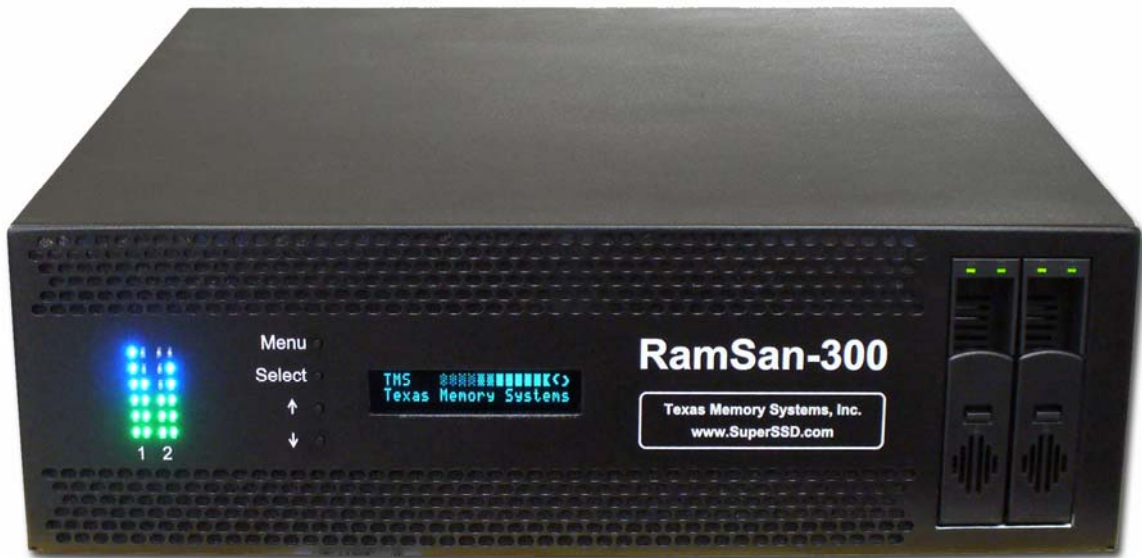


TEXAS MEMORY SYSTEMS, INC.

RamSan-300

User's Guide



Version 1.0

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Preface

Document Overview

This document provides operating procedures for the RamSan-300. It covers installation, management, and troubleshooting issues.

Conventions

This document uses the following textual conventions:

Select	Front panel button descriptions
Ethernet Setup	Front panel text (menu items)
lunconfig	Management port (serial/Telnet) commands and text.

Safety Precautions

PLEASE OBSERVE ALL DUE SAFETY MEASURES WHEN WORKING WITH SENSITIVE ELECTRICAL EQUIPMENT. READ AND FOLLOW ALL INSTRUCTIONS AND SAFETY PRECAUTIONS BEFORE OPERATING THE UNIT.

- Before servicing the unit, shutdown the unit and remove power cords from both power supply modules. Wait 15 seconds before servicing the unit.
- **DO NOT REACH INSIDE THE PROTECTIVE ENCLOSURE AFTER REMOVING A POWER SUPPLY MODULE.**
- Caution for service personnel: Power supply modules include Double Pole/Neutral Fusing.
- **RISK OF FIRE OR EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE. DO NOT DISPOSE OF USED BATTERIES IN A FIRE. THEY MAY EXPLODE. CHECK WITH LOCAL AUTHORITIES FOR DISPOSAL INSTRUCTIONS.**
- Only use TMS factory certified replacement parts. Faulty components should be replaced as soon as possible.

Revision History

The following table describes revisions to this document:

Version	Comments	Date	Firmware
1.0	Initial release	10/12/2006	3.0

Chapter 1 – Introduction

1.1 Overview

The RamSan-300 solid-state disk uses DDR RAM (memory) as its primary storage. This technology enables practically instantaneous data access, which results in dramatic application performance increases.

Texas Memory Systems (TMS) designed the RamSan to be highly available and fault tolerant. The system has higher availability than RAID or JBOD systems because the primary storage media is DDR RAM, which does not require moving parts. Additionally, DDR RAM has a very high mean time between failures (as high as several hundred years) according to some studies. The mechanical components in the RamSan are redundant and hot swappable.

The RamSan-300's internal disk drives provide a fully non-volatile solution. The RamSan-300 has three modes of operation: Active Backup™, DataSync, and Volatile mode.

The RamSan complements existing disk drives, JBOD, or RAID, in performance sensitive applications. Servers perceive the RamSan as another attached SCSI disk drive. For some applications, the RamSan is the only storage system required. For applications that store terabytes of data, storage administrators add the RamSan to systems that include RAID or JBOD.

Connect the RamSan via Fibre Channel to host servers, NAS filers, or storage network switches and hubs. If you have specific compatibility questions, please contact Texas Memory Systems.

Use the RamSan in a variety of applications. If hard disk drives slow down your application, there is a good chance that the RamSan can speed it up.

1.2 System Components

The system components for the RamSan-300 include:

- Main system memory ranging from 16 to 32 Gigabytes
- One or two dual-port Fibre Channel controllers
- Dual, redundant hot-swappable power supplies
- Redundant fans
- Ethernet monitoring port
- Serial monitoring port
- Front panel display for monitoring and configuration
- SNMP based monitoring
- Java-based Web monitoring
- Mirrored backup hard disk drives
- Redundant batteries

1.3 Power

The RamSan includes two power supplies. Only one power supply is needed to run the system. The power supplies are auto-ranging (they accept either 110 or 220 VAC power).

The RamSan-300's power supplies are connected to an internal battery pack. The battery pack provides up to 30 minutes of operation after a power failure. In the event one battery or power supply fails, the other functional power supply and battery combination handles the system operation. You can monitor power supply temperature and voltages from the system monitoring software.

If a RamSan-300 loses power, it operates for five minutes before shutting down. The shutdown process involves synchronizing data to the internal hard disk drives. If the system determines that the battery life will not last the full shutdown delay period, it starts the synchronization process.

When power is restored, the RamSan-300 restores system memory with the data from the internal hard disk drives and then resumes normal operations. In addition, the system begins recharging the batteries. You can monitor the battery charge levels using the bundled remote monitoring software.

1.4 Non-Volatility

By utilizing internal hard drives and batteries, the RamSan-300 combines the performance of DDR RAM storage with the non-volatile nature of hard disk drives. Texas Memory Systems equips the RamSan-300 with an internal backup RAID. The backup RAID can operate at about 60 MB/sec during operation. In order to operate the drives after a power failure occurs, the RamSan-300 contains redundant batteries. When fully functional and fully charged, the batteries are able to provide at least 30 minutes of operation.

The system monitors the internal disks and batteries for a failure condition. In such an event, it notifies the operator of an error through the front panel display and the management software.

1.5 Configurable Backup

The RamSan-300 allows the administrator to set backup modes for each LUN individually or system wide.

Active Backup™ mode (optional)

This ideal mode for most users is only available from Texas Memory Systems. In Active Backup mode, the RamSan uses available internal bandwidth (i.e. performance not utilized by the applications) to constantly backup memory to the disks. The system automatically optimizes this operation to backup the maximum amount of data at any given time without affecting performance. This means that at any one time, most of the data already resides on disk. Upon emergency or shutdown, the unit need only finish the backup that is already nearly completed. Active Backup is an optional feature on the RamSan-300; therefore, some systems may not display this option.

DataSync mode

In DataSync mode, reads and writes are done only to memory. The disks remain offline during normal operation. Five minutes after a power loss or if the user requests a shutdown, the system takes the Fibre Channel interfaces offline and synchronizes all data to the mirrored backup hard drives.

None (Volatile) mode

This operational mode disables the backup functionality for the LUN making it completely volatile. In the case of system shutdown or failure, all data stored in the selected LUN will be lost intentionally.

1.6 Performance

The RamSan-300 solid state disk is the ultimate in performance storage. With up to four Fibre Channel ports in a 3U package, the RamSan-300 delivers unparalleled bandwidth and I/O. The RamSan-300 is capable of 200,000 IOPS (I/O operations per second) and 1,500 MB/sec of read or write performance.

Chapter 2 – Installation

2.1 Electro-Static Discharge Warning

Important:

Please take full E.S.D. precautions if it is necessary at any time to come into contact with any circuit boards, components or connectors. Electrostatic discharge can damage the components used in the RamSan and its interfaces.

2.2 Battery Warning

The internal batteries in the RamSan-300 are charged with enough voltage to power a fully loaded system for approximately 30 minutes. However, the batteries may not be fully charged when you install your system. Therefore, ensure that your batteries are fully charged before you use the system where there is risk of power failure.

As a precaution, replace the RamSan's batteries every two years. To obtain spare or new batteries for your RamSan, contact Texas Memory Systems.

2.3 System Inspection

TMS ships the RamSan with a packing list. Ensure that you have received all of the components listed.

- 1) Examine the external chassis for any damage that might have occurred during shipping.
- 2) Ensure that both power supplies are locked securely in place and that the hard disk drives have not come loose.
- 3) Inspect the interface plate for any screws that might have loosened during shipping.
- 4) Inspect the front panel display for damage.
- 5) Report any meaningful damage to Texas Memory Systems.

Figure 2-1 shows an overhead view of the layout of the RamSan-300 components.

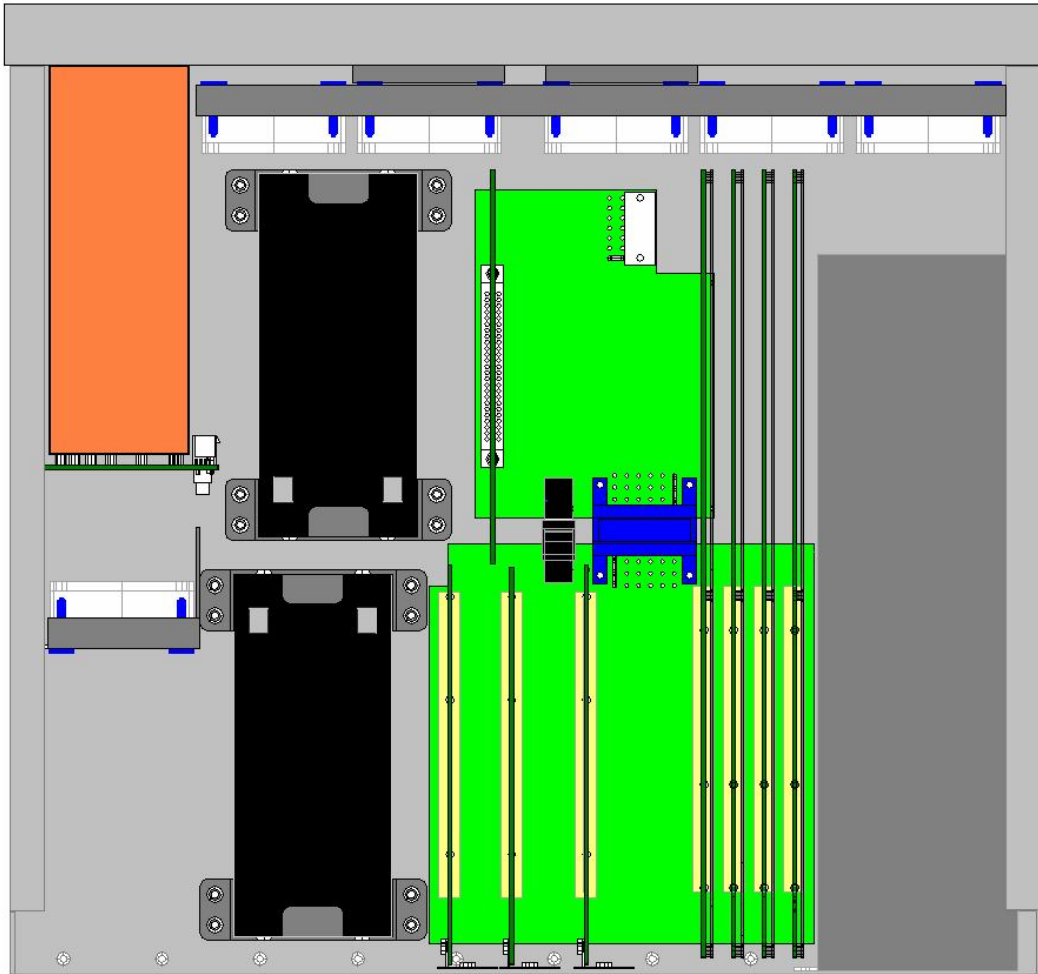


Figure 2-1: RamSan-300 Layout

2.4 Rack Mounting

The RamSan-300 solid state disk is a 3U rack-mountable system. TMS ships the system with the slides and equipment needed to install it into a standard 19" rack.

2.5 Connecting the Fibre Channel Ports

After you have inspected the system and properly mounted it, connect the Fibre Channel ports on the RamSan to your server or to a Fibre Channel switch.

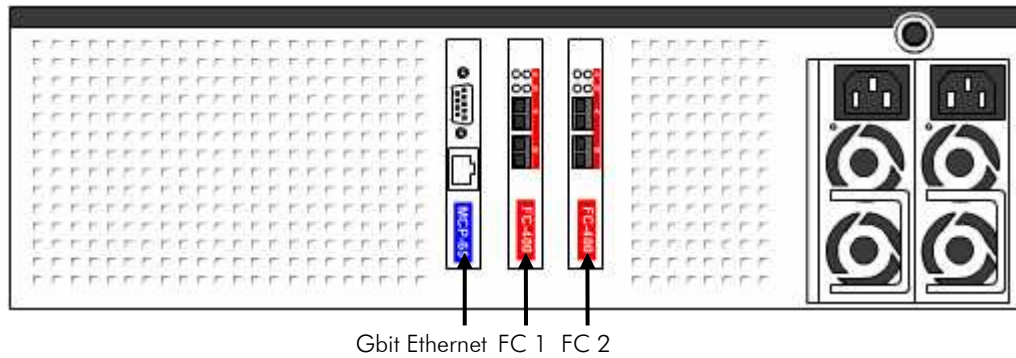


Figure 2-2: RamSan Interface Plate

Your system includes from one or two FC-400 Fibre Channel controllers.

Figure 2-2 shows the port layout for the RamSan. Each controller has two Fibre Channel ports: A and B, on the top and bottom respectively. The FC-400 ports on the system are capable of connecting to point-to-point, arbitrated loop, and switched fabric topologies at either 2- or 4-Gigabit speeds.

2.6 Connecting the Power Supplies

TMS equips the RamSan with dual redundant hot-swappable power supplies that operate on 110/220 VAC line power. A fully loaded RamSan requires approximately 250 watts of power. Using the provided AC power cords, connect both power supplies to a power source. Install the socket outlet in an easily accessible location near the equipment.

For normal system operation, connect both power supplies to an external power source. Since the power supplies are redundant, you may remove line power from one without any interruption in system operation. If a RamSan-300 completely loses external power, it will shutdown after a defined amount of time.

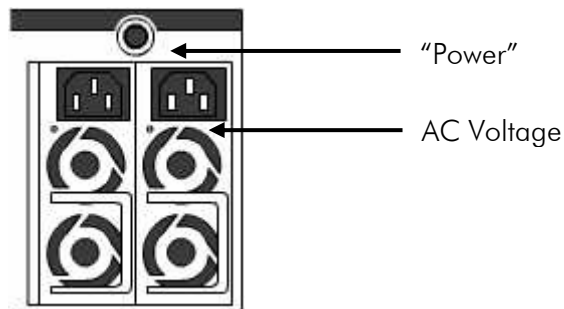


Figure 2-3 RamSan Power Supply

The power supply includes the following button and indicators:

“Power” switch

The large black button above the power supplies acts as an on/off switch and will silence the warning buzzer.

- The button provides a means to activate the power supplies (turn them on) after a system shutdown. If the system shuts down for any reason other than a power failure, press the “Power” switch to turn the system back on. If power is restored after a power failure or both power cords are removed and then reinserted, the system automatically powers on.
- When a power supply fails, is removed, or loses AC power, the power supplies beep. If the buzzer sounds, silence it by pressing the “Power” switch once or by correcting the problem. The silencing lasts until the problem is corrected. Once the problem is corrected, the buzzer will sound again if another power failure occurs.
- In addition, the button allows the user to force a hard-shutdown of the system. Only perform a hard-shutdown when you are unable to perform a manual shutdown and after backing up all of the data to external storage. To perform a hard-shutdown, unplug or remove both power supply modules. Then, hold down the “Power” switch for approximately 5 seconds to shutoff the batteries and cause the system to lose power.

Warning:

A hard-shutdown will cause data loss and should only be used when the user is unable to perform a manual shutdown and all the data has been backed up to external storage.

AC Voltage indicator light

When the power supply is connected to AC power and is operating properly, the indicator light attached to each power supply is green. If the green light is not on, either the power supply is disconnected from an AC power source or the power supply has failed. Check the power cable to determine if power has been lost to the supply or whether the supply has failed. The front panel display, Text Management Interface, or Web interface, may provide additional information regarding the problem.

2.7 Turning on the System

The RamSan automatically powers on when power is connected to the system. The only time the system does not power on automatically is when a user has initiated a manual shutdown or the system has powered off due to some failure other than AC power loss. In the event this happens, press the “Power” button, which is the large black button above the power supplies. Please see *Section 2.6 Connecting the Power Supplies*.

2.8 System Initialization

The front panel display shows the boot process’s current state. Once the power is connected, the system turns on automatically and the front panel display begins the power on sequence. The following happens

automatically (you can also monitor this boot sequence externally through the serial port):

1. Once AC power is connected, the RamSan will power-up and briefly display "**Initializing...**"

```
Initializing ...
```

Soon after that, you will see "**Memory Init ...**" and then the system displays progress of the initialization and estimated time remaining.

```
Memory Init ...      52.3%  
Est Time Left       00:15
```

2. Next, the front panel displays "**Restoring SSD**" and cycles between a progress bar and an estimated time until completion. Administrators may use this to determine how much time before the system is on-line. This information is also available through the Text Management Interface. This process will take approximately 12 minutes for a fully loaded system.

```
Restoring SSD ...    73.8%  
Est Time Left       04:03
```

3. Once the system has restored data, the front panel displays "**System Status: GOOD**" and shows the performance bars for each Fibre Channel port. The numbers represent the Fibre Channel Controllers. If a controller is not installed, the number and corresponding performance will not display. The top bars represent the port A and the bottom bars represent port B.

```
System Status:      GOOD  
1==                2==
```

The system is now ready for normal operation.

Chapter 3 – Management Tool Overview

3.1 Front Panel Display

The Front Panel Display provides a quick and easy way view the RamSan's status. It displays the current progress of disk synchronization and shows system warnings and failures.

The RamSan's front panel allows you to:

- Inspect the state of the system
- Change the method of IP address assignment
- Shutdown the system

Figure 3-1 displays the RamSan-300's front panel:

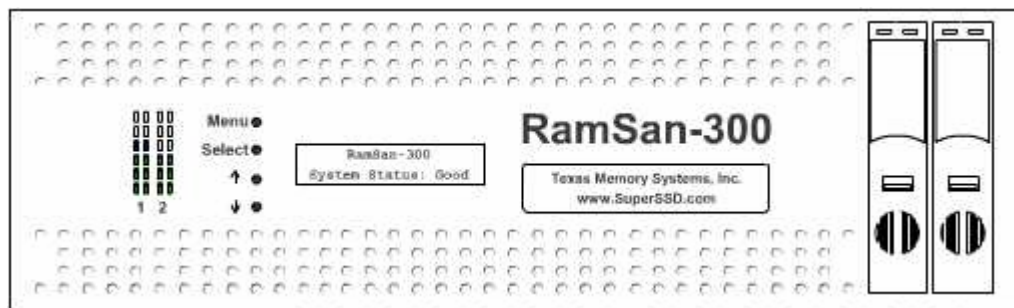


Figure 3-1: RamSan-300 Front Panel

Four buttons located to the left of the display are used to make selections:

- Menu** The **Menu** button has two functions:
- Function 1:
On any of the status or performance displays, pressing the "**Menu**" button launches the RamSan Main Menu.
 - Function 2:
Escape function. Once the menu is open, pressing "**Menu**" returns the user to the prior screen.

- Select** When a menu item is on the display, pressing "**Select**" will either: execute that menu option or proceed to the next layer in the menu. If the menu is not selected, this button is disabled.

- ↑** The "**↑**" button scrolls up through the menu. The "**↑**" button is also used cancel certain commands, as indicated on the display. If the menu is not selected, this button is disabled.



The “↓” button scrolls down through the menu. The “↵” button is also used confirm certain commands, as indicated on the display. If the menu is not selected, this button is disabled.

3.1.1 Front Panel menu system layout

The following details the menu system of the front panel display:

Main Menu

System Info

- Firmware Version
- Memory Size
- LUNs Configured
- IP Address
- # of Controllers
- FC Firmware
- System Uptime

System Status

- View Messages
- Clear System Errors
- Exit Menu

System Log

- Clear
- Exit Menu

Network Config

- Show Current Config
 - IP Mode
 - Ethernet Address
 - Subnet Mask
 - Gateway
 - Hostname
 - Hardware Address
- Set IP Config
 - Static
 - IP
 - Subnet Mask
 - Gateway
 - DHCP
 - None
 - No Change (Exit)
- Restart Network
- Exit Menu

Active Monitor Mode/Deactivate Monitor

LED Config

- Set LED Config
 - Display Bandwidth
 - Display IOPS
 - Performance Demo
 - LED Test Pattern
 - Disable LEDs
 - Exit Menu
- Set LED Brightness

LED Brightness [Level]
Exit Menu
Display Logo
Manual Restart
Manual Shutdown

3.2 Text Management Interface

The RamSan's management port allows you to manage, configure, and monitor system behavior. You may connect to the management port with either a DB-9 serial cable or an RJ-45 Ethernet cable.

3.2.1 Connecting using a terminal program

To connect to the RamSan using a serial port connection, use a dumb terminal or a terminal emulation program such as Windows™ HyperTerminal. Set your baud rate to 9600 with 8 data bits, 1 stop bit, no parity, and no flow control.

To connect to the serial port, use the DB-9 non-null serial cable supplied with the system.

3.2.2 Connecting using Telnet

Once the administrator configures the Ethernet port on the RamSan using either the front panel or the serial port, you may remotely monitor the system using a Telnet session. Set your terminal settings to VT100 mode.

In order to use the Ethernet port, first configure the IP address for the RamSan by using the front panel display or from the serial port.

3.3 Web Management Interface

Another way to get an overview of what is happening in a system is to use the web management interface. At a glance, this JAVA utility shows the status of all components and combines the information found in the Text Management Interface. In addition, the Web interface includes complete management and configuration features.

To access the web management interface, enter the RamSan's IP address in a web browser. The web management interface is password protected. Enter your system login and password to access the web management interface.

Chapter 4 – Configuring Through the Front Panel

4.1 Configuring Ethernet Setting via Front Panel

The RamSan allows system monitoring and configuration through the serial port and the Ethernet port. To access the system's Ethernet port, the administrator must assign the RamSan an IP address, subnet mask, and possibly a gateway. The administrator may assign the IP address in one of three ways: Static IP, DHCP, or No Ethernet. The default factory setting is DHCP. For any questions regarding IP assignment values, please consult your network administrator.

To setup the Ethernet via the Front Panel, use the arrow buttons to cycle through the top-level menu options until the display shows "Ethernet Setup." Use the Select button to choose this option and continue with the configuration. You may now use the arrow buttons to scroll through the following menu options:

- Displays a list of the current IP configuration, hostname, IP address, subnet mask, gateway address (if applicable), and hardware Ethernet address.
- To continue setting up the Ethernet configuration
- Shuts down and restarts the Ethernet port using the current IP assignment configuration
- Exits the setup menu.

Show Current Config

Set IP Config

Restart Network

Exit Menu

Use the arrow buttons to scroll up and down through the list. Pressing the "**Menu**" button returns to the previous menu, and pressing the "**Select**" button exits the menu system. To continue setting up the Ethernet configuration, select "**Set IP Config.**"

After selecting "**Set IP Config**," you may use the arrow buttons to cycle through:

- Enables you to set a static IP address for the RamSan.
- Sets the IP configuration to DHCP
- Disables Ethernet
- Returns to the Main Menu without making any changes

Static

DHCP

None

No change

Talk to your network administrator for the proper IP assignment type. The default factory setting is DHCP. Use the "**Select**" button to select the desired method of IP assignment. If you did not choose "**Static IP**" you are asked to confirm the selection with the "↓" button.

To configure the RamSan with a static IP, the system requires the IP address, subnet mask, and a possibly a gateway address.

After you have chosen "**Static IP**," "**Ethernet IP**" replaces the top line of the display, and the display prompts you to enter an IP. Use the "↑" or "↓" buttons to cycle through the numbers "0" through "9". To select the value, use the "**Select**" button. Then, the input prompt moves to the next character position. To back up a space, press the "↑" and "↓" button simultaneously. Repeat this procedure until you have entered the 4-byte address. Press the "**Menu**" button at any time to cancel the Static IP assignment.

Ethernet IP
—

After you have finished entering the IP, the top line of the front panel changes to "**Subnet Mask**." Using the same procedure as entering the IP address, enter the subnet mask.

Subnet Mask
—

The final value you must enter is the "**Gateway Address.**" If the RamSan is on a private network and this value is not needed, enter the value "**0.0.0.0**" to tell the RamSan to ignore this entry.

```
Gateway Address
-
```

After entering all three values, the display prompts you to confirm the command with the "↓" button.

After confirming the new IP assignment mode, the display indicates "**Shutting Down Network...**" followed by a success or failure message. Then, the display indicates "**Saving IP Config...**" followed by a success or failure message. Next, the RamSan attempts to start the network with the new settings, indicated on the front panel display with "**Restarting Network...**" Upon success, the system displays the new IP address on the front panel for 15 seconds or until any button is pressed.

```
Shutting Down Network...
```

```
Saving IP Config...
```

```
Restarting network...
```

```
New IP Address:
000.000.000.000
```

If the network fails to start, check the Ethernet connection and contact your system administrator. If the system successfully saved the IP configuration, you may simply select the "**Restart Network**" option from the "**Ethernet Setup**" menu instead of re-selecting the same IP configuration.

4.2 Power Down Settings

The RamSan has features that allow the administrator to safely power down the system.

4.2.1 Manual shutdown

The administrator can shut down the RamSan manually from the front panel and via Text Management Interface. This procedure safely synchronizes all data in RAM to the internal hard disk drive storage.

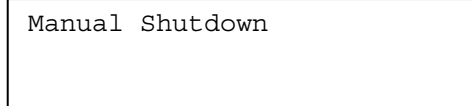
In order to turn the RamSan back on after a manual shutdown, press the "Power" button on the power supplies. For additional details, see *Section 2.7 – Turning on the System*.

Important:

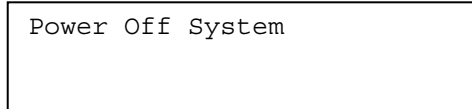
TMS recommends backing-up the contents of the RamSan to your server or another storage device as a fail-safe before performing a Manual Shutdown.

Via Front Panel Display

To shut down the system using the front panel, use the arrow buttons to cycle through the top-level menu to select **“Manual Shutdown.”** Use the **“Select”** button to select this menu item.



The display prompts you to confirm that you wish to **“Power Off System.”** To cancel the shutdown, use the **“↑”** button to return to the main menu. To proceed with the shutdown, use the **“↓”** button to confirm the system power off.



Now, the front panel display indicates that the system is powering off. Depending on the system mode and the size of memory, this procedure may take a while. The front panel cycles between a power off status bar and an estimated time until the system completes the power off.



4.2.2 Automatic shutdown

In the event that the system senses a high system temperature, power out of specs, or AC power is lost, the system will automatically initiate the shutdown procedure.

4.3 Front Panel Monitoring

When the menu on the front panel is not in use, the display monitors various aspects of the system. The display presents the following information:

4.3.1 Restore/Synchronize Progress

During any synchronization or data restore, the front panel cycles between the operation progress and estimated time remaining until completion.



If the system is rebuilding the disk array, the system displays **"RAID Rebuild. "**

RAID Rebuild ...	23.1%
Est Time Left	10:12

4.3.2 Status

The following status levels are possible:

"GOOD"

This is normal operation.

System Status:	GOOD
----------------	------

"WARNING"

Indicates that the RamSan has detected a system warning. Warning statements scroll across the front panel display.

System Status:	WARN
Warnings:	Disk Array Degr.

Possible warning examples:

- Pwr supply # removed
- AC lost at one or both power supplies
- One or both batteries are low
- Temperature warning
- One disk removed

"ERROR"

Indicates that the RamSan has detected a system failure. Error statements scroll across the front panel display.

System Status:	ERROR
Errors:	Disk # Failed

Possible failure examples:

- Fan failure
- Power supply failed
- System overheated
- More than one disk removed or failed.

In the case of either system warnings or failures, the front panel display alternates between displaying status information and warning or failure messages every 10 seconds.

4.3.3 Fibre Channel Performance

The front panel display can show the Fibre Channel Controller performance:

From the front panel main menu, select
“**Active Monitor Mode.**”

Active Monitor Mode

This mode shows the performance bars for each Fibre Channel port. The numbers represent the Fibre Channel Controllers. If a controller is not installed, the number and corresponding performance will not display. The top bars represent the port A and the bottom bars represent port B.

1== - 2== -

The system stays in Active Monitor Mode for 10 minutes or until the user selects “**Deactivate Monitor**” from the front panel main menu.

4.3.4 LED Performance Monitoring

If your system is equipped with front panel LEDs, you can also view bandwidth and IOPS:

From the front panel main menu, select **"LED Display"**

LED Display

This mode uses the LEDs to display bandwidth or IOPS. To use the LEDs to display bandwidth, select **"Display Bandwidth."** To use the LEDs to display IOPS, select **"Display IOPS."**

Display Bandwidth

Once you select one of the above options, the display will ask you to **"Enable Autoblink."** If you enable autoblink, the top LED will blink (even with constant bandwidth or IOPS).

Chapter 5 – System Maintenance

One of the main features of the RamSan is the ability to hot swap many of the system components. You can hot swap the power supplies and disk drives, meaning that you can remove and replace these components while the system is running.

5.1 Hot swapping power supplies

The RamSan includes two power supplies. The system only requires one functioning power supply to run. Texas Memory Systems has taken special care to enclose the RamSan power supplies in a protective case to minimize the electrical risks for users; however, it is critical for users to follow the following steps when removing and replacing the power supplies:

- Disconnect the power cord from the power supply.
- Wait 5 seconds.
- Remove the power supply that needs to be replaced from the RamSan chassis by pressing the release switch and pulling on the power supply handle. **DO NOT REACH INSIDE THE PROTECTIVE ENCLOSURE AFTER REMOVING THE POWER SUPPLY.**
- Insert the replacement power supply in the RamSan chassis. Make sure to insert the power supply squarely and press firmly until the power supply is fully inserted into the system.
- Reconnect power to the new power supply.
- The new power supply should begin to operate immediately.

Important:

Replace failed power supplies as soon as possible.

5.2 Hot swapping disk drives

The RamSan-300 includes redundant internal hard disk drives. The system can operate with one disk missing. DataSync mode synchronizes to the internal hard disk drives on shutdown, and Active Backup™ mode constantly synchronizes to the hard disk drives as bandwidth becomes available without affecting performance.

If a single hard disk drive fails with Active Backup LUNs, the system continues to write to the available hard disk drive. When this occurs, replace the malfunctioning disk with a new hard disk drive. Once inserted, the system rebuilds the new disk.

Important:

Do not remove a disk drive during disk rebuilds. Removing a disk drive may destroy data on all disks, which requires removing and replacing all drives for a complete synchronization with memory.

Use the following steps to replace a bad disk drive:

1. Verify that disk synchronization is not in progress. If one is in progress, then wait for the synchronization to complete before continuing.
2. Pull the hard disk eject lever to unlatch it.
3. Remove the hard disk by pulling squarely on the lever.
4. Insert new hard disk squarely into the available slot. Ensure the disk drive is completely inserted into the system and flush with the chassis.

Warning:

The system erases any pre-existing data on hard disk drives inserted into the RamSan-300 while the system is running.

Important:

TMS does not advise removing functional hard disks. While the action should be perfectly safe, it may affect system performance or downtime, depending on the system mode, as the system synchronizes the new disk drive.

5.3 Batteries

The RamSan-300 is equipped with two redundant 30-minute sealed lead acid batteries. The batteries are designed to protect the data in DDR RAM memory. If the RamSan-300 loses external power, the system continues to function by running on the internal batteries. Even if both power supplies are removed or fail, the batteries will continue to operate.

After power fails, the system remains in an active state for up to five minutes. If power is restored within this time, the system will remain online.

If the batteries are not fully charged, the system may initiate a shutdown before the allotted time is up. This ensures that the system protects the data in memory by storing it to disk. The shutdown operation takes approximately one minute for every 3.2GB as the system synchronizes data on the disks. Active Backup mode may reduce your backup time.

The RamSan-300 performs a periodic battery test to ensure the internal batteries are healthy. There is no risk for data loss during this test because the power supplies back up the batteries. The system repeats the test every 30 days. If the system powers off, the test cycle starts over. The RamSan reports periodic battery test failures in the System Event Log and in all of the management utilities, including the front panel display. If a failure occurs, contact Texas Memory Systems for a replacement battery immediately.

Important:

The periodic battery test does not guarantee that your batteries will have enough capacity to back up in all cases. Texas Memory Systems

recommends replacing your batteries every **two years**, even if they continue to pass the periodic battery test.

5.4 Fans

The system has one block of 12 fans. The fan block is accessed from the top of the chassis. Each airflow channel has redundant fans so that cooling is sufficient as long as one of the two fans is running. If one fan fails, the system will issue a warning. If both fans in a single channel fail, the system will issue an error.

Chapter 6 – Contacting Support

The RamSan is a complex system with many redundant features to safeguard your data; however, components can fail. The RamSan has many ways to inform the user about what is happening inside the system. Rather than try to list all the different possible failures, this section explains how to contact Texas Memory Systems.

6.1 Still Having Problems...

If a system component has failed, contact Texas Memory Systems for additional support. Please have a copy of the System Report available to speed along the support resolution.

Contact Information:

Texas Memory Systems, Inc.
10777 Westheimer, Suite 600
Houston, TX 77042

Phone: (713) 266-3200
Fax: (713) 266-0332
Email: support@texmemsys.com

Chapter 7 – Specifications

7.1 Physical Characteristics

Rack Mount Size:	3U (5.25") x 16" deep
Weight:	up to 70 lbs.
Voltage:	90 ~ 264 VAC
Ventilation:	Front to back airflow

7.2 Operating Environment

Temperature:	32-85 °F (0-30 °C)
Max relative humidity: (non-condensing)	80%
Power consumption:	250 W

7.3 Non-operating Environment

Temperature:	32-150 °F (0-65 °C)
Relative Humidity: (non-condensing)	10-90%

Appendix A – RamSan-300 Replacement Parts

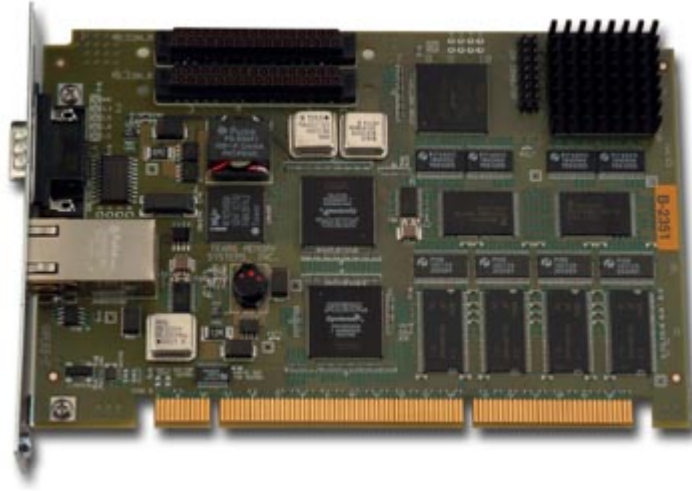


Figure A-1 MCP-65 Management Control Processor



Figure A-2 FC-400 Dual Channel 4-Gigabit Fibre Channel Controller



Figure A-3 Power Supply Module



Figure A-4 Memory Blade



Figure A-5 Hard Drives in Sleds

Appendix B – FCC/Safety Notices

Warning:

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in residential area is likely to cause harmful interference in which case the user will be required to correct interference at his own expense.

A Class A digital device also meets all requirements of the Canadian Interference-Causing Equipment Regulations.



This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

3030113 Conforms to UL STD 60950
Certified to CAN/CSA STD C22.2 NO. 60950-00

Electrical Ratings: 100-240V~ 3.5A 50-60 Hz
Made in U.S.A.

Appendix C – Warranty, Maintenance, Field Service, and Repair Policy

RETURN TO FACTORY WARRANTY

Texas Memory Systems, Inc. (TMS) equipment includes a one-year warranty from the date of shipment. This warranty includes return-to-factory service for equipment that does not meet its published specification during normal operation. Damage due to external causes including, but not limited to abuse, misuse, electrical power problems or any usage not in accordance with specifications and instructions automatically voids the warranty. TMS ACCEPTS NO RESPONSIBILITY FOR ANY EXPENSES OR DAMAGES INCLUDING LOST REVENUE INCURRED DIRECTLY OR INDIRECTLY AS A RESULT OF DEFECTIVE TMS EQUIPMENT, OR FOR ANY EXPENSES INCURRED DIRECTLY OR INDIRECTLY WHILE THE EQUIPMENT IS BEING REPAIRED AT THE TMS FACTORY.

Return to Factory

During the warranty coverage period, the customer may return defective equipment to the factory for repair or replacement. The customer is responsible for shipping the equipment back to the factory with a detailed description of the nature of the problem and the tests used to determine the failure. TMS will take all reasonable steps to repair or, at the discretion of TMS, replace the faulty equipment within ten working days of receipt.

Repairs/Returns

Prior to returning any product, TMS must first authorize and issue a Return Material Authorization (RMA) number. Any item returned without an RMA number is subject to refusal. Freight collect or COD returns will be refused. To receive an RMA number, contact TMS customer service. When contacting TMS, please have the TMS part number, the serial number, and a detailed description of the problem. All returned goods must be shipped freight prepaid in the original boxes and packing materials with the TMS RMA number prominently displayed on the outside of each shipping container. Once TMS has issued the RMA, the items must be returned to TMS within thirty days, or else the RMA will be cancelled.

Telephone and Software Support

Telephone support is available for a period of five years after purchase during normal TMS business hours. Firmware and software updates will be available at no cost.

ESSENTIAL WARRANTY – 8x5xNBD Onsite Repair

Texas Memory Systems Essential Warranty may be purchased which provides all of the features of the Return to Factory Warranty plan. In addition, the Essential Warranty includes advanced parts replacement and next business day on-site support.

Under the advanced parts replacement program, TMS will ship a replacement part to the install site for delivery the next business day (TMS is not responsible for delays caused by international shipping or customs) if, in the judgment of TMS, an issue as described by the customer is the result of a defective part. The customer must notify TMS by 2:00 p.m. CST in order to guarantee next day shipping. The customer is responsible for shipping the defective part back to the factory no later than ten days after receipt of the replacement hardware. If TMS has not received the defective hardware after this time, the customer will be charged the full price of the replacement hardware. The customer is responsible for shipping costs.

Additionally, in the event of a hardware failure, customers should call for technical support to receive assistance from Texas Memory Systems during standard business hours (9am-5pm CST). When necessary, the Essential Warranty also provides next business day, onsite service at the customer location Monday through Friday between the customer location hours of 9:00 a.m. and 5:00 p.m. Onsite service is only applicable to non-user replaceable components; onsite service does not cover software related issues. This plan does not include 24x7-telephone support; however, it can be purchased separately. Customers are not required to purchase a spares kit for this plan.; however, it can be purchased separately.

CRITICAL WARRANTY – 24x7x4 Onsite Repair

The Texas Memory Systems Critical Warranty may be purchased which provides all of the features of the Return to Factory Warranty plan. In addition, the Critical Warranty includes advanced parts replacement and 24x7 4-hour response onsite support.

Under the advanced parts replacement program, TMS will ship a replacement part to the install site for delivery the next business day (TMS is not responsible for delays caused by international shipping or customs) if, in the judgment of TMS, an issue as described by the customer is the result of a defective part. Customers must notify TMS by 2:00 p.m. CST in order to guarantee next day shipping. The customer is responsible for shipping the defective part back to the factory no later than ten days after receipt of the replacement hardware. If TMS has not received the defective hardware after this time, the customer will be charged the full price of the replacement hardware. The customer is responsible for shipping costs.

Texas Memory Systems Critical Warranty adds the protection of onsite four-hour response, when necessary, at the customer location seven days a week. TMS provides Critical Warranty customers with a dedicated 800 number for 24/7 technical support 365 days a year. In the event of a failure, customer should call to receive immediate technical assistance from the TMS technical support line. Onsite service is only applicable to non-user replaceable components; onsite service does not cover

software related issues. Customers must purchase a spares kit for items that will be maintained under the Critical Warranty. The spares kit does not contain all possible replacement parts for the unit. Parts that are not in the spares kit are sent under the terms of the advanced parts replacement program. The Critical Warranty may be purchased for the United States and most Western European countries*

* Please contact TMS for details on coverage areas.

OUTSIDE OF WARRANTY

Faulty equipment may be returned to the factory for repair up to five years after purchase with appropriate RMA. The customer is responsible for shipping the equipment back to the factory, together with a detailed description of the nature of the problem and the tests used to determine the failure. TMS will take all reasonable steps to repair or, at the discretion of TMS, replace the faulty equipment within thirty working days of receipt. Customers will be charged current list prices for replacement components plus an \$800 repair fee. The customer is responsible for shipping the repaired or replaced equipment back. In an emergency, special arrangements may be negotiated subject to the availability of TMS resources and components. Subject to availability, TMS field service personnel will perform troubleshooting of equipment. For customers outside the Houston, Texas area, TMS will charge normal travel expenses for field service personnel, including airfares, hotel accommodation, per-diem meal allowance, and other out-of-pocket expenses related to travel or attendance at the customer site.

Appendix D – Serial Port Settings

You may connect to the management port with either a DB-9 serial cable or an RJ-45 Ethernet cable. The following settings apply to the serial port.

Port Settings

To connect to the RamSan using a serial port connection, use a dumb terminal or a terminal emulation program such as Windows™ HyperTerminal. Set your baud rate to 9600 with 8 data bits, 1 stop bit, no parity, and no flow control.

To connect to the serial port, use the DB-9 non-null serial cable supplied with the system.

Default Account

Use the following default account information to access the RamSan through the serial port:

ssd Login: admin

Pin Out

The RamSan serial port has the following pin out settings:

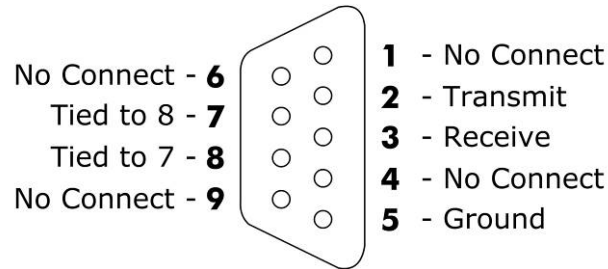


Figure D-0-1: Serial Port Pin Out