Remote Access Tool (RAT) Reference Guide

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Contributors

Written by Greg Russell
Illustrated by Matt Robinson
Edited by Cindi Leiser
Production by Carlos Miqueo
Engineering contributions by Matt Robinson

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Introduction

This document contains information about the Silicon Graphics service tool RAT, the Remote Access Tool. This information includes a general program overview, and instructions on installation, configuration, and operation of this program.

The following typographic conventions are used throughout this document:

Convention	Meaning
`TYPEWRITER FONT`	Denotes literal items such as command names, file names, routines, directory names, path names, signals, messages, and programming language structures.
italic font	Denotes variable entries and words or concepts being defined.
`bold typewriter font`	In screen drawings of interactive sessions, denotes literal items entered by the user. Output is shown in nonbold typewriter font.
[]	Indicates an optional item.
<>	Indicates a required variable within an optional item.
Enter	Enter means either to type a command or to select a menu command and then press the Enter key on your keyboard.

Within this document, reference is made to the online man pages available under IRIX throughout the `man` command. A *man page* is a discussion of a particular element of the IRIX operating system or a compatible product.

Each man page includes a general description of one or more commands, routines, or other topics and provides details of their usage (command syntax, routine parameters, system call arguments, and so on). If more than one topic appears on a page, the entry will appear in the printed manual alphabetized only under its major name. You can access a man page named `ls` online by typing **`man ls`**.

Man pages are grouped into sections numbered from 1 to 8. Each section contains entries of a particular type. Types of entries include user commands (1), administrator commands (8), system calls (2), library routines (3), file formats (5), and device descriptions (4).

Section numbers appear in parentheses after man page names. Man pages are referenced in text by entry name and section number.

Chapter 1

Overview of the Remote Access Tool (RAT)

This Chapter provides an overview of the Remote Access Tool (RAT).

1.1 What is RAT

RAT is a software application that interfaces to the system controllers on Origin2000, Origin200, and Onyx2 systems. It communicates with the system controller and enables you to control the entire system remotely through one interface. RAT supports most of the system controller command language operations for both the Module System Controller (MSC) and the Multi-Module System Controller (MMSC).

1.2 Who Can Use RAT

RAT is available to all internal engineers, including all TACs, SSEs, and SAEs. It should not be made available to customers because there is a risk that, with RAT, customers might configure their systems into an unbootable state. Also, some of the diagnostic capabilities accessible in the Power-On Diagnostics (POD) through RAT are proprietary and therefore must be protected.

However, a customer who purchases the IRISconsole product can achieve similar control of functions such as power on, power off, power cycle, system resets, NMIs, and so forth. In the future, Silicon Graphics will probably develop a version of RAT for system administrators that will provide the basic usefulness of the current application.

1.3 Why Use RAT

Some reasons to use the Remote Access Tool are:

- RAT enables you to monitor and control a system remotely, without requiring you to remember all the system controller commands.
- The complexity of an Origin2000 system controller configuration increases when more modules are added to the system. RAT helps you understand the configuration of the system during the troubleshooting process.
- Although you can enter system controller commands individually, using RAT saves time.
- RAT commands are self-documenting, which makes your use of RAT simple.

There are situations where using RAT is unsuitable. For example, if you want to enter only one command, it is more efficient to dial into the site directly and enter that command by hand. In other cases however, such as when you forget a command or subsequently need to enter additional commands, it is preferable to use RAT to execute all system controller commands.

Chapter 2

System Controller Overview

An Origin series system has two types of system controllers:

- Module System Controller (MSC)
- Multi-Module System Controller (MMSC)

This Chapter briefly discusses each type to familiarize you with the objectives of the system controllers and to explain how RAT works within any system controller configuration.

2.1 Module System Controller (MSC)

The MSC is the basic system controller for Origin2000 systems. The Origin200 version is very similar in design, except that it has only one external tricolor LED to indicate a fan speed, temperature, or other hardware-related problem. The Onyx2 system controller is also similar to the Origin2000 version except that the firmware is slightly different.

The major MSC features include:

- Power monitoring and state change
- NMI and reset capabilities
- Temperature, fan speed, voltage monitoring
- Virtual DIP switch settings

The MSC has two diagnostic ports: a DIN8 port on the front of the module and a DB9 port at the back of the module in the lower right-hand corner (there is currently no label on this port). A Y-style connection exists between the two ports. You should make sure there is only one cable plugged into either of these ports at the same time. (In other words, connect only one cable into either the DN8 port or into the DB9 port at the same time. If a cable is connected to the DN8 port and another cable is connected to the DB9 port at the same time, unexpected behavior will result.) RAT communicates with the system through either of these ports (the DB9 port is preferred because it is on the side of the module that is hidden from the customer's view). Refer to Figure 2-1 for an illustration of the MSC.

For more detailed MSC information, refer to the *Origin2000 IP27 PROM Technical Reference Manual* that is located on the Web at:

http://systemsw.engr.sgi.com/lego/ip27prom/ip27prom.html

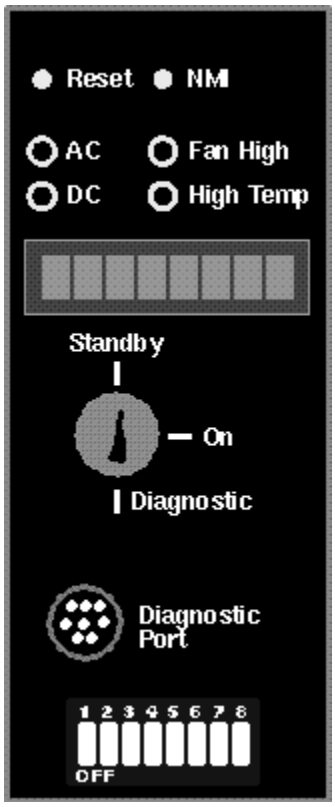

Figure 2-1 Module System Controller

2.2 Multi-Module System Controller (MMSC)

The MMSC is a Single Board Computer (SBC) that is manufactured by Computer Dynamics. It is the primary system controller for a rack configuration. Refer to Figure 2-2 for an illustration of the basic layout of the MMSC.

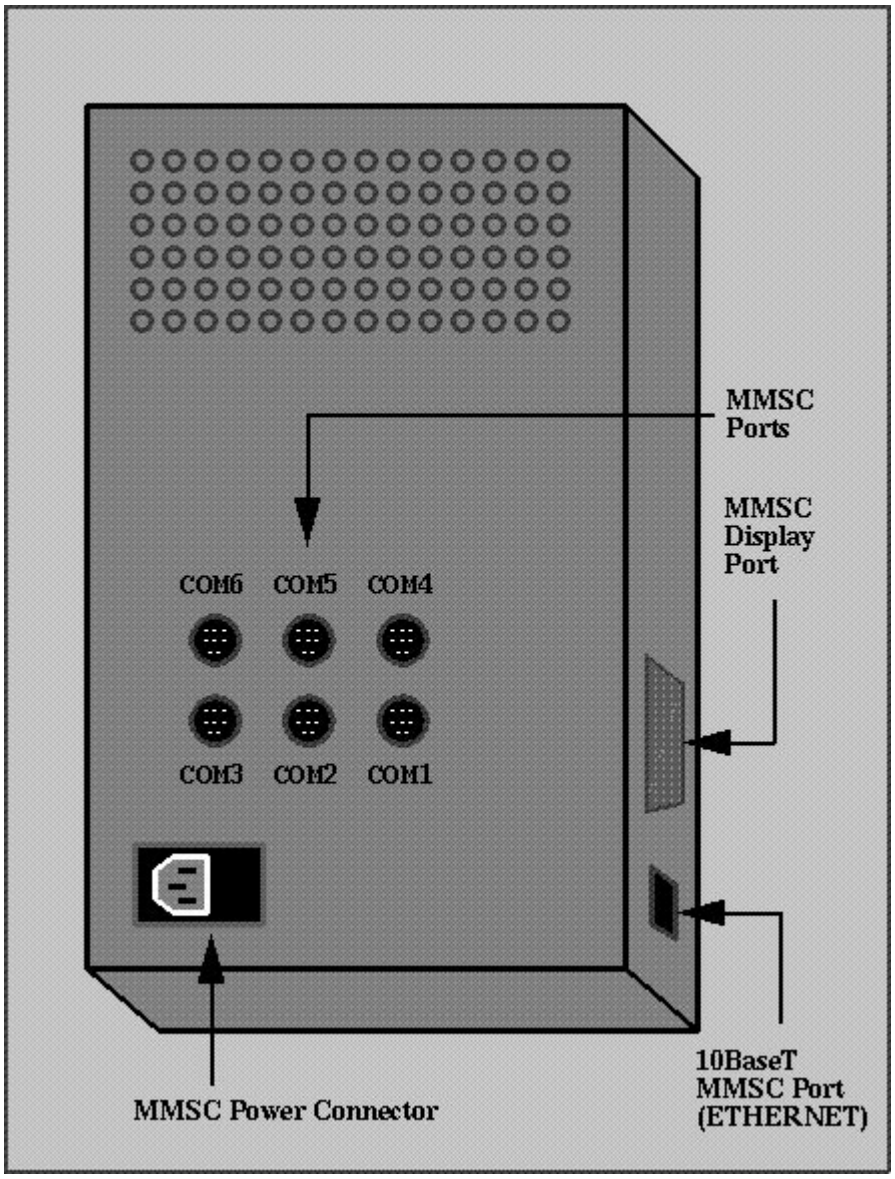

Figure 2-2 Multi-Module System Controller

Each MMSC has six DIN8 ports. In early versions of the MMSC, these ports were labeled COM1 through COM6. In later versions, the labeling of these ports changed. The new labeling and a description of each port follows:

Table 2-1 MMSC New Port Labeling

Port Name	New Name	Description
COM1	CONSOLE	The serial port reserved for the system console. In order for this port to work correctly, the COM4 port must be properly connected. The part numbers of the two cables that are required to connect a serial console with a DB25 port to COM1 are 018-8104-001 (DIN8 to DB9) and 018-0230-002 (DB9 to DB25).
COM2	UPPER BAY	The connection between the module located in the upper bay and the MMSC. The part number of the connecting cable is 018-0644-001.
COM3	LOWER BAY	The connection between the module located in the lower bay and the MMSC. The part number of the connecting cable is 018-0644-001.
COM4	BASE I/O TTY1	The connection between the ttyd1 port on the master BaseIO board in the system and the COM4 port enables the COM1 port to connect up as a serial console. The reason for this port connection is to enable a user to “steal” the console through COM5 (which is otherwise impossible). The part number of the cable between the COM4 port and the ttyd1 port on the Master BaseIO board is 018-0644-001.
COM5	ALT CONSOLE	COM5 is the remote service port, which provides either a modem or some type of direct serial connection to another SGI system. RAT uses this port to communicate with the MMSC. The cable part number depends on the type of connection that is used.
COM6	TEST	This port will remain unused during the initial release of the MMSC. Its original purpose was to give engineering a mechanism to develop the MMSC firmware.

Note: Some of the MMSCs shipped by manufacturing have ports that are mislabeled and can mislead the field engineer. Use the preceding COM port information and refer to Figure 2-2 to correctly identify the ports.

There are two additional ports on the MMSC:

Table 2-2 Additional Port Labeling on the MMSC

Port Name	Description
DISPLAY	The display port is used by one of the MMSCs in an Origin2000 rack configuration. Note that only one display is used per system configuration, not one display per rack.
MULTI-FFSC (or ETHERNET)	This port is a PRIVATE Ethernet connection that is used only for communication between MMSCs. Do not connect it to a customer's local network for any reason. Please refer to "System Controller Connectivity" for additional information.

For the purposes of this document, RAT always connects to the COM5 port through either a modem connection or some other direct serial connection. Silicon Graphics recommends that the RAT connection be made to the MMSC with the lowest RACK number in an Origin configuration. You can determine this by running the MMSC `rackid` command.

For more information about the MMSC, refer to the document titled *Origin2000 Multi-Module System Controller* on the Web at:

http://mmsc.engr.sgi.com

2.3 System Controller Connectivity

The system controller connectivity on Origin2000 systems follows a sideband network approach. Figure 2-3 is a diagram that illustrates this connectivity:

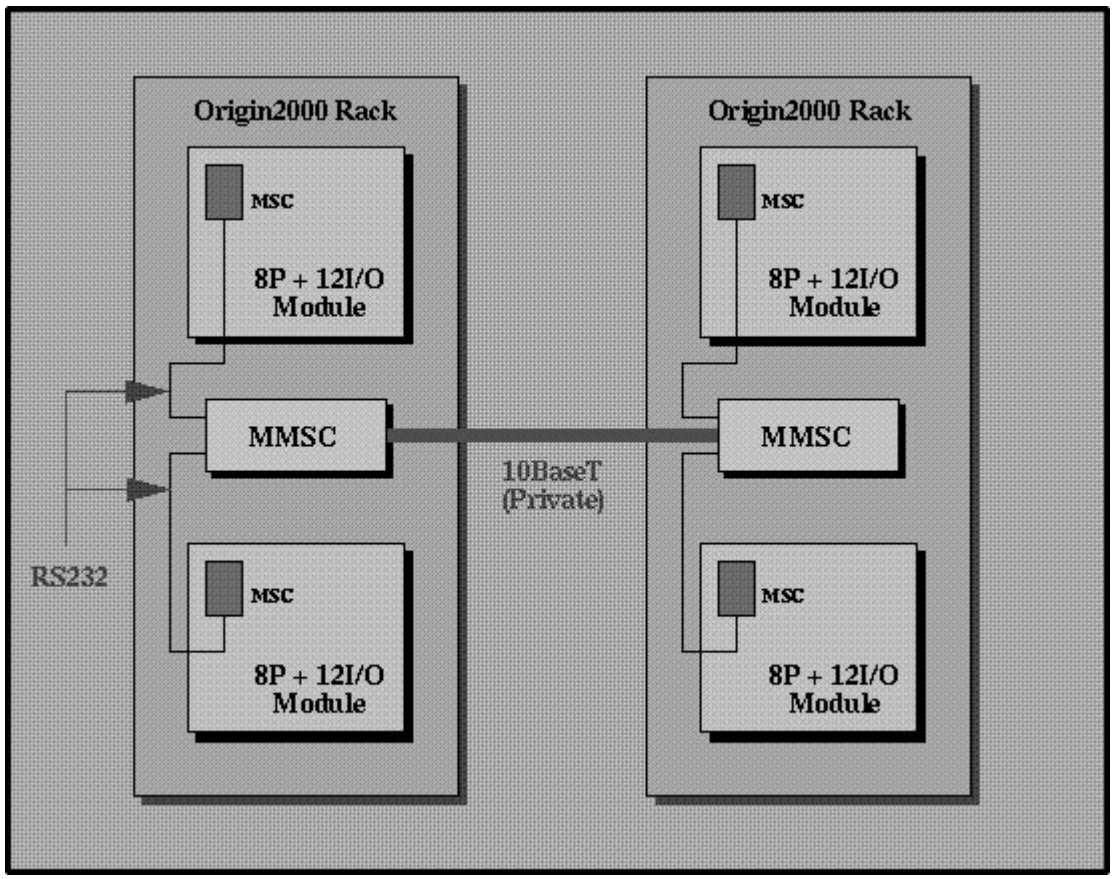

Figure 2-3 Connectivity Diagram

Each Origin2000 8P + 12 I/O module contains an MSC that individually controls the environment of the module. In a rack configuration, the MSC for each module in the rack is connected to the MMSC for that rack. There is always one MMSC in each rack, even if there is only one module in the rack. If there are multiple racks, the MMSCs are connected by a private 10BaseT network. If there are only two racks in the Origin2000 systems (up to 32 processors, or 4 total modules), a crossover 10BaseT cable connects the MMSCs. For rack configurations in which more than two racks are involved, a 10BaseT hub must be used to enable all of the MMSCs to communicate with each other. In the hub configuration, a straight-through cable type is used in place of a crossover type.

Chapter 3

RAT Configuration

This Chapter discusses RAT configuration issues, primarily involving installation and testing of RAT in an Origin2000 system controller environment.

3.1 Installation

You can install RAT from the Internal Support Tools CD out of the support image. There are versions available for IRIX 5.3, IRIX 6.2, IRIX 6.3, 6.4, and IRIX 6.5. Please see the release notes on the WCS Internal Support Tools CD for additional information about how to install the version for your operating system.

3.2 Dependencies

If you are installing the support image on a system that is running IRIX 5.3, you must first install the subsystem `eoe2.sw.uucp` or `eoe.sw.uucp`, depending on your configuration, in order to install the RAT software. For systems using IRIX 6.2 and above, install `eoe.sw.uucp` from these subsystems before installing RAT. RAT requires `/usr/bin/cu`, which is in `eoe.sw.uucp`, to perform dialer operations (either through a modem or to a serial device). Note that you must install the appropriate `uucp` image only on the system that will initiate the dialing. The `uucp` image does not necessarily need to be installed on the destination system.

Another possible dependency is the modem configuration (if a modem is being used to communicate with the MSC or MMSC). For U.S. Robotics, Telebit, and Microcom modems, you must set the S0 bit to 1 to configure auto answering correctly. After you have set the S0 register, use the `&W` modem command to save this value. Please refer to your modem handbook if you require additional information on modem configuration.

3.3 Command Line Options

RAT provides a number of command line options:

Table 3-1 RAT Command Line Options

Option	Description
-c X,B,P,D,S	Specifies the serial port configuration parameters in systems that use the MS-DOS operating system, where the option arguments are: X COM port (1, 2, 3, or 4) B Baud rate (300 to 57,600 bits/s) P Parity (N[one], E[ven], O[dd]) D Data bits (7 or 8) S Stop bits (1 or 2)
-d	Generate debugging output to `stderr`. This option is handy when you are tracing internal problems with RAT.
-e <*cmd*>	Run specified `cmd` instead of `/usr/bin/cu`. When this option is used, the `-d`, `-f`, `-l`, `-n`, and `-s` options are invalid. RAT uses the command line arguments after the `-e` as the command to execute. Also remember that you must specify the literal path to a command, such as `/usr/bsd/telnet` instead of `telnet`.
-f <*file*>	Save all data sent and received from the remote system controller into the specified file.
-i<*secs*>	Specify the time limit in seconds to connect to the remote system controller. By default, this value is 60 seconds, but it can be set anywhere between 30 to 600 seconds.
-l <*line*>	Specify the line to communicate with. This is the same device as the one specified with `/usr/bin/cu`.
-n <*telno*>	Specify the telephone number to dial as `telno`. This is similar to the phone number specified with `/usr/bin/cu`, except that it requires a `-n` option to the phone number.
-s <*speed*>	Specify the `speed` at which to try to connect. This option passes a speed parameter to `/usr/bin/cu`. If the specified speed is valid according to `/etc/uucp/Devices`, the dialer will connect at that rate.
`-v`	Print the RAT version number.

3.4 Testing RAT

When testing RAT, first enter `/usr/bin/cu` to try to connect to the remote system controller before attempting to dial directly with RAT. You can attempt this connection in a number of ways. Please refer to the man page for `cu` for more details on configuration.

1. Once `cu` is configured, dial into the remote system controller using the appropriate dialing scheme. For example, if you have a modem attached to `/dev/ttyd2`, enter

   `/usr/bin/cu -l ttyd2 -n <`*`phonenumber`*`>`

   where <*phonenumber*> is the number of the modem that is attached to the remote system controller. For a direct serial connection to /dev/ttyd2, enter

   `/usr/bin/cu -l ttyd2`

2. After the connection is made, enter the command

   `^Tver`

   (Press the Control and T keys simultaneously; then enter **`ver`**.) Terminate the `cu` connection with the `~.` option.

   This command sends a request to the system controller to return the version of the firmware currently running there. Note that, depending on the echo state of the system controller, this string may or may not be echoed when you type it. If the connection is working, the return message will be similar to:

   ```
   ok VER 2.22
   ```

   or

   ```
   R1:MMSC 1.0
   ```

   (The first message is returned from an MSC, and the second is from an MMSC.) If either of these messages appears, then the connection with `cu` is valid.

3. Test RAT. Enter **`/usr/bin/rat`** with the appropriate options (specifying `-l` and `-n` when necessary) and examine the output. If there is an error, verify that the connection is working properly either by checking again that `cu` still works, or by listening to the modem dialing the remote system and checking that handshaking is successful.

Most problems with RAT occur in the initial configuration of `cu`. Generally, if `cu` is configured correctly, then RAT will work. If a problem occurs with the `-e` option, verify that the command being executed connects properly. Because RAT opens a pseudoterminal (`pty`) connection to the executed program by default, RAT should not be the reason why the connection failed.

3.5 Starting RAT

After RAT connects to a remote system controller, it immediately issues the command `^Tver` to determine the type of system controller to which it is connected. If the system controller is an MMSC, it returns the string `MMSC`. Otherwise, RAT will try to initialize the remote connection as an MSC.

Chapter 4

Using RAT

When RAT begins executing, a Welcome to RAT window appears (refer to Figure 4-1). This window displays the overall configuration of each module in the system. An arrow points to the rack and the module that are currently selected; tagged modules are highlighted. The text below the image reflects the graphic information. In the lower-left corner of the window, a command line enables the user either to quit RAT or to proceed to the next menu level.

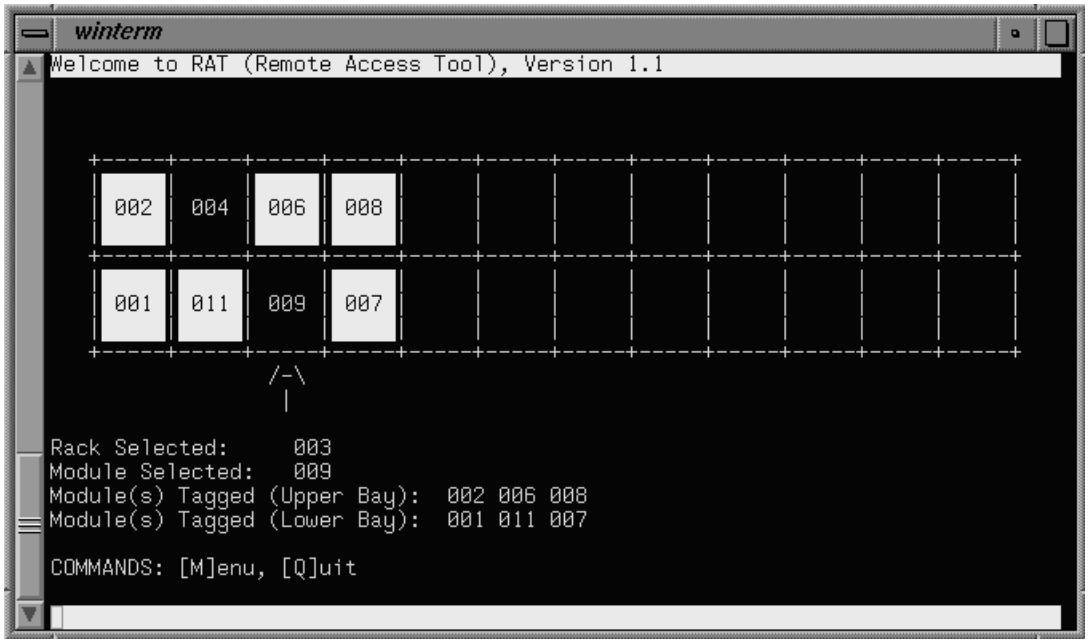

Figure 4-1 Welcome to RAT Menu

When you press the M key to select the Menu command, a dialog box, titled RAT MAIN MENU, appears (refer to Figure 4-2). You cannot directly execute the menu items in this dialog box; the dialog box only provides information. However, you can execute the dialog box menu items in the Welcome menu window (that reactivates as soon as you press any key).

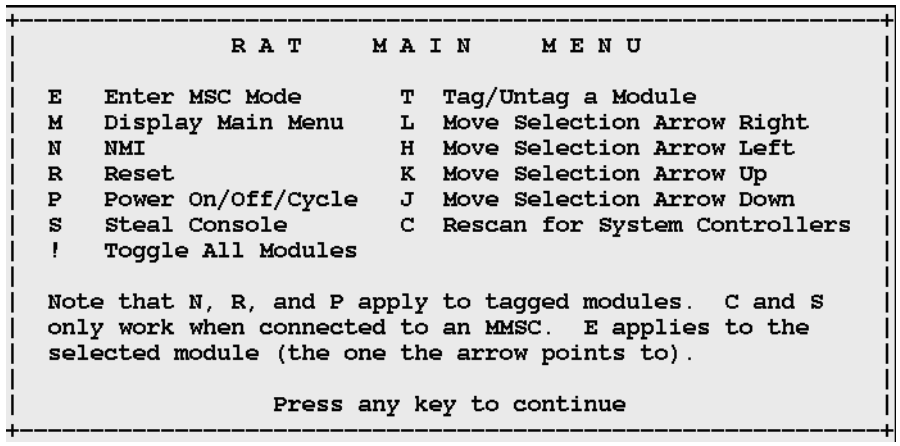

Figure 4-2 Welcome Menu Dialog Box

For example, after you have read the RAT MAIN MENU, press any key to remove it from the screen. Then you may enter a command from the RAT MAIN MENU in the Welcome menu window. If the command you have selected satisfies the restrictions listed at the bottom of the RAT MAIN MENU, RAT executes the command.

The rest of this chapter describes the menu items listed in the RAT MAIN MENU.

4.1 E Enter MSC Mode

Pressing the E key places the module that is indicated by the arrow (in the Welcome menu) in MSC mode. For example, if module 11 had been selected, a RAT MSC menu similar to Figure 4-3 would appear.

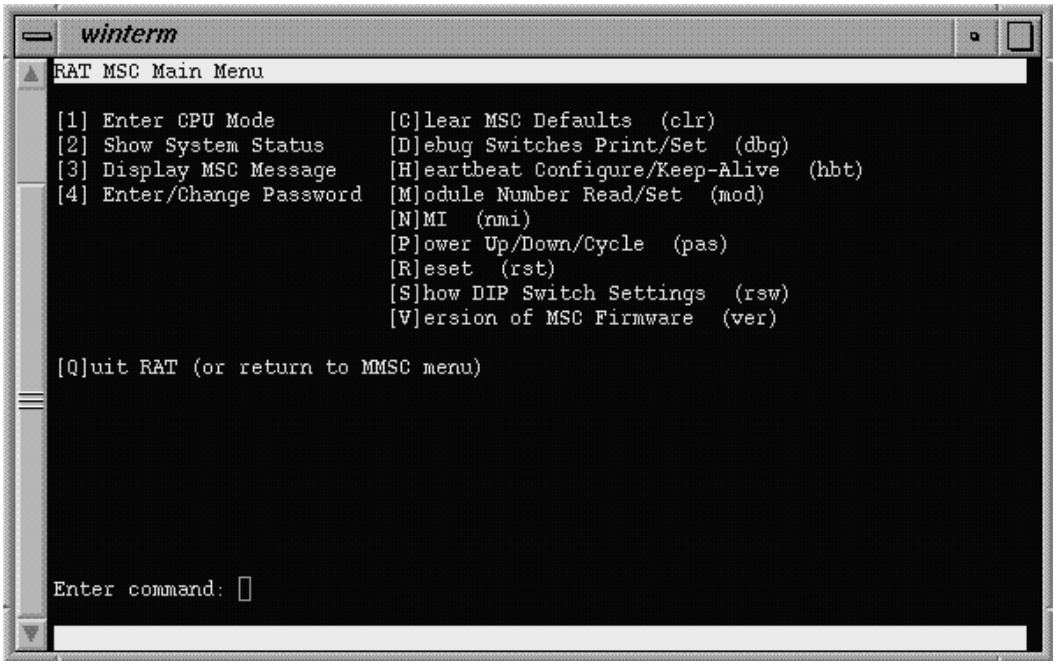

Figure 4-3 MSC Main Menu

The RAT MSC menu enables you to issue a variety of MSC commands to the module that is named in the menu bar at the top of the display. Each of the commands listed in the RAT MSC menu is explained in detail in the following subsections.

4.1.1 [1] Enter CPU Mode

The CPU Mode option enables you to communicate with any specified CPU in the system. All messages for a specified CPU will be displayed in the appropriate CPU window. Also, anything you type on the input line will be sent to the specified CPU. The menu selection is:

```
[1] Enter CPU Mode
```

Figure 4-4 illustrates the main display for CPU mode.

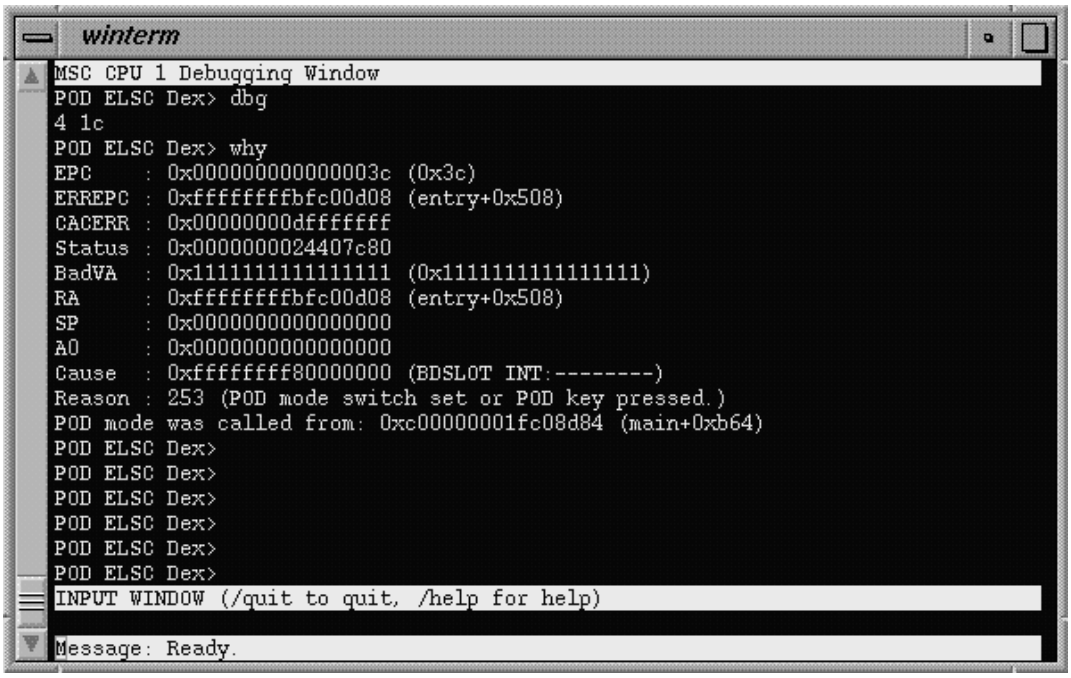

Figure 4-4 CPU Mode Display

In this example, the user has selected the Dirty Exclusive POD mode to debug CPU 1. From this menu, the user can enter commands to POD (or ^T commands to the MSC) either by typing characters into the INPUT WINDOW or by typing one of the following commands:

Table 4-1 MSC Commands

Command	Description
/help	Provide help instructions that are specific to the CPU mode window.
/cpu <*n*>	Switch to CPU n to enable debugging in that window. Entering the `/cpu n` command sends the command `^Tsel` <*cpu*> to the CPU specified. Note that RAT numbers the CPUs 0 through 7 instead of using the node/cpu scheme; for example, CPU 1A, 3B, and so forth. RAT correctly translates the CPU number for the user.
/quit	Return to the MSC Main Menu.

4.1.2 [2] Show System Status

The System Status option returns the system's vital signs. The menu selection is

```
[2] Show System Status
```

The collected information includes:

Table 4-2 System Vital Signs

Field	Description
Temperature	The system temperature can be either Normal, High, or Over temperature. A system that has an overtemperature condition will normally power itself down.
Fan Speed	The system fan speed can be either Normal or High. The fan speed can vary depending on the temperature levels, a partial fan failure, or a user request. You can change the fan speed by pressing the `f` key and then entering the desired fan speed.
Voltage Margin	The possible displayed voltages include the 3.45 Vdc, the 5 Vdc, and the termination voltage levels. Their values are either Low, Normal, or High. You can select voltage margins of plus or minus 5% of the normal setting for each of the voltages.To change a voltage margin, press the `v` key; then enter the voltage value that you wish to change, and finally enter the desired margin level.

4.1.3 [3] Display MSC Message

The Display Message option enables you to display an 8-character message on the main display. You must enter eight characters in order to complete a full display message. The menu selection is

```
[3] Display MSC Message
```

Caution: Do not use this command unless absolutely necessary. The MSC might already have a diagnostic message displayed on the front panel. If you choose this menu selection, a new message will overwrite what is currently on the display.

4.1.4 [4] Enter/Change Password

The Password Operations option enables you to enter or set the MSC password. The menu selection is

```
[4] Enter/Change Password
```

If you wish to enter the current password, the three-position key switch on the MSC must be in either the On or Off position. If the key switch is set to the Diag position, RAT will inform you that it is not necessary to enter the current password. If you decide to set a new MSC password, you will be prompted with the following question:

```
Are you sure that you want to do this? (Y/N)
```

If you enter y or Y (case is ignored), you will be prompted for a new 4-character password. The characters you choose must be in the ASCII range of 32 through 127 (no control characters are permitted through the RAT interface). After you have entered the new password, you are required to enter it a second time for verification.

4.1.5 [C]lear MSC Defaults (`clr`)

The Clear MSC Defaults option clears the MSC NVRAM fields, erasing various controlled fields such as the module number, debug settings, heartbeat toggles, and default echoing. The menu selection is

```
[C]lear MSC Defaults (clr)
```

Caution: You should not execute this command unless it is absolutely necessary because of potential damage to the current contents of the fields.

If you select this option, RAT will prompt you with the question:

```
Are you sure that you want to do this? (Y/N)
```

If you enter `y` or `Y` (case is ignored), RAT will return the MSC NVRAM to a default state and turn off echoing.

4.1.6 [D]ebug Switches Print/Set (dbg)

The Debug Settings option enables you to change the virtual DIP switch settings for the module, thereby changing the state of the hardware during the boot process. The menu selection is

```
[D]ebug Switches Print/Set  (dbg)
```

The debug bits correspond directly to the DIP switches; however, the debug bit value is logically added (exclusive OR [XOR]) to the DIP value to determine whether the value is 1 or 0. For example, if DIP switch 2 is turned on and the debug bit 2 is on, the resulting value will be 0 or off. The general rule is:

You can set the DIP switch on or set the debug switch on, but if both switches are turned on, the switch is logically turned off.

When the main display for the physical debug switches appears, the bits currently turned On or Off are displayed as in the following example. You may press the c key to change the values. Use the TAB key to move among the bit fields and press the 1 key to change the value to 1, or press the 0 key to change the value to 0. If you press the ESC key, no bits will be changed. If you press the SPACE key, the bit fields will be saved in MSC NVRAM. The display for debug settings appears similar to the following display:

```
           1     2     3     4     5     6     7     8
PHYSICAL  ---   ---   ---   ---   ---   ---   ---   ---
           0     0     1     1     1     0     0     0
DEBUG     ---   ---   ---   ---   ---   ---   ---   ---
           0     0     0     0     0     0     0     0
SWITCHES  ---   ---   ---   ---   ---   ---   ---   ---
           9     10    11    12    13    14    15    16
```

Note: If you change the bit fields, be certain that the fields are cleared before you exit RAT. Depending on the version, RAT may not warn the user about any changes before exiting. Always determine that both the DIP switch settings and the debug settings are in the correct state before you exit RAT.

4.1.7 [H]eartbeat Configure/Keep-Alive (hbt)

The Heartbeat Configuration option enables you to configure a heartbeat to the CPUs in the system. The menu selection is

```
[H]eartbeat Configure/Keep-Alive (hbt)
```

Caution: Use this option with extreme caution because it may be utilized by other system controller programs (fail-safe operations, for example, might use this option to verify that the R10000 CPUs in the system are responding).

You can send a single heartbeat by pressing the s key or change the heartbeat monitoring interval by entering a time value. Pressing the 0 key turns off heartbeat monitoring.

4.1.8 [M]odule Number Read/Set (mod)

The Module Number option enables you to view the current module number or to enter a new module number. The menu selection is

```
[M]odule Number Read/Set (mod)
```

Note that this option exists only with MSC firmware, revision 2.2 or greater. Also you should verify that the latest BaseIO and IP27 PROM versions are loaded on the system. If the mod command executes correctly, the module number will be returned. If this option is not valid for your MSC firmware, then RAT will display an error message.

4.1.9 [N]MI (nmi)

The NMI option sends a Non-maskable Interrupt signal to all CPUs in the module. The NMI starts the execution of code that attempts to save the system state by generating a crash dump. You should use this command only if you want to generate a crash dump. The menu selection is

```
[N]MI (nmi)
```

Before issuing the NMI, RAT asks you to confirm that you really want to send an NMI by displaying the question:

```
Are you sure you want to do this? (Y/N)
```

If you enter `y` or `Y` (case is ignored), RAT issues an NMI through the MSC to all of the CPUs.

4.1.10 [R]eset (rst)

The Reset option enables you to reset the system. The effect of this command is identical to pressing the reset button on the MSC front panel.

Reset causes the CPUs to stop execution and reinitializes the entire system. The reset is also propagated across the CrayLink Interconnect to other modules in the system. (Note that reset barriers exist for possible future implementation.) The menu selection is

```
[R]eset  (rst)
```

When you select Reset, RAT prompts you with the question:

```
Are you sure you want to do this? (Y/N)
```

If you enter y or Y (case is ignored), RAT issues a Reset to all CPUs through the MSC and across the CrayLink Interconnect, if it is operational.

4.1.11 [P]ower Up/Down/Cycle (pwr)

The Power Operations option enables you to power up, power down, or power cycle a system. The menu selection is

```
[P]ower Up/Down/Cycle (pwr)
```

When you press the `p` key in the MSC main menu, a new screen appears that describes the current power state of the module. Note that the power state does not indicate whether or not IRIX is running; it indicates whether or not the module has DC power.

Note: When a system is powered down, only DC power is removed from the system. AC power remains on to power the system controller. Power cycling a system involves removing DC power from the system for a specified amount of time and then reapplying DC power.

RAT monitors system power by querying the system controller once during the current power state (and thereafter each time you press the R key). RAT then displays the query result: `Up`, `Down`, or `Unknown`. The returned state, `Unknown`, means that the system controller was unable to return the system power status at the time of the query. This condition does not necessarily indicate a problem because the system controller could be busy processing output from the PROM, and the request could be lost in the messages coming back.

If you request a power down or a power cycle, RAT typically prompts you to confirm your request with the question:

```
Are you sure you want to do this? (Y/N)
```

After you enter `y` or `Y` (case is ignored), RAT requests the interval for power off or power cycle before the power operation is performed.

4.1.12 [S]how DIP Switch Settings (`rsw`)

The DIP Switch Settings option allows you to view the current hardware debug switch settings on the front panel of the MSC. These switches are difficult to reach (because the cover of the MSC, which is difficult to remove, obscures the view of the switches), and normally you will not manually change them. Instead, change the Debug Switch Settings (refer to Subsection 4.5) to alter the corresponding DIP settings. The menu selection is

```
[S]how DIP Switch Settings  (rsw)
```

The RAT display looks similar to the following example:

```
     1     2     3     4     5     6     7     8
    ---   ---   ---   ---   ---   ---   ---   ---
ON  | |   |*|   | |   | |   | |   | |   | |   | |
    ---   ---   ---   ---   ---   ---   ---   ---
OFF |*|   | |   |*|   |*|   |*|   |*|   |*|   |*|
    ---   ---   ---   ---   ---   ---   ---   ---
```

In the preceding example, DIP switch 2 is on, and the rest are off.

The following values for the DIP Switches are excerpted from the *Origin2000 IP27 PROM Technical Reference Manual* that is available on the Web at:

http://systemsw.engr.sgi.com/lego/ip27prom/ip27prom.html

4.1.12.1 Switch 1 and Switch 2, Diagnostic Level

Table 4-3 Switches 1 and 2 Diagnostics

1	2	Diagnostic Level
Off	Off	Normal
Off	On	Heavy
On	Off	None
On	On	Manufacturing

Switches 1 and 2 select the level of diagnostics that are run after a system reset, before booting the IRIX operating system. The switches apply only to the nodes in the module on which they are set.

The Normal diagnostic level tests each part of the system for basic functionality, using only relatively fast tests that detect hard failures to expedite the system boot.

The Heavy diagnostic level runs the most thorough diagnostics that are available on each part of the system. These diagnostics may take a long time to complete, especially the memory tests. Heavy-level diagnostics are most appropriate after you install new hardware or if you think the system is having hardware-related problems.

The Manufacturing diagnostic level runs Heavy diagnostics and it also outputs special FRU (field replaceable unit) information. Console input and output are handled through the system controller port, which must be connected to Silicon Graphics manufacturing equipment.

The None diagnostic level performs no diagnostics. As a result, the system boots as fast as possible. You should use this level of testing when debugging software such as kernel drivers and when you have complete confidence in the hardware.

4.1.12.2 Switch 3, Information Level

If Switch 3 is On, the PROM provides detailed informational messages during the boot process that are interspersed with the normal boot status messages. The switch applies only to the nodes in the module on which it is set.

4.1.12.3 Switch 4 and Switch 5, Boot Stop Point

Table 4-4 Switches 4 and 5 Boot Stop Point

4	5	Boot Stop Point
Off	Off	Never
Off	On	Local
On	Off	Global
On	On	Memoryless

Switches 4 and 5 enable you to stop the boot process at various stages.

The Never boot stop point setting enables the boot process to proceed all the way through to the IRIX operating system (default).

The Local boot stop point setting enables the boot process to proceed up to the point where it would normally load and jump to the BaseIO PROM. Instead of continuing, all nodes enter cached (Cac) POD Mode. If this switch is set on any module, it will be propagated to all modules.

The Global boot stop point setting enables the boot process to proceed to the point where it would normally load and jump to the BaseIO PROM. Instead of continuing, the master node enters cached (Cac) POD Mode and all of the slaves enter the Slave Loop. If this switch is set on any module, it will be propagated to all modules.

The Memoryless boot stop point setting stops the boot process as soon as possible after it allocates the minimum portion of the system that is required to enter POD mode. All nodes enter dirty exclusive (Dex) POD Mode even if there is no local memory.

Caution: If the Memoryless switch is set On in one module, the system that contains the module will not boot properly.

4.1.12.4 Switch 6, Default Environment

If Switch 6 is On, the PROM ignores all PROM Log environment variables and BaseIO NVRAM settings, and uses the system defaults. This setting may be useful for proceeding if any of the variable storage mechanisms contain data that is preventing the system from booting. This switch applies only to the module on which it is set.

4.1.12.5 Switch 7, Bypass BaseIO

If Switch 7 is On, the PROM bypasses the first BaseIO card that it locates and tries to boot from the second one that it locates. You may use this command help to boot the system if the first BaseIO card is not working, without having to physically remove the card. This switch applies only to the module on which it is set.

4.1.12.6 Switch 8, Bypass Global Master

If Switch 8 is On, the node that would ordinarily become the global master will become a slave, and the next CPU in line will become the global master. This switch applies only to the module on which it is set.

4.1.12.7 Switch 9, Override Disable

If the system is reset and Switch 9 is On, all of the CPUs and memory that were disabled by environmental variables (for example, Disable A, Disable B, DisMem, etc.) will be enabled. Refer to the POD Mode disable command.

This feature is useful for correcting the situation in which all CPUs or memory in the system have accidentally and simultaneously been disabled.

4.1.12.8 Switch 10, Not Assigned

Switch 10 is reserved for future use.

4.1.12.9 Switch 11, Use Default Console

If the ConsolePath environmental variable cannot find a user-defined console and Switch 11 is On, then the first serial device in each module is treated as a console device. The module that contains the Global Master CPU is considered to be the overall system console.

4.1.12.10 Switch 12, Router Oven Mode

Switch 12 enables a special feature that is used only by Manufacturing to partially boot systems with invalid router configurations in order to test all router ports in sparsely populated test fixtures.

4.1.12.11 Switch 13, Show Error State

If Switch 13 is On, the complete Hub chip error state is dumped at system boot time. This dump does not occur following a system power cycle because the error state that occurs then is random. This feature is most useful to developers.

4.1.12.12 Switch 14, Ignore Autoboot

If Switch 14 is On, the IO6 PROM ignores the autoboot environment and uses the 5-item PROM menu instead. This setting is an alternative to pressing the ESC key at the console when the message "Starting up the system" is displayed.

4.1.12.13 Switch 15, Not Assigned

Switch 15 is reserved for future use.

4.1.12.14 Switch 16, Not Assigned

Switch 16 is reserved for future use.

4.1.13 [V]ersion (ver)

Use the Version option to determine the current version of the MSC firmware. The menu selection is

```
[V]ersion of MSC Firmware (ver)
```

MSC firmware versions that are older than version 2.22 are out of date. If you intend to use RAT, update your MSC firmware to version 2.22 or greater.

4.1.14 [Q]uit (Return To Main Menu)

This option terminates the RAT MSC menu session and returns the user to the Welcome to RAT menu. The menu selection is

```
[Q]uit (Return To Main Menu)
```

4.2 M Display Main Menu

This option displays the Main Menu dialog box when you need to refer to it. The menu selection is

```
M   Display Main Menu
```

4.3 N NMI

Refer to Section 4.1.9, “[N]MI (nmi).”

4.4 R Reset

Refer to Section 4.1.10, “[R]eset (rst).”

4.5 P Power On/Off/Cycle

Refer to Section 4.1.11, “[P]ower Up / Down / Cycle (pwr).”

4.6 S Steal Console

The Steal Console option enables you to remotely steal the system console if the system console is wired from the master BaseIO board (`/dev/ttyd1`) to the COM4 port on the MMSC. After the console is stolen, you can return it by entering `^X` (press the Control key and the `X` key simultaneously). This action releases the console and returns you to the Welcome to RAT Menu. The Steal Console option executes only when you are connected to an MMSC.

4.7 T Tag/Untag a Module

The Tag / Untag a Module option enables you to select or deselect a module in the system configuration by toggling the current selection state of the module. The menu selection is

```
T  Tag/Untag a Module
```

A tagged module (one that is highlighted in the rack configuration display of the Welcome Menu) is included in the set of modules that are selected for any system-level function performed by the MMSC, such as NMI, Reset, and Power Operations. Untagging a module reverses the selected state of the module.

4.8 ! Toggle All Modules

When you initially press the ! key, you clear the tags on all tagged modules. Thereafter the ! key toggles the tags on and off.

4.9 L Move Selection Arrow Right

The L option moves the module selection arrow to the right in the Welcome to RAT menu.

4.10 H Move Selection Arrow Left

The H option moves the module selection arrow to the left in the Welcome to RAT menu.

4.11 K Move Selection Arrow Up

The K option moves the module selection arrow upward in the Welcome to RAT menu.

4.12 J Move Selection Arrow Down

The J option moves the module selection arrow downward in the Welcome to RAT menu.

4.13 C Rescan for System Controllers

The rescan option sends a `Rescan` command to the MMSC to request a new configuration scan. This option is seldom used unless you change the cabling between the MSCs and the MMSC(s). Rescan MMSC causes the MMSC to retransmit the command `^Tmod` to all MSCs.

The modules that respond within a given time are entered into a set of modules that are recognized by the MMSC; otherwise, the modules are marked “OFFLINE.”