input type="button" value="Configure"/>	Temperature: 64 °C
CH2 IN	<input type="button" value="Configure"/>	+12V: 12.0 V
		+3.3V: 3.25 V
CH1 OUT	<input type="button" value="Configure"/>	+2.5V: 2.48 V
		+1.8V: 1.79 V
		+1.5V: 1.48 V

CDC Lock Status:  Clock:
- System Block Diagram (MODEL RTR 2547):**
  - Channels In:** 500 MHz 12-bit A/D or 400 MHz 14-bit A/D.
  - Channels Out:** 800 MHz 16-bit D/A.
  - Processing:** DIGITAL DOWN-CONVERTER DECIMATION: 2 to 65.536 and DIGITAL UP-CONVERTER INTERPOLATION: 2 to 65.536.
  - Host Processor:** INTEL PROCESSOR, SYSTEM DRIVE, DDR SDRAM, RUNNING SYSTEMFLOW.
  - Storage:** RAID DATA STORAGE (four DATA DRIVES).
  - Connectivity:** Gigabit Ethernet, USB, Video Output, GPS Antenna (Optional).

## SystemFlow Hardware Configuration Interface

The RTR 2547 Configure screens provide a simple and intuitive means for setting up the system parameters. The DDC configuration screen shown here, allows user entries for input source, center frequency, decimation, as well as gate and trigger information. All parameters contain limit-checking and integrated help to provide an easier-to-use out-of-the-box experience.



The screenshot shows a software dialog box titled "ADC/DDC Channel Configuration". The main heading is "Channel 1 Input Parameters". The dialog contains several configuration options:

- Bandwidth:** A radio button is selected, with a text input field containing "100.0" and a dropdown menu set to "MHz".
- Decimation:** A radio button is unselected, with a text input field containing "1".
- Downconversion:** A checkbox is unselected.
- Input Source:** A dropdown menu is set to "ADC 1".
- Center Frequency:** A text input field contains "0.0" and a unit label "MHz".
- Gate / Trigger Mode:** A dropdown menu is set to "None".
- Gate / Trigger Polarity:** A dropdown menu is set to "Negative".
- Sync Source:** A dropdown menu is set to "Internal".
- Pulsed Radar:** A section header.
- Trigger Length:** A text input field contains "0" and a unit label "Samples".
- A/D Sampling Rate:** A text input field contains "200.0" and a unit label "MHz".
- Disk Data Rate:** A text input field contains "200.0" and a unit label "MS/s".

At the bottom of the dialog are three buttons: "OK", "Cancel", and "Apply".

## SystemFlow API

SystemFlow includes a complete API (Application Programming Interface) supporting control and status queries of all operations of the Talon recorder from a custom application.

High-level C-language function calls and the supporting device drivers allow users to incorporate the RTR 2547 as a high-performance server front end to a larger system. This is supported using a socket interface through the Ethernet port, either to a local host or through an internet link for remote, standalone acquisition. Recorded NTFS files can be easily retrieved through the same connection.

Below is an example of controlling recording via the SystemFlow API.

```

728     }
729     //transfer until end of disk
730     else if (transferType == TRANSFER_END_OF_DISK)
731     {
732         recordParams->transferTime    = 0;           // must set to 0
733         recordParams->transferLength  = 0;           // must set to 0
734     }
735
736     ////////////////////////////////// Start the record //////////////////////////////////
737     SetConsoleTextAttribute (hConsole, FOREGROUND_GREEN | FOREGROUND_INTENSITY );
738     printf("\nCase 6: RTS_Record\n");
739     SetConsoleTextAttribute (hConsole, wOldColorAttrs);
740
741     //trigger immediately
742     if(recordParams->trigger == RTS_TRIGGER_IMMEDIATELY)
743     {
744         //send record command
745         if ((error = RTS_Record(++msgNum,
746                               serverInfo,
747                               recordParams,
748                               recordChanId,
749                               fileName[0])) != RTS_SUCCESS)
750         {
751             printf("Record Error # 0x%lx.\n", error);
752             exitHandler(error);
753             goto freeMem;
754         }
755
756         Sleep(500);
757     }
758
759     //wait for SW trigger
760     else if(recordParams->trigger == RTS_WAIT_FOR_SW_TRIGGER)
761     {
762         //send record command which set up record and start DMA
763         if ((error = RTS_Record(++msgNum,
764                               serverInfo,
765                               recordParams,
766                               recordChanId,
767                               fileName[0])) != RTS_SUCCESS)

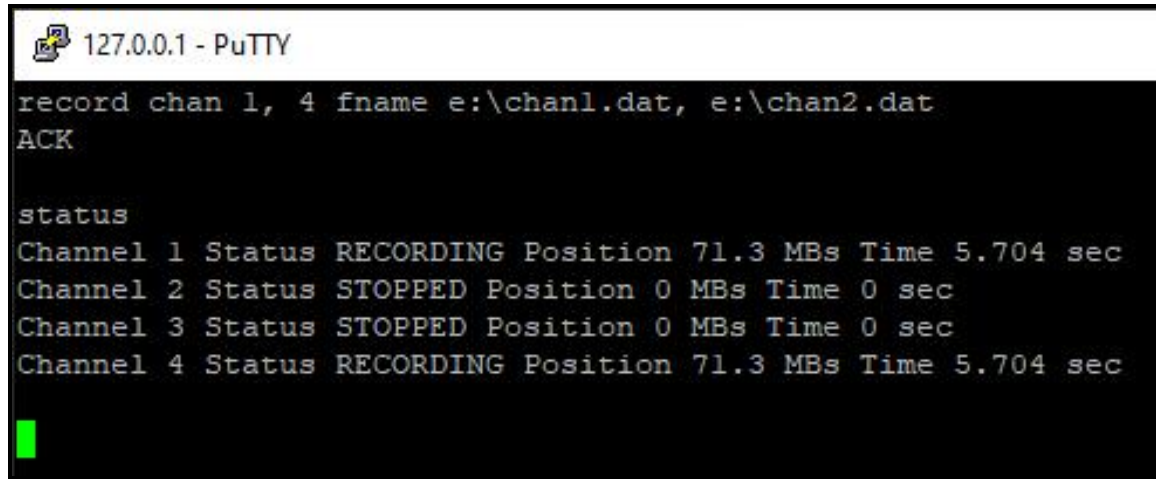
```

## SystemFlow Telnet

The Talon telnet facility is an optional feature that can be requested when ordering one of Pentek's Talon recording systems. The Talon telnet facility allows you to control a Talon recorder from a remote computer. You also can use the Talon recorder's SystemFlow [Signal Viewer](#) to remotely monitor real-time data.

Pentek's [Telnet Facility for Talon Recording Systems User's Guide](#) provides instructions for setting up telnet access and describes all the supported commands.

Below is an example of use of the "record" command:



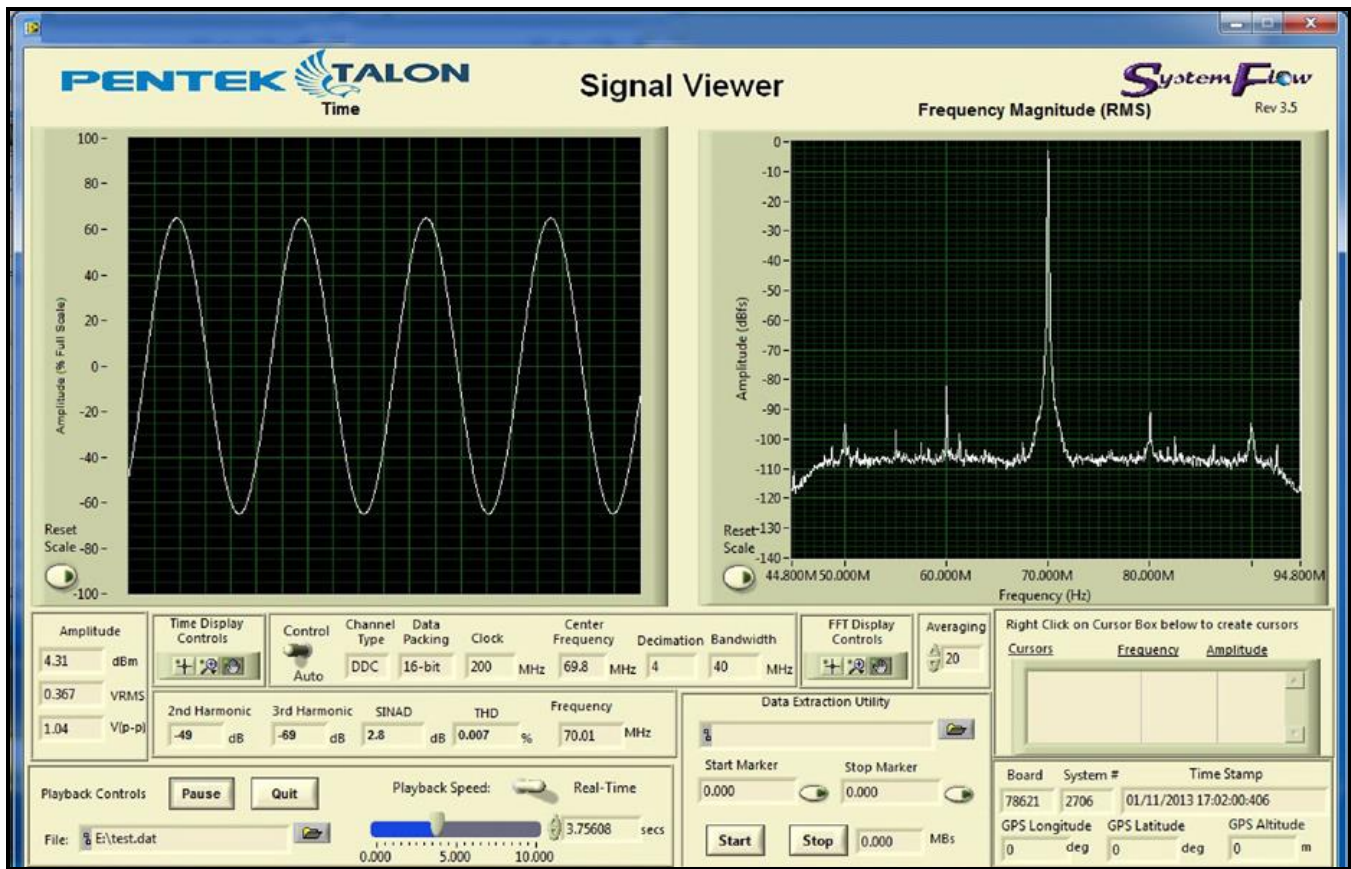
```
127.0.0.1 - PuTTY
record chan 1, 4 fname e:\chan1.dat, e:\chan2.dat
ACK

status
Channel 1 Status RECORDING Position 71.3 MBs Time 5.704 sec
Channel 2 Status STOPPED Position 0 MBs Time 0 sec
Channel 3 Status STOPPED Position 0 MBs Time 0 sec
Channel 4 Status RECORDING Position 71.3 MBs Time 5.704 sec
```

## Signal Viewer

The SystemFlow Signal Viewer includes a virtual oscilloscope and spectrum analyzer for signal monitoring in both the time and frequency domains. It is extremely useful for previewing live inputs prior to recording, and for monitoring signals as they are being recorded to help ensure successful recording sessions. The viewer can also be used to inspect and analyze the recorded files after the recording is complete.

Advanced signal analysis capabilities include automatic calculators for signal amplitude and frequency, second and third harmonic components, THD (total harmonic distortion), and SINAD (signal to noise and distortion). With time and frequency zoom, panning modes, and dual, annotated cursors to mark and measure points of interest, the SystemFlow Signal Viewer can often eliminate the need for a separate oscilloscope or spectrum analyzer in the field.





## Specifications

### PC Workstation (standard configuration)

**Operating System:** Windows®

**Processor:** Intel® Core™ i7 processor

**Operating System Drive:** 250 GB SSD

**SDRAM:** 8 standard, 16 GB or 32 GB optional

### RAID

**Total Storage:** 3.8 TB – 61 TB

**Supported RAID Levels:** 0, 5 and 6

**Drive Bays:** Hot-swap, removable, front panel

### Rear Panel I/O

Four USB 2.0 ports

Two SMA antenna connectors (2T2R)

HDMI port

USB 3.1 Gen 1 port, USB 3.1 Gen 2 Type-A port

USB Type-C port

RJ-45 LAN port

### Front Panel I/O

Two USB ports

Power and recessed RESET buttons

LED indicators for power and HDD access

### Analog Signal Inputs

**Connectors:** Transformer-coupled, female SSMC

**Transformer Type:** Coil Craft WBC4-6TLB

**Full Scale Input:** +5 dBm into 50 ohms

**3 dB Passband:** 300 kHz to 700 MHz

### A/D Converters

**Type:** Texas Instruments ADS5463 or ADS5474 (Option-014)

**Sampling Rate ( $f_s$ ):** 10 MHz to 500 MHz

**Resolution:** 12 Bits or 14 bits (Option -014)

**A/D Record Bandwidth:**  $f_s/2$  = Nyquist bandwidth

**Anti-Aliasing Filters:** External, user-supplied

### Digital Downconverter

**Type:** Pentek IP Core

**Decimation (D):** 2 to 65,536

**IF Center Frequency Tuning:** DC to  $f_s$ , 32 bits

**DCC Usable Bandwidth:**  $0.8 * f_s / D$

### Analog Signal Outputs

**Connectors:** Transformer-coupled, female SSMC

**Full Scale Output:** +4 dBm into 50 ohms

**3 dB Passband:** 300 kHz to 700 MHz

### Digital Upconverter, Interpolator and D/As

**D/A Resolution:** 16 bits

**Output Signal:** Analog, real or quadrature

**Type:** Texas Instruments DAC5688 and Pentek-installed IP core interpolator

**Interpolation:** 2 to 65,536

**Input Data Rate to DAC5688:** 250 MS/sec max.

**Output Sampling Rate:** 800 MHz max

**Output IF:** DC to 400 MHz

**Bandwidth Range:** Matches recording bandwidths

### Clock Sources

Selectable from onboard programmable VCXO, external or LVDS clocks

### External Clocks

**Type:** Female SSMC connector, sine wave, 0 to +10 dBm, AC-coupled, 50 ohms, 10 to 500 MHz divider input clock or PLL system reference

### Internal Clock

**Type:** Programmable VCXO from 10 to 810 MHz

### Physical and Environmental

**Dimensions:** 5.25" H x 8.5" W x 14.0" D

**Weight:** 17 lb (7.7 kg)

**Operating Temp:** 0° to +45° C

**Storage Temp:** -40° to +85° C

**Relative Humidity:** 5% to 95%, non-condensing

**Operating Shock:** 15 g max. (11 msec, half-sine wave)

**Operating Vibration:** 10 to 20 Hz: 0.02 inch peak, 20 to 500 Hz: 1.4 g peak acceleration

**Power Requirements:** 100 to 240 VAC, 50 to 60 Hz, 170 W max.

## Ordering Information

Channel Configurations	
Option -201	1-channel recording
Option -202	2-channel recording
Option -221	1-channel playback
Option -222	2-channel playback
Storage Options	
Option -410	3.8 TB SSD Storage Capacity
Option -415	7.6 TB SSD Storage Capacity
Option -420	15.3 TB SSD Storage Capacity
Option -430	30.6 TB SSD Storage Capacity
Option -460	61 TB SSD Storage Capacity
Additional Options	
Option -014	400 MHz, 14-bit A/Ds
Option -261	GPS time and position stamping
Option -285	Raid 5 configuration
Option -286	Raid 6 configuration
Option -309	16 GB system memory
Option -310	32 GB system memory
Option -625	Removable OS drive
Option -630	12 to 28V DC power supply
Contact Pentek for compatible Option combinations. Storage and General Options may change, contact Pentek for latest information.	

## Pricing and Availability

To learn more about our products or to discuss your specific application please contact [your local representative](#) or Pentek directly:

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## Lifetime Applications Support

Pentek offers the worldwide military embedded computing community shorter development time, reliable, rugged solutions for a variety of environments, reduced costs, and mature software development tools. We offer free lifetime support from our engineering staff, which customers can depend on through phone and email, as well as software updates. Take advantage of Pentek's 30 years of experience in delivering high-performance radar, communications, SIGINT, EW, and data acquisition MIL-Aero solutions worldwide.