

Talon RTR 2750

250 MS/sec RF/IF rugged rackmount recorder

Scalable multichannel RF/IF signal acquisition

- Phase-coherent recording of 16 independent input channels
- Captures RF signals with bandwidths up to 100 MHz
- Up to 243 TB of front-panel removable solid state storage
- SystemFlow GUI with Signal Viewer analysis tool



The Talon® RTR 2750 is a turnkey recording system that provides phase-coherent recording of 16 independent input channels. Each input channel includes a 250 MHz 16-bit A/D and an FPGA-based digital downconverter with programmable decimations from 2 to 65536, thereby providing the ability to capture RF signals with bandwidths up to 100 MHz.

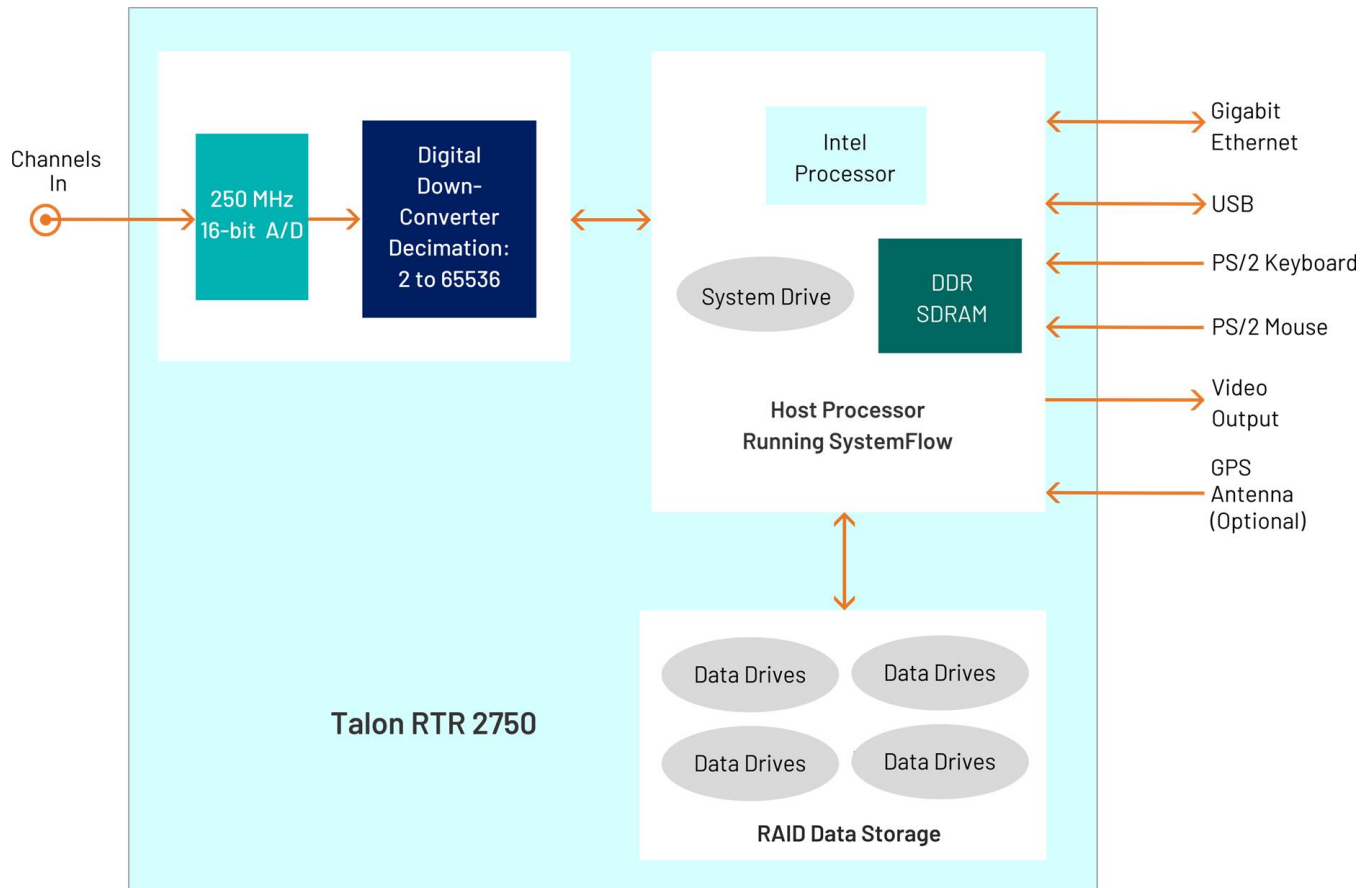
With options for AC- or DC-coupled input channels, RF signals up to 700 MHz in frequency can be sampled and streamed to disk in real-time at sustained aggregate recording rates up to 8 GB/sec in a 4U rackmount solution.

Designed to operate under conditions of vibration and extended operating temperatures, the RTR 2750 is ideal for military, airborne and field applications that require a rugged system. The hot-swappable solid state storage drives provide the highest level of performance under harsh conditions and allow for quick removal of mission-critical data.

A/D sampling rates, DDC decimations and trigger settings are among the selectable system parameters, providing a system that is simple to configure and operate. An optional GPS time and position stamping facility allows the user to timestamp each acquisition as well as track the location of a system in motion.

FEATURES

- Sixteen 250 MHz 16-bit A/Ds
- Sixteen independently-configurable DDC decimations ranging from 2 to 65536
- Sixteen interdependently-configurable DDC tuning frequencies
- Capable of recording RF frequencies to 700 MHz
- Capable of recording signals with bandwidths to 100 MHz
- 8 GB/s real-time aggregate recording rate
- 4U 19-inch rugged rackmount PC server chassis
- Windows® workstation with high-performance Intel® processor
- Front panel removable-SSD drives
- Up to 243 terabytes of storage to NTFS RAID disk array
- Multiple RAID levels of 0, 5 and 6
- SystemFlow® GUI with signal viewer analysis tool
- Optional GPS time and position stamping



RUGGED AND FLEXIBLE ARCHITECTURE

The RTR 2750 is configured in a 4U 19-inch rack-mountable chassis, with hot-swap data drives, front panel USB ports, and I/O connectors on the rear panel. Systems are scalable to accommodate multiple chassis to increase channel counts and aggregate data rates. All recorder chassis are connected via Ethernet and can be controlled from a single GUI either locally or from a remote PC.

The RTR 2750 includes as many as 32 hot-swappable SSDs to provide flexible storage capacities up to 243 TB. The 2.5-inch SSDs can be easily removed or exchanged during a mission to retrieve recorded data. Multiple RAID levels, including 0, 5, and 6 provide a choice for the required level of redundancy.

SYSTEMFLOW SOFTWARE

All Talon recorders include the Mercury SystemFlow[®] recording software. SystemFlow software enables users to configure and control a Talon recorder:

- The SystemFlow GUI provides a point-and-click user interface. 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 API provides a set of C-callable libraries that allow engineers to develop their own user interface to configure and control their Talon recorder. Additional high-level libraries, like Python, are available upon request.

The SystemFlow GUI and API can be run from a remote connection over Gigabit Ethernet. Recorders can be set up to run autonomously by implementing scripts using the API interface.

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

SYSTEMFLOW SIMULATOR

To learn more about SystemFlow software, contact Mercury at techsales@mrchy.com. The SystemFlow Simulator allows you to learn how to use a Talon recorder's SystemFlow software interface before you acquire a recorder or while you are waiting for delivery of a recorder.

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 Talon analog signal recorder.

Features

- Provides real-time recording system simulation
- Allows engineers to write and test their application (built using the SystemFlow API) before receiving the recorder hardware
- Demonstrates SystemFlow signal and file viewer tool
- 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

SYSTEMFLOW RECORDER INTERFACE

The RTR 2750 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 the user to monitor real-time signals or signals recorded on disk.

The screenshot displays the Mercury RF/IF Recording System GUI. At the top, there are tabs for 'Configure', 'Record', 'Status', and 'About'. The main header reads 'mercury RF/IF Recording System'. Below this, there are two configuration sections: 'Profile Configuration' with 'Load Profile' and 'Save Profile' buttons, and 'Remote Server Configuration' with fields for 'Server Name' and 'DNS Name/IP Address', and a 'Connect' button. A 'Local' tab is active, showing a sub-tab for '3317_2' and a window for 'Pentek Model 3317'. This window contains a table of channel parameters and board status.

Channel	Channel Parameters	Board Status
CH1 IN	Configure	Temperature: 57 °C
CH2 IN	Configure	+12V: 12.0 V
CH3 IN	Configure	+3.3V: 3.3 V
CH4 IN	Configure	+2.5V: 2.5 V
CH5 IN	Configure	+1.8V: 1.8 V
CH6 IN	Configure	+1.5V: 1.5 V
CH7 IN	Configure	Clock: Configure
CH8 IN	Configure	● CDC Lock Status

To the right of the configuration window is a block diagram of the Talon RTR 2750 hardware. It shows 'Channels In' entering a '250 MHz 18-bit A/D' converter, which feeds into a 'Digital Down-Converter Decimation: 2 to 65536'. This is connected to an 'Intel Processor' and 'DDR SDRAM'. The system also includes a 'System Drive' and 'Host Processor Running SystemFlow'. External connections include Gigabit Ethernet, USB, PS/2 Keyboard, PS/2 Mouse, Video Output, and an optional GPS Antenna. Below the processor is 'RAID Data Storage' consisting of four 'Data Drives'.

SYSTEMFLOW HARDWARE CONFIGURATION INTERFACE

The RTR 2750 Configure screens provide a simple and intuitive means for setting up the system parameters. The DDC configuration screen, shown below, allows user entries for input

source, center frequency, and decimation, as well as gate and trigger information. All parameters contain limit-checking and integrated help.

The screenshot shows a configuration window titled "Channel 1 Input Parameters" with a light green background. It contains several settings:

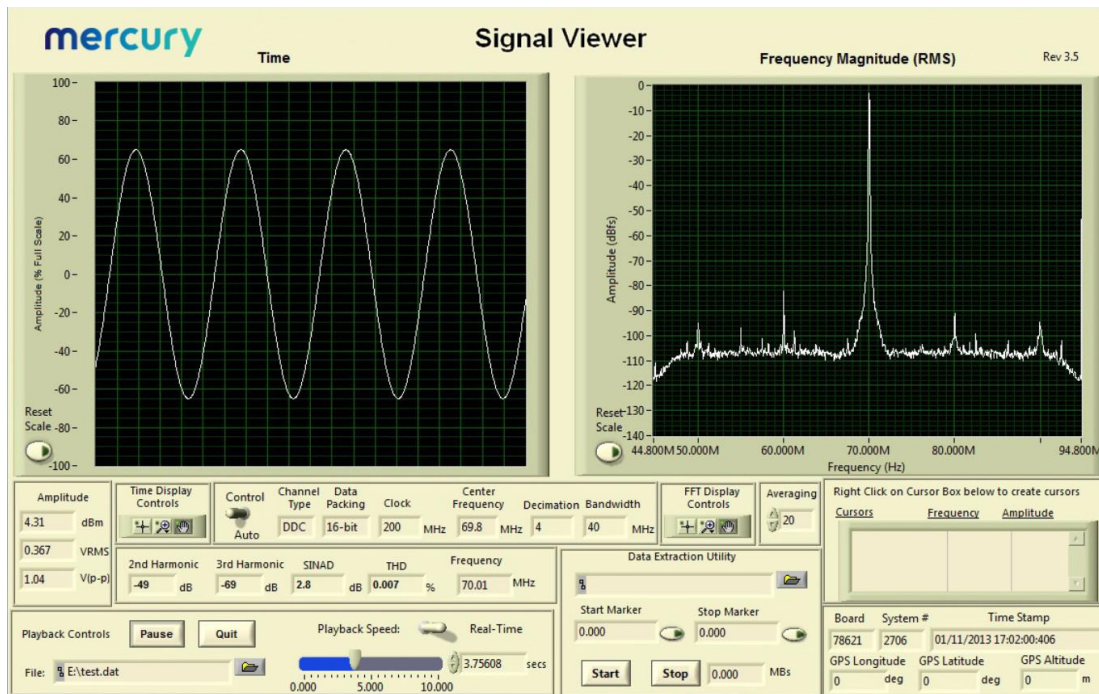
- Bandwidth:** Selected with a radio button, value is 100.0, unit is MHz (dropdown).
- Decimation:** Unselected with a radio button, value is 2.
- Downconversion:** Checked checkbox.
- Input Source:** Dropdown menu set to ADC 1.
- Center Frequency:** Value is 70.0, unit is MHz.
- Gate / Trigger Mode:** Dropdown menu set to None.
- Gate / Trigger Polarity:** Dropdown menu set to Negative.
- Sync Source:** Dropdown menu set to Internal.
- A/D Sampling Rate:** Value is 250.0, unit is MHz.
- Disk Data Rate:** Value is 125.0, unit is MS/s.

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

SIGNAL VIEWER

The SystemFlow Signal Viewer includes a spectrogram, 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.



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 2750 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. In addition to C, support is also provided for high level languages such as Python and C#. 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)
```

SPECIFICATIONS

PC Workstation

- Operating System: Windows®
- Processor: Intel Core i7 processor or better
- SDRAM: (standard) 8 GB
 - Option -309: 16 GB
 - Option -310: 32 GB
 - Option -311: 64 GB

RAID

- Storage: 15.3, 30.7 or 243 TB
- Supported RAID Levels: (standard) 0
 - Option -285: RAID 5
 - Option -286: RAID 6
- Drive Type: SATA III or NVME SSDs

Analog Signal Inputs

Connector Type: Rear-panel female MMCX connectors
 Input Type: Transformer-coupled, optional DC-coupled
 Full-Scale Input: +4 dBm into 50 ohms
 3 dB Passband: 300 kHz to 700 MHz
 Anti-Aliasing Filters: External, user-supplied

A/D Converters

Type: Texas Instruments ADS42LB69
 Sampling Rate (f_s): User selectable, 10 MHz to 250 MHz
 Resolution: 16 bits
 SNR: 73.2 dBFS
 SFDR: 87 dBc (HD2 and HD3)
 100 dBc (Non HD2 and HD3)

Digital Downconverters

Type: Mercury DDC IP Core
 Decimation (D): User selectable 2 to 65536
 IF Center Frequency Tuning: User selectable, 32-bit resolution
 DDC Usable Bandwidth: $0.8 \cdot f_s / D$, factory-supplied DDC coefficient tables

A/D Clock

Clock Sources: Selectable from onboard programmable VCXO or external clocks

External Clocks

Connector Type: Rear panel female MMCX connector
 Input Type: Transformer-coupled
 Full-scale Input: 0 to +10 dBm

Trigger

Connector Type: Rear panel female MMCX connector
 Input Type: LVTTTL

Physical and Environmental

4U Short Chassis: 19" W x 21" D x 7" H
 Weight: 50 lb. approx.
 Operating Temp: 0° to +50° 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, 500 W max.

ORDERING INFORMATION

RAID Configurations

Standard	RAID 0 configuration
Option -285	RAID 5 configuration
Option -286	RAID 6 configuration

Memory Options

Standard	8 GB system memory
Option -309	16 GB system memory
Option -310	32 GB system memory
Option -311	64 GB system memory

Storage Options	
Option -415	7.6 TB SSD storage capacity
Option -420	15.3 TB SSD storage capacity
Option -430	30.7 TB SSD storage capacity
Option -460	61.4 TB SSD storage capacity
Option -485	122.8 TB SSD storage capacity
Option -490	243.3 TB SSD storage capacity

General Options (append to all options)	
Option -261	GPS time and position stamping
Option -264	IRIG-B time stamping

Contact Mercury for compatible option combinations. Storage and general options may change, so contact Mercury for the latest information.

LIFETIME SUPPORT FOR TALON PRODUCTS

Mercury offers worldwide customers 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 our 40 years of experience in delivering high-performance radar, communications, SIGINT, EW, and data acquisition MIL-Aero solutions worldwide.



Corporate Headquarters

50 Minuteman Road
 Andover, MA 01810 USA
+1 978.967.1401 tel
+1 866.627.6951 tel
+1 978.256.3599 fax

International Headquarters

Mercury International
 Avenue Eugène-Lance, 38
 PO Box 584
 CH-1212 Grand-Lancy 1
 Geneva, Switzerland
+41 22 884 5100 tel

Learn more

Visit:
mrcy.com/go/MP2750

For technical details, contact:
mrcy.com/go/CF2750



The Mercury Systems logo and the following are trademarks or registered trademarks of Mercury Systems, Inc.: Mercury Systems, Innovation That Matters, SystemFlow, and Talon. Other marks used herein may be trademarks or registered trademarks of their respective holders. Mercury believes this information is accurate as of its publication date and is not responsible for any inadvertent errors. The information contained herein is subject to change without notice.

