

## Talon Recording System FAQs

### What is a Talon Recording System?

Talon Recording Systems are high speed recording systems, capable of streaming data to disk in real time at sustained data rates as high as 8 GB/s. Talon recorders include very large amounts of storage, allowing users to record for hours and even days contiguously.

Talon recorders include a variety of front ends that allow users to record analog or digital signals. They are built in several different form factors, providing a solution for most environments.

Talon recorders support the ability to record multiple channels simultaneously. Talon analog signal recorders provide the ability to record multiple channels with phase coherency across all channels.

Talon recorders include optional playback capabilities allowing users to retransmit signals that have been recorded. This is especially useful in bringing real-world RF environments back to the laboratory.

Talon Recording Systems include a fully integrated graphical user interface with signal analysis tools built right into the recording system workstation. These tools include a virtual oscilloscope, a virtual spectrum analyzer, a spectrogram display, and a display of signal measurements.

Talon recorders are built on a powerful workstation that uses the latest Intel processor, providing a system that can serve as a development and analysis platform as well as a recorder. Recorded files are written to the native NTFS file system, making them instantly accessible to the user and available for immediate analysis by third party analysis software like Matlab.

A C-callable API is included to allow users to integrate Talon's recording capabilities into a larger system or to create a custom user interface.

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## What type of signals can I record with a Talon Recording System?

There are two main types of signals that Talon recorders support: Analog signals and Digital signals.

**Analog signals** have not been digitized prior to their connection to the Talon recorder. These signals are typically RF, IF (intermediate frequency), radar and communications signals. These signals are typically captured by a sensor or antenna and often have some signal conditioning (amplification and/or filtering) to allow the Talon recorder to digitize and capture them.

**Digital signals** typically start as analog signals. These signals have been digitized and formatted by hardware in the field, providing a digital data stream to the Talon recorder. Digital data formats supported by Talon Recording Systems include serial FPDP, Ethernet (UDP & TCP) and LVDS.

Pentek provides an analog signal recorder selection guide and a digital signal recorder selection guide on the Pentek web site. This provides an excellent starting point to help narrow down the appropriate Talon Recording System for your application.

Analog Signal Recorder Selection Guide

[http://www.pentek.com/selectguide/rec\\_selectguide.cfm](http://www.pentek.com/selectguide/rec_selectguide.cfm)

Digital Signal Recorder Selection Guide

[http://www.pentek.com/selectguide/rec\\_digselectguide.cfm](http://www.pentek.com/selectguide/rec_digselectguide.cfm)

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## How do I select the correct Talon analog signal recorder?

There are two major characteristics that differentiate one Talon analog signal recorder from another: the form factor and the maximum sample rate of the A/D converter.

The maximum sample rate of the A/D converter is listed in the main description of every Talon analog signal recorder. For example, the Model 2746 - 200 MS/s RF/IF Rugged Rackmount Recorder provides A/Ds with a maximum sample rate of 200 MHz. This sample rate dictates the maximum bandwidth signal that this recorder can accurately sample and record.

In the case of a 200 MHz A/D, we know that the maximum signal bandwidth that can be captured is  $0.8 \times f_s/2$ , assuming a user-supplied 80% anti-aliasing filter. This means that this A/D is capable of capturing signals that are 80 MHz wide. A 3.6 GHz A/D product is capable of capturing signals that are 1440 MHz wide, also assuming an 80% anti-aliasing filter.

For more information about how to select a recorder based on form factor, please see the FAQ entitled, “**What is the difference between the RTV, RTS, RTR and RTX series of recorders?**”

## What digital signal types do the Talon digital signal recorders support?

Talon digital signal recorders include support for serial FPDP, Gigabit Ethernet, 10 Gigabit Ethernet, 40 Gigabit Ethernet and LVDS.



## **What is the difference between the RTV, RTS, RTR and RTX series of recorders?**

The RTV series is the value series of Talon recorders. These are the least expensive Talon recorders and are intended for laboratory use (benign environments.) They are limited in storage and streaming data rates to disk and have very few options available. In addition to their low cost, they also have the advantage of shipping from stock, unlike the other series that typically have lead times from six to eight weeks or longer. These recorders come in a rackmountable PC server chassis.

The RTS series is the commercial series of Talon recorders. These are intended for benign environments, have great flexibility in channel count and are capable of holding large volumes of data storage. These systems use HDDs (hard disk drives) for data storage and are limited in their sustained data rate to disk. These recorders come in a rackmountable PC server chassis.

The RTR series is the rugged series of Talon recorders. RTR recorders come in both a portable (briefcase style) and rackmountable PC server chassis form factor. Both use SSDs (solid state drives) to help the systems tolerate shock and vibration. They also include enhanced cooling to allow them to operate in higher temperature environments (up to 55 deg C.) The RTR series recorders provide the highest streaming data rates to disk of all of the Talon series.

The RTX series is the extreme rugged series of Talon recorders. RTX recorders are flight certified, capable of handling high levels of shock and vibration as well as high altitude use. RTX series chassis use Pentek's QuickPac drive packaging technology that provides the ability to quickly remove and replace volumes of data storage from the Talon recorder. This is especially useful during flight missions where aircraft time is expensive.

The RTX series chassis comes in two different form factors. A rackmountable chassis uses high powered fans to air cool system components. This chassis includes a shock isolated inner chassis, EMI filters and a modular rear panel to allow for custom signal connectors.

The alternate style RTX chassis focuses on SWaP and is available in a 1/2 ATR style chassis. This conduction cooled chassis is extremely rugged and is able to operate in the harshest of environments. This chassis uses QuickPacs to provide up to 15.2 TB of storage in a very small package.

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## **What is SystemFlow? What does it include?**

SystemFlow is the trade name of the Talon Recording System software that is integrated into every Talon recorder. The software includes the graphical user interface (GUI) that is used to control the recorder, signal analysis tools and an API that allows users to integrate the Talon recorder into a larger system.

The SystemFlow GUI provides intuitive configuration screens for simple setup of the recorder and allows users to store their settings as profiles. An integrated signal viewer provides a virtual oscilloscope, virtual spectrum analyzer and spectrogram to allow for analysis of signals prior to, during and after recording.

SystemFlow is only available as an integrated component of Pentek's Talon Recording Systems. It is not available as a standalone product.

## **Should I choose a system that uses HDDs or SSDs?**

HDDs (hard disk drives) and SSDs (solid state drives) both have advantages when used in a high-speed real-time recording system.

HDDs offer large storage capacities at a low cost. They are limited in speed, requiring more parallel HDDs than a system that uses SSDs, but when a large storage capacity is required, they can reduce the cost of a recording system significantly.

HDDs are susceptible to write failures and a subsequent record speed reduction when exposed to shock or vibration. This makes HDDs unsuitable for operation in harsh environments.

SSDs are becoming increasingly popular as storage capacities increase while their price decreases. SSDs are still more expensive than HDDs, which results in a large price difference in high storage capacity recording systems.

SSDs offer very fast recording rates, requiring fewer drives in a high speed recorder than a system that uses HDDs. This makes them particularly desirable in high-speed, lower-storage capacity systems. SSDs are virtually immune to shock and vibration making them ideal for harsh environment applications.

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## **How many minutes of data can I collect with a Talon Recording System?**

There are a number of factors that need to be considered to determine the amount of time a Talon recorder can record for. Storage capacity, sample rate, number of channels, bit resolution and duty cycle are among the factors that are used to calculate the storage time.

A typical Talon recorder holds anywhere from 4 TB to 192 TB. In a basic example, a two channel system that streams data to disk at 400 MB/s per channel continuously would provide the following storage time:

2 channels x 400 MB/s = 800 MB/s.

For a 4 TB Talon Recording System:  $4 \text{ TB} / 800 \text{ MB/s} = 5000 \text{ seconds} = 83.33 \text{ minutes}$ .

For a 192 TB Talon Recording System:  $192 \text{ TB} / 800 \text{ MB/s} = 66.67 \text{ hours}$ .

## **Are Talon recorders scalable? Is it easy to add more channels?**

Talon recorders use a Client-Server based architecture to separate the GUI control Client from the Talon Recording System Server. This architecture allows a single GUI to control multiple Talon recorders. This provides users the ability to add additional channels to a system simply by adding more chassis.

Furthermore, Talon recorders provide synchronization circuitry that allows analog recording systems to distribute A/D clocks, gates and sync signals across multiple chassis. This provides phase coherency across channels in a multi-chassis system.

## **Can I control my Talon Recording System from another PC?**

Talon's Client-Server based architecture allows the user to control the recorder remotely from another PC over Ethernet. The SystemFlow GUI can be installed on a remote PC to allow the user to operate the Talon system remotely. Optionally, the user can use Windows' Remote Login facility to log directly into the recording system from a remote location.

Additionally, the user can use the SystemFlow API to develop his or her own interface to remotely control the Talon Recording System.



## **Do Talon Recorders support multi-user control?**

The Talon recording server can accept connections from multiple clients to allow several users full access to the Talon Recording System. This allows multiple users to monitor signals prior to, during or after a recording. It also allows multiple users to control the recorder from different locations.

## **What other features are included with a Talon Recording System?**

Talon recorders have many features to provide flexibility and ease of use in the field. Features include removable data storage, removable OS drive with locking mechanism, high-speed offload facilities like 10 gigabit Ethernet, encrypted data storage and instant secure erase.

Software features to provide convenience to the user include one-click profile storage and retrieval, auto-file naming, time of day auto-initiated recording and segmented recording to simplify post-processing and analysis.

Other features include continuous looped recording, GPS position tracking of a flight during a recording, and radar pulse recording with precision time stamping for radar pulse reconstruction.

Additionally, SystemFlow includes post processing tools that allow the user to search through recorded files for signals of interest and then extract this information. This extraction allows the user to create smaller files from large recordings, making them easier to analyze. Time stamping of the data is preserved during the extraction process.

## **How can I try a Talon Recording System? Do you have any tools to get me started?**

Pentek provides a free test-drive of a Talon Recording System via the SystemFlow Simulator that is available for anyone to download from the Pentek web site. It can be found here:

<http://www.pentek.com/systemflow/systemflow.cfm#SystemFlowSimulator>

The Simulator not only serves as a demonstration tool, but can be used for training field operators as well as a test bench for SystemFlow API developers. This allows users who wish to develop their own interface to begin development weeks before receiving their Talon Recorder.

A live demonstration can also be arranged through a local Pentek sales representative.

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## **What about customer support, warranty and life cycle management?**

Talon recorders come with free lifetime email and phone support.

Pentek's warranty statement is available at the following web location:

<http://www.pentek.com/contact/customerinfo.cfm?HID2=TM#A6>

Pentek's life cycle management policy is available at the following web location:

<http://www.pentek.com/support/productlifecycle.cfm?HID2=TM>

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