



MONSSTR

MODular Non-volatile Selectable SStorage Recorder

Digital Recording...

MONSSTR 2300(V1)

Digital Video and Data Recorder

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The Model 2300(V1) MONSSTR[®] (MODular Non-volatile Selectable SStorage Recorder) is the latest in the series of industry-leading state-of-the-art recorders developed by CALCULEX[®]. It combines the unmatched performance of the CALCULEX FlashCache[®] II (FCMMII) and SpinCache[™] (SCMM) memory cartridges with a wide range of internal, highly configurable IRIG Standard 106 Chapter 10 input data multiplexers and output reconstructors and is ideally suited for multiple missions. Figure 1 is a high-level block diagram of a MONSSTR 2300(V1).

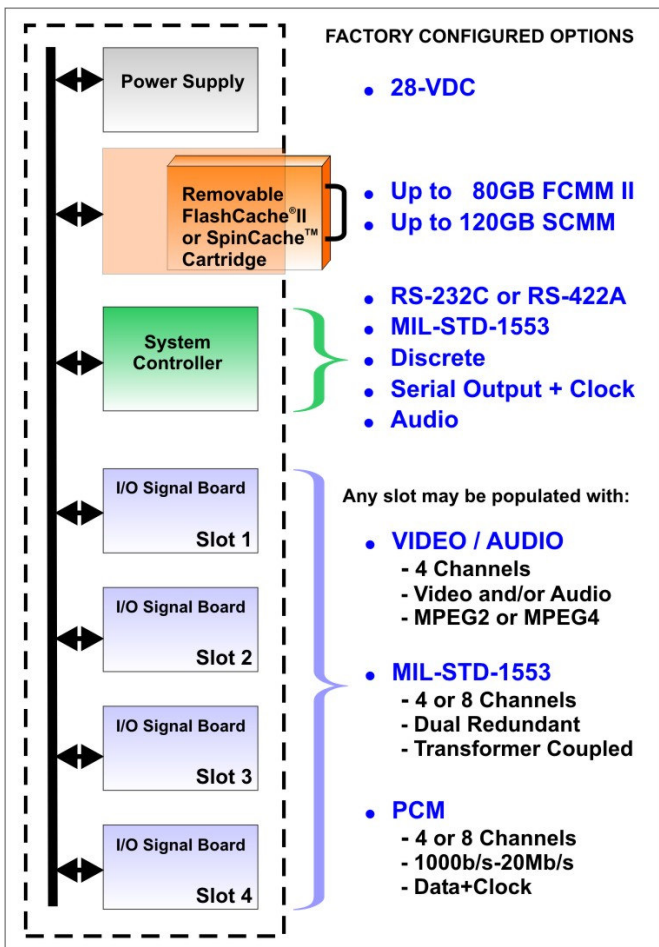


Figure 1: Model 2300(V1) Block Diagram

Product Highlights:

- Compact, Rugged, Multi-channel Recorder
 - FlashCache[®] II – 8GB to 81GB or SpinCache[™] – 60GB to 120GB
 - Up to 40MB/s Aggregate Record Data Rate
 - Four User Slots for Input/Output Cards
- Available Card Types:**
- 4 Video and Audio Channels
 - 4 or 8 PCM Channels
 - 4 or 8 MIL-STD-1553 Channels
- IRIG 106 Chapter 10 Data Packet Format for Software or Hardware Demultiplexing
 - Custom, Application Specific Data Processor Boards

FlashCache II and SpinCache Memory Cartridges with FireWire® Interface

All 2000 series MONSSTR recorders use non-volatile FlashCache II or SpinCache memory cartridges to store user data. With up to 80 GBytes (FCMM II) or 120GBytes (SCMM) of memory in a 3.5"x 7.0"x 1.5" package, the small size of the FlashCache II and SpinCache cartridge belie its blazing performance. A FlashCache II or SpinCache cartridge can sustain a 40MB/s write or read speed under all conditions. While this high data bandwidth is not typically needed for recording, it is always appreciated before or after a mission when data is being uploaded into or downloaded from the cartridge.

FlashCache II and SpinCache cartridges are equipped with a built-in IEEE 1394b FireWire interface for simple and fast data download into a computer, as shown in Figure 2. The speed of the FireWire interface in Beta mode is 800Mbps and the interface is backward compatible with 1394a and 1394-1995. When connected to a computer running Windows®, the FlashCache II and SpinCache cartridges mount like external storage devices, e.g. a memory stick or digital camera. These cartridges are shipped in sturdy reusable cases. Figure 3 shows one of the non-volatile cartridges with a standard writing pen for size comparison. Table 1 lists available FlashCache II and SpinCache cartridge memory sizes.

IRIG Standard 106 Chapter 10 Data Format

The MONSSTR 2300(V1) incorporates internal data multiplexers to format user data into IRIG 106 Chapter



Figure 2: FlashCache II and SpinCache Cartridge with IEEE 1394b FireWire Interface

Cartridge Model No.	Capacity (GB)
FlashCache II	
CSR-2002/8	8.19
CSR-2002/16	16.38
CSR-2002/24	24.57
CSR-2002/32	32.76
CSR-2002/40	40.96
CSR-2002/49	49.15
CSR-2002/57	57.34
CSR-2002/65	65.53
CSR-2002/73	73.72
CSR-2002/81	81.92
SpinCache	
CSR-2011/60	60.00
CSR-2011/80	80.00
CSR-2011/120	120.00

Table 1: FlashCache II and SpinCache Memory Cartridge Capacities

10 packets. A key feature of Chapter 10 packet format is the 10MHz relative time counts with 1/10 microsecond precision that are inserted into each packet header and each message or data frame within an individual packet. The Chapter 10 format is designed to simplify direct processing of user data employing demultiplexing software without reconstructing the raw input signals during playback. Its precise relative timing across all input channels also enables excellent reconstruction of the relative phases of the original signals when data output is required in its raw electrical input format. CALCULEX offers both software and hardware IRIG 106 Chapter 10 demultiplexing products.

Multiple Input Data Types

The MONSSTR 2300(V1) controller has an integral audio input channel and IRIG time code input channel. The audio input is digitized into a standard "wave" sample stream suitable for output on any personal computer with a multimedia sound output. The internal IRIG time code generator synchronizes to an external IRIG-A, -B, or -G amplitude-modulated signal and generates an IRIG time packet once per IRIG frame. These IRIG time packets are used to establish the absolute time of each 10MHz relative time count in all the other channel data packets.

The MONSSTR 2300(V1) has four user slots that are each capable of accommodating one of five standard input/output boards as follows:

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- 4 or 8 channel PCM board
- 4 or 8 dual-redundant MIL-STD-1553 bus
- 4 channel video and audio board

Any of these input/output boards can be plugged into any of the four user input slots, yielding signal configurations up to 40 channels. CALCULEX can also develop user-specific custom modules to support other data types or data processing requirements.

Video and Audio Inputs

The MONSSTR 2300(V1) is specifically designed to record multiple channels of composite video from NTSC or PAL sources. Each channel supports video, audio, or both, and is compressed into an industry standard MPEG Program Stream or Transport Stream, depending on the mode of operation. Full motion color video, digitized into 720 pixels per line and 480 lines per frame can be compressed into as little as 2 megabits per second. In Variable Bit Rate (VBR) mode, the generated Chapter 10 video packets contain multiple MPEG Program Stream packets. In Constant Bit Rate (CBR) mode, the Chapter 10 video packets are created with multiple frame-synchronized MPEG Transport Stream packets. CBR mode supports the selectable real time serial data output described below.

Live Video and PCM Output

The MONSSTR 2300(V1) has an internal crossbar switch that can route any of the PCM input channels or CBR mode video input channels to a dedicated output port on the system controller. This feature is specifically designed to support dynamic selection of any PCM or compressed video channels during a mission for real time encryption and telemetry to a ground data processing facility. This feature also provides for simple real time verification that the particular channel selected is being recorded.

Real Time Data Processing and Output Functions

Recorded data can be played back for reconstruction and output to the user while recording new data. This read-while-write capability enables the user to process and display or transmit recorded data while the mission is in

progress. The user card slots may also be configured with one or more data processor modules. During the record process, data from the various input channels is multiplexed and recorded into the FlashCache II or SpinCache cartridge, rendering it accessible to the data processor modules for real time computational, display, or output functions. The typical read-after-write latency through the cartridge is less than two milliseconds.

Flexible Command and Control

The MONSSTR 2300(V1) has a very flexible command and control interface. The user may select from one of four standard interfaces; RS-232C, RS-422A, MIL-STD-1553, or discrete. Multiple interfaces may be active simultaneously. For example, switches and lamps may be used to control the unit while the RS-422A interface outputs the amount of memory remaining as a numerical percentage. The MONSSTR 2300(V1) command protocol is per the IRIG 106 Chapter 10 format.

Installation

The MONSSTR 2300(V1) can be hard-mounted to a cold plate using conventional ARINC bayonet pins and toe clips. MIL-C-38999 connectors on the unit enable the use of industry standard mating plugs. The receiver door is spring-loaded and designed for cartridge insertion and removal with a single, gloved hand. FlashCache II and SpinCache cartridges are keyed so they can only be inserted in the correct orientation.

A unique latching mechanism allows the memory cartridge to remain firmly in place while in use. This feature allows for mounting the recorder in any orientation within the aircraft.



Figure 3: FlashCache II Cartridge and writing pen

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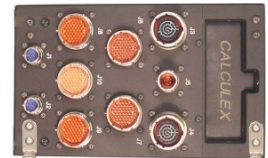
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SPECIFICATIONS:

Recorder Size:	7.5”H x 10.0”L x 4.5”W excluding connectors and cartridge door
Cartridge:	One (1) FlashCache II or SpinCache cartridge
Cartridge Size:	3.5”W x 7.0”L x 1.5”H
Cartridge Removal:	7.0” clearance in front of face plate
Cartridge Weight:	Up to 1.5 pounds
Recording Format:	IRIG 106 Chapter 10 packet format
Input/Output Boards:	Four (4). Any combination of PCM, MIL-STD-1553, or video boards
PCM Board▶	4 or 8 channels, data + clock. 1000 b/s – 20Mb/s, NRZ-L frame synchronizer per channel, 1000B/s – 4 Mb/s BiPhase
MIL-STD-1553 Board▶	4 or 8 dual-redundant busses, short or long stub coupled
Video Audio Board▶	4 channels, video, audio or both, NTSC or PAL, MPEG2 or MPEG4
Weight:	Up to 15.5 pounds

INSTALLATION OPTIONS:

Toe Clip Options



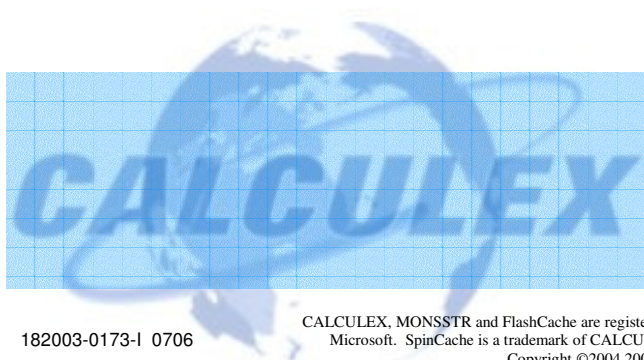
ENVIRONMENTAL:

Temperature:	-40°C to +72°C, (operational) -55°C to +95°C, storage
Humidity:	5% to 95%, non-condensing
Cooling:	Conduction and Convection
Shock:	20Gs, any axis
Acceleration:	15Gs, any axis
Vibration:	16.75gRMS, any axis
Altitude:	80,000 ft. (operational) 100,000 ft. (non-operational)
Explosive Atmosphere:	Per MIL-STD-810F
Salt Fog:	Per MIL-STD-810F
Sand & Dust:	Per MIL-STD-810F
Fungus:	Per MIL-STD-810F
EMI:	Per MIL-STD-461E
Maximum Power:	2.5 Amp @ 28VDC per MIL-STD-704A/D



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