

New!

## Model RTX 2778

## LVDS Digital I/O Extreme Rackmount Recorder



### Features

- Designed to meet MIL-STD-810 shock and vibration
- Designed to meet EMC/EMI per MIL-STD-461 EMC
- 4U 19-inch rugged rackmount PC server chassis, 22" deep
- Windows® 7 Professional workstation with high-performance Intel® Core™ i7 processor
- 32 bits of LVDS digital I/O
- LVDS clock, Data Valid and Data Suspend signals
- Supports clock rates up to 250 MHz
- Real-time aggregate recording rates of up to 5 GB/sec
- Up to four front-panel removable QuickPac SSD drive canisters with eight drives each
- Up to 30 terabytes of storage to NTFS RAID disk array
- SystemFlow® GUI virtual instrumentation panel for fast, intuitive operation
- C-callable API for integration of recorder into application
- File headers include time stamping and recording parameters
- Optional GPS time and position stamping
- Optional playback mode

### General Information

The Talon® RTX 2778 is a turnkey record and playback system that is built to operate under harsh conditions. Designed to withstand high vibration and operating temperatures, the RTX 2778 is intended for military, airborne and UAV applications requiring a rugged system.

The RTX 2778 records and plays back digital data using the Pentek Model 78610 LVDS digital I/O board. Using highly optimized disk storage technology, the system achieves aggregate recording rates of up to 5 GB/sec.

The RTX 2778 utilizes a 32-bit LVDS interface that can be clocked at speeds up to 250 MHz. It includes Data Valid and Suspend signals and provides the ability to turn these signals on and off as well as control their polarity.

Optional GPS time and position stamping accurately identifies each record in the file header.

### SystemFlow Software

The RTX 2778 includes the SystemFlow Recording Software. SystemFlow features a Windows-based GUI (Graphical User Interface) that provides a simple means to configure and control the system.

Custom configurations can be stored as profiles and later loaded when needed,

allowing the user to select preconfigured settings with a single click.

Built on a Windows 7 Professional workstation, the RTX 2778 allows the user to install post-processing and analysis tools to operate on the recorded data.

The RTX 2778 records data to the native NTFS file system, providing immediate access to the recorded data.

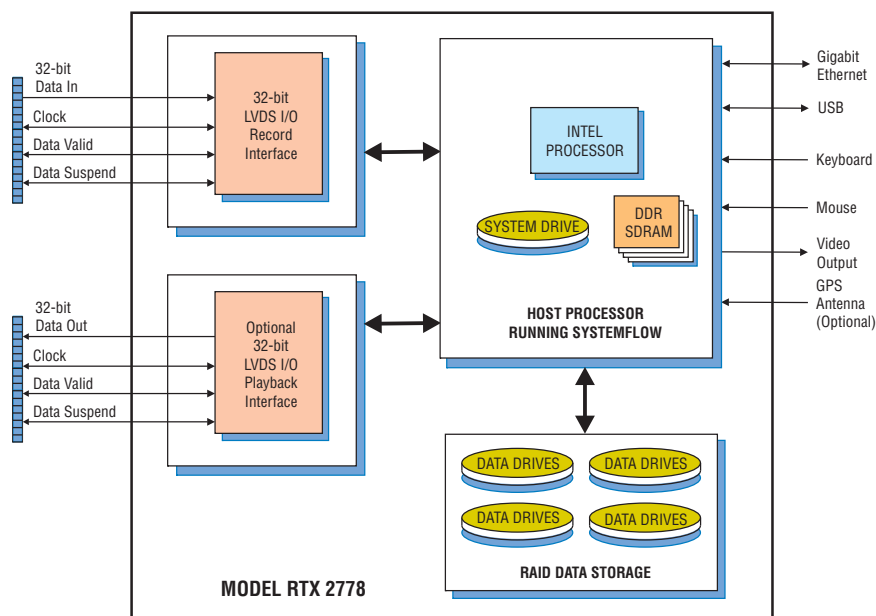
Data can be off-loaded via two rear-access gigabit Ethernet ports, two USB 3.0 ports or up to four USB 2.0 ports.

### Rugged Mil-Spec Chassis

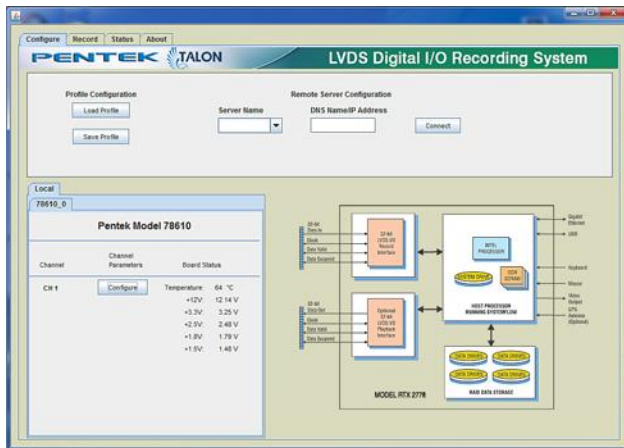
The Talon RTX 2778 uses a shock- and vibration-isolated inner chassis and solid-state drives to assure reliability under harsh conditions. The chassis uses an in-line EMI filter along with rear-panel MIL-style connectors to meet MIL-STD-461 emissions specifications.

Up to four front-panel removable QuickPac drive canisters are provided, each containing up to eight SSDs. Each drive canister can hold up to 7.6 TB of data storage and allows for quick and easy removal of mission-critical data.

Forced-air cooling draws air from the front of the chassis and pushes it out the back via exhaust fans. A hinged front door with a serviceable air filter provides protection against dust and sand. ►



## ► SystemFlow Graphical User Interface

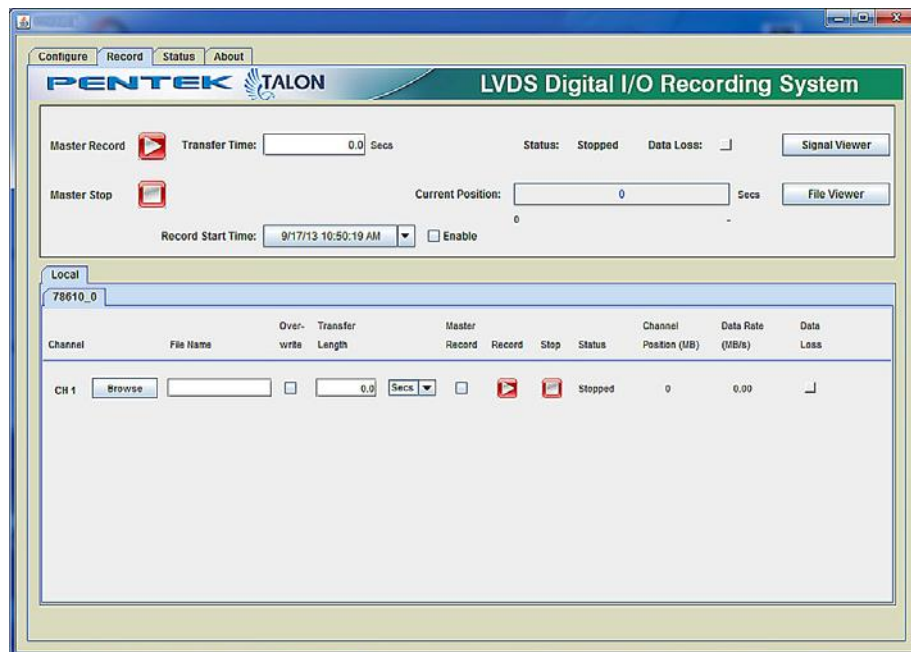


### SystemFlow Main Interface

The RTX 2778 GUI shows a block diagram of the system and provides the user with a control interface for the recording system. It includes Configure, Record, Playback, and Status screens, each with intuitive controls and indicators. The user can easily move between screens to configure parameters, control and monitor a recording, and play back a recorded stream.

### SystemFlow Hardware Configuration Interface

The Configure screen presents operational system parameters including temperature and voltages. These parameters include data valid and suspend enables, as well as polarity control for both signals. All parameters contain limit-checking and integrated help to provide an easier-to-use out-of-the-box experience.



### SystemFlow Record Interface

The SystemFlow Record screen allows you to browse a folder and enter a file name for the recording. The length of the recording for each channel can be specified in megabytes or in seconds. Intuitive buttons for Record, Pause and Stop simplify operation. Status indicators for each channel display the mode, the number of recorded bytes, and the average data rate. A Data Loss indicator alerts the user to any problem, such as a disk full condition.

By checking the Master Record boxes, any combination of channels in the lower screen can be grouped for synchronous recording via the upper Master Record screen. The recording time can be specified, and monitoring functions inform the operator of recording progress. ►

### ► SystemFlow API

SystemFlow includes a complete API (Application Programming Interface) supporting control and status queries of all operations of the RTX 2776 from a custom application.

High-level C-language function calls and the supporting device drivers allow users to incorporate the RTX 2776 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, stand-alone acquisition. Recorded NTFS files can be easily retrieved through the same connection.

### Specifications

#### PC Workstation (standard configuration)

**Operating System:** Windows 7 Professional

**Processor:** Intel Core i7 processor

**Clock Speed:** 3.0 GHz or higher

**SDRAM:** 8 GB

#### Data Storage

**Style:** Up to four front-panel removable QuickPac drive canisters; up to eight SSDs contained in each canister

**Location:** Front panel

**Capacity:** Up to 30 TB

**Number of Drives:** Up to 32 total

**Supported RAID Levels:** 0, 1, 5 and 6

#### LVDS Interface

**Cable:** 80-pin ribbon cable

**Connector Type:** 2x40 pin IDC

**Data Lines:** 32 LVDS pairs, 2.5 V compliant

**Clock:** One LVDS pair, 2.5 V compliant

**Data Valid:** One LVDS pair, 2.5 V compliant

**Data Suspend:** One LVDS pair, 2.5 V compliant

#### Physical and Environmental

**Dimensions:** 19" W x 22" D x 7" H

**Weight:** 50 lb, approx.

**Operating Temp:** -20° to +50° C

**Storage Temp:** -40° to +85° C

**Relative Humidity:** 10% to 95%, non-condensing

**Operating Shock:** Designed to MIL-STD 810F, method 514.5, procedures I and VI

**Operating Vibration:** Designed to MIL-STD 810F, method 514.5, procedure I

**EMI/EMC:** Designed to MIL-STD 461E, CE101, CE102, CS101, CS113, RE101, RE102, RS101, RS103

**Input Power:** 85 to 264 VAC, 47–400 Hz, 600 W max.

## Model RTX 2778 Order Information and Options

### Interface Options

|                    |                    |
|--------------------|--------------------|
| <b>Option -201</b> | Record Interface   |
| <b>Option -221</b> | Playback Interface |

### Storage Options

|                    |         |
|--------------------|---------|
| <b>Option -242</b> | 3.8 TB  |
| <b>Option -244</b> | 7.6 TB  |
| <b>Option -245</b> | 11.5 TB |
| <b>Option -246</b> | 15.3 TB |
| <b>Option -247</b> | 23.0 TB |
| <b>Option -249</b> | 30.7 TB |

### General Options

|                    |                              |
|--------------------|------------------------------|
| <b>Option -261</b> | GPS time & position stamping |
| <b>Option -264</b> | IRIG-B time stamping         |
| <b>Option -680</b> | 28 VDC power supply          |

**Contact Pentek for compatible Option combinations**  
**Storage and Channel-count Options may change, contact Pentek for the latest information**

*Specifications are subject to change without notice*



Figure 1. Rackmount RTX chassis is designed to meet or exceed Mil Specs.



Figure 2. Chassis View showing one QuickPac canister partially withdrawn.

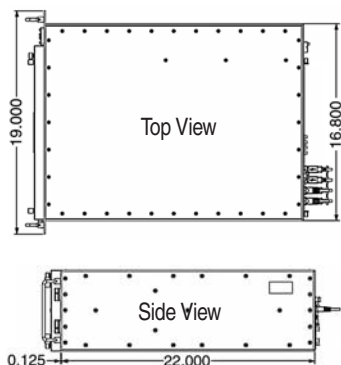


Figure 3. Dimensional drawings of the rackmount enclosure.

## Extreme Rackmount Recorders

Pentek's Talon® RTX Rackmount series recorders are designed to provide a combination of high performance and large storage capacity in a military-specified rackmount chassis. Designed for field operation, the RTX Rackmount series provides up to 30 TB of SSD storage with aggregate recording rates up to 5 GB/sec.

## Military Specifications

All Talon RTX rackmount recorders are designed to meet military specifications for temperature, altitude, shock, vibration, radiated emissions, conducted emissions, ESD, sand and dust.

The following list contains these military specifications.

- **Vibration:** MIL-STD-810F, method 514.5
- **Shock:** MIL-STD-810F, method 516.5
- **EMI/EMC:** MIL-STD-461E, CE101, CE102, CS101 CS114, RE101, RE102, RS101, RS103
- **ESD:** MIL-STD-1686A
- **Sand & Dust:** MIL-STD-810F, method 510

## Chassis Design

All Talon RTX rackmount chassis are specially designed using heavy-duty wrought aluminum extrusions to provide superior torsional strength. Extrusions are partially overlapped for superior EMC. The chassis is 4U in height, with a depth of only 22". A fully-loaded chassis weighs as little as 45 lb.

Rear-panel I/O includes bulk-head mounted SMA connectors, a 4-pin 38999 power connector as well as motherboard I/O. Rear-panels are modular and customizable allowing the end-user to specify the desired connectors.

The Operating System drive can be internally hard-mounted or can be made removable. Additionally an internally-mounted optical DVD writer is optional. All drives, OS, DVD and data drives are protected from dust with EMI filters.



Figure 4. The rear panel includes all analog signal connections and can be customized to suit the application requirements.

## QuickPac Canisters

In order to provide field engineers the ability to quickly remove and replace storage drives in the field, Pentek has developed the QuickPac™ canisters for use in the Talon RTX rackmount chassis. These canisters hold eight SSDs, providing up to 7.68 TB of storage capacity in each canister. Up to four QuickPac canisters can be installed in a Talon RTX rackmount chassis, providing a total storage capacity of 30 TB.

Fastened by four thumbscrews, QuickPac canisters can easily be swapped in the field, allowing users to replace those filled with data with new, empty ones with very little down time. QuickPac canisters can be transported to the lab for offload or analysis, using one of Pentek's Talon offload or play-back systems.



Figure 5. Front and rear view of the QuickPac canister showing the eight SSDs inside.

## Floating Inner Chassis

In order to withstand conditions of high vibration and shock, the RTX rackmount chassis is designed to isolate all critical system components by placing them on a floating inner chassis.

This inner chassis is suspended using multiaxis mounts that attenuate externally-transmitted shock and vibration energy. This allows the system to perform flawlessly in aircraft, ships, ground vehicles, UAVs or any other areas of high shock or vibration.

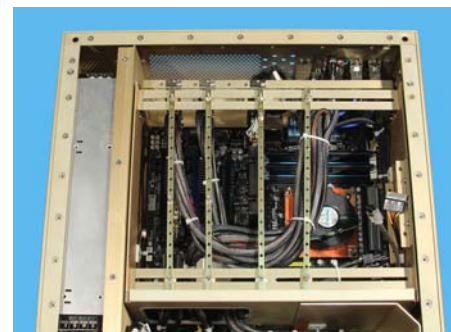


Figure 6. The inner chassis floats with respect to the outer enclosure to improve isolation from shock and vibration.



### Cooling and Filtering

Every RTX recorder includes a high-powered forced air-cooling system, to allow the proper transfer of heat from hot system components out the back of the chassis. Cool air is pulled from the front of the system through the QuickPac drive packs and forced over the hottest system components to ensure optimal cooling.

High-powered fans can be controlled via system software to allow the system to

run quietly with lower cooling levels or at maximum air flow levels. This can be adjusted to match the user's application.

Every RTX recorder includes filtering necessary to protect the system as well as the surrounding operating environment. EMI filters are placed on the front and rear of the chassis, to protect the surrounding environment from radiated emissions. A removable front panel filter protects the system against dust and sand.

### Modular Power Supply

Every Talon RTX rackmount Recorder includes a 600 Watt, 85 – 264 V, 47– 400 Hz AC power supply. The power supply has an inline EMI filter to protect against conducted emissions and is isolated from the other electronics in the system, via an isolated chassis compartment. The 400 Hz rating allows every RTX rackmount recorder to operate in aircraft and other environments where smaller, 400 Hz generators are used. For applications that require DC power, 24 V and 28 V DC power supplies are available to replace the AC power supply.

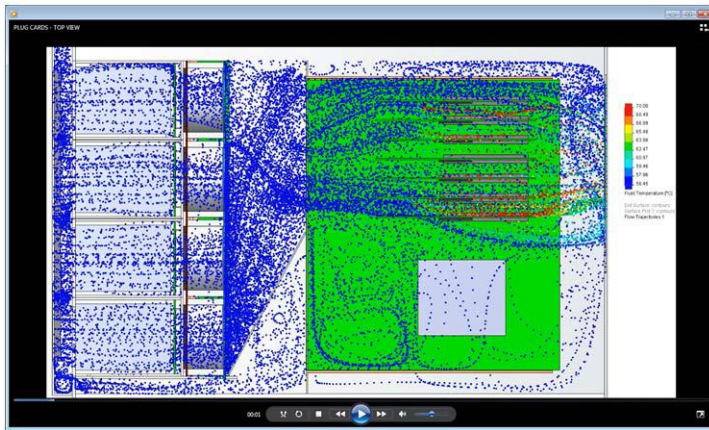


Figure 7. Airflow map shows the extensive ventilation provided to all components inside the RTX rackmount recorder.

### Talon Solutions Chart

The chart below compares Pentek's different Talon Recording System solutions. As seen here, the RTX Rackmount series

provide high performance and large storage capacity in a rugged package that meets high-level military specifications.

| Talon Chassis Type            | RTS-COTS Rackmount      | RTR Portable          | RTR Rackmount           | RTX Rackmount  | RTX 1/2 ATR  |
|-------------------------------|-------------------------|-----------------------|-------------------------|--|--|
| Dimensions (H"xW"xL")         | 7x19x26                 | 13.4x16.9x9.5         | 7x19x21/26              | 7x19x22  | 8.1x7.1x16.5   |
| Weight (lb)                   | 60–85                   | 30–35                 | 45–85                   | 45–60  | 30–35  |
| Cooling                       | Forced-air              | Forced-air            | Forced-air              | Forced-air   | Conduction   |
| Storage Drive Type            | HDD                     | SSD                   | SSD                     | SSD  | SSD  |
| Max. Storage Capacity (TB)    | 60                      | 7.6                   | 38.4                    | 30.7   | 3.8  |
| Max. Record Rate (MB/sec)     | 1600                    | 1600                  | 5000                    | 5000   | 500  |
| Drive Removal                 | Individual (with trays) | Individual (no trays) | Individual (with trays) | QuickPac Canisters   | Internal (needs disassembly)                               |
| Operating Temperature (deg C) | 5 to 45                 | 0 to 50               | –10 to 55               | –20 to 55  | –40 to 71  |
| Operating Altitude (ft)       | 10,000                  | 10,000                | 10,000                  | 15,000   | 65,000   |
| Shock                         | –                       | 15 g                  | 15 g                    | MIL-STD-810F Method 516.5  | MIL-STD-810F Method 516.5                                  |
| Vibration                     | –                       | 1.4 g<br>20–500 Hz    | 1.4 g<br>20–500 Hz      | MIL-STD-810F Method 514.5  | MIL-STD-810F Method 514.5                                  |
| EMI/EMC                       | –                       | –                     | –                       | MIL-STD-461E<br>CE101, CE102, CS101<br>CS114, RE101, RE102<br>RS101, RS103 | MIL-STD-461E<br>CE101, CE102, CS101<br>RE101, RE102, RS101 |
| ESD                           | –                       | –                     | –                       | MIL-STD-1686A  | –  |
| Sand and Dust                 | –                       | –                     | –                       | MIL-STD-810F Method 510  | MIL-STD-810F Method 510                                    |

## Appendix A - System Specifications Summary

| Parameter             | Condition     | Specification   |
|-----------------------|---------------|---|
| Temperature           | Operating     | –20° C to +55° C  |
|                       | Non-operating | –40° C to +70° C  |
| Altitude              | Operating     | 0 to 15,000 ft  |
|                       | Non-operating | 0 to 40,000 ft  |
| Humidity              | Operating     | 0–95%, non-condensing   |
| Fungus                | Operating     | No fungus nutrient material shall be used   |
| Shock                 | Operating     | MIL-STD-810F, Method 516.5, Procedure I (functional shock), 20 g half sine, 12 msec in each axis  |
| Vibration             | Operating     | MIL-STD-810F, Method 514.5, Procedure I   |
| Airborne Noise        | Operating     | 60 dBA max at 1 meter from the equipment  |
| Structure-borne Noise | Operating     | Maximum structure-borne noise per MIL-STD-704-2 is no greater than 60 dB one-third octave $L_a$ , (Type III)  |
| Blowing Dust          | Operating     | The unit shall resume specified performance after exposed to settling-dust conditions defined in MIL-STD-810F, Method 510, Procedure II - See Note 1  |
| Inclination Angles    | Operating     | The unit shall maintain specified performance when subjected to: <ul style="list-style-type: none"> <li>• A static pitch angle of <math>\pm 5^\circ</math></li> <li>• A list angle of <math>15^\circ</math></li> <li>• A roll angle of <math>45^\circ</math></li> </ul> |

Note 1: Standard maintenance includes cleaning of the dust filter(s) as required.

## Appendix B - Emissions Specifications Summary

CE101: Conducted Emissions, Power Leads, 30 Hz to 10 kHz  
CE102: Conducted Emissions, Power Leads, 10 kHz to 10 MHz  
CS101: Conducted Susceptibility, Power Leads, 30 Hz to 50 kHz  
CS114: Conducted Susceptibility, Bulk Cable Injection, 10 kHz to 400 MHz  
CS116: Conducted Susceptibility, Damped Sinusoidal Transients, Cable and Power Leads, 10 kHz to 100 MHz  
RE101: Radiated Emissions, Magnetic Field, 30 Hz to 100 kHz  
RE102: Radiated Emissions, Electric Field, 10 kHz to 18 GHz  
RS101: Radiated Susceptibility, Magnetic Field, 30 Hz to 100 kHz  
RS103: Radiated Susceptibility, Electric Field, 10 kHz to 40 GHz

*Specifications are subject to change without notice*