Lucent Technologies
Bell Labs Innovations

# Remote Maintenance Board (RMB) AYC54 and AYC55

Version 2

Reference

585-310-165
Issue 2
May 1999
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- Answered by the called station
- Answered by the attendant
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- A call is unanswered
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| EMC Directive | 89/336/EEC |
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**Remote Maintenance Board (RMB) AYC54 and AYC55 Version 2, Reference**
585-310-165, Issue 2, May 1999

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# RMB Reference Errata

**The following items do not work as described in the RMB Reference and will be fixed or added in a future RMB release.**

## Scenarios Typically Encountered

The RMB's message buffer is not stored in non-volatile memory and is therefore erased when the RMB loses power.

Only part of the RMB's user parameters are stored in non-volatile memory. The rest of the user parameters are loaded from the platform on power-up. A configured RMB has sufficient data to call out if the platform doesn't boot.

The modem reset feature has not been implemented using either the reset button or the command. The entire RMB must be reset in order to reset the modem.

Diagnostics can not be executed for devices on the PCI bus.

Calls can occasionally get dropped after executing the **reboot!** command. The work around is to call into the platform again.

In Independent state it is possible to backspace too far and erase the RMB prompt. This does not hamper operation and commands can be entered.

The default usage for the user-defined inputs is monitoring a UPS. The default event labels don't reflect which input is used for which UPS function (e.g. UPS is on batteries), refer to the manual.

Occasionally while using the rmbcmd program, the user is dropped out to the UNIX prompt. The work around is to execute **rmbcmd** again.

The remote user will not be given a chance to execute the diagnostics if the platform is rebooted using **UNIX! init 6** or any other reboot command from Independent state. The user should use **init 6** from UNIX instead.

If a remote user is dialed into the RMB and a panic call happens, the user is dropped and the call is placed. The work around is to use the action flag command: **actionflag= 0**. Before exiting, restore the setting using **actionflag= 1**.

The RMB can only process one call to INADS at a time. If a second call is needed before the first one is handled, it is dropped. The work around is to look in the message buffer for a record of the alarm, since default event/actions lists always send a message to the buffer.

Use of the term “core” will change to “firmware”. The term “FW” (an abbreviation of firmware) is displayed with the **rev?** command. The **rev?** command outputs version numbers of the the firmware, the RMB hardware, boot code, and the BIOS enable code (BEC).

## Scenarios Infrequently Encountered

The **os!** command is listed on the command menus as **unix!**. However, **unix!** must still be used.

The **bios?** command does not return the BIOS vendor name. BIOS information can be obtained from the diagnostics menu as a work around.

The modem's **ATI(n)** command (n = 1-4) does not report the correct information about the modem's capabilities and the checksum value.

If the parallel port is set to "EPP" mode in the platform CMOS, the platform will hang when the "Hardware Information Menu" item is executed from the diagnostics menu.

When using the **modem=** command the COM port is changed immediately. The other parameters are not changed until the call drops.

The **init=** command is not recommended and this command will be phased out. The work around is to use the RMB modem utility.

The ability to specify user-defined names for events, inputs, and outputs has not been implemented yet. This affects the following commands: **eventlabel=, eventlist?, inputn=, inputn?, outputn=, outputn?**

The current default for the communications port (COM1 or COM2) is configured by the rmbinteg2 package. The default allows the COM port to be used in MMCX.

The modem connection speed is reported at connect time using the AT command: **S95= 111**.

The RMB's initialization code will not capture POST code information if the main firmware segment is corrupt or not loaded.

Occasionally the temperature readings are erratic, issue the **temp?** two or three times to make sure you get a stable, repeatable temperature reading for the `temp2` value.

The **ok?** command reports the results of the RMB's built in self test, but does not report the time of the last power-up of the RMB.

The fan status hex number displayed with the fan status text message lags behind the text by several seconds, but is updated shortly. The work- around is to repeat the command several times until the hex number is stable and repeatable.

Actions which display text messages on the local console will also display the message on the remote console if the RMB is in Independent state.

There is no support for a **modemtype= 0** option where the RMB is always in Independent state for systems without a COM port for the RMB.

The rmbmodem command only changes UNIX system files but the RMB doesn't get updated automatically unless it is reset. The work around is to use rmbmodem and then do a **configure!** from the rmbcmd menu.

The sanity timer and the sanity reboot timer get reset to the default of 5 minutes when executing **reboot!**. Changing the defaults will have no effect.

Action 19 should sound the mother board speaker for 9 seconds, but the beep is actually much shorter. The beeps for actions 11 through 18 are actually shorter than designed.

The **normal!** command is missing from Independent state. The work around is to use the **exit** command, which drops the modem connection, then call back into the RMB.

After downloading new firmware into the RMB, the next modem connection into the RMB may drop shortly after the connection is made. The work around is to call in again.

Sometimes the first modem call after a download will not transmit data from UNIX. Independent state will not work either. The only way to recover from this condition is to press the reset button for more than 3.5 seconds on the RMB faceplate.

When a remote user is in Independent state and a local user enters manager mode, the `RMB timed out` error message is reported. This message is in error and the local user is permitted to be in manager mode.

The message buffer should store 128 messages, presently only 127 messages are stored in the message buffer.

The **msgn?** command always responds with the `Not that many messages in the buffer` error message if no argument is given or if other invalid input such as **msgn? t** is sent.

The RMB software enforces the proper format of the **date=** command. The 1.4.7 format is MM/DD/YY, where MM is a two-digit month field, DD is a two-digit day field, and YY is a two-digit year field.

The default for daylight savings time (**dst=**) should be on, it is actually off. **dst=** on should be set manually for it to work correctly.

In Independent state, a prompt may not be returned after using the **msgall? a** command. The work around is simply to hit the return key to get a new prompt.

Commands to enable, disable, or inquire about messages written to the console have not been implemented (**consolemsg=** and **consolemsg?**). The work around is to use the **action=** command to set or delete actions 20 through 29.

Commands to enable, disable or inquire about panic dialing have not been implemented (**outcall=** and **outcall?**). The work around is to use the **action=** command to set or delete actions 51 and 52.

The 730-24 and PCAT terminals are not supported yet.

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# About This Document

This document describes the features, capabilities, and use of the Remote Maintenance Board (RMB). It also contains:

- Commands
- Diagnostics
- Remote access and security
- Events and actions
- Configuring the RMB

## Intended audiences

This document is provided for the following audiences:

- Technical Support Organization (TSO)
- Global Support Organization (GSO)
- Tier 4 engineers
- Remote field engineers
- Application teams and documentation staff

The document assumes that the RMB is already installed and functional. It also assumes that the reader is accessing the RMB remotely.

## Hardware and software versions

This document includes reference information for the Remote Maintenance Board, Version 2, model numbers AYC54 and AYC55. The package is 1.4.8. The hardware comcodes are: AYC54 - 107725467 and AYC55 - 107765109.

Later versions of the board, firmware, and documentation are planned; at their release this documentation will be obsolete.

## How this document is organized

This document has six chapters and four appendices:

- Chapter 1, "Introduction to the RMB", defines the RMB, its features and capabilities, functional and physical descriptions, and requirements.
- Chapter 2, "Remote Access and Static Password Security", describes the RMB remote access feature. It also provides information about security under UNIX, DOS, and at host reset.
- Chapter 3, "RMB Commands", describes the levels of operation, types of users, and command requirements.
- Chapter 4, "Events and Actions", describes the RMB monitoring feature and the resulting events and actions. It also describes alarms.
- Chapter 5, "Diagnostics", describes testing of the platform using the RMB diagnostic commands. It includes nine types of tests and the RMB self test.
- Chapter 6, "Configuring the RMB", covers configuration programs, remote management process, and onsite process.
- Appendix A, "Modem Communications", lists the standard AT command set for remote access. It includes the AT base commands summary, AT extended commands summary, AT result code summary and S registers.
- Appendix B, "Diagnostic codes", lists the codes that may be displayed when the BIST selects the Impaired state, and POST codes sent from a MAP/5P, MAP/40, or MAP/100 processor.
- Appendix C, "Physical Description", lists the physical aspects of the RMB AYC54.
- Appendix D, "RMB Specifications and Regulatory Information", lists RMB environmental requirement information, as well as information required by regulatory agencies.

This document also includes a list of abbreviations and a cross-referenced index.

## RMB naming

The Remote Maintenance Board is produced in two models, the AYC54 and the AYC55. Throughout this document, information common to both models is referred to as the “RMB”. The model number is used if information is specific to one model.

## Conventions used

The following conventions are used throughout this document.

| | |
|---|---|
| Command names, options that you enter, and prompts | Bold<br>Example: **systest** |
| Values and instructions that appear on the screen | Constant width<br>Example: `Press any key to continue` |
| Keyboard keys you press | Rounded boxes<br>Example: ENTER |
| Warnings about toll fraud | Warning icon<br>Example:<br>**SECURITY ALERT:**<br>*If toll fraud occurs, it can result in substantial additional charges for telecommunications services.* |
| Graphic names | Lowercase filename and date<br>Example (found within a graphic):<br>cyr2cp2 LJK 061697<br>These filenames are for internal purposes only and can be ignored. |

## Related documentation

In addition to this document, the RMB documentation set includes the *Remote Maintenance Board (RMB) Installation,* 585-310-166.

To protect against toll fraud, see the *BCS Products Security Handbook* and the *BCS Toll Fraud Overview*.

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# Introduction to the RMB

# 1

This chapter describes the Remote Maintenance Board (RMB), gives a high-level overview of its features, and lists the Lucent Technologies platforms it supports. Included are:

- RMB use overview
- RMB definition
- Features and capabilities
- Functional overview

## RMB use overview

The Remote Maintenance Board provides a variety of information, from a variety of situations through remote access to a customer's platform. It can dial out to a pre-administered telephone number with an alarm about the platform's status. You can dial in through an onboard modem or through an external modem to make queries about platform conditions. You can reboot the platform while retaining a view of some of the platform's status. You can also dial in to check the RMB status or settings. The RMB uses a separate telephone line through which its capabilities can be used.

## RMB definition

The RMB is an add-in, ISA-bus hardware card that provides the following capabilities and features through its own software and hardware:

- Continuous monitoring of conditions indicating the system's health. When any condition exceeds an administered level, the RMB might respond with one or more actions, such as calling INADS.
- Services access through either an on-board modem or an external modem port. The RMB modem can be used for incoming services calls, outgoing alarms, or file transfers.
- Operation regardless of the state of the platform. If the platform is inoperable, the RMB can receive an escape sequence to switch to a state of operation independent of the platform. Most RMB commands are still available in the Independent state.
- Remote reboot of the platform while retaining the modem connection. After the operating system boots, the login prompt re-displays.
- Remote session. Support staff can access the platform with many of the capabilities of the local console.
- Platform hardware diagnostics.
- RMB hardware verification by means of a Built in Self-Test (BIST), which executes when the RMB is started or reset.

## RMB models

The Remote Maintenance Board is produced in two models, the AYC54 and the AYC55. Throughout this document, “RMB” refers to information common to both models. The model number is used if information is specific to one model.

Both models provide the same monitoring and diagnostic capabilities, but differ in whether a modem is built-in. The models have these characteristics:

- The AYC54 includes an on-board modem. The modem uses the V.34 protocol. It is intended for use in North America, which uses a single standard for modem protocol and voltages. Also, an external modem can be used.
- The AYC55 does not include an on-board modem. This model is intended for use outside of North America. Each customer can then connect one of the external, recommended modems that uses local standards.

## Supported platforms

Platform adjunct products connect to a switch to provide additional features, such as voice messaging or voice response. The RMB supports the following adjunct products:

- Cornerstone platform
- INTUITY AUDIX® system
- INTUITY CONVERSANT® system
- Multi Media Communications Exchange (MMCX) system operating on Lynx (a version of UNIX®).

Throughout this document, the adjunct products are referred to as “platforms”.

## Supported ISA-Bus processors

The RMB is compatible with the following ISA-bus processors:

- 486SX
- 486DX
- Pentium
- Pentium II

## Supported operating systems

The RMB is compatible with the following operating systems:

- UNIX System Laboratories, System V, release 4.2

- UnixWare version 1.1
- UnixWare version 2.01 and above
- Lynx version 2.3

## Functional overview

This section describes:

- Connectivity view
- System access and security
- RMB interfaces
- Types of users
- Operating states

### Connectivity view

The platform connects to a switch and provides additional features such as voice messaging and voice response. The RMB uses an external, direct telephone line or a DID line through the switch for modem communications. So, dependent only on the incoming line status, services has access to the Platform at any time. However, using a DID line through the switch adds the risks inherent in switch stability.

Figure 1-1 shows how the AYC54 is connected to the platforms that it supports and to services remote support.

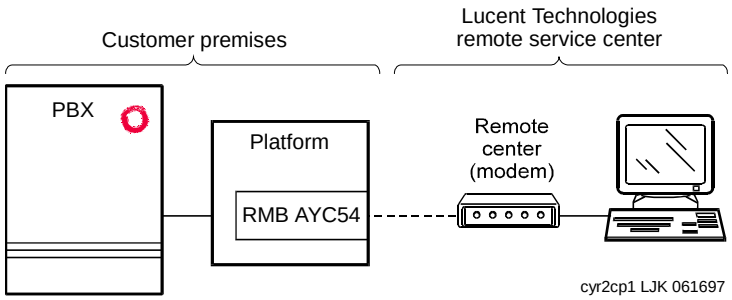


**Figure 1-1. Conceptual AYC54 connections**

Figure 1-2 shows how the AYC55 is connected to the platforms that it supports and to services remote support.

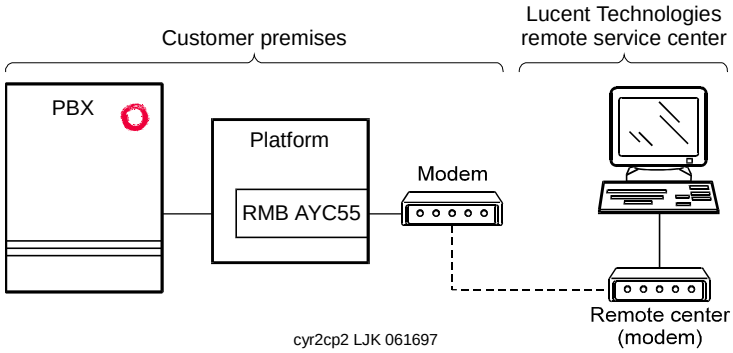


**Figure 1-2. Conceptual AYC55 connections**

**NOTE:**
The RMB may be used with an analog line that has the call waiting feature, but only if the feature has been disabled.

### Security levels

The RMB has two levels of security:

- User
- Manager

Both levels are available when the service person is at the local console or is calling remotely. The capabilities of each are:

- User - can execute only commands that query the RMB or platform operating parameters.
- Manager - can execute all commands, including user-level queries and those that set RMB operating parameters.

Lists of commands for both types of users are found under ‘‘Commands under RMBCMD’’ on page 3-4.

## Operating states

The RMB operates in one of the following states:

- Normal
- Independent
- Panic Dialout
- Built-in self-test
- Download
- Impaired
- Disabled

The RMB typically operates in Normal state. Figure 1-3 on page 1-7 gives a visual overview of how the RMB can either place itself or be placed in the various states. Table 1-1 on page 1-8 gives a written description of each of the states, including how it is placed in the state, the RMB’s capabilities in the state, and what the RMB does while it is in the state.

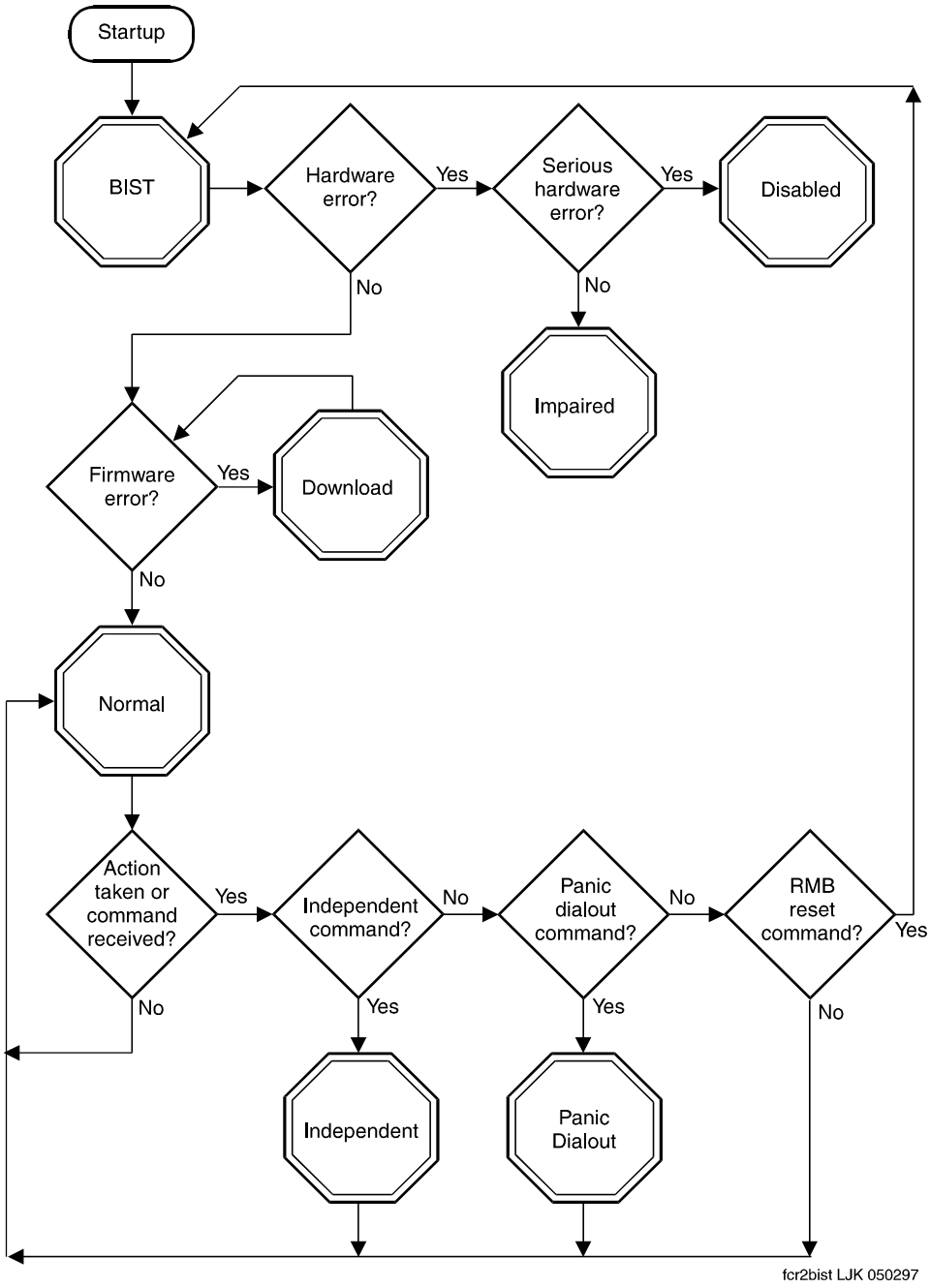


**Figure 1-3. RMB states process flow**

**Table 1-1. RMB states description**

| | | |
|---|---|---|
| **Normal** | **Cause** | The RMB has been powered up or reset and passes the built-in self-test. See ''RMB Built-In Self-Test (BIST)'' on page 1-9. |
| | **Capabilities** | Commands that are remotely entered through the RMB go to the operating system or to application software. Modem is available for platform use. RMB responds to commands entered through RMBCMD. |
| | **RMB Action** | The RMB continuously monitors events and executes actions. If **rmbcmd** is entered, the RMB responds to Normal state commands. See ''RMB commands'' on page 3-5. |
| **Independent** | **Cause** | RMB takes action 89 or receives the appropriate command. (See ''Action list'' on page 4-7 or this escape sequence is pressed: Ctrl **c** Ctrl **c** Ctrl **c**.) |
| | **Capabilities** | The RMB continuously monitors events and executes actions. The user can enter most Normal state commands directly from a remote terminal. |
| | **RMB Action** | RMB controls the modem. Events are still monitored and actions are taken. Actions taken during Normal state are still taken. If **rmbcmd** is entered, the RMB responds to Normal state commands. See ''RMB commands'' on page 3-5. |
| **Download** | **Cause** | The RMB:<br>■ finds an out-of-date or bad firmware image after a reset<br>■ receives a user request for a firmware update. |
| | **Capabilities** | None. |
| | **RMB Action** | The RMB downloads firmware into its flash PROM from the platform's operating system. |

*Continued on next page*

**Table 1-1. RMB states description — *Continued***

| | | |
|---|---|---|
| **Panic Dialout** | **Cause** | Action 51 or 52 is performed. (see ‘‘Actions’’ on page 4-5.) |
| | **Capabilities** | The RMB continuously monitors events and executes actions, except those actions that interfere with the panic call. |
| | **RMB Action** | The RMB takes the modem, dials the phone number, connects and sends a panic message, then disconnects. The RMB returns to the state from which it began Panic Dialout state. |
| **RMB Built-In Self-Test (BIST)** | **Cause** | Three reasons:<br>■ The RMB is powered up via the platform power switch<br>■ The RMB reset switch is pressed for 3.5 seconds or more<br>■ The **rmbreset!** command is sent. |
| | **Capabilities** | None. The RMB on-board processor performs a check of RMB hardware. |
| | **RMB Action** | If the self-test passes, the RMB goes to Normal state. If it fails, the RMB goes to either Disabled state or to Normal/Impaired state. |

*Continued on next page*

**Table 1-1. RMB states description — *Continued***

| | | |
|---|---|---|
| **Impaired** | **Cause** | When a less severe hardware error is detected by the RMB BIST. |
| | **Capabilities** | The RMB may respond as if in Normal state or Independent state, but the detected error may result in some loss of RMB functionality and reliability. Use the **rmbstate?** query. If the response is `Normal/Impaired` or `Independent/Impaired`, use the **ok?** query to check the current hardware faults. (See Appendix B, ‘‘Diagnostic codes’’.) Modem functionality may permit access to the RMB to troubleshoot the system. |
| | **RMB Action** | The RMB operates to the extent possible.<br><br>**NOTE:**<br>The presence of Impaired state most often implies that RMB replacement is required. |
| **Disabled** | **Cause** | The RMB fails its self check. |
| | **Capabilities** | None. |
| | **RMB Action** | The RMB BIST detected a severe or fatal problem with the processor complex or any problem that could degrade the host platform. The RMB and its modem are shut down.<br><br>**NOTE:**<br>The presence of Disabled state means RMB replacement is required. |

## Installing a replacement or new RMB

Several issues must be considered with the installation of a different RMB:

- If you recommend a new installation or replacement of the RMB, be certain the hardware and software are installed at the same time. Otherwise, system resources are wasted.

- If the COM port on the RMB is changed, the RMB configuration must be updated or the COM port will not be seen by UNIX during reboot. After updating the configuration, reboot the platform. For information about changing the COM port using **modem=** and updating the configuration, see Chapter 3.

## Remote, user-invoked changes to other states

If you want to change to another state and are using a remote connection, there are specific commands to use. However, the modem connection may be dropped, among other considerations. To change from:

- normal to independent, use the Ctrl **c** Ctrl **c** Ctrl **c** key sequence (without pressing ENTER).

  The modem connection is retained.

- independent to normal, use the **exit** command.

  The RMB returns to Normal state and drops the modem connection.

- normal to download, use **rmbdld** from the UNIX prompt as shown in Table 3-9 on page 3-40.

## Local, user-invoked changes to other states

If you want to change to another state and are at the local console, there are specific commands to use. To change from:

- normal to independent, use the **independent!** command.

  If the modem is:

  — connected, the RMB waits until the remote user disconnects, then goes to Independent state.

  — disconnected, the RMB goes to Independent state.

- normal to download, use **rmbdld** from the UNIX prompt as shown in Table 3-9 on page 3-40.

## RMB states after reset

The RMB goes through a sequence of events in response to a platform or RMB reset. These events include being in some of the states listed in Table 1-1 for differing amounts of time. The sequence is as follows:

1. The RMB and/or platform is reset.

   See ‘‘Platform diagnostics at reset’’ on page 2-10 and ‘‘RMB reset’’ on the same page for more information.

2. The RMB goes to RMB BIST state.

Essential hardware is initialized, then the integrity of the main flash PROM code is checked.

3. If the integrity of the main flash PROM code is:
   - — intact, control is passed to the main RMB software, which then goes to Normal state.
   - — corrupt, the RMB goes to Download state until the download succeeds.

## RMB user interfaces

The RMB has three basic interfaces. Each interface provides an access point for different parts of the platform or the RMB itself. The interfaces are:

- RMBCMD. Software utility that provides an access to RMB commands. RMBCMD is used to send queries about system status or to change RMB settings. RMBCMD can be used during Normal or Independent state.
- Independent state. Used to check or temporarily change the settings or configurations of the RMB itself. Used to remotely reboot the platform through a reset. Is also used to view the status of the platform, regardless of its operating state. Most RMB commands are available.
- Diagnostics. Provides a view of the utilities that check the integrity of the platform's components. Diagnostics may be loaded from the RMB into the platform and executed. The platform operating system is not loaded.

Each of these interfaces are used with some part of the RMB and are in addition to the transparent, remote access provided to the platform.

**NOTE:**
Platform diagnostics cannot be run from RMBCMD.

### Command interfaces by location

Depending on the location of the user, different capabilities are available. More capabilities are available to the remote user.

**Table 1-2. Command interface availability**

| | RMBCMD | Independent state | Diagnostics |
|---|---|---|---|
| **Local console** | Yes | No | Yes |
| **Remote console** | Yes | Yes | Yes |

## FLASH PROM code integrity

The RMB firmware is stored in the FLASH PROM that is part of the processor complex. This firmware rarely requires any maintenance. However, this firmware may be corrupt for the following reasons:

- The first time the RMB is initialized in the platform, the firmware has not yet been downloaded. This is normally programmed in the factory.
- During Download state and before the firmware is completely loaded, a power failure, platform reset, or a similarly unusual event interrupts the download.

The risk of corrupt firmware is minimized by the fact that the Download state is invoked only when the FLASH PROM image is bad or when an older version exists than what is stored on the platform. Download state loads a new copy of the firmware into the FLASH PROM. See Figure 1-3 on page 1-7 for more information.

# Remote Access and Static Password Security

# 2

This chapter describes the RMB remote access feature including:

- Security strategy
- Remote access security levels
- Remote access methods
- Remote access features
- Security administration

## Remote access and security overview

The RMB AYC54 provides remote access to a host system by functioning as a Hayes-compatible modem. It can provide access to the host system even when the operating system can no longer respond.

The RMB has three different remote access views:

- Normal state
- Independent state
- diagnostics

The RMB has two different security levels:

- User
- Manager

The RMB requires the appropriate level of authorization to access any of the respective views except remote diagnostics.

## Default Passwords

For initial access, the RMB uses default user and manager passwords.

The default passwords are to be used only in the following circumstances:

1. In the factory, for testing purposes.
2. By the technician, for programming the customer INADS identification number.
3. By remote services, until the password is automatically changed by the Password Change System (PCS).

**NOTE:**
It might take a minute or more to see the UNIX prompt when calling in to the remote platform. If the prompt does not appear after a reasonable amount of time, drop the call and try again.

### Until PCS is implemented

The host system is shipped with default Lucent Technologies passwords as described in the last section. These passwords may be changed using manager-level clearance and the correct commands, until the Password Change System (PCS) is implemented. After that point, security will be managed for TSO users. Until the PCS system is implemented, any changes to passwords must be communicated to all authorized parties.

**CAUTION:**
Do not use null (carriage return) as part of any changed passwords. Do not use the word “root” for a password.

### Changing passwords

In the case where a user or manager forgets their RMB password, or the password needs to be changed, a manager must change the password using the **setpw1!** command for the user password or the **setpw2!** command for the manager password. However, these commands require that the manager know the original password. All passwords must be between 7 to 10 characters long and must start with an alpha character.

Procedures for restoring passwords to the default value can only be performed by authorized TSO/GSO managers. This information is kept secret for security reasons.

## Remote access security levels

When you use the RMB remote access capabilities, there are two levels of privileges available: user or manager. These are the only security levels available regardless of the remote access view.

### User level

A user has access primarily to queries about system status and RMB settings. The RMB requires that you pass the user privilege level before progressing to the manager level. The user privilege level requires a password.

### Manager level

A manager has all the access privileges of a user, and in addition can change system settings and reboot the host system, if required. The manager privilege level requires an additional password.

### Changing from user to manager level

Normal and Independent states require that you log in first as a user. To change to manager level access, the **manager** command is required, as well as a valid RMB manager password. If an invalid manager password is entered, access remains at the user level.

See Chapter 3, "RMB Commands" for more information about the commands available for each privilege level.

## Changing from manager to user level

The RMB will switch from the manager level to the user level under any of the following conditions:

- The host system is turned on or rebooted
- The RMB enters the Independent state via Action 89
- The **exit** command is executed in the Independent state
- The **rmbreset!** command is executed
- The reset button on the RMB faceplate is pressed
- The **user** command is executed
- The **exit** command is executed from the RMBCMD menu in UNIX

**CAUTION:**

*Two sessions on the RMB are possible at one time, with one on the local console and one through the modem. If either session is in manager mode, both can use manager commands. Alternatively, if either enters user mode, both go to user mode.*

## Security and operating states

Security differs slightly based on the RMB state, as in Table 2-1.

**Table 2-1. Security methods**

| State | Method |
|---|---|
| Normal | User must first pass UNIX security.<br>To use RMB:<br>a. Enter the **rmbcmd** command<br>b. Enter the user password<br>The system gives the user 3 attempts to enter the correct password<br>If correct password is:<br>— entered, user-level RMB prompt displays and query commands can be used.<br>— not entered, or incorrectly entered, the user is returned to the UNIX prompt. |
| Independent | At a change from Normal to Independent state, the RMB requests the user password. If the correct password is:<br>— entered, user-level RMB prompt displays and query commands can be used.<br>— not entered or 30 seconds with no input passes, the call is dropped and the RMB is returned to Normal state.<br>If a remote user initiates the Independent state escape sequence from the Normal state, the RMB prompts the user for a user-level password. If the password is not accepted before the login time expires, the RMB drops the remote caller and returns to the Normal state. |

## If the line drops

Because of line conditions or other reasons beyond your or the RMB's control, the telephone connection may drop. If the RMB is in Normal state, it will stay in Normal state. If the RMB is in Independent state, it will stay in Independent state.

**CAUTION:**
*If the line drops while diagnostics are running, call back immediately. Never leave the diagnostics running without being connected (they will continue to run unattended). At the present time, the diagnostics are not password protected when you reconnect after the line drops.*

If you return to the RMB while it is in Normal state, UNIX security must again be passed at the system login.

## Remote access methods

This section describes the remote access methods available through the RMB.

### On-Board modem

The RMB AYC54 is accessible through its on-board modem. When the RMB is called while the system is in the Normal state, it responds as a standard modem.

The RMB AYC54 on-board modem supports a set of common Hayes commands. It does not support storage of Hayes parameters. The RMB AYC54 software that uses the modem uses the same set of commands and can use the modem as needed without regard to how it is configured.

For complete information on commands, see Appendix A, "Modem Communications".

**NOTE:**
The RMB is shipped with a recommended configuration for the card and its modem. Changing the default modem configuration may significantly impact serviceability of the system.

The RMB AYC55 does not have an on-board modem.

### External modem

The RMB AYC54 can be connected to an external modem, bypassing its internal modem. The AYC55 must connect to one of the recommended external modems for use in global configurations.

### Terminals supported

VT100 is the specified terminal for RMB operation. You can also use any terminal that emulates the VT100 function.

TSO access requires the use of a remote terminal emulation package and terminal types. These are:

- Terminal packages: Dynacomm, Terranova.
- Terminal types: VT100, 4410, 4425, 513, 730-24, PCAT, xterm.

Remote terminal software package can be used from a server or a particular personal computer. Remote modem communication can be accomplished through a terminal server or a modem pool.

### Modem reset and recovery time

You may need to reset the RMB modem. Whenever you reset the modem or the RMB, the telephone connection is dropped. Take one of these actions:

- Enter the **rmbreset!** command.

  RMB and modem are reset.

- Press the reset button on the RMB faceplate (AYC54 internal modem only).

  Button must be pressed for less than 3.5 seconds. See Figure 5-1 on page 5-25 for the location of the reset button.

Plan to allow up to 30 seconds for the RMB modem to initialize itself.

### Far-end modem and missing data

If you experience data error or flow control problems, check the settings of the non-RMB, far-end modem. Some hardware flow control problems have been observed during communication with certain modems at the non-RMB end.

Flow control at both ends must be set to communicate properly. The RMB uses hardware flow control to meter data.

To correctly set the far-end modem, refer to that manufacturer's documentation.

## Remote access features

This section describes the different features offered by the RMB for remote access to the host system.

### Remote session

The RMB remote session provides a unique feature. The system can be reset or rebooted at any time from the remote console and the modem is not dropped during the reboot process. Any data sent to the RMB's COM port after the reboot process is sent to the remote console, including diagnostics and the RMB's software functionality.

**NOTE:**
It might take several minutes to see the UNIX prompt when calling in to the remote platform. If the prompt does not appear after a reasonable amount of time, drop the call and try again.

The remote session can also run the RMB platform diagnostics software.

## Operating state access differences

Remote access to the RMB differs depending on operating state, so that regardless of the condition of the platform's operating system, you can still use the RMB's diagnostic capabilities. While the RMB is in:

- Normal state, the platform controls the modem. Access to the RMB is available through the RMBCMD command by request of the platform's operating system.
- Independent state, the RMB controls the modem. Many of the same commands are available as during RMBCMD.

Figure 2-1 on page 2-9 shows RMB access paths based on the user's location and the operating state.

.

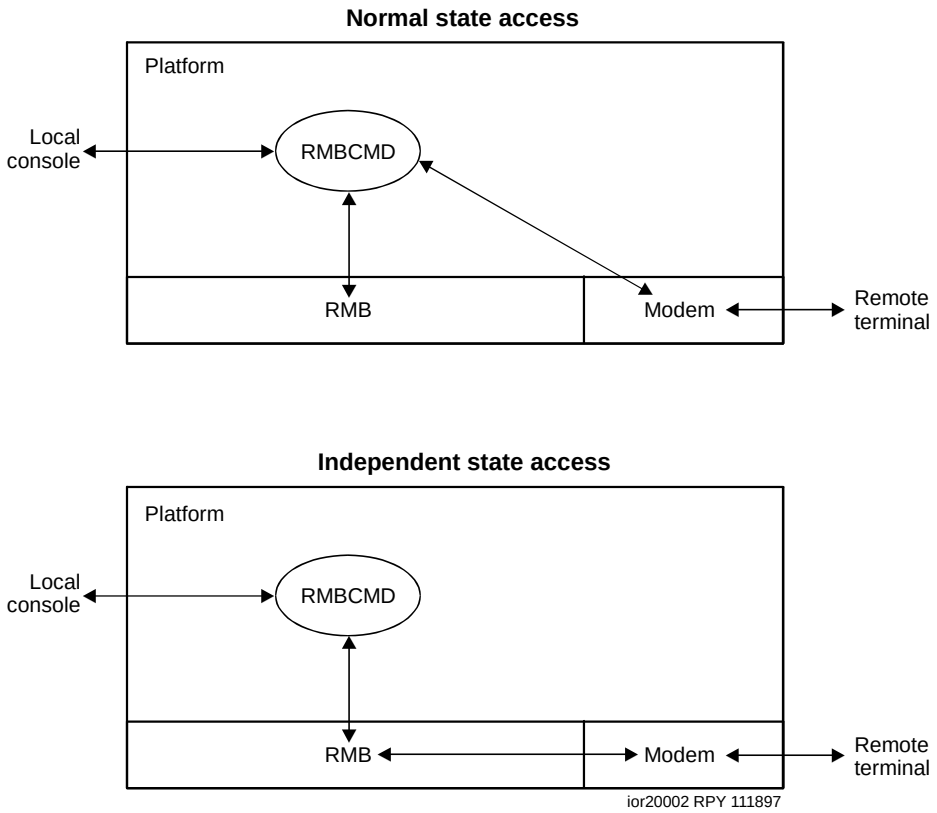


**Figure 2-1. Operating state and location access differences**

## Platform reset

The RMB can be used to reset the platform in a number of ways. However, the highly preferred method uses a graceful shutdown. If a graceful shutdown does not work, only then should you resort to more serious measures.

### Graceful shutdowns

Consider using a graceful shutdown method first. Graceful shutdown commands give the UNIX operating system time to close files and to complete other preventive measures before actually closing down the operating system.

Graceful shutdowns are UNIX commands that can be entered from either the console or through the RMB modem. However, logging in to use these commands also requires that you have special user privileges, such as root permission.

Refer to the documentation for your platform or for the respective operating system for the most appropriate graceful shutdown method.

## Hard resets

If the platform does not respond to graceful shutdown commands, the following methods may be required. Use of these methods can and do damage operating system and customer's files. All of these methods are the same as using the power off switch, which does not allow the operating system to close files or to complete any other preventive measures. Use them only in serious emergencies.

Hard reset methods include:

- Through the RMB in Independent state:
  - — use the **reboot!** command
- While standing next to the platform:
  - — press the Ctrl ALT DEL keys at the same time
  - — press the platform's reset switch
  - — turn the platform power switch off, then on

**NOTE:**
If **reboot!** is used without the reset cable attached, the platform will not reset, the platform owns the modem and the Ctrl **c** Ctrl **c** Ctrl **c** sequence must be pressed to return to Independent state.

### Platform diagnostics at reset

If the RMB initializes properly and diagnostics are enabled, the user is prompted to press **C** to continue or **D** to load diagnostics.

## RMB reset

An RMB reset happens under three conditions:

1. when power is first applied to the platform

   The RMB functions as the platform initializes to capture platform post codes during that period.

2. reset button pressed for three seconds
3. issuing the **rmbreset!** command.

The RMB can be reset through methods outside the card or through built-in methods. When it is reset, particular events occur, as listed in Table 2-2 on page 2-11.

**Table 2-2. Reset conditions**

| Occurrence | Description | RMB Response |
|---|---|---|
| Platform power up | The platform power is turned on. | The RMB follows these steps:<br>1. Initializes essential RMB hardware during RMB BIST state.<br>2. Checks the integrity of the main FLASH PROM code.<br>If the code appears to be:<br>— intact, control is passed to the main code, which completes the hardware initialization, then goes to Normal state.<br>— corrupt, the RMB changes to Download state and does not accept commands while the download occurs. After a successful download, the RMB resumes normal operations.<br>3. Loads the extended BIOS routines (if the BEC enable switch is on).<br>4. Initializes the modem with the configured string.<br>5. Clears the POST code buffer and resets all event counters. |
| RMB Reset command | The **rmbreset!** command is entered | Same as *platform power up except for loading bios routines.* |
| Platform reset | Reset via operating system shutdown command. | ■ RMB rewrites the BIOS POST code record once the system begins POST. See Appendix B, "Diagnostic codes" for more information.<br>■ Modem remains in current state (e.g., keeps an active call up). |
| | Hard Reset via the reset signal to the platform. | ■ RMB resets event counters and re-writes the platform's POST code record.<br>■ Modem remains in current state (e.g., keeps an active call up).<br>■ RMB loads diagnostics if the BEC is enabled. |

*Continued on next page*

**Table 2-2. Reset conditions — *Continued***

| Occurrence | Description | RMB Response |
|---|---|---|
| RMB Reset | The platform power is turned on. | Same as *platform power up*. |
| | The RMB reset switch is pressed or if firmware watchdog timer expires. | ■ Same as *platform power up*.<br><br>**NOTE:**<br>The modem is reset even if the RMB does not have control over it at the time (e.g., drops an active call). |

**NOTE:**
If the reset button is pressed for less than 3 seconds, the modem is reset. If the reset button is pressed for more than 3.5 seconds both the RMB and the modem are reset.

# RMB Commands

# 3

This chapter describes the RMB commands for various users. Included are:

- Levels of operation
- Types of users
- Command requirements
- Table of manager and user commands
- UNIX commands

# Levels of operation

The RMB command (**rmbcmd**) includes a manager level and a user level.

## User level

At the user level:

- A password is required.
- When the password is entered correctly, a list of query commands is shown.
- The query commands are the only commands that can be accessed at the user level.

## Manager level

At the manager level:

- From the user level, enter the **manager** command. Then, enter the manager password.
- When the password is entered correctly, additional commands are available.
- The manager can change the configuration of the RMB.
- The manager can change items in the RMB such as passwords, phone numbers, and actions.
- The manager can also enter the **user** command and return to the previous user level of operation.

# Command conventions

The **rmbcmd** uses unique command prompts and suffixes to display the current privilege level.

This section details command:

- Prompts
- Suffixes
- Tables listing commands for RMB states and for security levels

## Prompts

Depending on the privilege and operating state, the RMB responds with a different prompt. The user must enter the correct command and password to enter either privilege level. For more information on operating states, see "Operating states" on page 1-6.

**Table 3-1. Command prompts**

| Privilege level | During RMBCMD | During Independent state |
|---|---|---|
| User | **User:** | **RMB?** |
| Manager | **Manager:** | **RMB!** |

The Independent state prompts are sent only to the remote user. Local users do not see them.

### Busy prompt

At times, you may get a busy prompt. This may occur because the RMB is performing a panic call or processing a request from the daemon. The panic call must be completed before additional actions are taken that could interfere with it, such as state changes. Retry **rmbcmd** again after a few minutes to see whether the call or request is finished.

## Command suffixes

A set of entries listed in the following tables may use the same command, but a different suffix. Different suffixes with the same command give different results, but are designed to correspond to the same information. There are three different command suffixes:

**Table 3-2. Suffixes**

| | | |
|---|---|---|
| **?** | Queries. Lists information only. | User and manager |
| **!** | Takes an action | Manager |
| **=** | Change parameter | Manager |

## Commands under RMBCMD

The commands in Table 3-3 are available after entering the **rmbcmd** command. **rmbcmd** is the primary method of interacting with the RMB. Through this program, you can make queries of the platform or RMB and can set operating parameters, including the interface to the platform.

**rmbcmd** runs on the RMB host platform, which must be operational. The commands can be used from Normal state or Independent state. Whether a command can be used depends on the security level and the RMB state. Most of the Normal state commands can also be used in Independent state.

### Table conventions

The table has several conventions to simplify its use:

- The Command row uses upper- and lowercase letters for legibility purposes only. Use the Example row for proper case entry style.
- Commands that have off/on parameters can also be entered as 0 or 1. 0= off and 1= on. These commands also redisplay or echo what was entered. However, the ForceBEC command requires numeric input.
- Numeric parameters listed with a dash indicate an inclusive range. For example, “(1-4)” means that an entry can be 1, 2, 3, or 4.
- The RMB accepts four-character hexadecimal entries, which is different than other system conventions. In this table, a BIOS memory address that may be written as DC00 is the same as 0xDC000 or DC000H in other notations. In the RMB, the last character is always 0, so its entry is assumed.
- To enter commands with the **?**, **!** or **=** suffix, leave ***one*** space after the suffix.

**NOTE:**
Changes made in manager mode are not permanent until the **configure!** command is used.

**Table 3-3. RMB commands**

| | |
|---|---|
| **Action=** | |
| Level | Manager |
| Description | Sets the alarm levels and the corresponding actions for each event. See Table 4-5 on page 4-8 for more information. |
| Parameter | Event number (0-34), Warning level number (0-2), Event Counter, action, #,#,#,# |
| Example | `Manager:` **action= 33,1,20,70,25,0,0,0** ENTER |
| **Action?** | |
| Level | User |
| Description | Displays the parameters defined for a particular event number and warning level, as requested by the user. |
| Parameter | Event number and warning level number |
| Example | `User:` **Action? 33,1** ENTER<br>`20 70,25,00,00,00` |
| **Actionflag=** | |
| Level | Manager |
| Description | Sets the Event/Action handler. |
| Parameter | Off for disable. On for enable. (On resets all event counters to zero.) |
| Example | `Manager:` **actionflag= on** ENTER |
| **Actionflag?** | |
| Level | User |
| Description | Displays the status of Event/Action handling. "On" status means that actions are taken in response to event counts reaching configured levels. "Off" status means that events are monitored but no actions are taken.<br><br>**NOTE:**<br>The ActionFlag must be "on", as well as either the BEC switch or ForceBEC enabled, for actions to be processed. |
| Parameter | none |
| Example | `User:` **Actionflag?** ENTER<br>`On` |

*Continued on next page*

**Table 3-3. RMB commands — *Continued***

| | |
|---|---|
| **Addr=** | |
| Level | Manager |
| Description | Sets the BEC address, which takes effect at the next reboot. |
| Parameter | 4-digit hex number from C100 to FE00. Cannot use C000, D000, E000, or F000. |
| Example | `Manager:` **addr= E100** ENTER |
| **Addr?** | |
| Level | User |
| Description | Displays a four digit hexadecimal number reflecting the setting of the base segment address of the BEC. |
| Parameter | none |
| Example | `User:` **Addr?** ENTER<br>`E100` |
| **Alarm!** | |
| Level | Manager |
| Description | Increments an internal alarm counter on RMB events 13-28. See Table 4-7 on page 4-13 for more information. |
| Parameter | Number from 1 to 16 |
| Example | `Manager:`**alarm! 2** ENTER |
| **Alarm?** | |
| Level | User |
| Description | Displays the current value or all values for the internal alarm counters in the RMB. |
| Parameter | Alarm number (1 -16) or A (all) |
| Example | `User:` **alarm? a** ENTER<br>`1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0`<br>`8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0`<br>`15 = 0, 16 = 0` |

*Continued on next page*

**Table 3-3. RMB commands — *Continued***

| | |
|---|---|
| **BIOS?** | |
| Level | User |
| Description | Displays the BIOS information, including product name and version. |
| Parameter | none |
| Example | `User:` **bios?** ENTER<br>`AMI BIOS Copyright (c) 1997` |
| **BoardType?** | |
| Level | User |
| Description | Displays whether board is AYC54 or AYC55. |
| Parameter | none |
| Example | `User:` **boardtype?** ENTER<br>`1 - AYC54` |
| **BootTimeout=** | |
| Level | Manager |
| Description | Sets the timeout value, in minutes. This value is the amount of time allowed for the system to boot and send a sanity check, if the RMB is configured to perform sanity checking. |
| Parameter | Amount of time in minutes |
| Example | `Manager:` **boottimeout= 5** ENTER |
| **BootTimeOut?** | |
| Level | User |
| Description | Displays the current timeout value in minutes.<br>The value is the amount of time allowed for the system to boot and provide a sanity check to the board, provided the RMB is configured to perform sanity checking. |
| Parameter | Time in minutes |
| Example | `User:` **boottimeout?** ENTER<br>5 |

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**Table 3-3. RMB commands — *Continued***

| | |
|---|---|
| **ClearAlarm!** | |
| Level | Manager |
| Description | Clears an internal alarm counter. |
| Parameter | Number from 1 to 16 |
| Example | `Manager:` **clearalarm! 2** ENTER |
| **ClearConfig!** | |
| Level | Manager |
| Description | Restores all RMB configuration options except passwords to the factory default.<br>**NOTE:**<br>Always use **configure!** after using this command. |
| Parameter | (blank) |
| Example | `Manager:` **clearconfig!** ENTER |
| **ClearEvent!** | |
| Level | Manager |
| Description | Clears current event counter. |
| Parameter | Number from 0 to 34 |
| Example | `Manager:` **clearevent! 12** ENTER |
| **Close!** | |
| Level | Manager |
| Description | Closes 1-4 or all contacts (user- definable outputs) on RMB. |
| Parameter | 1, 2, 3, 4, or A (for All contacts) |
| Example | `Manager:` **close! 2** ENTER |

*Continued on next page*

**Table 3-3. RMB commands — *Continued***

| | |
|---|---|
| **Configure!** | |
| Level | Manager |
| Description | Makes current board configuration permanent.<br><br>**NOTE:**<br>Works only in RMBCMD, not in diagnostics or Independent state. See Chapter 6 for more information.<br><br>**NOTE:**<br>This command clears all event counters. |
| Parameter | none |
| Example | `Manager:` **configure!** ENTER |
| **Contacts?** | |
| Level | User |
| Description | Displays the current status of the 4 contact closures on the RMB. Each user-definable output is defined as either *open* or *closed*. |
| Parameter | none |
| Example | `User:` **contacts?** ENTER<br>`Input 1: Open, Input 2: Open, Input 3: Open, Input 4: Open`<br>`Output 1: Open, Output 2: Open, Output 3: Open, Output 4: Open` |
| **Country=** | |
| Level | Manager |
| Description | Assigns a country label to the RMB. |
| Parameter | 28 character maximum |
| Example | `Manager:` **country= usa** ENTER |
| **Country?** | |
| Level | User |
| Description | Displays the country setting. |
| Parameter | none |
| Example | `User:` **country?** ENTER<br>`usa` |

*Continued on next page*

**Table 3-3. RMB commands — *Continued***

| | |
|---|---|
| **Date=** | |
| Level | Manager |
| Description | Sets the current date in the RMB Real Time Clock. |
| Parameter | month, day, year in mm/dd/yy format |
| Example | `Manager:` **date= 05/01/98** ENTER |
| **Date?** | |
| Level | User |
| Description | Displays RMB Real Time Clock date. |
| Parameter | none |
| Example | `User:` **date?** ENTER<br>`05/01/98` |
| **DialOut=** | |
| Level | Manager |
| Description | Sets the dial string sent before a phone number to cause the modem to dial that phone number. Use Hayes™ modem-compatible commands. |
| Parameter | Up to 10 characters |
| Example | `Manager:` **dialout= atdt** ENTER |
| **Dialout?** | |
| Level | User |
| Description | Displays the string that is sent prior to a phone number, in order to cause the modem to dial that phone number. This string is compatible with the Hayes command set. |
| Parameter | none |
| Example | `User:` **dialout?** ENTER<br>`atdt` |
| **Dir** | |
| Level | User |
| Description | Displays currently-available commands. |
| Parameter | none |
| Example | `User:` **dir** ENTER<br>`(displays all available commands)` |

*Continued on next page*

**Table 3-3. RMB commands — *Continued***

| | |
|---|---|
| **DOSshadow=** | |
| | **Not Implemented** |
| **DOSshadow?** | |
| | **Not Implemented** |
| **DST=** | |
| Level | Manager |
| Description | Sets RMB RTC daylight savings time flag. |
| Parameter | 0= off<br>1= on |
| Example | `Manager:` **dst= on** ENTER |
| **DST?** | |
| Level | User |
| Description | Displays RMB RTC daylight savings time flag. |
| Parameter | none |
| Example | `User:` **dst?** ENTER<br>on |
| **Event?** | |
| Level | User |
| Description | Displays the current value of the counter or all values associated with the event specified. |
| Parameter | 0 - 34 or A for all. |
| Example | `User:` **Event? a** ENTER<br>`0 = 0, 1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0`<br>`7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0`<br>`14 = 0, 15 = 0, 16 = 0, 17 = 0, 18 = 0, 19 = 0, 20 = 0`<br>`21 = 0, 22 = 0, 23 = 0, 24 = 0, 25 = 0, 26 = 0, 27 = 0`<br>`28 = 0, 29 = 0, 30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0` |

*Continued on next page*

**Table 3-3. RMB commands — *Continued***

| | |
|---|---|
| **EventLabel=** | |
| | **Not Implemented** |
| **EventList?** | |
| | **Not Implemented** |
| **Exit** | |
| Level | User |
| Description | *Normal state:* exits RMBCMD and displays the UNIX/Lynx prompt.<br>*Independent state:* Drops the modem connection and returns RMB to Normal state. |
| Parameter | none |
| Example | `User:` **exit** ENTER |
| **Fans=** | |
| Level | Manager |
| Description | Sets fan status connector. |
| Parameter | 0= not connected<br>1= connected |
| Example | `Manager:` **fans= 0** ENTER |
| **Fans?** | |
| Level | User |
| Description | Displays the current status of the fans, if connected. See status messages in Table 3-5 on page 3-32.. |
| Parameter | none |
| Example | `User:` **fans?** ENTER<br>`0 00 - Fans: Not connected`<br>`Exhaust Fan: Not monitored` |
| **FlowCntl=** | |
| Level | Manager |
| Description | Sets modem flow control. |
| Parameter | 0= none<br>1= software<br>2= hardware |
| Example | `Manager:` **flowcntl= 2** ENTER |

*Continued on next page*

**Table 3-3. RMB commands — *Continued***

| | |
|---|---|
| **FlowCntl?** | |
| Level | User |
| Description | Displays status of modem flow control. None, hardware, or software. |
| Parameter | none |
| Example | `User:` **flowcntl?** ENTER<br>`0 - None` |
| **ForceBec=** | |
| Level | Manager |
| Description | Sets the two forcebec flags. See "BEC Switch and ForceBEC command" on page 3-33 for more information. |
| Parameter | Numeric only: 0= off or 1= on |
| Example | `Manager:` **forcebec= 0,0** ENTER |
| **Forcebec?** | |
| Level | User |
| Description | Displays status of BEC enable switch override flags. |
| Parameter | none |
| Example | `User:` **forcebec?** ENTER<br>`0,0 BEC switch is OFF` |
| **Help** | |
| Level | User |
| Description | Displays currently-available commands. |
| Parameter | none |
| Example | `User:` **help** ENTER<br>`(user or manager command list)` |
| **ID=** | |
| Level | Manager |
| Description | Sets the ID field, which is assigned by the field installer or factory. INADS uses this field to identify the source of an alarm. |
| Parameter | Character string up to ten characters |
| Example | `Manager:` **id= RMB** ENTER |

*Continued on next page*

**Table 3-3. RMB commands — *Continued***

| | |
|---|---|
| **ID?** | |
| Level | User |
| Description | Displays the ID string of the RMB. |
| Parameter | none |
| Example | `User:` **id?** ENTER<br>`RMB` |
| **Independent!** | |
| Level | Manager |
| Description | Switches RMB to Independent state. |
| Parameter | none |
| Example | `Manager:` **independent!** ENTER |
| **INIT=** | |
| Level | Manager |
| Description | Sets the modem initialization string for the next initialization.<br><br>⚠ **CAUTION:**<br>*Use of an invalid string can block modem access. Request assistance from development staff before changing the init string, then change it back after you finish.* |
| Parameter | Character string up to 32 characters |
| Example | `Manager:` **init= at&f&r1** ENTER |
| **INIT?** | |
| Level | User |
| Description | Displays the modem initialization string. |
| Parameter | none |
| Example | `User:` **init?** ENTER<br>`at&f&r1` |
| **InputN=** | |
| Level | Manager |
| Description | Assigns labels to user inputs. |
| Parameter | Number (1, 2, 3 or 4) and label. 28 characters maximum. |

***Continued on next page***

**Table 3-3. RMB commands — *Continued***

| | |
|---|---|
| Example | `Manager:` **inputn= 1, (first input)** ENTER |
| **InputN?** | |
| | **Not Implemented** |
| **LS** | |
| Level | User |
| Description | Displays currently-available commands. |
| Parameter | none |
| Example | `User:` **ls** ENTER<br>`(user or manager command list)` |
| **Manager** | |
| Level | User |
| Description | If manager password matches, puts RMB in manager mode and allows configuration changes. |
| Parameter | Enter key, then valid manager password.<br>For security, no password characters are echoed. |
| Example | `User:` **manager**<br>`Password:` **(enter password here)**<br>`Manager:` |
| **Modem=** | |
| Level | Manager |
| Description | Sets modem's operating parameters. The settings are the DTE speed, not the DCE, and the COM port speed, not the modem speed.<br>**CAUTION:**<br>*Set baud rate only at 4800 or higher.* |
| Parameter | COM Port number (1 - 4); Baud rate (4800, 9600, 19200, 38400); Parity (N for None, E for Even, O for Odd); data bits (7 or 8); stop bits (1 or 2). |
| Example | `Manager:` **modem= 2,19200,N,8,1** ENTER |

*Continued on next page*

**Table 3-3. RMB commands — *Continued***

| | |
|---|---|
| **Modem?** | |
| Level | User |
| Description | Displays COM port, modem baud rate, data bits, parity, stopbits. |
| Parameter | none |
| Example | `User:` **modem?** ENTER<br>`2,19200,N,8,1` |
| **ModemType=** | |
| Level | Manager |
| Description | Sets modem type. Requires **configure!**, then **rmbreset!** to take effect. Before setting to 0, see "Setting Communication port # to zero" on page 6-8. |
| Parameter | 0= none (AYC54 or AYC55)<br>1= internal (AYC54 only)<br>2= external (AYC54 or AYC55) |
| Example | `Manager:` **modemtype= 1** ENTER |
| **ModemType?** | |
| Level | User |
| Description | Displays modem type. “Stored” parameters take effect after the next RMB reset or power up. |
| Parameter | none |
| Example | `User:` **modemtype?** ENTER<br>`Active: 1 - Internal, Stored: 1 - Internal` |
| **Msg=** | |
| Level | Manager |
| Description | Sends a message to the circular buffer. |
| Parameter | Sends a message. Up to 127 characters. |
| Example | `Manager:` **msg= disk backed up on 4/6/97** ENTER |

*Continued on next page*

**Table 3-3. RMB commands — *Continued***

| | |
|---|---|
| **MsgAll?** | |
| Level | User |
| Description | Displays on a line-by-line basis, and in chronological order, the message number, date, time, and text of every message held in the buffer. |
| Parameter | none to display messages in descending chronological order, or ***a*** to display messages in ascending chronological order |
| Example | `User:` **msgall?** ENTER<br>`(displays all existing messages with most recent message first)`<br>`User:` **msgall? a** ENTER<br>`(displays all existing messages with most recent message last)` |
| **MsgClearAll!** | |
| Level | Manager |
| Description | Erases all messages from the buffer. |
| Parameter | none |
| Example | `Manager:` **msgclearall!** ENTER |
| **MsgClearN!** | |
| Level | Manager |
| Description | Erases a single message from buffer. |
| Parameter | Number from 0 to 127 |
| Example | `Manager:` **msgclearn! 34** ENTER |
| **MsgN?** | |
| Level | User |
| Description | Displays the date, time, and a specific message from the circular buffer. If the specific message does not exist, nothing is displayed. |
| Parameter | Message number |
| Example | `User:` **msgn? 2** ENTER<br>`(date, time, and message)` |

*Continued on next page*

**Table 3-3. RMB commands — *Continued***

| | |
|---|---|
| **MsgNum?** | |
| Level | User |
| Description | Displays the number of messages currently held in the circular message buffer. |
| Parameter | none |
| Example | `User:` **msgnum?** ENTER<br>`12` |
| **MsgSpace?** | |
| Level | User |
| Description | Displays the amount of space (in number of messages) currently available for additional messages. |
| Parameter | none |
| Example | `User:` **msgspace?** ENTER<br>`14` |
| **OK?** | |
| Level | User |
| Description | Displays the results of the last BIST. For more information, see Appendix B, "Diagnostic codes". |
| Parameter | none |
| Example | `User:` **ok?** ENTER<br>`No RMB-2 test failures detected` |
| **Open!** | |
| Level | Manager |
| Description | Opens one or all contacts (user-definable outputs) on RMB. |
| Parameter | 1-4 or A (all contacts) |
| Example | `Manager:` **open! 2** ENTER |
| **Outputn=** | |
| | **Not Implemented** |
| **Outputn?** | |
| | **Not Implemented** |
| **PanicMsg=** | |
| Level | Manager |

*Continued on next page*

**Table 3-3. RMB commands — *Continued***

| | |
|---|---|
| Description | Sets the panic message. |
| Parameter | Up to 127 characters |
| Example | `Manager:` **panicmsg= emergency** ENTER |
| **PanicMsg?** | |
| Level | User |
| Description | Displays the current message. |
| Parameter | none |
| Example | `User:` **panicmsg?** ENTER<br>`emergency` |
| **Phone1=** | |
| Level | Manager |
| Description | Sets outdialing attributes for phone number 1, including area code, and international code.<br><br>**NOTE:**<br>Use `,` for a dial pause. |
| Parameter | Up to 32 characters |
| Example | `Manager:` **phone1= 9,18005353573** ENTER |
| **Phone1?** | |
| Level | User |
| Description | Displays phone number 1. |
| Parameter | none |
| Example | `User:` **phone1?** ENTER<br>`9,18005353573` |
| **Phone2=** | |
| Level | Manager |
| Description | Sets outdialing attributes for phone number 2, including area code and international code.<br><br>**NOTE:**<br>Use `,` for a dial pause. |
| Parameter | Up to 32 characters |
| Example | `Manager:` **phone2= 9,18005353573** ENTER |

*Continued on next page*

**Table 3-3. RMB commands — *Continued***

| | |
|---|---|
| **Phone2?** | |
| Level | User |
| Description | Displays phone number 2. |
| Parameter | none |
| Example | `User:` **phone2?** ENTER<br>`9,18005353573` |
| **PostCodes?** | |
| Level | User |
| Description | Displays the POST codes received during the last power-up, the time and date of last RMB reset, and the BIOS. For more information, see Appendix B, "Diagnostic codes". |
| Parameter | none |
| Example | `User:` **postcodes?** ENTER<br>`11/07/97 15:47:56  BIOS version is unavailable` |
| **Reboot!** | |
| Level | Manager |
| Description | Initiates a platform reboot or a cold boot via the reset cable.<br>**NOTE:**<br>Use this command only from the Independent state. |
| Parameter | none |
| Example | `Manager:` **reboot!** ENTER |

**CAUTION:**
*Before using this command, try the procedures listed under "Platform reset" on page 2-9. Rebooting a system in operation can damage customer files. No warning or confirmation is given before the reboot. This command is a last resort only.*

| | |
|---|---|
| **Rev?** | |
| Level | User |
| Description | Displays the revision numbers of the RMB hardware, boot code, BIOS enable code (BEC) and firmware. |
| Parameter | none |

*Continued on next page*

**Table 3-3. RMB commands — *Continued***

| | |
|---|---|
| Example | `User:` **rev?** ENTER<br>`HW 4C, Boot 1.0, BEC 1.12, Firmware 8.04`<br><br>**NOTE:**<br>The hardware (HW) revision number may be followed by a letter. If no letter is present, or if the letter is B, the RMB on-board modem will operate at a maximum speed of 28.8K baud. If the letter is C, the RMB on-board modem will operate at a maximum speed of 33.6K baud. |
| **RMBreset!** | |
| Level | Manager |
| Description | Resets RMB hardware (including modem). The call is dropped. Wait a couple of minutes before logging in again. |
| Parameter | none |
| Example | `Manager:` **rmbreset!** ENTER |
| **RmbState?** | |
| Level | User |
| Description | Displays the current state of the RMB. See Table 1-1 on page 1-8. |
| Parameter | none |
| Example | `User:` **rmbstate?** ENTER<br>`Normal` |
| **Sanity=** | |
| Level | Manager |
| Description | Enables or disables the UNIX sanity timer. |
| Parameter | Off= disable<br>On= enable |
| Example | `Manager:` **sanity= on** ENTER |
| **Sanity?** | |
| Level | User |
| Description | Displays the sanity check status, whether enabled or disabled. |
| Parameter | none |
| Example | `User:` **sanity?** ENTER<br>`on` |

*Continued on next page*

**Table 3-3. RMB commands — *Continued***

| | |
|---|---|
| **SanityTime=** | |
| Level | Manager |
| Description | Sets the time between sanity checks. |
| Parameter | Number of minutes (1-10) |
| Example | `Manager:` **sanitytime= 5** ENTER |
| **SanityTime?** | |
| Level | User |
| Description | Displays the amount of time, in minutes, between required sanity checks, if the RMB is configured to perform sanity checking. |
| Parameter | none |
| Example | `User:` **sanitytime?** ENTER<br>5 |
| **Setpw1!** | |
| Level | Manager |
| Description | Sets Password 1, the user password.<br><br>**CAUTION:**<br>*Type the new password characters carefully: the RMB does not confirm your entry. Give the new password to all authorized parties.* |
| Parameter | Old password, comma, new password. 10 characters maximum, 7 minimum. The first character must be alphabetic. |
| Example | `Manager:` **setpw1! butt3rfly, po2sies** ENTER |
| **Setpw2!** | |
| Level | Manager |
| Description | Sets Password 2, the manager password.<br><br>See the caution under Setpw1. |
| Parameter | Old password, comma, new password. 10 characters maximum, 7 minimum. The first character must be alphabetic. |
| Example | `Manager:` **setpw2! monk3ys, pe6nuts** ENTER |

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**Table 3-3. RMB commands — *Continued***

| **Style=** | |
|---|---|
| Level | Manager |
| Description | Sets panic outdial message style and maximum number of retry attempts. Message style parameter is 0= generic, 1= INADS, 2= user-defined INADS format. |
| Parameter | Style, 0-4 retry attempts |
| Example | `Manager:` **style= 1,2** ENTER |
| **Style?** | |
| Level | User |
| Description | Displays format of outdial messages and maximum number of retry attempts. |
| Parameter | none |
| Example | `User:` **style?** ENTER<br>`1,2` |
| **Temp?** | |
| Level | User |
| Description | Displays temperature of thermistor 1, thermistor 2, two-thermistor average, maximum before alarm, minimum before alarm. The maximum and minimum are set by the **tempmax=** and **tempmin=** commands. |
| Parameter | none |
| Example | `User:` **temp?** ENTER<br>`Temp1: 80.00, Temp2: 84.58, Avg: 82.29, Max: 120.00, Min: 50.00` |
| **TempMax=** | |
| Level | Manager |
| Description | Sets the maximum value for the average temperature (in Fahrenheit) of thermistors 1 and 2. If the average exceeds this value an event counter is incremented. |
| Parameter | Any number between 50° F and 200° F |
| Example | `Manager:` **tempmax= 120** ENTER |

*Continued on next page*

**Table 3-3. RMB commands — *Continued***

| | |
|---|---|
| **TempMin=** | |
| Level | Manager |
| Description | Sets the minimum value for the average temperature (in Fahrenheit) of thermistors 1 and 2. If the average falls below this value an event counter is incremented. |
| Parameter | Any number between 50° F and 200° F |
| Example | `Manager:` **tempmin= 50** ENTER |
| **Time=** | |
| Level | Manager |
| Description | Sets RMB Real Time Clock's time. |
| Parameter | Hours, minutes and seconds in HH:MM:SS (24 hour format) |
| Example | `Manager:` **time= 15:14:35** ENTER |
| **Time?** | |
| Level | User |
| Description | Displays RMB Real Time Clock time. |
| Parameter | none |
| Example | `User:` **time? 15:14:35** ENTER |

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**Table 3-3. RMB commands — *Continued***

| | |
|---|---|
| **UNIX!** | |
| Level | User |
| Description | Allows execution of operating system commands from RMBCMD. Type **ls** to display available commands.<br><br>**NOTE:**<br>This command can be used in the Normal or Independent state. In Independent state, however, system responses are shown only on the local console.<br><br>Use this command to shut down a system when you can not log in. To shut down the system, enter:<br>**UNIX! /sbin/init 0**<br>After waiting for the system to shut down, reboot the system using the reboot! command. |
| Parameter | none |
| Example | `User:` **UNIX! date** ENTER<br>`Fri Nov 14 09:41:54 MST 1997` |
| **UPS=** | |
| Level | Manager |
| Description | Sets UPS location. |
| Parameter | 0= no connection<br>1= connected to internal UPS<br>2= connected to external jack |
| Example | `Manager:` **ups= 0** ENTER |
| **UPS?** | |
| Level | User |
| Description | Displays the current UPS status and UPS location as shown in Table 3-6 on page 3-33. |
| Parameter | none |
| Example | `User:` **ups?** ENTER<br>`2 00 - UPS: External, status unknown` |
| **User** | |
| Level | Manager |

*Continued on next page*

**Table 3-3. RMB commands — *Continued***

| | |
|---|---|
| Description | Changes from manager mode to user mode. |
| Parameter | none |
| Example | `Manager:` **user** ENTER<br>`User:` |
| **Volts=** | |
| Level | Manager |
| Description | Sets the percent of tolerance allowable on the voltage lines. |
| Parameters | Enter the following parameter in whole numbers:<br>■ From 2 to 10% (before release 1.4.8)<br>■ From 2 to 25% (release 1.4.8 or later)<br>**NOTE:**<br>In release 1.4.8 or later, each voltage tolerance can be configured seperately |
| Example | **Manager: volts= 7** ENTER `(before release 1.4.8)`<br>**Manager: volts= +12 8** ENTER `where +12 is the supply voltage, and 8 is the voltage tolerance (release 1.4.8 and later)` |
| **Volts?** | |
| Level | User |
| Description | Displays the current values for the four power supply voltages, including the actual, minimum, and maximum for each. |
| Parameter | none |
| Example | `User:` **volts?** ENTER<br>`+12v: Actual +11.91, Min +11.16, Max +12.84`<br>`-12v: Actual -12.06, Min -12.84, Max -11.16`<br>`+5v: Actual +5.06, Min +4.65, Max +5.35`<br>`-5v: Actual -5.15, Min -5.35, Max -4.65` |

**NOTE:**
Manager commands that change the RMB configuration and that are made during Independent state or diagnostics are stored only in the buffer. The next time the RMB is configured or reset, these changes are lost.

See Chapter 6, "Configuring the RMB", for more information on making permanent changes to the RMB configuration.

## RMB commands grouping

The following table lists the commands by the groups in which they might be used. Reference this table after you become familiar with each command's parameters and usage.

**Table 3-4. RMB commands - functional groups**

| Group | Commands | Purpose |
|---|---|---|
| RMB firmware | **BoardType?** | reports RMB board type (AYC54 or AYC55) |
| | **ClearConfig!** | clears all selected user options except passwords |
| | **Configure!** | makes active board configuration permanent |
| | **Country?** | reports country code |
| | **Country=** | sets country code |
| | **Dir (Help, LS)** | displays available RMB commands |
| | **Exit** | Normal state: exits RMBCMD and displays command prompt.<br>Independent state: drops modem connection, returns RMB to Normal state |
| | **ID?** | reports ID field |
| | **ID=** | sets ID field |
| | **OK?** | reports results of last RMB POST and results of background maintenance |
| | **Rev?** | reports HW, Boot, BEC, and Firmware revision numbers |
| | **RMBreset!** | resets RMB hardware (including modem) |
| | **RMBstate?** | reports RMB state |
| RMB Host Interface | **Addr?** | reports BEC base address |
| | **Addr=** | sets BEC base address |
| | **BIOS?** | reports name-of-BIOS field |
| | **BootTimeout?** | reports Boot Sanity Timeout Time |
| | **BootTimeout=** | sets Boot Sanity Timeout Time (in minutes) |

*Continued on next page*

**Table 3-4. RMB commands - functional groups — *Continued***

| Group | Commands | Purpose |
|---|---|---|
| | **ForceBEC=** | sets FORCEBEC flag |
| | **ForceBEC?** | reports FORCEBEC flag status |
| | **PostCodes?** | reports POST codes w/timestamp |
| | **UNIX!** | sends a system command to the platform |
| | **Reboot!** | orders platform to reboot (if reset cable is present) |
| | **Sanity?** | reports sanity checking status |
| | **Sanity=** | turns sanity checking on or off |
| | **SanityTime?** | reports sanity timeout time |
| | **SanityTime=** | sets sanity timeout time in minutes |
| Event, Alarm and Action | **Action?** | reports an event-action list |
| | **Action=** | sets an event-action list |
| | **ActionFlag?** | reports action enabling flag status |
| | **ActionFlag=** | sets action enabling flag |
| | **Alarm!** | increments platform alarm counter n |
| | **Alarm?** | reports platform alarm counter n value |
| | **ClearAlarm!** | clears platform alarm counter n |
| | **ClearEvent!** | clears current event count |
| | **ConsoleMsg=** | sets whether console messages display |
| | **ConsoleMsg?** | reports whether console messages display |
| | **Event?** | reports current event count |
| | **EventLabel=** | labels a user-definable event counter (9-34) |
| | **EventList?** | reports event labels and event counts (0-34) |
| | **Outcall=** | sets whether panic calls are dialed out |
| | **Outcall?** | reports whether panic calls are dialed out |
| Msg Buffer | **Msg=** | sends a message to circular buffer |
| | **MsgAll?** | reports all messages in buffer |
| | **MsgClearAll!** | erases all messages in buffer |

*Continued on next page*

**Table 3-4. RMB commands - functional groups — *Continued***

| Group | Commands | Purpose |
|---|---|---|
| | **MsgClearN!** | erases a single message from buffer |
| | **MsgN?** | reports a single message from buffer |
| | **MsgNum?** | reports the number of messages in buffer |
| | **MsgSpace?** | reports space left in message buffer |
| Tempera-tures and Voltages | **Temp?** | reports all platform temperatures and control values |
| | **TempMax=** | sets maximum allowable temperature |
| | **TempMin=** | sets minimum allowable temperature |
| | **Volts?** | reports all platform voltages and control values |
| | **Volts=** | sets maximum % voltage drift |
| Real-Time Clock | **Date?** | reports RMB RTC date |
| | **Date=** | sets RMB RTC date |
| | **DST?** | reports RMB RTC Daylight Savings Time flag |
| | **DST=** | sets RMB RTC Daylight Savings Time flag |
| | **Time?** | reports RMB RTC time |
| | **Time=** | sets RMB RTC time |
| UPS, Fans, User I/O | **Close!** | closes one or all user-definable outputs |
| | **Contacts?** | reports state of user-definable inputs/outputs |
| | **Fans?** | reports fan status |
| | **Fans=** | sets fan location |
| | **Inputn?** | reports user-definable input labels and status |
| | **Inputn=** | assigns labels to user I/O inputs |
| | **Open!** | opens one or all user-definable outputs |
| | **Outputn?** | reports user-definable output labels and status |
| | **Outputn=** | assigns labels to user-definable outputs |
| | **UPS?** | reports UPS status |

*Continued on next page*

**Table 3-4. RMB commands - functional groups — *Continued***

| Group | Commands | Purpose |
|---|---|---|
| | **UPS=** | sets UPS location |
| Modem | **DialOut?** | reports dial out string |
| | **DialOut=** | sets dial out string |
| | **FlowCntl?** | Displays status of modem flow control. (None, hardware, or software.) |
| | **FlowCntl=** | Sets modem flow control. |
| | **Independent!** | initiates request to connect modem to firmware |
| | **Init?** | reports modem initialization string |
| | **Modem?** | reports modem baud, data bits, parity, stopbits |
| | **Modem=** | sets modem's operating parameters |
| | **ModemReset!** | resets AYC54 modem HW and FW only |
| | **ModemType?** | reports modem type (AYC54 or external) |
| | **ModemType=** | select AYC54 RMB modem or an external modem (at RMB UART DB-9 port) |
| | **Normal!** | initiates request to connect modem to platform |
| | **PanicMsg?** | reports panic message |
| | **PanicMsg=** | sets panic message |
| | **Phone1?** | reports phone number 1 |
| | **Phone1=** | sets phone number 1 |
| | **Phone2?** | reports phone number 2 |
| | **Phone2=** | sets phone number 2 |
| | **Style?** | reports panic outdial message style |
| | **Style=** | sets panic outdial message style and maximum number of outcall retries |
| Static Password Security | **Manager** | allows config changes (sets Manager mode) if Manager password is matched |

*Continued on next page*

**Table 3-4. RMB commands - functional groups — *Continued***

| Group | Commands | Purpose |
|---|---|---|
| | **Setpw1!** | sets the user password. |
| | **Setpw2!** | sets the manager password. |
| | **User** | disallows config changes (sets User mode) |

## Special commands

Several commands display specialized information or require special consideration before use. The commands include: fans, ups, and forcebec. Each is included in the following section.

### Fans? command

The RMB displays messages regarding the fan status as shown in Table 3-5 when the fan location is connected (**fans= 1**) and the **fans?** command is used. The RMB displays the status number in hexadecimal. For information about **fans?** command use, see page 3-12.

**Table 3-5. Fan status numbers**

| Status number | Error message |
|---|---|
| 0 00 | Fans are not connected. |
| 1 00 | All fans are OK. |
| 1 01 | Fan 1 fault |
| 1 02 | Fan 2 fault |
| 1 04 | Fan 3 fault |
| 1 08 | Fan 4 fault |
| 1 10 | Exhaust fan fault |
| 1 20 | Power supply fan fault |

More than one status can be reported. For example, if the fan status is 0 09, fans 1 and 4 are defective. A text message is also displayed with the fan location and status.

### UPS? command

The **ups?** command is used with a MAP100 that has an internal UPS. The RMB displays messages regarding the UPS status as shown in Table 3-6 when the UPS location is internal (**ups= 1**) and the **ups?** command is used. The RMB displays the status number in hexadecimal. For information about **ups?** command use, see page 3-25.

**Table 3-6. UPS status numbers**

| Status number | Error message |
|---|---|
| 0 00 | `All inputs OK or UPS is not connected.` |
| 0 01 | `UPS is active` |
| 0 02 | `UPS battery charge is low` |
| 0 04 | `UPS has failed` |
| 0 08 | `UPS battery is recharging` |
| 0 10 | `UPS battery won't recharge` |

More than one status can be reported. For example, if UPS status is 0 03, the UPS is active with a low battery charge. If UPS status is 0 14, the UPS has failed and its battery won't recharge. A text message displays showing the UPS location and status.

If the UPS location is set to external (ups= 2), a **`status unknown`** text message is displayed because the external UPS status indicators are not monitored by the RMB.

## BEC Switch and ForceBEC command

The BIOS Extension Code (BEC) contains diagnostic code which tests the platform's components. Technicians can load the BEC locally or remotely whenever the platform is rebooted. Each time the platform is rebooted, the BEC and ForceBEC command switches are checked. If:

- the respective switches in firmware and on the platform are set correctly, and
- the user presses D to load the diagnostics, and
- for a local user, enters the RMB user password when prompted,

then the RMB loads the BEC code into the platform so the user can run the diagnostic utilities.

The ForceBEC command provides a full firmware override for the BEC Enable switch (see Figure C-1 on page C-5) to determine whether the BEC can be run. Using the ForceBEC command is usually easier, because the hardware switch may be inaccessible or you may want to run the BEC tests remotely.

Whether the BEC is enabled is based on the following:

| First ForceBEC flag: | Second ForceBEC flag: | BEC enable switch: | Is BEC enabled? |
|---|---|---|---|
| 0 | Ignored | On | Yes |
| 1 | 1 | Ignored | Yes |
| 1 | 0 | Ignored | No |
| 0 | Ignored | Off | No |

To clarify, the first ForceBEC flag determines whether the second ForceBEC flag is used. For example, if the ForceBEC flags are:

- 1,1 the BEC procedure is run, regardless of the BEC enable switch status.
- 0,1 only the BEC enable switch is used to determine whether to run the test.

For information on ForceBEC command use, see page 3-13. For the location of the BEC Enable Switch, see Figure C-1 on page C-5.

## Error messages during RMBCMD use

While using RMBCMD from any of the three accesses, the error messages below might display. For corrective actions with numbered steps, try the steps in order.

**Table 3-7. RMBCMD error message**

| # | Message | Reason | Corrective Action |
|---|---|---|---|
| 1 | `RMB protocol error` | The board does not follow the protocol between software and firmware and is malfunctioning. | 1. Press the RMB Reset button for 3.5 seconds or more.<br>2. Download the current firmware.<br>3. Replace the board. |
| 2 | `RMB timed out` | A command is sent by software to the board but did not receive a reply. Occurs when:<br>■ the board is stuck somewhere (during a failed download where it is in the boot as an example).<br>■ **rmbreset** is sent, because the board firmware does a reset, does not finish the current transaction, and the acknowledgment never comes. | 1. Wait about a minute to see whether the RMB corrects itself.<br>2. Follow item #1 steps. |
| 3 | `RMB is busy with a request by another process` | The RMB completes processes sequentially. Three possible reasons, in order of probability:<br>■ Either a download of the firmware (about 1 min. 30 sec.) or of the BEC ( 2 min. 30 sec.) could be occurring.<br>■ After a download and during a configuration, which can take about 30 seconds.<br>■ During a sanity check, which gets sent to the board every 30 seconds. | 1. Wait about five minutes.<br>2. Follow item #1 steps. |
| 4 | `You must be a super user` | Only users with 'root' privilege can execute RMB software. Any other user sees this error. | Log out and log back in as a user with 'root' privilege. |

*Continued on next page*

**Table 3-7. RMBCMD error message — *Continued***

| # | Message | Reason | Corrective Action |
|---|---|---|---|
| 5 | `RMB could not perform task` | The board receives a valid semaphore with a valid argument but can't perform the request. | 1. Wait about five minutes.<br>2. Follow item #1 steps. |
| 6 | `RMB is busy` | The board is busy booting up (still in boot), or busy being downloaded. | 1. Wait about five minutes.<br>2. Follow item #1 steps. |
| 7 | `RMB receives bad data` | A valid command but invalid parameters were entered. The RMB may also display the correct usage in the error message. | 1. Check the manual for the correct command syntax.<br>2. Reenter the command and parameters. |
| 8 | `Invalid Command` | This is not one of the accepted commands of **rmbcmd**. | Same as item #7. |
| 9 | `Required parameter is missing` | A command that requires certain parameters was issued without one. | Same as item #7. |

## Independent state progress messages

When the RMB is in Independent state, status messages are sent to the remote user. The messages are listed in Table 3-8.

**Table 3-8. Independent state messages**

| Message | Reason | Corrective Action |
|---|---|---|
| Attempting to reboot RMB platform. This may take several minutes. The call should not drop. After a few minutes, press ENTER or RETURN periodically to obtain a prompt. | The remote manager entered the **reboot!** command. The firmware has closed the platform reset relay contacts and if a reset cable is connected to the platform, the platform reboots.<br><br>**NOTE:**<br>`RMB platform is rebooting` is written into the message buffer to confirm that the remote host reset. Also, if the BEC is enabled, the `Press D to load diagnostics...` prompt is displayed at the local and remote consoles. | None. Normal operation. |
| Command data too long... truncating it. | With an RMB command, the remote user entered a string that is longer than 127 characters. Only the **msg=** and **panicmsg=** commands accept input this long. | If desired, retype a shorter string. |
| Disconnecting and returning RMB to Normal state. | The remote user has entered the **exit** command. The remote user is disconnected and the RMB returned to Normal state. | None. Normal operation. |
| Disconnecting to execute panic call. | A panic call was initiated at the remote RMB host platform. The remote user is disconnected so the panic call can complete. | Wait a few minutes, then dial back in. |
| Disconnecting to reset RMB. | This message is sent when the **RMBreset!** command is issued by a remote manager. The call is dropped for the reset. | Wait a few minutes, then dial back in. |
| Disconnecting to reset RMB modem. | This message is sent when the **ModemReset!** command is issued by a remote manager. The call is dropped for the reset. | Wait a few minutes, then dial back in. |

*Continued on next page*

**Table 3-8. Independent state messages — *Continued***

| Message | Reason | Corrective Action |
|---|---|---|
| Escaping to RMB Independent state. | The remote user entered the Independent state escape sequence while the RMB was in Normal state. After entering the escape sequence:<br>■ Independent state password prompt appears.<br>— If valid RMB user password is entered, the RMB goes to Independent state.<br>— If security violation occurs as described below, the RMB is returned to Normal state. | Enter a valid password. |
| Invalid RMB command | The remote user entered a string that is not a valid RMB command. | Retype the correct command. |
| Password: | Presented when a remote caller first connects to a RMB in Independent state, or when a remote user changes from Normal to Independent state. In either case, the first password prompt immediately follows the *WARNING: Lucent... restricted...* message.<br>If:<br>■ a Manager command is executing on the RMB while a remote caller logs in during Independent state,<br>Then:<br>■ the RMB drops down to User mode<br>■ the Manager command may fail and return an error to software.<br>Also presented when a remote user enters the Manager command. The remote user has one opportunity to enter the manager password within 15 seconds. If the password entry is valid the RMB enters manager mode; if not the RMB remains in user mode. | Enter correct password. |

*Continued on next page*

**Table 3-8. Independent state messages — *Continued***

| Message | Reason | Corrective Action |
|---|---|---|
| RMB manager permission required. | A manager-level command was entered while the RMB was in user mode. The manager-level command is not executed. | Change to Manager mode, then retype the command. |
| Security violation... disconnecting. | After being presented with the Independent state password prompt, the remote caller failed to enter the valid RMB user password within three attempts and thirty seconds. | Request the current password for this RMB, then retry the Independent state attempt. |
| Unix! output will occur at the remote RMB host platform. | This message is sent when the remote user enters the **Unix!** command.The Unix command is executed by the RMB host platform and the command output will not be seen by the remote RMB user. | Request assistance from the local user. |

## UNIX commands

The RMB works under the UNIX operating system. Several commands are required for functions outside of the RMB, communicating directly with the platform's operating system. These commands are available in Normal state, because the RMB provides an access to the operating system. They are also available after entering the **UNIX!** command.

The commands cannot be used in Independent state with **UNIX!**, because no output is sent to the remote console. Without seeing the output, you cannot respond to system events or information.

UNIX does not recognize the commands unless you change to the correct directory or use it in the path and use the correct form. The directory name is: **/rmb/bin** The correct form is **. /**

For example, from the **/rmb/bin** directory, you would enter: **. /rmb_show**

**Table 3-9. UNIX commands**

| Command | Description | Notes |
|---|---|---|
| **rmbalarm** | Tests the RMB's capability of sending an alarm. | Error messages on page 3-42. |
| **rmbcmd** | The interactive application used to query the RMB or to change its operating parameters. | All commands found in Table 3-3 on page 3-5. |
| **rmb_cust** | Loads the platform-specific RMB parameters. | Error messages on page 3-42. |

*Continued on next page*

**Table 3-9. UNIX commands — *Continued***

| Command | Description | Notes |
|---|---|---|
| **rmbdld** | Downloads a new version of firmware, diagnostics and user parameters to the RMB. | Error messages on page 3-45. |

**WARNING:**

*Remote use of* **rmbdld** *requires the* ***nohup*** *command. Without* ***nohup****, the RMB is rendered unusable. Use this command format:*
***nohup /rmb/bin/rmbdld -c /rmb/data/coreX_YZ.bin***
*where* ***X_YZ*** *is the RMB firmware release number.*

*Also,*
***nohup /rmb/bin/rmbdld -d /rmb/data/becX_YZ.bin***
*where* ***X_YZ*** *is the RMB diagnostics release number.*

**NOTE:**

If the RMB becomes unusable, press the reset button for 3.5 seconds.

**CAUTION:**

*Do not change the names of downloadable firmware update files. A technician site call is required to correct the resultant problems.*

| | | |
|---|---|---|
| **rmbmodem** | Installs the correct modem init string and chat string. | Description and procedure on page 3-47. |
| **rmbrev** | Displays the hardware and firmware versions of the RMB. | |
| **rmbsane** | Switches state between independent and normal, and turns on or off sanity processing. | |
| **rmb_show** | Displays the current parameters of the RMB. | |

## Error messages during RMBALARM

These errors might display during the use of the RMBALARM command as listed in Table 3-10. For corrective actions with numbered steps, try the steps in order.

**Table 3-10. RMBALARM error messages**

| # | Message | Reason | Corrective Action |
|---|---|---|---|
| 1 | | Attempting to use manager mode with **rmbcmd**, error messages 1 through 8 from Table 3-7 on page 3-35 might display. | See Table 3-7 actions for each error message. |
| 2 | rmbalarm n | (Where n is 0 to 15.) Either the alarm number is missing or is not a number between 0 and 15. | Reenter the command correctly. |
| 3 | The alarm was NOT incremented! | The request to increment the counter of the specified alarm failed. | Try these steps:<br>1. Wait about a minute to see whether the RMB corrects itself.<br>2. Press the RMB Reset button for 3.5 seconds or more.<br>3. Download the current firmware.<br>4. Replace the board. |

## Error messages during RMB_CUST

These errors might display during the use of the RMB_CUST command as listed in Table 3-11 and are stored in the log files `/rmb/data/rmb_log` and `/rmb/data/ormb_log`. For corrective actions with numbered steps, try the steps in order.

**Table 3-11. RMB_CUST error messages**

| # | Message | Reason | Corrective Action |
|---|---|---|---|
| 1 | (Any one of error messages 1 through 15 from Table 3-12 on page 3-45.) | Attempting to download a newer version of the firmware with **rmbdld** | See Table 3-12 actions for each error message. |
| 2 | (Any one of error messages 1 through 8 from Table 3-7 on page 3-35.) | Attempting to use manager mode with **rmbcmd** | See Table 3-7 actions for each error message. |
| 3 | 4 core download attempts failed | If the board's firmware is older than the hard disk version, then the hard disk version is downloaded. However, the download fails 4 times. | Try these steps:<br>1. Wait about a minute to see whether the RMB corrects itself.<br>2. Press the RMB Reset button for 3.5 seconds or more.<br>3. Download the current firmware.<br>4. Replace the board. |
| 4 | ERROR - DATE semaphore failed to load 3 times rmb_ cust is TERMINATING NOW. Please check the RMB card. When ready, re-run with the command "rmb_cust" | RMB date is not set successfully after 3 tries. | Same as #3 in this table. |
| 5 | ERROR - CLOCK semaphore failed to load 3 times rmb_cust is TERMINATING NOW. Please check the RMB card. When ready, re-run with the command "rmb_ cust" | RMB time is not set successfully after 3 tries. | Same as #3 in this table. |
| 6 | can't read stored config | Unable to read the file `/rmb/data/storedcfg` from the hard drive. | 1. Make sure the file exists and is readable and writable.<br>2. Reinstall the software |

*Continued on next page*

**Table 3-11. RMB_CUST error messages — *Continued***

| # | Message | Reason | Corrective Action |
|---|---|---|---|
| 7 | ERROR - CONFIG_ CHKSUM semaphore failed to load 3 times rmb_cust is TERMINATING NOW. Please check the RMB card. | Cannot calculate the configuration checksum from the RMB after 3 tries. | Same as #3 in this table. |
| 8 | rmb_cust can't write active config file | Cannot write to the file `/rmb/data/activecfg` on the hard drive. | 1. Make sure the file exists and is readable and writable.<br>2. Reinstall the software |
| 9 | ERROR - CONFIGUREX semaphore failed to load 3 times rmb_cust is TERMINATING NOW. Please check the RMB card. | Cannot reconfigure the board with the stored configuration after 3 tries. | Same as #3 in this table. |
| 10 | rmb_cust can't write stored config file | Cannot write to the file `/rmb/data/storedcfg` on the hard drive. | 1. Make sure the file exists and is readable and writable.<br>2. Reinstall the software |

## Error messages during RMBDLD

These errors might display during the use of the RMBDLD command as listed in Table 3-12. For corrective actions with numbered steps, try the steps in order.

**Table 3-12. RMBDLD error messages**

| # | Message | Reason | Corrective Action |
|---|---|---|---|
| 1 | Missing input file | There is no download file specified when entering the **rmbdld** command. | Follow the procedure, including command parameters, on page 6-9. |
| 2 | input file 'name of file' does not follow naming convention | To download BEC, the file name must begin with **bec**, followed by X_YZ (where X, Y, Z are digits between 0 and 9), followed by **.bin**. A similar convention applies to firmware file. They have to begin with **core**, followed by X_YZ (digits as above), and followed by **.bin**. | Look under the directory /rmb/data for the downloadable files. If they don't exist, consider transferring a new copy into /rmb/data or reinstall the software |
| 3 | can't open input file 'name of file' | The download file specified on the command line can't be opened. | Make sure the file exists and has read permission. |
| 4 | input file 'name of file' is corrupt | The download file does not have the right format. The format is header record followed by data records, ending with trailer record. | Transfer a new copy of the file into /rmb/data or reinstall the software. |
| 5 | 'name of file' does not have the right format | The download file does not have **ayc54** in the header record. | Transfer a new copy of the file into /rmb/data or reinstall the software. |
| 6 | You must be a super user | You must have root permission to execute RMB software. | Log out and log back in as a user with 'root' privilege. |
| 7 | RMB is busy with a request by another process. | Either the rmbdaemon is busy downloading or configuring, or another user is using **rmbcmd** with a command such as **configure!**. RMB access is locked. Similarly, if this user does not see the message, other users do. | Wait about five minutes and try access again. If access doesn't occur, try these steps:<br>1. Press the RMB Reset button for 3.5 seconds or more.<br>2. Download the current firmware.<br>3. Replace the board. |

*Continued on next page*

**Table 3-12. RMBDLD error messages — *Continued***

| # | Message | Reason | Corrective Action |
|---|---|---|---|
| 8 | RMB does not enter the programming mode | The board did not switch to the download code from the boot. | Try these steps:<br>1. Press the RMB Reset button for 3.5 seconds or more.<br>2. Download the current firmware.<br>3. Replace the board. |
| 9 | incorrect transfer through semaphore port, try again | A binary record is transferred to the board, then is positively acknowledged. Then the board verifies the binary record before writing it to the FLASH. This process continues until all records are transferred or any binary record is incorrect and this message is displayed. The download is attempted a second time. | Wait until:<br>■ successful completion, or:<br>■ error message #10 appears |
| 10 | rmbdld can't get file to transfer through semaphore twice | The same error as in the previous message occurs in the 2nd attempt to download. However, **rmbdld** exits. | Try these steps:<br>1. Press the RMB Reset button for 3.5 seconds or more.<br>2. Download the current firmware.<br>3. Replace the board. |
| 11 | rmbdld can't erase FLASH. Replace board | Erase of the FLASH failed, which implies a hardware failure related to FLASH memory. | Replace board. |
| 12 | rmbdld can't write FLASH. Replace board | The write to FLASH failed, which implies a hardware failure related to FLASH memory. | Replace board. |
| 13 | Board failure | The board returns an error that should not come from the boot code, which implies that the board is not sane. | Replace board. |

*Continued on next page*

**Table 3-12. RMBDLD error messages — *Continued***

| # | Message | Reason | Corrective Action |
|---|---|---|---|
| 14 | The semaphore to compute the core checksum failed. | The boot code can not compute the checksum of the newly-downloaded firmware. | Replace board. |
| 15 | The semaphore to verify the core failed 'error code'. | A comparison is made of two checksums: the firmware and for what was transmitted into the FLASH. The checksums do not compare, which most likely implies that the boot code is not sane. | Replace board. |
| 16 | The file you attempted to download is not a BOOT binary. Please check the file and try again. | The binary file is incorrectly named. | Rename the file using the correct format. |
| 17 | The file you attempted to download is not a CORE binary. Please check the file and try again. | The binary file is incorrectly named. | Rename the file using the correct format. |
| 18 | The file you attempted to download is not a BEC binary. Please check the file and try again. | The binary file is incorrectly named. | Rename the file using the correct format. |

## Using RMBmodem

The RMBmodem command is used to set the initialization string for the modem used with the RMB, whether internal or external. Since the initialization string can be complicated, the initialization strings of the following three modems have been included in the command's database:

- `Internal modem`

- Paradyne 3820
- Paradyne 3910

## Generic Modem Settings

A fourth option is available for customizing initialization strings for modems not included in the command's database. This option requires that you completely understand the implications of any command or character in the initialization string. A list of the initialization commands for the AYC54 modem can be found in Appendix A.

If you are configuring a generic modem, use the following criteria to create an initialization string that is compatible with the RMB. You must satisfy each of these criteria for the modem to function properly:

### Pin Configuration

- The modem must provide the RS-232 Data Set Ready lead (DSR, pin 6) for the RMB to recognize that the modem is attached and powered up. If the modem does not provide this lead, the RMB will not recognize it and will not be able to configure the modem. Thus, you may have re-configure the modem before connecting it to the RMB.
- The modem must provide the RS-232 lead Data Carrier Detect (DCD, pin 8) to reflect the state of the call.
- The modem must be configured for hardware flow control. Hardware flow control lowers the RS-232 lead Clear To Send (CTS, pin 5) to stop receiving from the RMB. The modem stops sending to the RMB when it sees that Request To Send (RTS, pin 4) has been lowered.
- The RMB will provide the RS-232 lead Data Terminal Ready (DTR, pin 20) and the Transmitted Data lead (TD, pin 2).
- The modem must provide the Received Data (RD, pin 3) lead and may provide Ring Indicator (RI, pin 22), while the line is ringing.
- No other leads are supported.

### Modem Option Settings

- The modem must support the Hayes command set (AT command set).
- The modem should be configured to turn off the command echo and result codes.
- The modem speed on the DTE side must match the RMB, which is configured with the modem= command. The preferred speed is 38400 bits per second. The RMB does not change speeds to match an incoming call, so if the two do not match, the RMB will answer incoming calls but will not exchange data until an outgoing call is placed (which forces the modem to speed match the RMB).

- The modem should be configured to auto answer after a single ring, because the RMB does not send the Hayes command to auto answer.
- The modem must be configured for the call to follow DTR, since the RMB lowers DTR to drop a call.
- Many modems come out of the box with configurations that are compatible with the RMB. However, if a modem needs to be changed from the factory defaults, the changes should be written to a profile in the modem and the modem should be configured to load that profile on power up. Most modems have the ability to store multiple profiles.

### To use the RMBmodem command:

1. At the UNIX prompt, type **rmbmodem** and press ENTER.

   The following text displays:

   ```
   Rmbmodem Version 1.0 UNIXWare v.1.1
   Please specify the modem used:
      1. Internal
      2. Paradyne 3820
      3. Paradyne 3910
      4. Unknown - specify modem initialization string
   Enter your choice (1,2,3 or 4):
   ```

   **NOTE:**
   "Internal" refers only to the AYC54 on-board modem.

2. Enter the number selection.

| If you select: | Then: |
|---|---|
| 1,2 or 3 | The modem is configured |
| 4 | This prompt displays:<br>`Enter your modem init string:`<br>Type the characters required to initialize the modem correctly and press ENTER. |

The modem is initialized, either with the predetermined string or with the string you entered.

## Error messages during RMBSANE

These errors might display during the use of the RMBSANE command as listed in Table 3-13 and are stored in the log files `/rmb/data/rmb_log` and `/rmb/data/ormb_log`. For corrective actions with numbered steps, try the steps in order.

**Table 3-13. RMBSANE error messages**

| # | Message | Reason | Corrective Action |
|---|---|---|---|
| 1 | | Attempting to use manager mode with **rmbcmd**, error messages 1 through 8 from Table 3-7 on page 3-35 might display. | See Table 3-7 actions for each error message. |
| 2 | ERROR - Turning on sanity checking failed 3 times | Board does not respond to the semaphore that turns on sanity checking. | Try these steps:<br>1. Wait about a minute to see whether the RMB corrects itself.<br>2. Press the RMB Reset button for 3.5 seconds or more.<br>3. Download the current firmware.<br>4. Replace the board. |
| 3 | ERROR - Query of RMB state failed 3 times | Board does not respond to the semaphore that queries about the current state of the board (independent or normal). | Same as #2 in this table. |
| 4 | ERROR - Switching to normal mode failed 3 times | Board does not respond to the semaphore that switches board to Normal state. | Same as #2 in this table. |
| 5 | ERROR - Turning off sanity checking failed 3 times | Board does not respond to the semaphore that turns off sanity checking. | Same as #2 in this table. |

# Events and Actions

# 4

This chapter describes the RMB event monitoring feature and the resulting actions. It also describes alarms and how the RMB contacts the INADS system. Included are:

- Event/Action Overview
- Events
- Actions
- Alarms
- Buffer Messages

## Event/Action Overview

One of the most important features of the RMB is that it continuously monitors events. When an event occurs, a counter is incremented. If the count reaches a preset number, the RMB takes an action, such as sending a message to the customer's console, or calling INADS. Whether the RMB just sends a message, calls INADS, or some other action depends on the entries in the stored event/action table.

In this chapter, events are defined and listed with relevant characteristics. Then, actions that can be taken are listed. An example is included of how the two work together. Finally, the default event/action list is included for reference.

## Events

There are three different types of monitored events. The table below describes when the types of events occur and what type of event triggers its occurrence:

**Table 4-1. Event types**

| Event type | Frequency | Example of event monitored |
|---|---|---|
| Periodic | every 6 seconds | Platform temperature, voltage, status of UPS, or fans |
| Episodic | As it occurs | User-defined software alarms or platform reboots |
| Sanity check | At the sanitytime value | Platform operating system functionality |

Monitored events include the following:

**Table 4-2. RMB monitored events**

| # | Event Description | Comments | Monitor Rate |
|---|---|---|---|
| 0 | Real-time clock problem | | Periodic |
| 1 | | Reserved | |
| 2 | Temperature above max specified | As detected by RMB thermistors | Periodic |
| 3 | Temperature below min specified | As detected by RMB thermistors | Periodic |
| 4 | Voltage(s) outside range | | Periodic |
| 5 | | Reserved | |
| 6 | Sanity indicator not received | | Sanity check |
| 7 | Boot sanity timeout occurred | | Sanity check |
| 8 | Platform ISA bus reset occurred | When ISA bus reset signal is activated | Episodic |
| *9 | Internal UPS activated | Legacy MAP/100 only | Periodic |

*Continued on next page*

**Table 4-2. RMB monitored events — *Continued***

| # | Event Description | Comments | Monitor Rate |
|---|---|---|---|
| *10 | Internal UPS battery power low | Legacy MAP/100 only | Periodic |
| *11 | Internal UPS fault | Legacy MAP/100 only | Periodic |
| 12 | One or more fans malfunctioning | | Periodic |
| *13-27 | Application alarm 1 through 15 | | Episodic |
| *28 | INADS test alarm 16 | | Episodic |
| *29 | Internal UPS power failure | Legacy MAP/100 only | Periodic |
| *30 | Internal UPS is charging | Legacy MAP/100 only | Periodic |
| *31-34 | User-definable input 1-4 activated | | Periodic |

* denotes a default label that can be changed using the RMB command **eventlabel=**. Up to 32 characters may be entered.

If an external UPS is used and the **ups= 2** command is set, these default labels apply:

**Table 4-3. RMB monitored events - External UPS only**

| # | Event Description (with comments) | Monitor Rate |
|---|---|---|
| 31* | External UPS activated | Periodic |
| 32* | External UPS battery power low | Periodic |
| 33* | External UPS is in bypass mode | Periodic |

* denotes a default label that can be changed using the RMB command **eventlabel=**. Up to 32 characters may be entered.

## Event counters

Event counters have values from 0 to 9999 (decimal). Counters increase or are cleared based on the type of event to which they are assigned.

- Periodic event counters clear themselves when the event goes away, such as when the temperature falls back below administered levels. If the rate of events increases past the administered value, an action is taken.
- Episodic events must be cleared by the user or the software that controls the event. This type of event is configured by an application or services, so after the event occurs, it must be manually cleared.
- Sanity checks rely on messages from the platform's operating system, so when no more messages arrive, the RMB considers this an event. As long as the platform operates normally, this type of event continues to be cleared.

All events are cleared when the following occurs:

- the **clearevent!** command is entered
- the **rmbreset!** command is entered
- the **configure!** command is entered
- reset button on the RMB faceplate is pressed for more than 3.5 seconds
- the RMB loses power
- an ISA bus reset occurs (except event 8, which is incremented)

The **clearalarm!** command resets events 13 through 28, which are incremented by signals sent from an application.

## Event severity levels

RMB events have three levels of severity:

- Warning alarm
- Minor alarm
- Major alarm

The event/action table contains the counter for each level of severity. Each level can trigger up to five actions whenever the event count reaches the table's value.

## Actions

When an event counter reaches one of the three severity levels, the RMB takes an action or a set of actions. Examples of actions include:

- Sounding platform speaker
- Setting or clearing a contact closure for local alarming
- Dialing out with an alarm

The RMB can take a variety of actions, as shown in Table 4-4.

**Table 4-4. Action codes**

| Action Code | Description |
|---|---|
| 00 | Do nothing |
| 01-09 | Delay recheck of this event for 1-9 minutes. |
| 10* | Sound platform speaker (UNIX only). |
| 11-19* | Sound platform speaker for 1-9 seconds (UNIX only). |
| 20-29* | Write event message to console preceded by 0-9 CRLFs. The event message reads: `Event <event number> has reached count <counter value>, creating a <warning/minor/major> alarm.` |
| 30-33 | Close user-definable output contacts 1 to 4. |
| 34 | Close all four user-definable output contacts. |
| 40-43 | Open user-definable output contacts 1 to 4. |
| 44 | Open all four user-definable output contacts. |
| 50 | Reset modem with the configured modem initialization string. This drops any current RMB connection. |
| 51 | Panic outcall phone number 1. Includes dialing the INADS or Trouble Tracker systems with a smart alarm. See "Alarm messages" on page 4-12 for alarm format. |
| 52 | Panic call with phone number 2. Includes dialing the INADS or Trouble Tracker systems with a smart alarm. See "Alarm messages" on page 4-12 for alarm format. |
| 53 | Write panic message to message buffer, preceded by a timestamp. |
| 60 | Reset an individual event's counter. |

*Continued on next page*

**Table 4-4. Action codes — *Continued***

| Action Code | Description |
|---|---|
| 70 | Write an event's message to the RMB's circular buffer. The event message reads: `Event <event number> has reached count <counter value>, creating a <warning/minor/major> alarm.` |
| 80-86* | Send **/etc/init<n>** message to platform where <n> is 0-6. (UNIX only) |
| 89 | If the RMB is in Normal state, put it in Independent state. |
| 99 | Reboot the system via hard reset signal. |

**NOTE:**
* - these actions require an active system running the RMB UNIX daemon to take effect.

# Event/Action Table

The settings in the event/action table determine, for each event, the actions that the RMB will take.

## Event/Action Example

Event 4, voltage out of range (±12v, ±5v) on any power supply voltage, results in the following:

| Severity Level | Counter | Actions (up to 5) |
|---|---|---|
| 0 -- Warning alarm | 10 | 70,00,00,00,00 |
| 1 -- Minor alarm | 20 | 70,25,00,00,00 |
| 2 -- Major alarm | 30 | 70,25,51,00,00 |

If the event counter reaches 10, an event message is written to the RMB's circular buffer.

If the event counter reaches 20, an event message is written to the RMB's circular buffer, and an event message is written to the console preceded by 5 CRLFs.

If the event counter reaches 30, an event message is written to the RMB's circular buffer, an event message is written to the console preceded by 5 CRLFs, and a panic outcall is made to the phone number in the phone1 field. The call message uses the format described under "Alarm messages" on page 4-12.

## Action list

An action list is a series of numbers that the RMB reads from the event/action table to determine what to do for each event. The format for the action list is:

Event Number, Alarm Number, Event Count, Action, Action, Action, Action, Action

The characteristics of each component are:

- Event Number -- Range from 0 to 34 as shown in Table 4-1
- Alarm Number -- 0, 1, or 2, depending on severity level
- Event Count -- specifies how many times the event can occur before the action list is executed
- Action -- Up to five actions can be taken

Actions are processed in the order they are received.

## Event/Action table

The table below contains the recommended configuration for the RMB event/action table. The table includes each event with its severity, the action list that is executed when the event occurs, and a short description of the action taken.

**Table 4-5. Recommended event/actions**

| # | Event name | Severity | Action list | Description |
|---|---|---|---|---|
| 0 | RTC battery dead | minor | 0,1,30,70,25,0,0,0 | Write a message to the buffer and console |
| 0 | RTC battery dead | major | 0,2,100,70,25,51,0,0 | Write more messages and call INADS |
| 1 | Reserved | | | |
| 2 | temp over max | warning | 2,0,10,70,0,0,0,0 | Write a message to the buffer |
| 2 | temp over max | minor | 2,1,20,70,25,0,0,0 | Write a message to the buffer and console |
| 2 | temp over max | major | 2,2,30,70,25,51,0,0 | Write more messages and call INADS |
| 3 | temp below min | warning | 3,0,10,70,0,0,0,0 | Write a message to the buffer |
| 3 | temp below min | minor | 3,1,9998,25,60,0,0,0 | Write a message to the console and reset the counter |
| 4 | voltage error | warning | 4,0,10,70,0,0,0,0 | Write a message to the buffer |
| 4 | voltage error | minor | 4,1,20,70,25,0,0,0 | Write a message to the buffer and console |
| 4 | voltage error | major | 4,2,30,70,25,51,0,0 | Write a message and call INADS |
| 5 | system power failure | | none | This event is reserved for future use |
| 6 | sanity timeout | minor | 6,1,1,70,0,0,0,0 | Write a message to the buffer |

*Continued on next page*

**Table 4-5. Recommended event/actions**

| # | Event name | Severity | Action list | Description |
|---|---|---|---|---|
| 6 | sanity timeout | major | 6,2,2,70,51,89,0,0 | Go into Independent state, call to INADS is recommended especially for out-of-hours coverage |
| 7 | sanity boottime | warning | 7,0,13,70,60,0,0,0 | Write a message and reset the counter |
| 8 | system rebooted | warning | 8,0,1,70,60,0,0,0 | Write a message and reset the counter |
| 9 | UPS activated | warning | 9,0,10,70,0,0,0,0 | Write a message to the buffer |
| 9 | UPS activated | minor | 9,1,50,70,25,0,0,0 | Event count depends on load and UPS capacity |
| 9 | UPS activated | major | 9,2,100,70,25,0,0,0 | Event count depends on load and UPS capacity |
| 10 | UPS battery low | warning | 10,0,10,70,25,0,0,0 | Event count depends on load and UPS capacity |
| 10 | UPS battery low | minor | 10,1,20,70,25,51,0,0 | Call INADS so that the TSO can shut down the platform gracefully |
| 10 | UPS battery low | major | 10,2,30,70,25,0,0,0 | Event count depends on load and UPS capacity |
| 11 | UPS fault | warning | 11,0,50,70,0,0,0,0 | For legacy map-100 only |
| 11 | UPS fault | minor | 11,1,100,70,25,0,0,0 | For legacy map-100 only |
| 11 | UPS fault | major | 11,2,300,70,25,51,0,0 | For legacy map-100 only |
| 12 | fan error | warning | 12,0,10,70,0,0,0,0 | For map-100 and map-100C only |
| 12 | fan error | minor | 12,1,20,70,25,0,0,0 | For map-100 and map-100C only |
| 12 | fan error | major | 12,2,30,70,25,51,0,0 | For map-100 and map-100c only |

*Continued on next page*

**Table 4-5. Recommended event/actions**

| # | Event name | Severity | Action list | Description |
|---|---|---|---|---|
| 13-27 | user alarm counter1-15 | | typically none | Typically not used. Can be used to send software alarms. |
| 28 | user alarm counter 16 | | 28,0,1,70,51,60, 0,0 | Call to INADS for testing after initial RMB installation. |
| 29 | UPS power failure | | none | Reserved for future use |
| 30 | UPS charging | | none | Reserved for future use |
| 31 | Input 1 | warning | 31,0,10,70,0,0,0, 0 | Write a message to the buffer |
| 31 | Input 1 | minor | 31,1,50,70,25,0, 0,0 | Event count depends on load and ups capacity |
| 31 | Input 1 | major | 31,2,100,70,25,0, 0,0 | Event count depends on load and ups capacity |
| 32 | Input 2 | warning | 32,0,10,70,25,0, 0,0 | Event count depends on load and UPS capacity |
| 32 | Input 2 | minor | 32,1,20,70,25,51, 0,0 | Call INADS so that the TSO can shut down the platform gracefully |
| 32 | Input 2 | major | 32,2,30,70,25, 0,0,0 | Event count depends on load and UPS capacity |
| 33 | Input 3 | warning | 33,0,10,70,0,0,0, 0 | Write a message to the buffer |
| 33 | Input 3 | minor | 33,1,20,70,25,0, 0,0 | Write a message to the buffer and console |
| 33 | Input 3 | major | 33,2,30,70,25,51, 0,0 | Write more messages and call INADS |
| 34 | Input 4 activated | | none | |

In the event/action list above, most alarms to the TSO also send an error message to the console so the customer is notified of the platform status.

**CAUTION:**
*Although TSO associates can make changes to settings in the event/action table, any change must be communicated to any other interested support person.*

### Event/Action qualifiers

For event/action processing to occur:

- The BEC switch must be on or the **forcebec?** setting must be on,on.

  Check the status of the switch on the RMB and/or use **forcebec?**.

- The actionflag must be on.

  Use **actionflag?** to check its status.

- For sanity processing, sanity must be turned on.

  Use **sanity?** to check its status.

- For modem calls to INADS, a phone number must be loaded in the RMB configuration.

  Use **phone1?** or **phone2?** to display the phone numbers.

- An event/action list must be loaded in the RMB configuration.

  Verify with **action? x y**, where x is the event number and y is the alarm level. Make a note of the alarm threshold and the actions that are programmed.

- The event counter must not already have exceeded the action threshold.

  Check the counter with **event? x**, where x is the event number. If necessary, reset the event counter with **clearevent!**. This also allows you to make sure that the event will be triggered. Make sure the event counter is incrementing through the alarm threshold.

## Alarms

The RMB can dial out and send alarm information to either of two telephone numbers in response to an event. The RMB contains a circular buffer to store alarm logs and other messages. A circular buffer stores messages until it is full, after which the oldest messages are replaced.

## Alarm messages

Alarm messages are sent to INADS in the following format:

**Table 4-6. Alarm format**

| Byte | # of bytes | Field | Contents | Note |
|---|---|---|---|---|
| 0-9 | 10 | Product ID | | Supplied by services |
| 10 | 1 | Null character | | ASCII code 00H |
| 11-12 | 2 | Date of alarm | 0-31 | |
| 13 | 1 | Field separator | / | ASCII code 2FH |
| 14-15 | 2 | Hour of alarm | 00-23 | |
| 16 | 1 | Field separator | : | ASCII code 3AH |
| 17-18 | 2 | Minute of alarm | 00-59 | |
| 19 | 1 | Field separator | , | ASCII code 2C |
| 20-22 | 3 | Alarm type | ACT<br>RES<br>CLR | Active<br>Resolved<br>Cleared |
| 23 | 1 | Field separator | \| | ASCII code 7CH |
| 24-XXX, where XXX ≤ 240 | ≤ 217 | Alarm information | Event <event number> has reached count <counter value>, triggering a <warning/minor/major> alarm. | Application software can change the default to a flexible field for inserting alarm information. |
| XXX+1 | 1 | End of record, terminator | DEL | ASCII code 7FH |

Table 4-6 shows the INADS message format. The non-INADS format is simply a time-stamped panic message similar to the following:

```
23:12:05 EMERGENCY
```

## Alarm numbers

Alarms are actually a subset of the monitored set of events, as found in Table 4-2 on page 4-2. The alarm number found in the INADS message is actually an event, and corresponds to events as in the following table. These alarms are generated by the applications so the RMB can call INADS to report application-specific problems.

**Table 4-7. Alarm numbers**

| Alarm number | Event |
|---|---|
| 01 | 13 |
| 02 | 14 |
| 03 | 15 |
| 04 | 16 |
| 05 | 17 |
| 06 | 18 |
| 07 | 19 |
| 08 | 20 |
| 09 | 21 |
| 10 | 22 |
| 11 | 23 |
| 12 | 24 |
| 13 | 25 |
| 14 | 26 |
| 15 | 27 |
| 16 | 28 |

## Responding to alarms that send panic calls

When the RMB sends out an INADS-format alarm, it:

1. Calls the Initialization and Administration System (INADS) Operation Support System (OSS).
2. Waits up to 1 minute for OSS to answer.
3. After connecting, the RMB waits 5 seconds, then sends the alarm message in the format described in Table 4-6. The OSS responds with POSACK or NEGACK.

4. If the response is:
    a. POSACK, the RMB sends the asterisk character ***** and drops the telephone line.
    b. NEGACK or some other type of failure, the RMB executes a call attempt retry strategy.
5. If the RMB receives no response within 30 seconds, it drops the line, and executes a call attempt retry strategy until it reaches the administered value for the maximum number of outcall retries.

**NOTE:**
Check the call attempt retry strategy using the **style?** command.

## Additional buffer messages

Besides the Action 70 messages, additional messages are written to the message buffer to give the user potentially useful information. These messages might concern security issues or might give users status about processing, for example.

**Table 4-8. Additional buffer messages**

| Message | Description | Corrective Action |
|---|---|---|
| `Attempting to reset RMB platform.` | The remote manager entered the **Reboot!** command. Platform reset relay contacts are closed, so if a reset cable is installed, platform reboots. These actions also occur:<br>■ `RMB platform is rebooting` message is written to the message buffer.<br>■ if the BEC is enabled, the prompt: `Press D to load diagnostics` displays at the local and remote consoles. | If the platform fails to reset, try these steps:<br>■ make sure that the RMB reset cable is properly installed and not defective.<br>■ If the cable is OK and the platform does not reset when its reset switch is pressed, the reset relay circuitry on the RMB may be defective. Replace the RMB. |
| `Initiating panic call request.` | An initial panic call has been requested with Action 51 or 52. The remote user is disconnected so the panic call may be completed. | To stay connected while dialed in through the RMB modem, turn action processing off with the **ActionFlag= 0** command. Use the **ActionFlag= 1** command to turn action processing back on before exiting. |
| `Initiating panic call retry.` | A panic call retry has started. The remote user is disconnected so the panic call may complete. | To stay connected while dialed in through the RMB modem, turn action processing off with the **ActionFlag= 0** command. Use the **ActionFlag= 1** command to turn action processing back on before exiting. |
| `Panic call failed, INADS ACK not detected.` | The RMB dialed through the modem, connected to a remote system, and transmitted the INADS-formatted message, but did not receive an INADS positive acknowledgment (so 2) within 30 seconds, so it disconnected.<br>A pending panic call retry is attempted 3 minutes after the failed panic call was initiated. | If panic calls to INADS fail, make sure that the RMB ID and phone numbers are valid.<br>See **ID=**, **Phone1=**, **Phone2=** and related commands in Table 3-3 on page 3-5. |

*Continued on next page*

**Table 4-8. Additional buffer messages**

| Message | Description | Corrective Action |
|---|---|---|
| `Panic call failed, INADS NAK received.` | The RMB dialed through its modem, connected to a remote system, transmitted the INADS-formatted message, but received an INADS negative acknowledgment (`so 3`), so it disconnected.<br><br>A pending panic call retry is attempted 3 minutes after the failed panic call was initiated. | If panic calls to INADS fail, make sure that the RMB ID and phone numbers are valid.<br><br>See **ID=**, **Phone1=**, **Phone2=** and related commands in Table 3-3 on page 3-5. |
| `Panic call successfully completed.` | The RMB dialed through its modem, connected to a remote system, transmitted the INADS-formatted message, and received the INADS positive acknowledgment (`so 2`) within 30 seconds. Firmware responded to the INADS ACK by sending the character '`*`' and disconnecting.<br><br>In non-INADS mode, a panic call is successful if, after connecting to the remote system, firmware transmits the time-stamped panic message, waits 5 seconds, then disconnects before losing the connection. | None |
| `Modem configur-ation failed.` | One or more of the RMB modem configuration parameters could not be configured (baud rate, parity, data bits, stop bits). The modem reported an error, or the external modem's DSR signal was not detected during the modem configuration attempt.<br><br>A pending panic call retry is attempted 3 minutes after the failed panic call was initiated. | *All Modems*: Make sure the modem configuration parameters are valid for the RMB modem in use. See **Modem=** and related commands in Table 3-3 on page 3-5.<br><br>*External modem*: Check the modem hardware, including cables, adapters, and power supply. Make sure that dial tone is present at the phone jack.<br><br>If all else fails, replace the RMB. |

***Continued on next page***

**Table 4-8. Additional buffer messages**

| Message | Description | Corrective Action |
|---|---|---|
| `Modem connection attempt failed.` | The RMB dialed through its modem, but was unable to connect to the remote system, or the external modem's DSR signal was not detected during this call attempt.<br><br>A pending panic call retry is attempted 3 minutes after the failed panic call was initiated. | ■ Make sure that the modem configuration parameters and the modem initialization string are valid for the RMB modem in use.<br>■ If panic calls to this remote system always fail, make sure that the RMB phone numbers and modem type are valid. See the **rmbmodem** utility under "UNIX commands" on page 3-40, or the **Modem=**, **ModemType=** and related commands inTable 3-3 on page 3-5.<br>■ Verify that the modular cable between the modem and the phone jack is OK. Make sure that a dial tone is present at the phone jack.<br>■ *External Modem*: If an external modem is in use, check the modem hardware, including cables, adapters, and power supply.<br>■ If all else fails, replace the RMB. |

*Continued on next page*

**Table 4-8. Additional buffer messages**

| Message | Description | Corrective Action |
|---|---|---|
| Modem connection dropped unexpectedly. | The RMB dialed through its modem, connected to a remote system, transmitted the INADS-formatted message, but the remote system disconnected before sending an INADS ACK (so 2) or NAK (so 3).<br><br>In non-INADS mode, the time-stamped panic message is transmitted, but the remote system disconnected before the RMB (which normally disconnects 5 seconds after transmitting the panic message).<br><br>A pending panic call retry is attempted 3 minutes after the failed panic call was initiated. | ■ Make sure that the modem configuration parameters and the modem initialization string are valid for the RMB modem in use.<br><br>■ If panic calls to this remote system always fail, make sure that the RMB phone numbers and modem type are valid. See the **rmbmodem** utility under "UNIX commands" on page 3-40, or the **Modem=**, **ModemType=** and related commands inTable 3-3 on page 3-5.<br><br>■ Verify that the modular cable between the modem and the phone jack is OK. Make sure that a dial tone is present at the phone jack.<br><br>■ *External Modem*: If an external modem is in use, check the modem hardware, including cables, adapters, and power supply.<br><br>■ If all else fails, replace the RMB. |
| Modem initialization failed. | *Internal modem*: After configuring the modem, the RMB was unable to initialize it with the modem initialization string. The modem reported an error, or the<br><br>*External modem*: The DSR signal was not detected during the modem initialization attempt.<br><br>A pending panic call retry is attempted 3 minutes after the failed panic call was initiated. | ■ Make sure the modem initialization string is valid for the RMB modem in use. See the **rmbmodem** utility under "UNIX commands" on page 3-40, or the **Init?**, **ModemType=** and related commands in Table 3-3 on page 3-5.<br><br>■ If an external modem is in use, check the modem hardware, including cables, adapters, and power supply.<br><br>■ If all else fails, replace the RMB. |

*Continued on next page*

**Table 4-8. Additional buffer messages**

| Message | Description | Corrective Action |
|---|---|---|
| RMB platform is rebooting. | An ISA-bus reset was detected by firmware. The reset may have been caused by:<br>■ remote RMB manager issuing the **Reboot!** command<br>■ local user pressing the platform's reset switch<br>■ (on some platforms) Ctrl ALT DEL<br>■ execution of any software (i.e., softboot) which causes an ISA-bus reset. | ■ If the platform is being held in reset, unplug the RMB reset cable from the RMB (leave it connected to the platform). If the platform now boots properly, the reset cable is probably OK.<br>■ If the platform is still being held in reset, the reset cable may be defective.<br>■ If the RMB reset cable appears to be OK, the RMB may be defective. Replace the RMB. |
| RMB remote connection dropped unexpectedly. | A remote Independent state user was disconnected before entering the RMB **Exit** command by:<br>■ escaping to modem command mode, which drops the connection<br>■ exiting via application software<br>■ disconnecting by any other unforeseen occurrence | ■ Make sure that the modem configuration parameters and the modem initialization string are valid for the RMB modem in use. See the **rmbmodem** utility under "UNIX commands" on page 3-40, or the **Init?**, **Modem=** and related commands in Table 3-3 on page 3-5.<br>■ If an external modem is in use, check the modem hardware, including cables, adapters, and power supply.<br>■ If all else fails, replace the RMB. |
| Security violation. Disconnecting remote caller. | The remote user did not enter a valid RMB user password to enter Independent state within three attempts and/or thirty seconds. | The remote user must use the valid RMB user password. If the password has been lost, it must be restored to its default. |

# Diagnostics

# 5

This chapter describes platform tests using diagnostic software and RMB tests using the board's built-in test software. It describes:

- Tests performed on the platform
- The RMB BIST (built-in selftest)

## Platform test overview

The RMB includes software, PC-Doctor™ by Watergate Software, Inc.™, that tests the integrity and functionality of the platform's hardware. These tests run only after rebooting the platform, so unless it is down, plan the tests with the customer.

Sample screens show menus listing the available tests. These tests include:

- CPU and coprocessor tests
- Memory diagnostic tests
- System board tests
- Video adapter tests
- Serial port tests
- Parallel port tests
- Fixed disk tests
- Disk surface scan tests
- Floppy disk tests

This chapter uses abbreviations for many system hardware components. If you are not familiar with a term, check the glossary.

## Testing the platform

This section describes how to test the platform by using the diagnostic commands. To begin testing:

1. Boot the system.

   The Lucent Technologies copyright screen appears, then the following question displays:

   ```
   Do you wish to continue booting or load diagnostics? [C/D]
   [any key except 'D' or 'd' will continue booting]
   ```

2. Type: **D** for diagnostics.

   Make your selection within 10 seconds, or the program continues booting.

   Errors may occur during startup of the diagnostics program. See "Diagnostic startup messages" on page 5-19 for more information.

3. If you are a remote user, skip to Step 4 . If you are a local user, complete the following steps:

   a. At the `Password` prompt, enter the RMB user password within 10 seconds.

After the third failed password attempt, the call is dropped. If the password is successfully entered, the program displays the PC Doctor Diagnostic screen (Screen 5-1).

4. Use the cursor keys to highlight the appropriate test.
5. Press **ENTER**.

**CAUTION:**
*If a diagnostics test is destructive to data files, the console displays a warning message that existing data will be overwritten by test data.*

Messages are written to a log file as the diagnostics tests are run. To interpret these messages, see "Test log results" on page 5-21 for more information.

6. After completing the tests, highlight “Quit” and press **ENTER**.

**NOTE:**
Do not attempt the menu’s interactive tests remotely. If you are running diagnostics from a remote site, you must ensure that the following tests are deselected:

- External loopback test of the serial ports
- External loopback and IRQ test of the parallel ports
- All floppy disk tests

### Aborting the tests

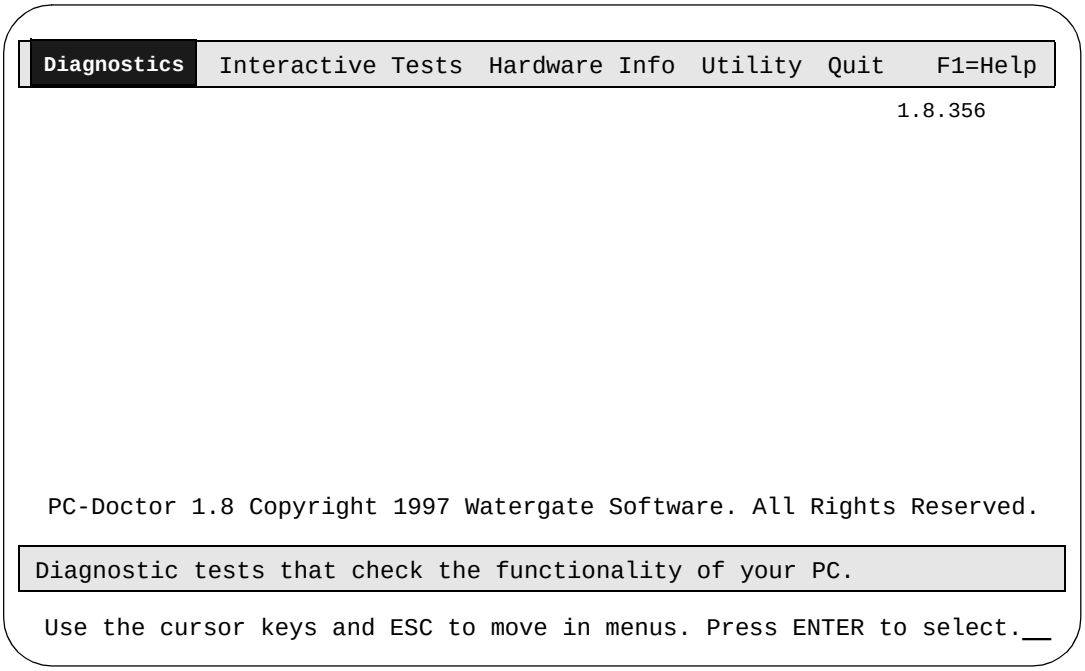
Use the ESC key to abort or end an in-progress test. It may take one or more minutes for longer tests to end, because the system is returned to a reasonable state after the test is aborted.

Most tests can be aborted. However, **do not** abort the surface scan test because of its potentially destructive nature. See page 5-17 for more information.

### Exiting the tests normally

To exit the tests, see "EXIT this program" on page 5-18.

**NOTE:**
The number in the upper-right corner refers to the RMB version of PC-Doctor.

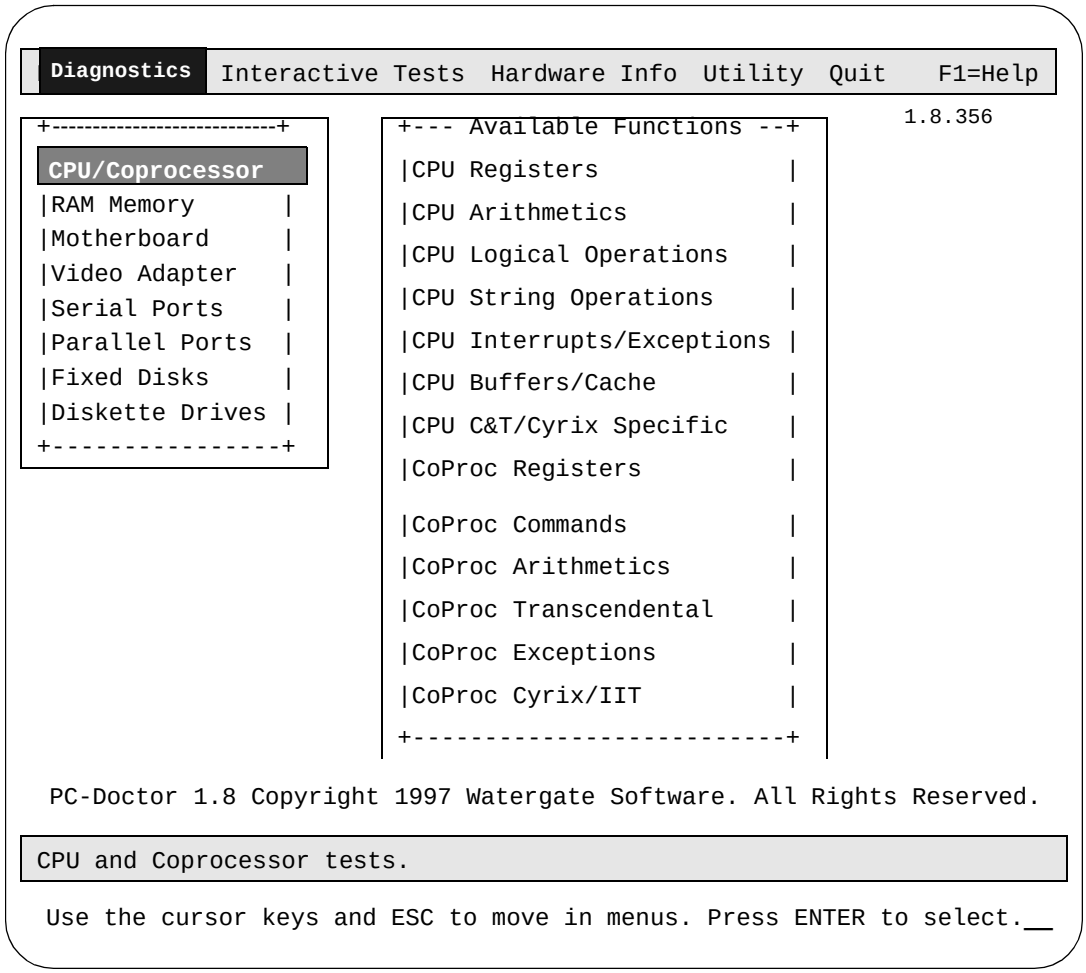



**Screen 5-1. PC-Doctor diagnostics screen**

## Using PC-Doctor

Test the platform by using the diagnostic commands in PC-Doctor. The following screens illustrate the graphic interface of PC-Doctor. Use the cursor keys to select the appropriate diagnostic tests. Press ENTER to perform the test. Screen 5-2 displays when you select “Diagnostics”.

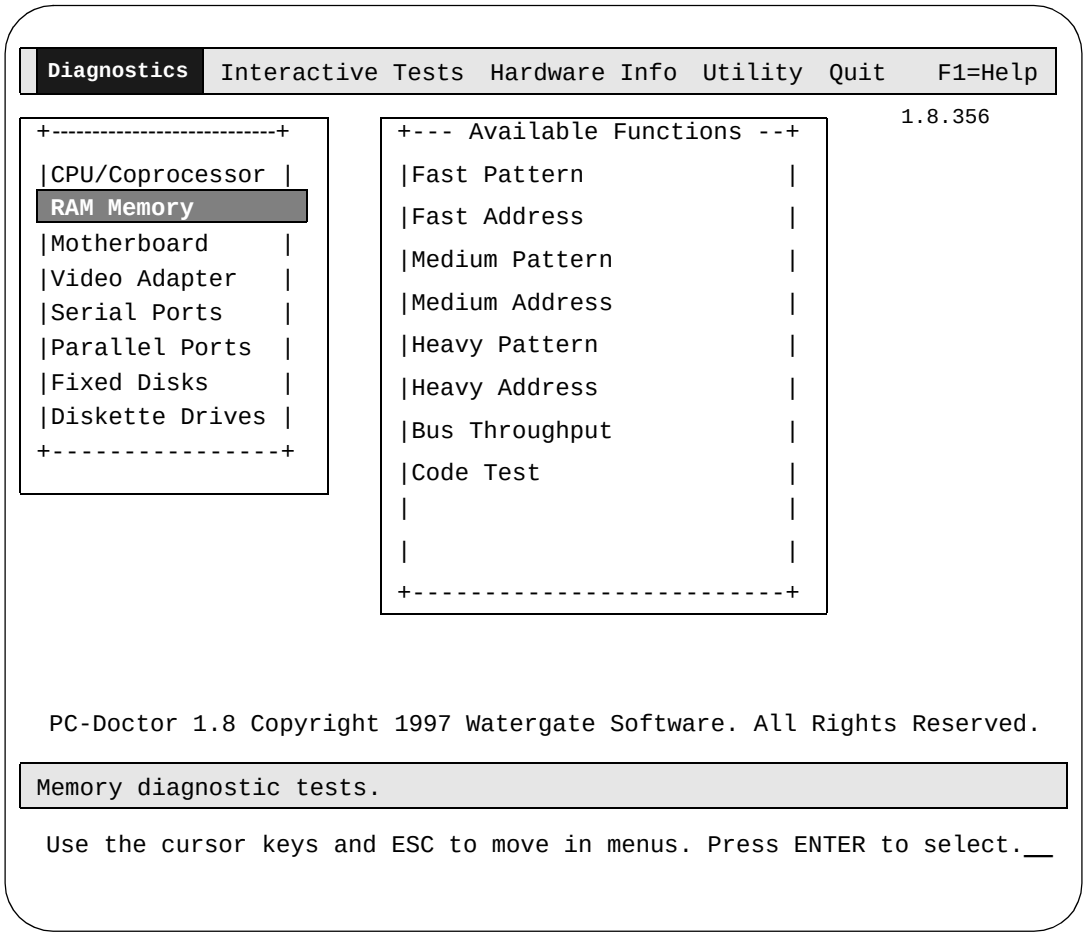
**NOTE:**
The on-line help for PC-Doctor is not available due to the space constraints of the RMB.




**Screen 5-2. CPU and coprocessor tests**

## CPU and coprocessor tests

Tests are performed on the CPU and coprocessor. C&T, Cyrix, and IIT refer to integrated circuit manufacturers.



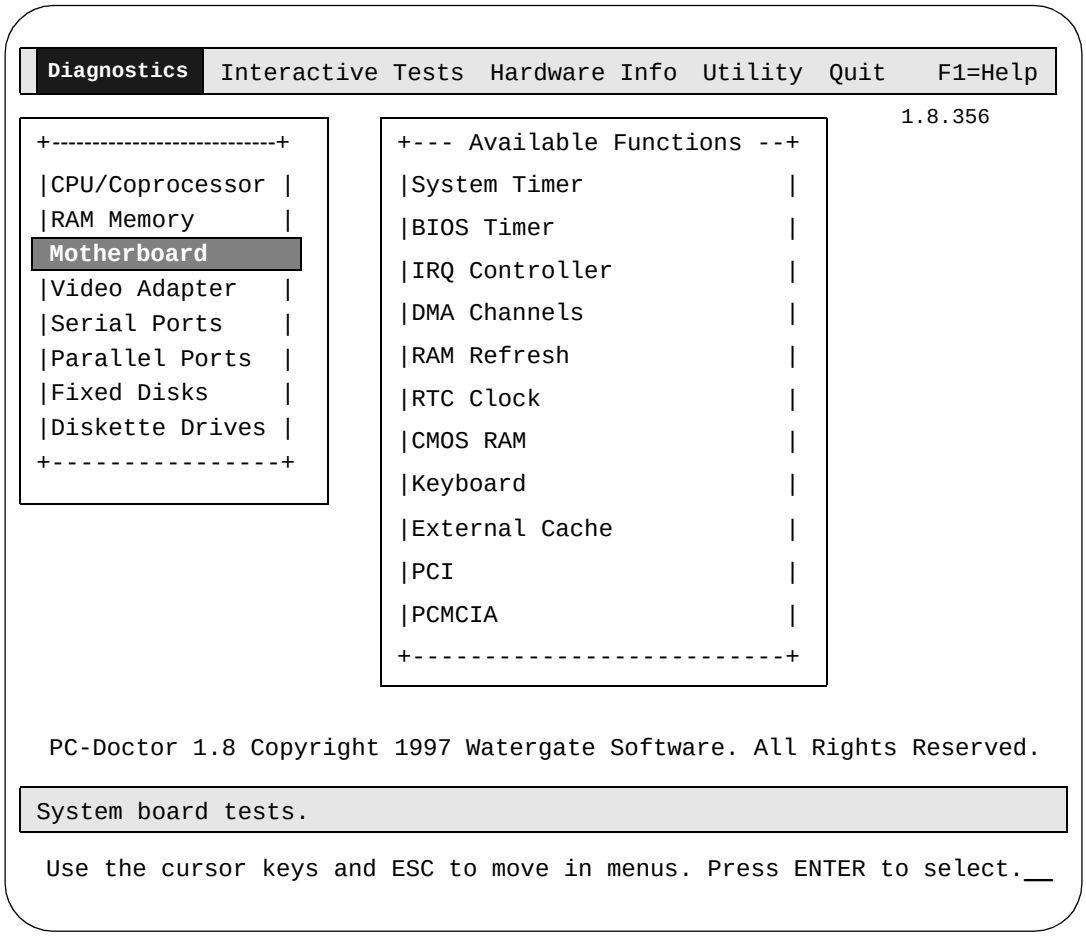

**Screen 5-3. Memory diagnostic tests**

## Memory tests

Tests are performed on base, extended, and expanded memory, and upper memory (UMB) blocks. Memory tests are divided into three categories:

- Pattern–verifies memory locations
- Address–verifies chip select lines
- Bus throughput–verifies bus noise and timing

Pattern and address tests are available as fast, medium and heavy.

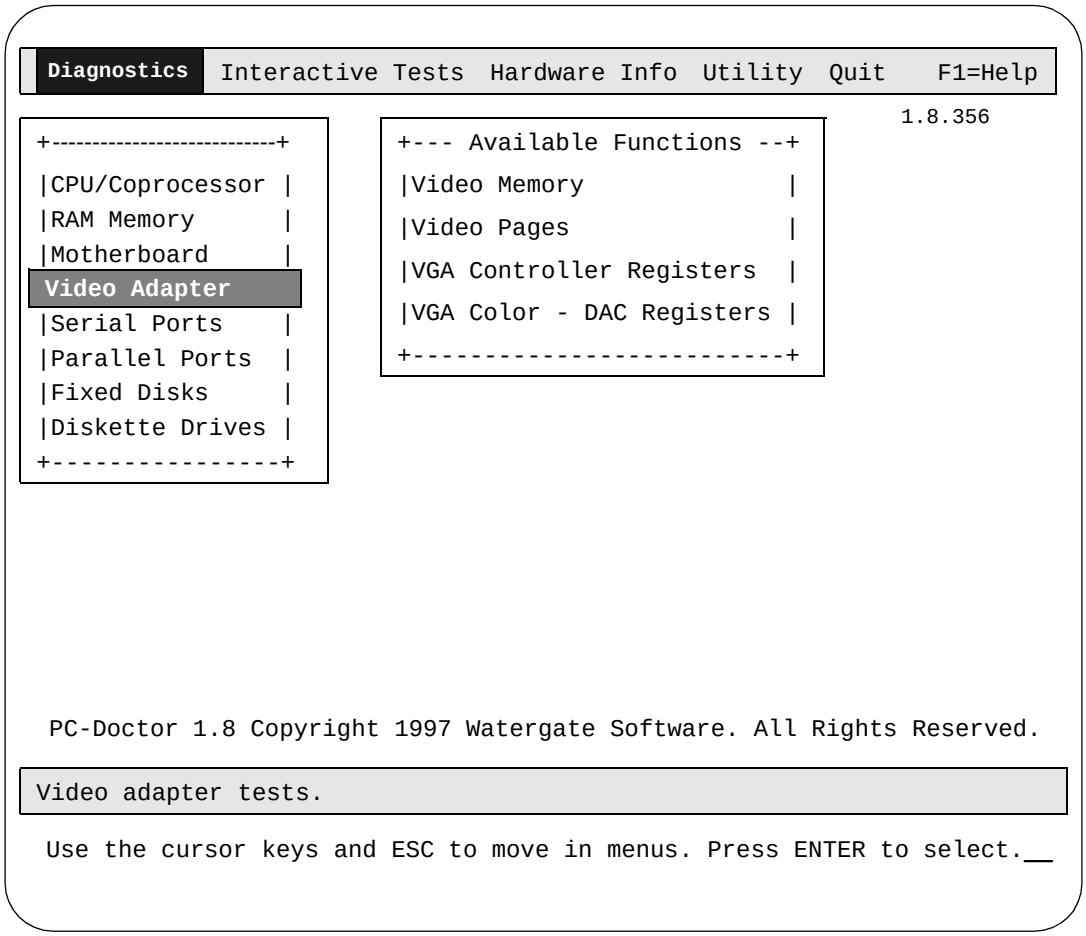



**Screen 5-4. System board tests**

## System/Motherboard tests

System board tests are performed in the following areas:

- 80x86 central processing unit (CPU)–registers, except CS and IP (code segment and instruction pointer), arithmetics, logical operations, string operations, interrupts/exceptions, buffers/cache, C&T/Cyrix specific
- Floating point unit (math coprocessor)–registers, commands, arithmetics, transcendental, exceptions, Cyrix/IIT
- System board–system timer, BIOS timer, IRQ controller, DMA channels, RAM refresh, RTC clock, CMOS RAM, keyboard, external cache, PCI, PCMCIA
- Keyboard–keyboard keys, LEDs, repeat (checks the keyboard repeat function), 84-key AT-compatible keyboard or 101-key enhanced AT-style keyboard

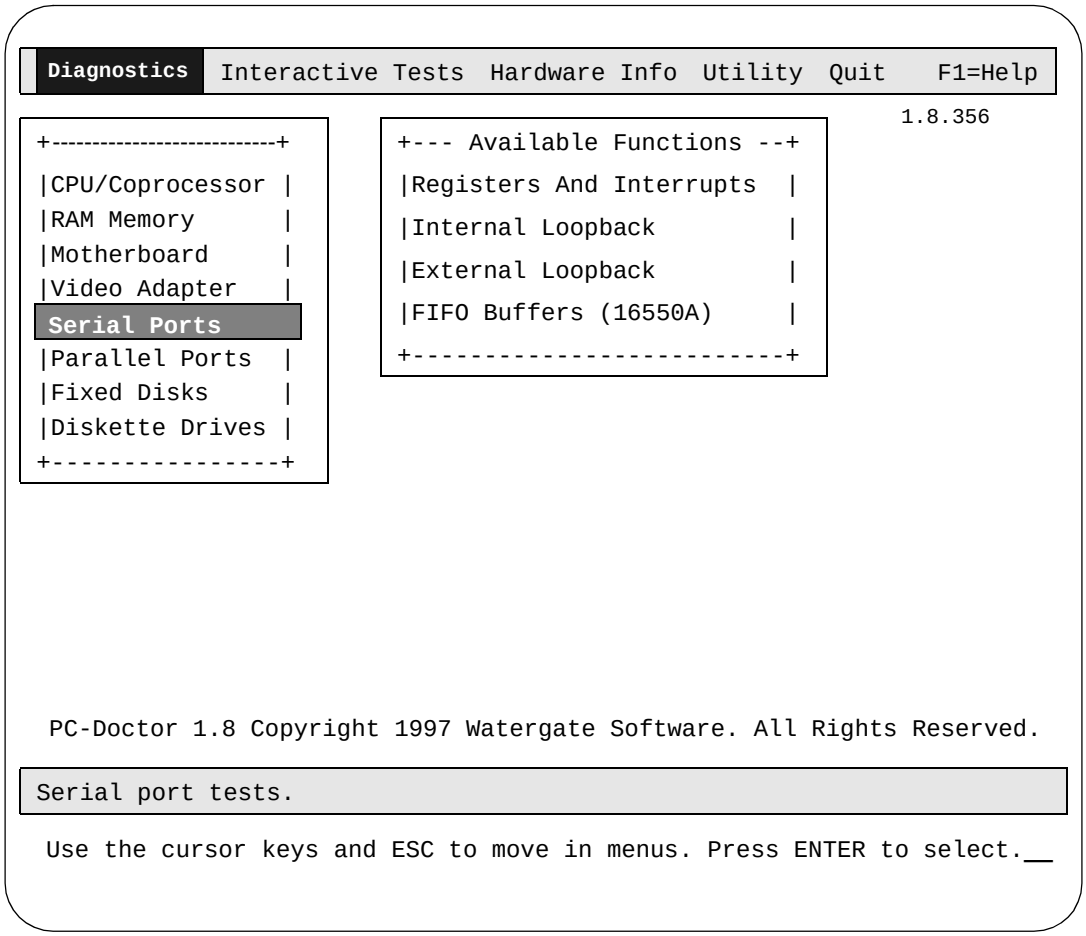



**Screen 5-5. Video adapter tests**

## Video adapter tests

The video and monitor tests check the functionality of both the video adapter and the monitor. They operate with either a monochrome or a color system using popular monochrome, and VGA (video graphics array) and SVGA (super video graphics array) adapters, as well as monochrome and color analog, digital, and multiple scan frequency monitors. Tests include:

- Video memory
- Video pages
- VGA controller registers
- VGA color-DAC (digital to analog converter) register
- Character sets, color palettes, monitor quality, and VGA function

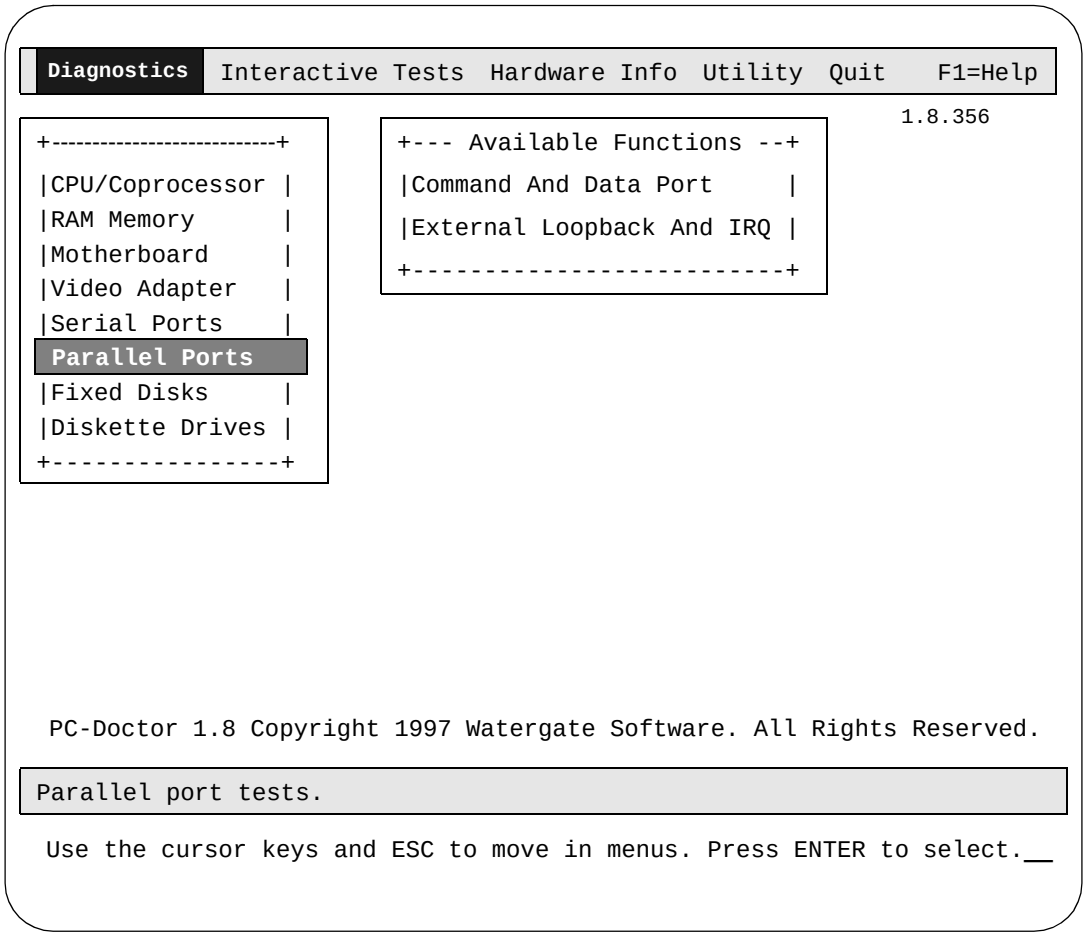



**Screen 5-6. Serial port tests**

## Serial port tests

The serial port tests check the internal functionality of the serial port controller chips, as well as the integrity of the drivers and connections to external serial devices. The RMB COM port is hidden for the platform diagnostics and cannot be tested. The tests are performed on up to 4 adapters that have been identified by the BIOS. Tests include:

- Registers and interrupts–test and validate chip functions
- Internal loopback–done with serial adapters; does not require external loopback plugs
- External loopback–must connect the DB9 or DB25 loopback plug onto the platform serial ports
- FIFO buffers (16550A)–done with serial adapters; does not require external loopback plugs

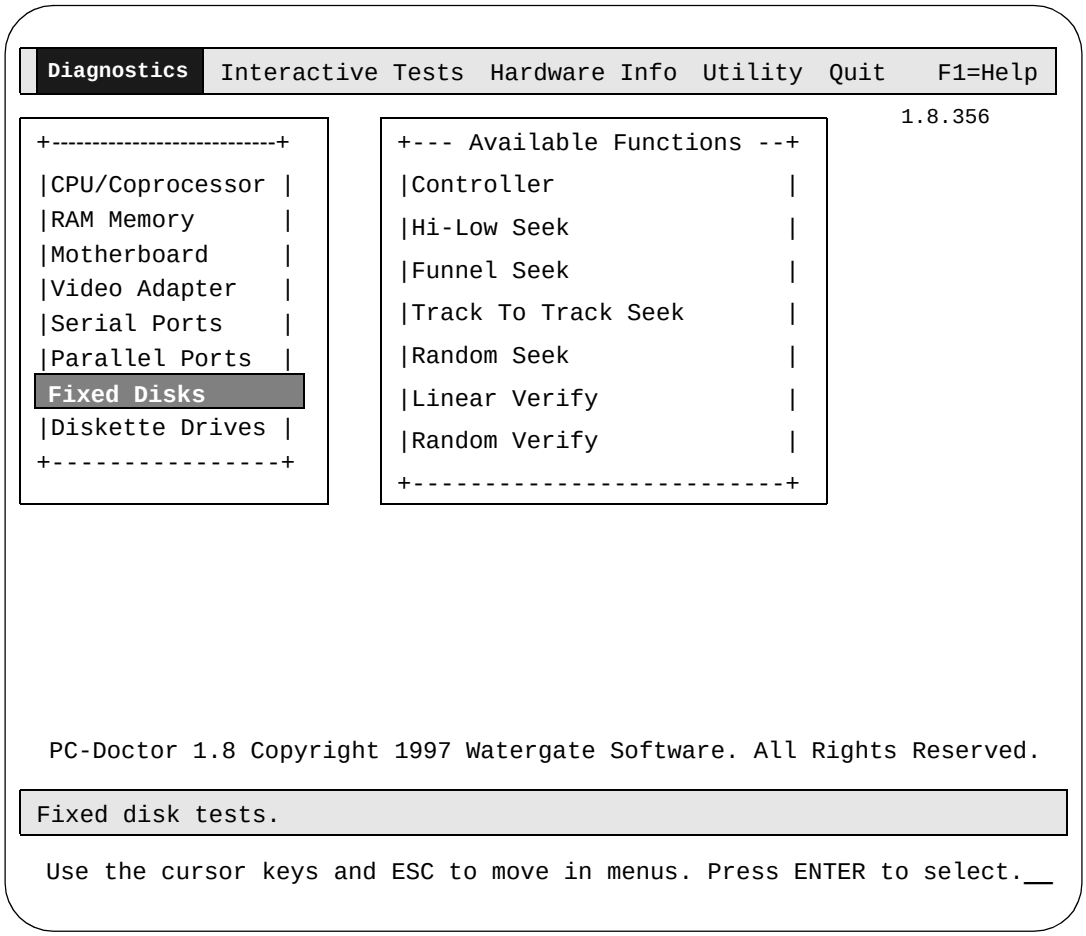



**Screen 5-7. Parallel port tests**

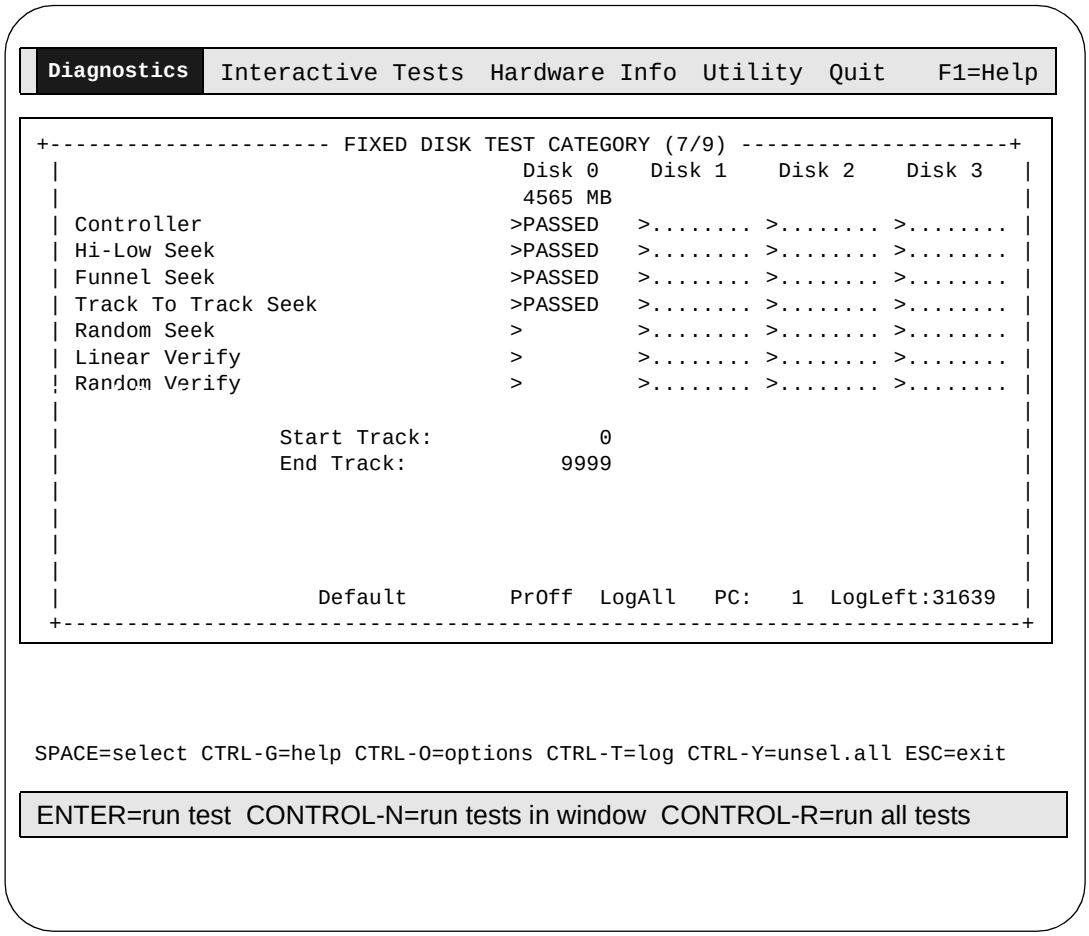
## Parallel port tests

Parallel port tests verify the ability of the parallel ports to control a printer properly. The tests send various patterns of signals out of the port. The tests are performed on up to 4 adapters that have been identified by the BIOS. Tests include:

- Command and data port pattern–test the respective registers
- External loopback and IRQ
  - — Verify the port input and output capabilities and the IRQ line
  - — Connect the DB25 parallel loopback plug onto the platform parallel ports.




**Screen 5-8. Fixed disk tests**




**Screen 5-9. Fixed disk tests - in progress**

## Fixed disk tests

Tests performed on the hard drive include a surface scan for surface defects and the following:

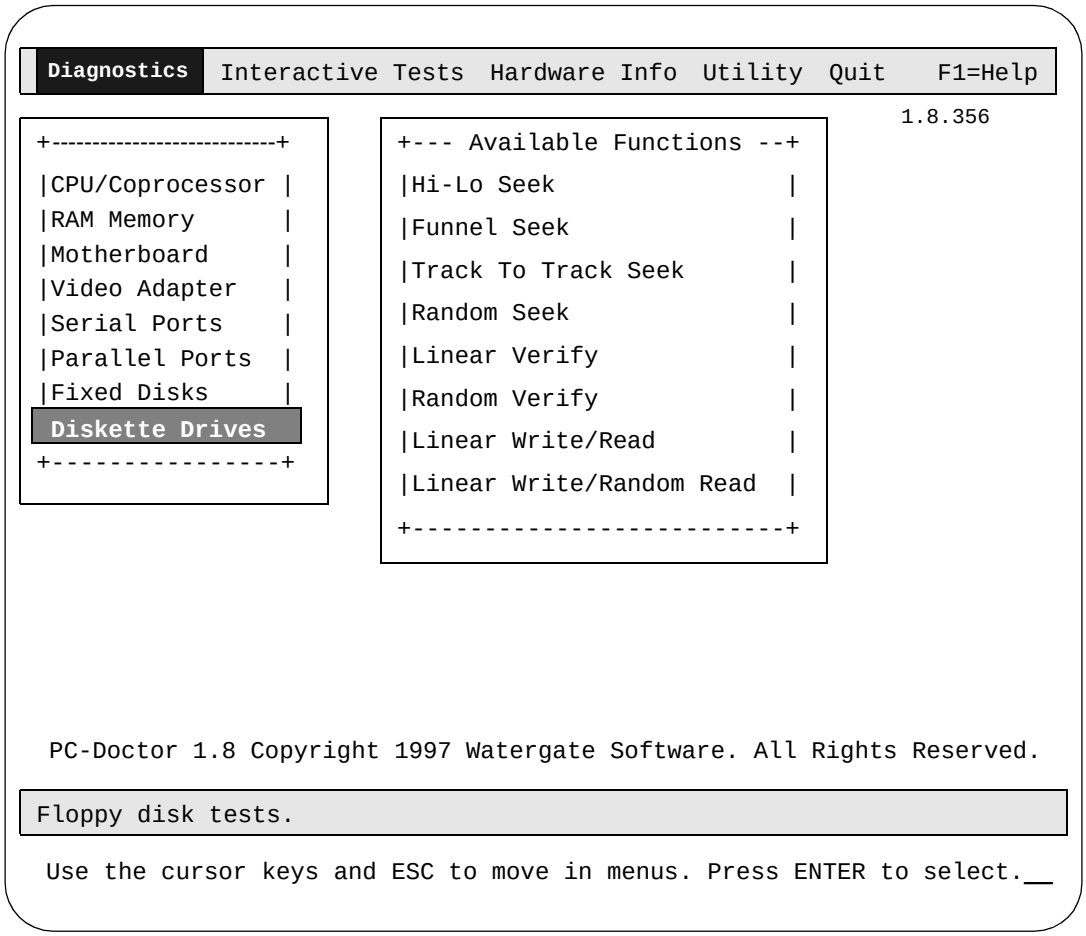
- Controller–performed at least 4 times on the controller chip, then resets
- Hi-low seek–drive heads are moved from the lowest to the highest tracks and then returned to the lowest; test is repeated
- Funnel seek–drive heads are moved from track X to track Y and back where X is 0 and increased by 1 with each seek operation until Y is 0
- Track-to-track seek–drive heads are moved from track 0 to the maximum one track at a time
- Random seek–drive heads are moved randomly
- Linear verify–reads all tracks on the disk; displays track number if errors
- Random verify–reads random tracks

### Remote Diagnostics Screen Error Workarounds

During `Fixed Disk Tests`, the system can output enough characters to overwrite the screen display. When this occurs, there are two ways to work around the problem:

1. Allow the tests to continue until the end of the requested tests. At this point, the system will display all the `PASSED and FAILED` results.
2. Press ESC to interrupt the tests. This action causes the test in progress to abort after a short period of time. If the display is still not clear enough, press ESC to return to the main menu, then initiate the aborted test. The system displays the previous results. To continue testing, select and run the desired tests.

**NOTE:**
In some cases the storage capacity of the hard drive that displays on the screen may be much smaller than the actual capacity of the drive. If this occurs, the program will only perform the tests on the displayed storage capacity. To get a more accurate measure of the capacity of the disk drive, select **Hardware: Physical Disk Drives** from the PC Doctor main menu.

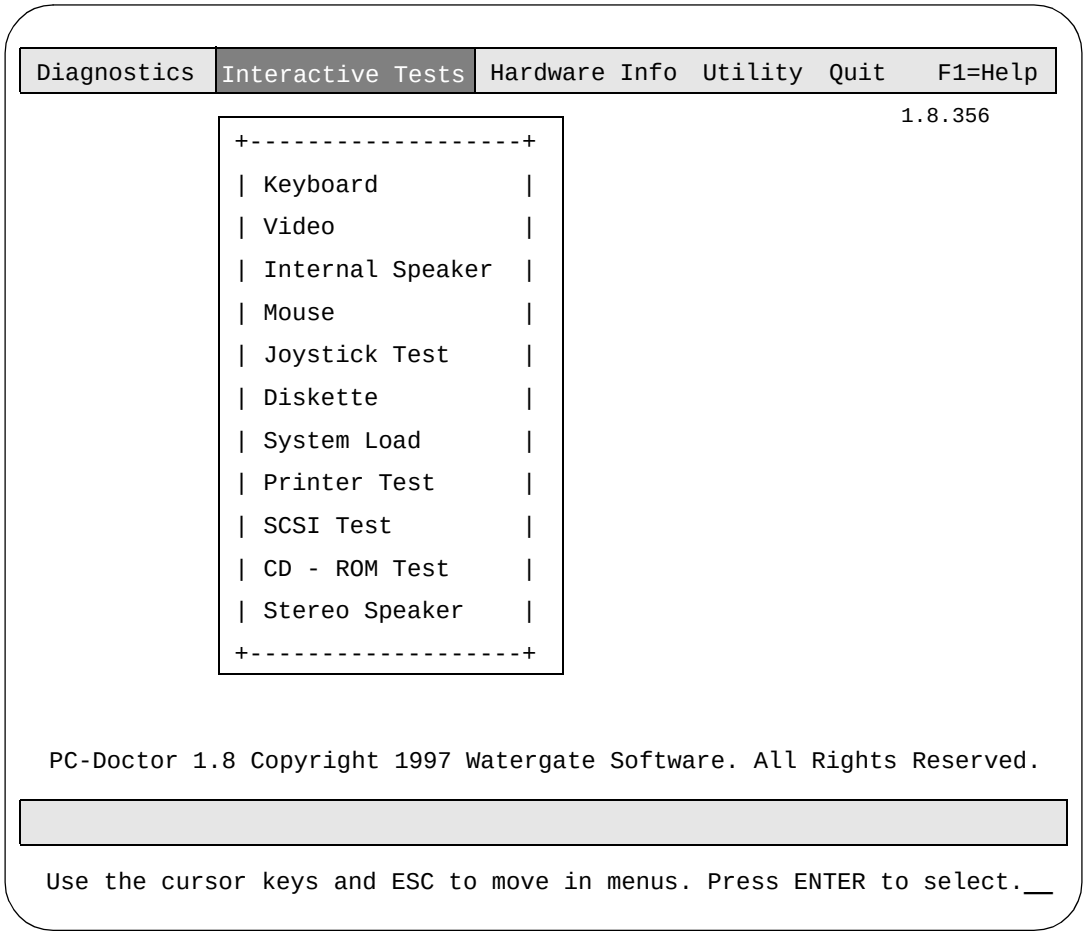



**Screen 5-10. Floppy disk tests**

## Floppy disk tests

These tests verify that the floppy controller and drive function properly. They require the tester to insert a scratch diskette (DOS or UNIX formatted) prior to testing. Tests include:

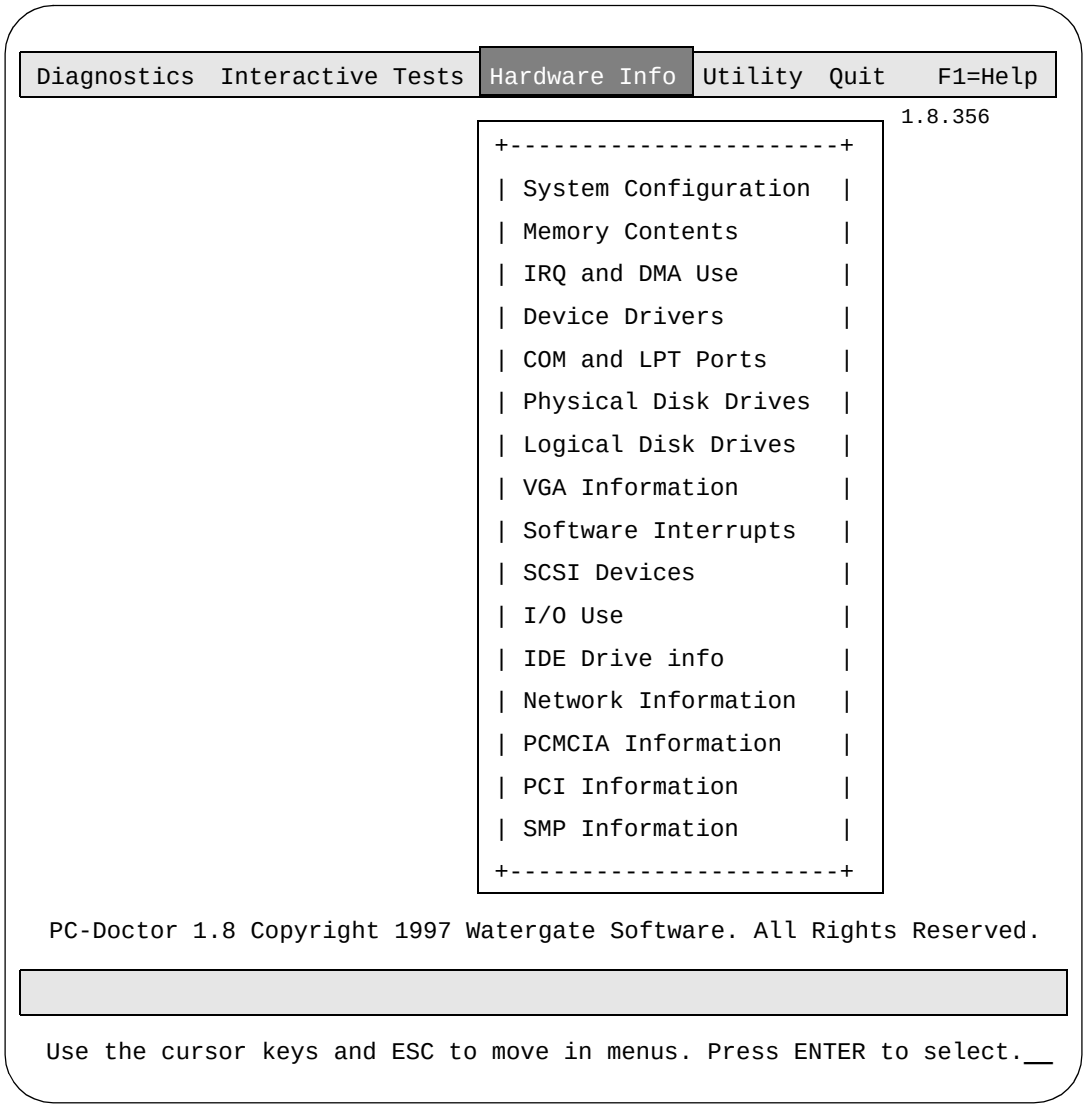
- Hi-low seek
- Funnel seek
- Track-to-track seek
- Random seek
- Linear verify
- Random verify
- Linear write and read–this test overwrites any data on the diskette
- Linear write–this test overwrites any data on the diskette
- Random read



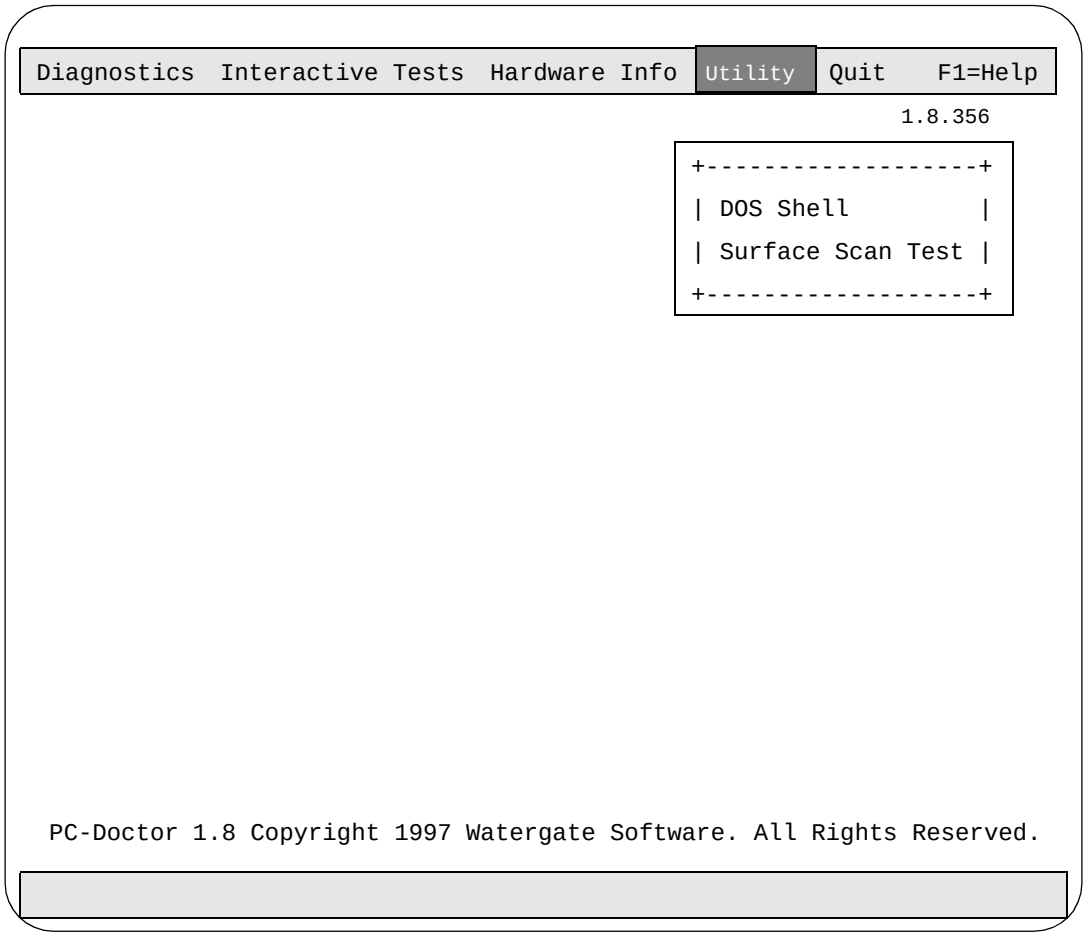

**Screen 5-11. Interactive tests**

### Interactive tests

**NOTE:**
Onsite personnel are required to perform the interactive tests.




**Screen 5-12. Hardware information tests**



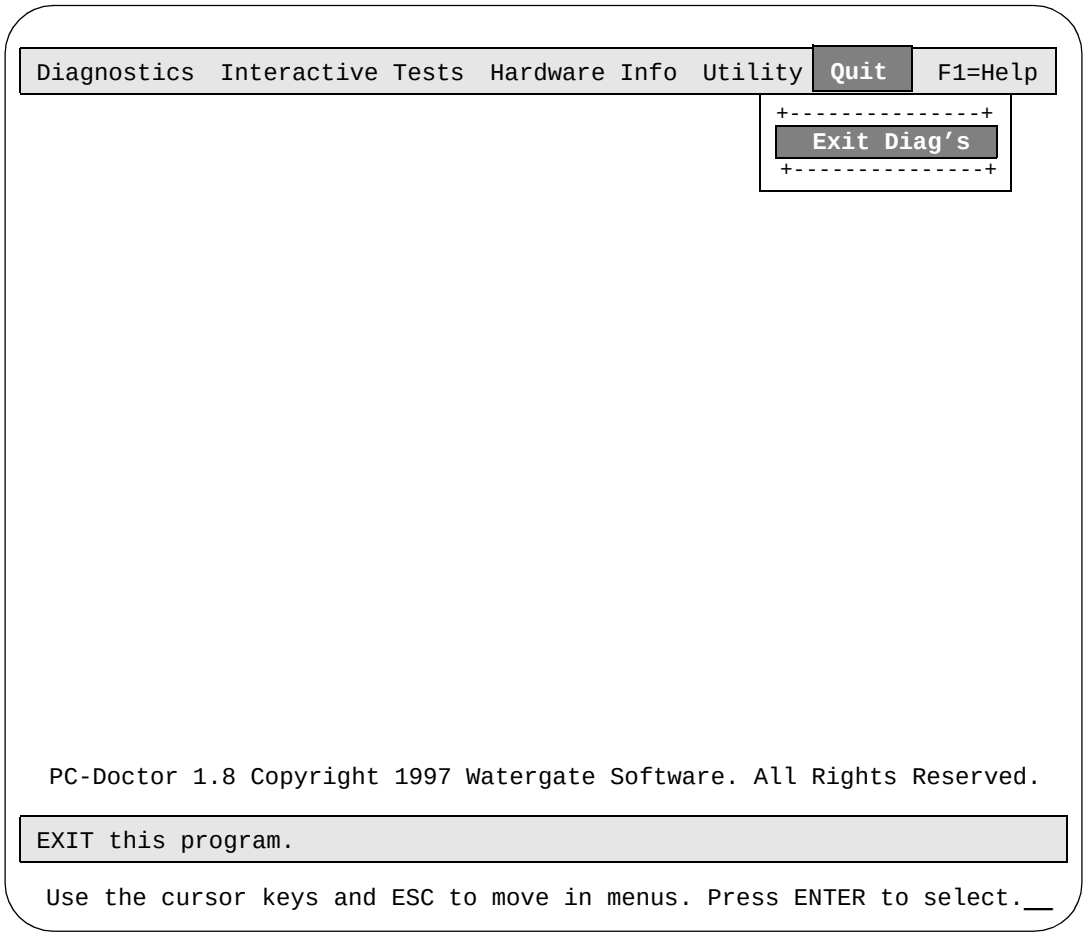

**Screen 5-13. Utility tests**

## Surface scan test

Use this test only as a last resort because of the risk of permanent data loss and the amount of time required to complete the test.

**CAUTION:**
*During writing testing, the diagnostics application attempts to maintain original sector contents by buffering them in memory. However, a power outage, fatal error, bad track, or similar event can prevent the diagnostics from restoring original sector contents and can cause irreversible loss.*

**WARNING:**
*Aborting during execution is not recommended because of the risk of irreversible damage.*




**Screen 5-14. EXIT this program**

### EXIT this program

To exit from PC-Doctor:

1. Use the cursor keys to select the menu item: "Quit."
2. Press ENTER

   "Exit Diag's" is highlighted.
3. Press ENTER

   The platform reboots, then this question displays:

   ```
   Do you wish to continue booting or load diagnostics?
   C/D
   ```
4. Either type **C** (to continue) or wait ten seconds for the boot to continue.

# Diagnostic error messages

Error or status messages are displayed by the BEC diagnostic program to inform you of problems found or of the status of the program. There are two sets of errors in this section:

- Startup messages
- Test log results

## Startup messages

The messages listed in Table 5-1 might display as the BEC diagnostics program begins. The errors might occur while the BEC gains, takes or has control of the platform components.

**Table 5-1. Diagnostic startup messages**

| Message | Reason | Corrective Action |
|---|---|---|
| `INVALID RMB CONFIGURATION; REMOTE CONSOLE DISABLED` | invalid COM port configuration data received from RMB | Reconfigure using **modem=** to a valid COM port number (1-4). |
| `Do you wish to continue booting or load diagnostics? [C/D]`<br>`[Any key except 'd' or 'D' will continue booting]:` | prompt for running diagnostics or continue system boot | Press **D** or **d** for diagnostics or any other text key (or wait 10 seconds) to continue boot. |
| `timer expired` | 10 seconds has elapsed without completion of valid password or selection of C/D | Enter selection within 10 seconds. |
| `Password verified` | Correct password entered. | Continue to your RMB tasks. |
| `Password failed` | Incorrect password was entered | Retry password entry. |
| `Loading diagnostics` | Diagnostics are about to start. | Wait for diagnostics menu. |
| `Booting Platform Operating System` | Exit from BEC code; RMB proceeds to Normal state. | Wait for login prompt. |

*Continued on next page*

**Table 5-1. Diagnostic startup messages — *Continued***

| Message | Reason | Corrective Action |
|---|---|---|
| `Enter Password:` | security prompt | Enter user or manager password. |
| `Password Timeout` | 10 seconds elapsed without completion of password entry | Enter selection within 10 seconds. |
| `RMB-2 FAILURE PROCESSING PASSWORDS` | NAK was received from RMB while processing passwords | Reset the RMB using **rmbreset!** and retry password entry. |
| `RMB-2 PASSWORD PROCESSING ABORTED` | ERROR received from RMB while processing passwords | Reset the RMB using **rmbreset!** and retry password entry. |
| `RMB-2 TIMEOUT PROCESSING PASSWORD` | RMB timed out internally | Reset the RMB using **rmbreset!** and retry password entry. |
| `RMB-2 PASSWORD ACCESS DENIED` | Password was incorrect | Ensure correct password. Check spelling and punctuation. |
| `RMB-2 FAILURE GETTING SERIAL PORT ADDRESS` | RMB failed to complete transaction | Reset the RMB using **rmbreset!** and retry. |
| `RMB-2 TIMEOUT GETTING SERIAL PORT ADDRESS` | 10 seconds expired without response from RMB-2 | Reset the RMB using **rmbreset!** and retry. |
| `FAILURE SETTING PAGES; LOCKING SYSTEM` | Cannot access BEC code | Reset the RMB using **rmbreset!** and the platform using **reboot!**, then retry. |
| `Datalight Paged Memory Disk Installed as Drive n` | Normal message during BEC operating system boot | Conduct diagnostic tests after BEC starts. |
| `FAILURE GETTING BASE ADDRESS; LOCKING SYSTEM` | unable to complete access of BEC code | Reset the RMB using **rmbreset!** and the platform using **reboot!**, then retry. |

## Test log results

Messages are written to the test log during diagnostics tests. After the diagnostics are complete, you can display the test log by pressing Ctrl **t**. Each function may receive a passed, failed or N/A report. Table 5-2 lists each condition and appropriate action if a failed condition exists.

**Table 5-2. Test log results**

| Test Performed | Possible message(s) | If Failed, then: |
|---|---|---|
| CPU Registers | `Passed, Failed` | replace processor board (note 5) |
| CPU Arithmetics | `Passed, Failed` | replace processor board (note 5) |
| CPU Logical Operations | `Passed, Failed` | replace processor board (note 5) |
| CPU String Operations | `Passed, Failed` | replace processor board (note 5) |
| CPU Interrupts/Exceptions | `Passed, Failed` | replace processor board (note 5) |
| CPU Buffers/Cache | `Passed, Failed` | replace processor board (note 5) |
| CPU C&T/Cyrix Specific | `Passed, Failed` | replace processor board (note 5) |
| CoProc Registers | `Passed, Failed or N/A` | replace processor board (note 5) |
| CoProc Commands | `Passed, Failed or N/A` | replace processor board (note 5) |
| CoProc Arithmetics | `Passed, Failed or N/A` | replace processor board (note 5) |
| CoProc Transcendental | `Passed, Failed or N/A` | replace processor board (note 5) |
| CoProc Exceptions | `Passed, Failed or N/A` | replace processor board (note 5) |
| CoProc Cyrix/IIT | `Passed, Failed or N/A` | replace processor board (note 5) |
| Base Fast Pattern | `Passed, Failed` | replace memory SIMMS |
| Base Fast Address | `Passed, Failed` | replace memory SIMMS |
| Base Bus Throughput | `Passed, Failed` | replace memory SIMMS |
| Extended Fast Pattern | `Passed, Failed` | replace memory SIMMS |
| Extended Fast Address | `Passed, Failed` | replace memory SIMMS |
| Extended Code Test | `Passed, Failed` | replace memory SIMMS |
| System Timer | `Passed, Failed` | replace processor board (note 5) |

*Continued on next page*

**Table 5-2. Test log results — *Continued***

| Test Performed | Possible message(s) | If Failed, then: |
|---|---|---|
| BIOS Timer | `Passed, Failed` | replace processor board (note 5) |
| IRQ Controller | `Passed, Failed` | replace processor board (note 5) |
| DMA Channels | `Passed, Failed` | replace processor board (note 5) |
| RAM Refresh | `Passed, Failed` | replace processor board (note 5) |
| RTC Clock | `Passed, Failed` | replace processor board (note 5) |
| CMOS RAM | `Passed, Failed` | replace processor board (note 5) |
| Keyboard | `Passed, Failed` | replace processor board (note 5) |
| External Cache | `Passed, Failed` | replace processor board (note 5) |
| PCI | `Passed, Failed or N/A` | 1. replace processor board (note 5)<br>2. replace backplane |
| Video Memory | `Passed, Failed` | replace video board (note 3) |
| Video Pages | `Passed, Failed` | replace video board (note 3) |
| VGA Controller Registers | `Passed, Failed` | replace video board (note 3) |
| VGA Color-DAC Registers | `Passed, Failed` | replace video board (note 3) |
| Hard Disk 0 Hi-Low Seek | `Passed, Failed` | replace the disk drive |
| Hard Disk 0 Funnel Seek | `Passed, Failed` | replace the disk drive |
| Hard Disk 0 Track To Track Seek | `Passed, Failed` | replace the disk drive |
| Hard Disk 0 Random Seek | `Passed, Failed` | replace the disk drive |
| Hard Disk 0 Linear Verify | `Passed, Failed` | replace the disk drive |
| Hard Disk 0 Random Verify | `Passed, Failed` | replace the disk drive |
| Sound Blaster | `Passed, Failed or N/A` | (note 1) (note 4) |
| CAS Diagnostic | `Passed, Failed or N/A` | (note 1) (note 4) |
| CD-ROM/DVD | `Passed, Failed or N/A` | (note 1) (note 4) |

***Continued on next page***

**Table 5-2. Test log results — *Continued***

| Test Performed | Possible message(s) | If Failed, then: |
|---|---|---|
| SCSI | `Passed, Failed or N/A` | (note 1) (note 4) |
| PCMCIA | `Passed, Failed or N/A` | (note 1) (note 4) |
| USB Port | `Passed, Failed or N/A` | (note 1) (note 4) |

Notes:

1. Items with "N/A" in the message column may produce statements such as `No device detected` or `No driver installed`; these indicate that such devices are not installed and therefore not tested. The function may be ignored.
2. The message `No SCSI CAM or ASPI driver found.` does NOT indicate that SCSI Disk drives were not tested; the SCSI controller and disk drives are tested separately.
3. In some instances, the VIDEO hardware may be incorporated into the processor card or the mother-board. Check the platform-specific configuration document for details.
4. The Sound Blaster, CD-ROM, Tape Drives, Non-Hard-disk SCSI devices, PCMCIA and USB devices require specialized drivers to be installed, which are not configurable in the RMB, thus are not tested.
5. The "Processor Card" may be a daughter card on a passive backplane such as the MAP40/MAP100, or may be the mother-board/backplane combo such as the MAP/5P. Check the platform-specific configuration document for details.

## RMB BIST

Whenever the RMB is reset, it runs a series of tests to check the integrity of its own hardware and firmware. The selftest includes:

- Running a brief CPU instruction set test
- Checking the external RAM
- Checking the flash memory
- Testing the real time clock
- Testing the modem
- Reading the Fan and UPS status registers

Reset the RMB by pressing the reset switch on its faceplate for a minimum of 3.5 seconds, or by entering the manager command: **rmbreset!**. Entering the command drops the telephone connection. An illustration of the reset button can be found in Figure 5-1 on page 5-25.

The RMB stores the results of the selftest, which can be retrieved using: **ok?**. See Appendix B for selftest codes.

The RMB uses the results of the BIST to select the initial operating state and appropriate action. See Table 5-3 below.

**Table 5-3. RMB BIST results and actions**

| Problem detected as... | State entered | Actions taken |
|---|---|---|
| Serious | Disabled | RMB shut down. RMB needs to be replaced. |
| Less serious problem | Normal/Impaired or Independent/Impaired | RMB operates as normally as possible. RMB needs to be replaced. |
| No problem | Normal | RMB operates normally. |

If the BIST determines that the RMB is not functioning normally, **rmbstate?** displays one of the following states:

- Disabled
- Normal/Impaired
- Independent/Impaired

The RMB should be replaced if **rmbstate?** displays any of the responses listed above. For more information about RMB states, see Table 1-1 on page 1-8.

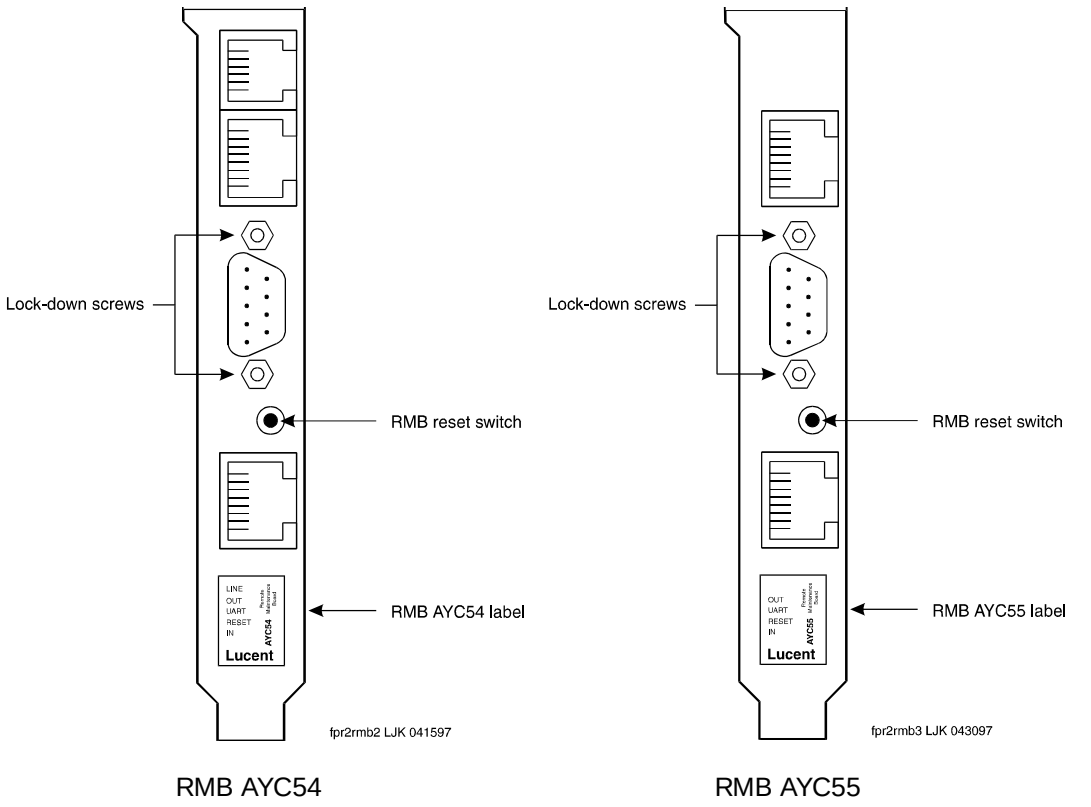



**Figure 5-1. RMB faceplate reset button**

# Configuring the RMB

# 6

This chapter details information and procedures used to configure the RMB if a change in the default configuration is required. Configuration changes must be made by someone with manager-level security clearance. Included are:

- Configuration overview
- Configuration management

**NOTE:**
The RMB is shipped with a recommended configuration for each option. This configuration has been developed to maximize the value of the RMB in the platform. Changing the default configuration may significantly impact your and other's ability to service the platform.

If necessary, you can change the RMB configuration to accommodate differences in platform or customer implementations. Communicate any changes to any other person who may be responsible for supporting the customer's system.

## Configuration overview

The RMB has many options for changing how it responds to input. Its configuration is a standard set of parameters that determine how the RMB works. The parameters were developed to maximize the value of the information collected by the RMB for the largest number of applications.

The RMB's configuration design includes:

- a permanent copy resides in storage on the platform's hard drive
- the same configuration is used, even in a newly-installed board.
- can be downloaded at any time to return the RMB to a known configuration
- a subset of the configuration resides in the RMB's nonvolatile RAM to ensure operation regardless of platform status

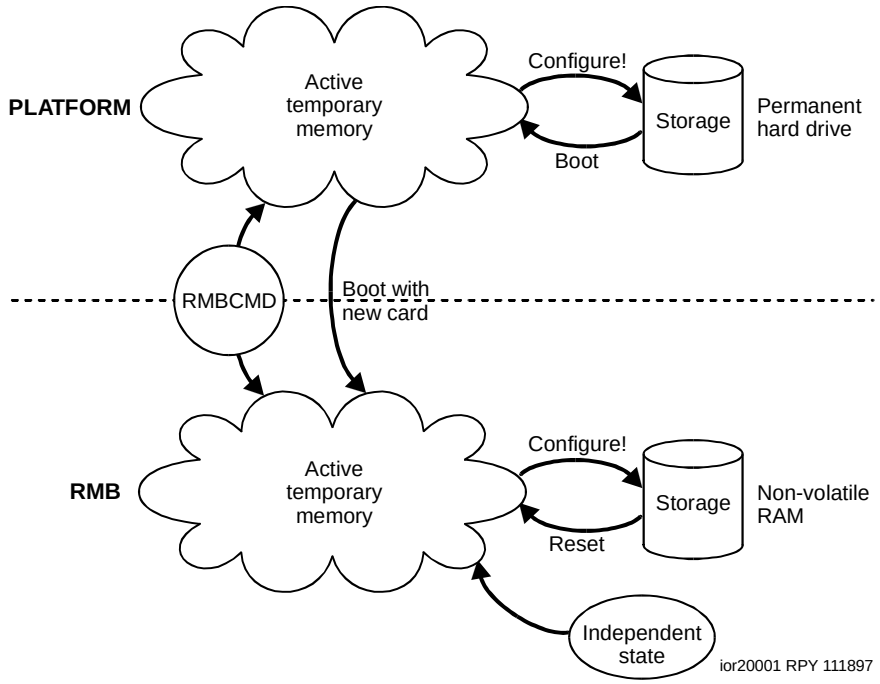



**Figure 6-1. RMB Configuration**

Figure 6-1 illustrates the relationship of active, temporary memory and permanent storage on the platform and on the RMB. The RMB configuration is installed and maintained by this method:

- **Standard configuration.** A standard, optimized configuration is installed with the RMB, either at the factory or onsite. The settings in this configuration are designed to work well with as many applications as possible
- **Permanent storage.** The configuration is stored on the platform's hard drive. The RMB's nonvolatile RAM contains a subset of the configuration to use if the platform is not operational.
- **Temporary changes.** Changes are made in temporary, active memory through the commands under **rmbcmd** (see Table 3-3 on page 3-5). If the RMB is rebooted, this memory is cleared.
- **Permanent changes.** Changes held in temporary, active memory are written to the permanent configuration on the platform's hard drive using the **configure!** command. Relevant changes are written through the RMB's temporary, active memory to nonvolatile RAM.
- **Replacement RMBs.** Storing the configuration on the platform's hard drive ensures that the same configuration can be used, regardless of the installed hardware. After a replacement RMB is installed, the onsite technician should use the **configure!** command to replace the standard RMB configuration with the customized version that is stored on the platform.
- **Independent state changes.** Changes can be made to the configuration using Independent state commands. However, these changes cannot be saved to permanent storage. If the RMB is rebooted, the changes are cleared.

## RMBCMD

The RMB configuration can be viewed in total or in part using the commands listed in Table 3-3 on page 3-5. **rmbcmd** is a program that gives you access to any of the information or data that is available from RMB, such as the temperature and power voltages.

With the proper privilege level, changes to the RMB configuration must be made through this program. Whether you can view or change the configuration with those commands depends on the privilege level. User level privileges allow queries about the configuration; manager level privileges allow queries and changes in the configuration.

RMB commands are available when the RMB is in Normal state or Independent state. However, changes to configuration options may not be stored in the RMB configuration file and may be lost at an RMB reset, unless they are made in Normal state.

# Configuration management

RMB configuration management ensures that user-selected operating parameters are stored in protected areas of flash memory while the RMB is operational, and that these user options are restored after the board initializes. Parameters include:

- Event/action management
- Security management
- Sanity and maintenance management

After the initial configuration, the parameters can be changed through remote login.

## Configuration management overview

The RMB contains a buffer that stores the configuration options to be used while the software, firmware and hardware operates. These options can be viewed from any one of two views on the RMB, Normal state or Independent state. Changes can also be made, but may not be permanent.

The configuration must be stored such that it can be downloaded if necessary. So, a file is stored on the platform containing the settings that can be reloaded after the RMB is reset.

This file is only updated using the **configure!** command, which requires manager security clearance. Furthermore, since the configuration file is only accessible while the platform's operating system is available, changes must therefore be made and updated while in Normal state.

**CAUTION:**
*Changes to the RMB configuration must be made with the agreement of any other user that may support the customer's system. If you plan to use* **configure!***, be certain that the planned changes have been communicated to all relevant parties.*

## Changing the configuration

To make permanent changes to the configuration file:

1. Use the **rmbcmd** command.
2. Enter the user password.
3. Enter **manager** and the manager password.
4. Use the RMB commands to make configuration changes.
5. Compare all settings to Table 6-1 on page 6-5 and Table 4-5 on page 4-8.
6. Enter the **configure!** command.

The new parameters are written to the configuration file stored on the platform.

## Configuration options

Table 6-1 lists the information stored in the RMB.

**Table 6-1. RMB configuration options**

| Item | Purpose | Value | Default |
|---|---|---|---|
| Product ID | used by services to identify the customer in the INADS database | 10 characters | RMB |
| User Password | required to access RMB | 10 characters maximum<br>7 characters minimum | (default) |
| Manager password | required to perform destructive tests, and change passwords or other critical data | 10 characters maximum<br>7 characters minimum | (default) |
| BEC address | location of the BEC software | nnnn | E100 |
| Date | updates the RMB on-board real time clock | mm/dd/yy | none |
| Time | updates the RMB on-board real time clock. 24-hour format | hh:mm:ss | none |
| UPS Connected? | gives status of the Uninterruptible Power Supply:<br>0= not connected<br>1= internal connector on<br>2= external faceplate connector on | 0, 1, or 2 | 2 |
| Fan Connected? | indicates whether fan is connected:<br>0= not connected<br>1= connected | 0 or 1 | 0 |
| Exhaust fan connected? | indicates whether exhaust fan is connected:<br>0= not connected<br>1= connected | 0 or 1 | 0 |

*Continued on next page*

**Table 6-1. RMB configuration options — *Continued***

| Item | Purpose | Value | Default |
|---|---|---|---|
| Communica-tion port # | Lists the com port used by the RMB. COM1 represents IRQ4, I/O port address 03F8H | 0-4 | 0 |
| Modem type | 0= RMB always in Independent state, platform never owns the modem<br>1= internal modem<br>2= external modem | 1= AYC54<br>2= AYC55<br>(depends on model) | 1 or 2 |
| Modem flow control | 0= no flow control<br>1= software<br>2= hardware | 0, 1, 2 | 2 |
| Modem speed | DTE speed used by the firmware when RMB owns the modem | 4800 - 38400 | 38400 |
| Parity | whether or not the modem uses the parity bit during byte transfer | E(ven), O(dd), N(one) | N |
| Number of data bits | number of data bits in a transmitted segment | 7,8 | 8 |
| Number of stop bits | Number of stop bits in a transmitted segment | 1,2 | 1 |
| Initialization string | Initialization string sent to the modem | 32 characters | AT &F &R1 X3 |
| Dial-out command | Dial out command used by the modem prior to the phone number dialed | 10 characters | ATDT |
| Phone number 1 | Typically, the INADS system phone number. Use comma for 3-second pause. Example: 9,5551212 | 32 characters | 9, 18005353573 |
| Phone number 2 | Typically, the secondary INADS system phone number. Use comma for 3-second pause. Example: 9,5551212 | 32 characters | |

*Continued on next page*

**Table 6-1. RMB configuration options — *Continued***

| Item | Purpose | Value | Default |
|---|---|---|---|
| Power tolerance % | voltage range on the +/-12V and +/-5V bus lines in percent | 2 to 10<br>2 to 25 (Release 1.4.8 and later) | positive tolerance: 7<br>negative tolerance: 8 (Release 1.4.8 and later) |
| Upper temperature threshold | maximum temperature Fahrenheit without an action | +50 to +200 | +120°F |
| Lower temperature threshold | minimum temperature Fahrenheit without an action | +50 to +200 | +50°F |
| Sanity checking | whether to use sanity check | on or off | on |
| Sanity boot time-out | Time, in minutes, to allow for UNIX to boot. 0= do not check | nnnn | 5 |
| UNIX Sanity time-out | Time, in minutes, to allow for UNIX sanity timer to check with RMB. 0= do not check | nnnn | 5 |
| Panic message | sent during certain emergency dialouts | 126 chars | EMERGENCY |
| Default outcall message style | determines message format: 0= standard,<br>1= INADS/Trouble Tracker | 0 or 1 | 1 |
| Input label | Label input 1, 2, 3, 4 | 32 characters | See Table C-10 on page C-15 |
| Output label | Label output 1, 2, 3, 4 | 32 characters | See Table C-11 on page C-16 |
| User-definable event label | Label events 9-30 | 28 characters | See Table 4-2 on page 4-2 for the default labels |
| Maximum number of outcall retries | Number of times the RMB retries calls to Phone1 or Phone2. Actual attempts is one greater than this setting. | 0-4 | 2 |

*Continued on next page*

**Table 6-1. RMB configuration options — *Continued***

| Item | Purpose | Value | Default |
|---|---|---|---|
| Actionflag | Must be on for events to be processed. BEC switch must also be on or bypassed with FORCEBEC command. | 0= off<br>1= on | 1 |
| Forcebec | A set of two on/off switches. See "ForceBEC" on page 6-8 for more details. | 0= off<br>1= on | 0,0 |
| DST | determines whether the real-time clock adjusts for daylight savings time. | 0= off<br>1= on | 1 |
| Country | Used to administer country-specific options, such as the modem init string. | 28 characters | USA |
| BEC Enable Switch | Physical switch located on top of the card | 0= off<br>1= on | off |

### Setting Communication port # to zero

Setting Communication port # to 0 has several important implications, including:

- no platform COM port or IRQ addresses are used
- UNIX remote access is not available
- INADS alarms cannot be sent from the application software
- diagnostics are not available because no COM port is available

### ForceBEC

The ForceBEC parameter controls whether the user is given the opportunity to load platform diagnostics. The settings pertain to the firmware that is set by the **forcebec=** command and the BEC enable switch. Of the parameters in this setting, the first controls whether firmware overrides the BEC switch. The second controls whether diagnostics run when the override feature is enabled.

When the BEC enable switch is off, action processing is stopped and vice versa. However, use of the **forcebec=** command still allows action processing to occur.

See "BEC Switch and ForceBEC command" on page 3-33 for more information.

## Updating the RMB firmware and diagnostics

If the RMB firmware or diagnostics must be updated, follow this procedure:

1. Dial in to the RMB.
2. Load the file using UUCP or a similar utility.
3. Use **rev?** to check the version of the software. Record the firmware number and BEC number.
4. Check the filenames of the firmware and BEC code in the `/rmb/data` directory to be certain that the X_YZ number is higher than the version found in step 3.
5. Run **rmbdld** using the following format:

   ```
   nohup /rmb/bin/rmbdld -c /rmb/data/coreX_YZ.bin
   ```

   ```
   nohup /rmb/bin/rmbdld -d /rmb/data/becX_YZ.bin
   ```

   where *coreX_YZ.bin* is the name and version of the firmware file and *becX_YZ.bin* is the name and version of the diagnostics file.

   This command loads the file and drops the modem.
6. Call back in five minutes.
7. Type **rmbcmd** and then type the password.
8. Use **rev?** to check the version of the software. Look at the firmware number and compare it to step 3.

   The version should be incremented and match the version in step 4.
9. Resume normal RMB use.

## Administering a modem for the AYC55

The AYC55 uses the same configuration file stored on the hard drive as the AYC54 for the RMB settings. However, an external modem may require manual configuration. Refer to your modem's documentation, then use **rmbcmd** commands to configure settings between the RMB and the external modem. You may need to use these commands:

1. **modemtype=** Sets RMB to use external modem. See page 3-16.
2. **modem=** Sets the modem's operating parameters. See page 3-15.
3. **rmbmodem** Sets the initialization string. See page 3-47.

**NOTE:**
**rmbmodem** is a stand-alone command and is not part of rmbcmd.

# Modem Communications

# A

This appendix lists the standard AT command sets for internal modem communication and the default settings. Included are:

- AT Base Commands on page A-2
- AT Extended Commands on page A-7
- AT v.42/MNP Commands on page A-11
- AT Result Codes on page A-15
- S Registers on page A-18

These commands are used to change the modem's configuration with the UNIX **rmbmodem** command, found on page 3-47.

**NOTE:**
The RMB is shipped with a recommended configuration for the card and its modem. Changing the default modem configuration may significantly impact your and other's ability to service the platform.

If necessary, you can change the modem configuration. However, we assume that you have the requisite knowledge to make changes and to correct any errors that may occur. Therefore, no procedural information is provided for AT command use as part of this appendix.

External modems use similar, but not identical commands.

## AT base commands

In Table A-1, an asterisk (*) indicates the default.

**Table A-1. AT base commands**

| | | |
|---|---|---|
| A | Answer command | |
| Bn | Communication standard | |
| | Group 1: | |
| | 0 | Selects ITU-TSS V.22 when the modem is at 1200 bps, and ITU-TSS V.21 when the modem is at 300 bps |
| | 1 | *Selects Bell 212A when the modem is at 1200 bps, and Bell 103J when the modem is at 300 bps |
| | 2 | Selects V.23 R1200/T75 ASB when the modem is originating, and V.23 T1200/R75 when the modem is answering |
| | 3 | Select V.23 T1200/R75 when the modem is originating, and V.23 R1200/T75 when the modem is answering |
| | 4 - 9 | Reserved |
| | Group 2: | |
| | 10 -14 | Reserved |
| | Group 3: | |
| | 15 | Selects ITU-TSS V.21 when the modem is at 300 bps |
| | 16 | *Selects Bell 103J when the modem is at 300 bps |
| | 17-19 | Reserved |
| | Group 4: | |
| | 20-29 | Reserved |
| | Group 5: | |
| | 30 | *Selects V.22bis when the modem is at 2400 bps |
| | 31 | Reserved (V.22bis Fast-train) |
| | 32 | V.34 |
| | 33–39 | Reserved |

*Continued on next page*

**Table A-1. AT base commands — *Continued***

| | |
|---|---|
| Group 6: | |
| 40 | Reserved |
| 41 | *Selects V.32 full duplex when modem is at 4800 bps |
| 42 | V.34 |
| 43-49 | Reserved |
| Group 7: | |
| 50-51 | Reserved |
| 52 | *Selects V.32bis full duplex when the modem is at 7200 bps |
| 53 | V.34 |
| 54-59 | Reserved |
| Group 8: | |
| 60 | *Selects V.32 full duplex when the modem is at 9600 bps |
| 61 | V.34 |
| 62-69 | Reserved |
| Group 9: | |
| 70 | *Selects V.32bis full duplex when the modem is at 12.0K bps |
| 71 | V.34 |
| 72-74 | Reserved |
| Group10: | |
| 75 | *Selects V.32bis full duplex when the modem is at 14.4K bps |
| 76 | V.34 |
| 77-99 | Reserved |
| Group 11 (16.8 K bps) | |
| 80 | V.34 |
| 81-84 | Reserved |

*Continued on next page*

**Table A-1. AT base commands — *Continued***

| | | |
|---|---|---|
| | Group 12 (19.2 K bps) | |
| | 85 | V.34 |
| | 86-87 | Reserved |
| | Group 13 (21.6 K bps) | |
| | 90 | V.34 |
| | 91-94 | Reserved |
| | Group 14 (24.0 K bps) | |
| | 95 | V.34 |
| | 96-99 | Reserved |
| | Group 15 (26.4 K bps) | |
| | 100 | V.34 |
| | 101-104 | Reserved |
| | Group 16 (28.8 K bps) | |
| | 105 | V.34 |
| | 106-110 | Reserved |
| Cn | Carrier control option | |
| | 0 | Transmit carrier always off (RETURNS ERROR) |
| | 1 | *Normal transmit carrier |
| D | Dial command | |
| | Dial modifiers: | |
| | ! | Flash hook |
| | , | Pause |
| | P | Pulse |
| | R | Originate call in answer mode |
| | T | Tone |
| En | Offline echo command | |
| | 0 | *Echo disabled (default) |
| | 1 | Echo enabled |
| Fn | Online echo command | |

*Continued on next page*

**Table A-1. AT base commands — *Continued***

| | | |
|---|---|---|
| | 0 | Echo enabled (RETURNS ERROR) |
| | 1 | *Echo disabled |
| Hn | Switch hook control | |
| | 0 | *Execute hang up process |
| | 1 | Go off hook |
| Nn | Select negotiate handshake | |
| | 0 | No automode, no V.34 |
| | 1 | Automode, no V.34 |
| | 2 | V.34 enable, no automode |
| | 3 | Automode + V.34 |
| On | Go on line | |
| | 0 | Returns modem to a previously established state |
| | 1 | Begins an equalizer retrain sequence, then returns to online state |
| | 3 | Issues rate renegotiation sequence, then returns to online state |
| P | Enable pulse dialing | |
| Qn | Result code display option | |
| | 0 | *Result codes enabled |
| | 1 | Result codes disabled |
| Sn | Select an S register | |
| | n= | 0–115 |
| Sn=x | Write an S register | |
| | n= | 0–115 |
| | x= | 0–255 |
| Sn? | Read an S register | |
| | n= | 0–115 S register address |
| T | Enable tone dialing | |
| Vn | Result code form | |
| | 0 | Numeric form |

*Continued on next page*

**Table A-1. AT base commands — *Continued***

| | | |
|---|---|---|
| | 1 | *Verbose form |
| Wn | Select extended result code | |
| | 0 | *CONNECT result code reports DTE speed; if S95=0, then disable all extended result codes |
| | 1 | CONNECT result code reports DTE speed; if S95=0, then enable the CARRIER and PROTOCOL extended result codes |
| | 2 | CONNECT result code reports DCE speed; if S95=0, then disable all extended result codes |
| Xn | Result code set/call progress | |
| | 0 | Result codes 0: 4 enabled. Busy and dial tone detect disabled |
| | 1 | Result codes 0: 5,10 enabled. Busy and dial tone detect disabled |
| | 2 | Result codes 0: 6,10 enabled. Busy detect enabled and dial tone detect enabled |
| | 3 | Result codes 0: 5,7,10 enabled. Busy detect enabled and dial tone detect disabled |
| | 4 | *Result codes 0: 7,10 enabled. Busy and dial tone detect enabled |
| Yn | Long space disconnect | |
| | 0 | *Disable long space disconnect |
| | 1 | Enabled long space disconnect |

## AT extended commands

In Table A-2, an asterisk (*) indicates the default.

**Table A-2. AT extended commands**

<table>
<tr><td>&Bn</td><td colspan="2">V.32 auto retrain</td></tr>
<tr><td></td><td>0</td><td>Hangup if bad EQM</td></tr>
<tr><td></td><td>1</td><td>*Retrain; failure in S7 hangup</td></tr>
<tr><td></td><td>2</td><td>Do not hangup and do not retrain (tolerate bad line)</td></tr>
<tr><td>&Cn</td><td colspan="2">Data carrier detect option</td></tr>
<tr><td></td><td colspan="2">(If &Q0 is selected)</td></tr>
<tr><td></td><td>0</td><td>State of carrier from remote modem is ignored.<br>RLSD circuit is always on</td></tr>
<tr><td></td><td>1</td><td>*State of carrier from remote modem is tracked.<br>RLSD circuit reflects the state of carrier</td></tr>
<tr><td></td><td colspan="2">(If &Q1 or &Q4 is selected)<br>&Cn has no effect. RLSD shows current state of carrier</td></tr>
<tr><td>&Dn</td><td colspan="2">Data terminal ready option</td></tr>
<tr><td></td><td>0 - 3</td><td>Determines how modem is to respond to DTR.<br>Depends on selected &Q command</td></tr>
<tr><td></td><td>Default=2</td><td></td></tr>
<tr><td></td><td colspan="2">The following table shows the events that result from a selecting a particular &D and &Q value:<br><br><table><tr><th></th><th>&D0</th><th>&D1</th><th>&D2</th><th>&D3</th></tr><tr><td>&Q0</td><td>a</td><td>c</td><td>d</td><td>e</td></tr><tr><td>&Q1</td><td>b</td><td>c</td><td>d</td><td>e</td></tr><tr><td>&Q2</td><td>d</td><td>d</td><td>d</td><td>e</td></tr><tr><td>&Q3</td><td>d</td><td>d</td><td>d</td><td>e</td></tr><tr><td>&Q4</td><td>b</td><td>c</td><td>d</td><td>e</td></tr></table><br>a) DTR ignored<br>b) Go to hangup with OK result<br>c) Go to in-line command (if on-line) and send OK<br>d) Go to hangup with OK result, auto answer is disabled while DTR is off<br>e) hard reset</td></tr>
</table>

*Continued on next page*

**Table A-2. AT extended commands**

| | | |
|---|---|---|
| &F | Load factory defaults | |
| &Gn | Guard tone option | |
| | 0 | *Guard tone disabled |
| | 1 | 550Hz guard tone enabled |
| | 2 | 1800Hz guard tone enabled |
| &Jn | Auxiliary relay control | |
| | 0 | *Auxiliary relay is never operated |
| | 1 | A lead is connected to A1 lead while modem is off hook |
| &Kn | Select flow control | |
| | 0 | Flow control disabled |
| | 1 | Reserved |
| | 2 | Reserved |
| | 3 | *Enabled hardware flow control (RTS/CTS) |
| | 4 | Enabled software flow control (XON/XOFF) |
| | 5 | Reserved |
| &Ln | Dial up/leased line option | |
| | 0 | *Dial up line processing |
| | 1 | Leased line processing |
| &Mn | Select communication mode | |
| | *On-Line State* | *Idle State* |
| | 0: Asynch | *Normal |
| | 1:Synch | Normal |
| | 2: Synch | Dial when DTR =1<br>Hangup when DTR =0 |
| | 3: Synch | Talk/Data, DTR = 0/1 |
| &P | Dial pulse ratio | |
| | 0 | *Make = 39%, Break = 61% for use in the United States |
| | 1 | Make = 33%, Break = 67% for use in the United Kingdom and Hong Kong |

*Continued on next page*

**Table A-2. AT extended commands**

| | | |
|---|---|---|
| &Qn | Communications mode option | |
| | *On-Line State* | *Idle State* |
| | 0: Asynch | *Normal |
| | 1: Synch | Normal |
| | 2: Synch | Dial when DTR = 1<br>Hangup when DTR = 0 |
| | 3: Synch | Talk/Data, DTR = 0/1 |
| | 4: Asynch | Hayes AutoSync™ (optional) |
| &Rn | RTS/CTS option | |
| | 0 | CTS tracks RTS while modem is in on-line state; if &Q1 - &Q3 is selected |
| | 1 | *RTS is ignored. CTS remains on while the modem is in on-line state |
| &Sn: | Data set ready option | |
| | (If &Q0 is selected) | |
| | 0 | *DSR circuit always on |
| | 1 | DSR circuit on during handshaking, off in test or idle mode; DSR is on when carrier is lost |
| | (If &Q1 to &Q4 is selected) | |
| | | DSR circuit on during handshaking, off in test or idle mode |
| &Tn | Self test commands | |
| | 0 | Terminate test in progress |
| | 1 | Local analog loopback<br>O: Low frequency band<br>A: High frequency band |
| | 3 | Local digital loopback |
| | 4 | Grant RDL request from remote modem |
| | 5 | Deny RDL request from remote modem |
| | 6 | Remote digital loopback |
| | 7 | Remote digital loopback with self test |

*Continued on next page*

**Table A-2. AT extended commands**

| | | |
|---|---|---|
| | 8 | Local analog loopback with self test<br>O: Low frequency band<br>A: High frequency band |
| &Un | Disable trellis coding | |
| | 0 | *Enable trellis coding |
| | 1 | Disable trellis coding |
| &Vn | View active configuration and stored profile | |
| | 0 | Stored profile 0 |
| | 1 | Stored profile 1 |

# AT V.42/MNP Commands

In Table A-3, an asterisk (*) indicates the default.

**Table A-3. AT v.42/MNP commands**

| | | |
|---|---|---|
| %An | Set autoreliable fallback character | |
| | 0 | 127 (ASCII character) (default: 13) |
| %D | V.25bis operating mode | |
| | 0 | 108/2 mode* |
| | 1 | 108/1 mode |
| %En | Auto-retrain (V.22bis and V.32 only) | |
| | 0 | Disabled |
| | 1 | *Enabled |
| %Fn | V.25bis character framing | |
| | 0 | *Asynchronous |
| | 1 | HDLC |
| | 2 | Bisync |
| %Gn | Auto fallforward/fallback enable (V.22bis and V.32 only) | |
| | 0 | Disabled (V.32, V.22bis) |
| | 1 | *Enabled (V.32bis, V.34) |
| %T | 400Hz detection | |
| | 0 | Enabled |
| | 1 | *Disabled |
| %V | Switch to V.25bis | |
| \An | MNP block size | |
| | 0 | Max 64 characters |
| | 1 | Max 128 characters |
| | 2 | Max 192 characters |
| | 3 | *Max 256 characters |
| | 4 | Max 32 characters |
| \Bn | Transmit break | |

*Continued on next page*

**Table A-3. AT v.42/MNP commands**

| | | |
|---|---|---|
| | 0 - 9 | Break length in 100 msec |
| \Cn | Set autoreliable buffer *(requires license from Microcom)* | |
| | 0 | *Does not buffer data |
| | 1 | Buffers data for 4 seconds, until 200 characters have been buffered or SYN character is detected, then switches to reliable mode. If buffer fills, data is passed to serial port. |
| | 2 | Does not buffer data. Switches to normal mode upon receipt of autoreliable character and passes it to serial port. |
| \Gn | Set modem port flow control | |
| | 0 | *Disable port flow control |
| | 1 | Set port flow control to XON/XOFF |
| \Jn | BPS rate adjust | |
| | 0 | *Turn off feature |
| | 1 | Turn on feature |
| \Kn | Set break control | |
| | *In connect state, if reliable mode then transmit break to remote* | |
| | 0,2,4 | Enter command state but do not send a break |
| | 1 | Destructive/Expedited |
| | 3 | Non-destructive/Expedited |
| | 5 | Non-destructive/Non-expedited |
| | *In command state, if reliable mode then transmit break to remote* | |
| | 0, 1 | Destructive/Expedited |
| | 2, 3 | Non-destructive/Expedited |
| | 4, 5 | Non-destructive/Non-expedited |
| | *In connect state, if direct mode then receive break at serial port* | |
| | 0,2,4 | Immediately send break and enter command state |
| | 1,3,5 | Immediately send break through |
| | *In connect state, receive break at modem port, send to serial port* | |
| | 0, 1 | Destructive/Expedited |

***Continued on next page***

**Table A-3. AT v.42/MNP commands**

| | | |
|---|---|---|
| | 2, 3 | Non-destructive/Expedited |
| | 4, 5 | Non-destructive/Non-expedited |
| | Default: | 5 |
| \Ln | Block MNP link | |
| | 0 | *Initiates stream link |
| | 1 | Reserved |
| \Nn | Set operating mode | |
| | 0 | Normal mode |
| | 1 | Direct mode |
| | 2 | MNP reliable mode |
| | 3 | *V.42 autoreliable mode |
| | 4 | V.42 reliable mode |
| \O | Originate reliable link | |
| \Qn | Set serial port flow control | |
| | 0 | Disables flow control |
| | 1 | XON/XOFF |
| | 2 | Unidirectional hardware flow control |
| | 3 | *Bidirectional hardware flow control |
| \Tn | Set inactivity timer | |
| | 0-90 | Length in minutes |
| | Default | 0 |
| \U | Accept autoreliable link | |
| \Vn | Modify result code form | |
| | 0 | *Enable codes defined by ATV command |
| | 1 | Enable modified MNP codes |
| \Xn | Set XON/XOFF pass-through | |
| | 0 | *Processes flow control characters |
| | 1 | Processes flow control characters and passes them though to the local or remote so they can process the characters |

*Continued on next page*

**Table A-3. AT v.42/MNP commands**

| | | |
|---|---|---|
| \Y | Switch to reliable mode | |
| \Z | Switch to normal mode | |
| -Cn | Calling tone option | |
| | 0 | *Calling tone disabled |
| | 1 | Calling tone enabled |
| | 2 | V.8 calling tone sent for V.34 modulation, and 1300Hz calling tone sent for all other modulations |
| -Jn | Set V.42 detect phase | |
| | 0 | Disables the V.42 detect phase |
| | 1 | *Enables the V.42 detect phase |
| -V | Display modem firmware version number | |

## AT result codes

Table A-4 shows result codes defined by the AT command.

**Table A-4. AT result codes**

| Numeric code | Verbose code |
|---|---|
| 0 | OK |
| 1 | Connect |
| 2 | RING |
| 3 | NO CARRIER |
| 4 | ERROR |
| 5 | Connect 1200 |
| 6 | NO DIALTONE |
| 7 | BUSY |
| 8 | NO ANSWER |
| 9 | Connect 600 |
| 10 | Connect 2400 |
| 11 | Connect 4800 |
| 12 | Connect 9600 |
| 13 | Connect 14.4K |
| 14 | Connect 19.2K |
| 18 | Connect 57.6K |
| 24 | Connect 7200 |
| 25 | Connect 12.0K |
| 26 | Connect 1200/75 |
| 27 | Connect 75/1200 |
| 28 | Connect 38.4K |
| 31 | Connect 115.2K |
| 40 | Carrier 300 |
| 42 | Carrier 75/1200 |
| 43 | Carrier 1200/75 |

*Continued on next page*

**Table A-4. AT result codes**

| | |
|---|---|
| 46 | Carrier 1200 |
| 47 | Carrier 2400 |
| 48 | Carrier 4800 |
| 49 | Carrier 7200 |
| 50 | Carrier 9600 |
| 51 | Carrier 12.0K |
| 52 | Carrier 14.4K |
| 53 | Carrier 16.8K |
| 54 | Carrier 19.2K |
| 55 | Carrier 21.6K |
| 56 | Carrier 24.0K |
| 57 | Carrier 26.4K |
| 58 | Carrier 28.8K |
| 59 | Connect 16.8K |
| 61 | Connect 21.6 K |
| 62 | Connect 24.0K |
| 63 | Connect 26.4K |
| 64 | Connect 28.8K |
| 65 | RINGBACK |
| 69 | Compression: NONE |
| 70 | Protocol: NONE |
| 80 | Protocol: MNP |
| 81 | Protocol: MNP 2 |
| 82 | Protocol: MNP 3 |
| 83 | Protocol: MNP 2,4 |
| 84 | Protocol: MNP 3,4 |
| 85 | Protocol: MNP 2,10 |

*Continued on next page*

**Table A-4. AT result codes**

| | |
|---|---|
| 86 | Protocol: MNP 3,10 |
| 87 | Protocol: MNP 2,4,10 |
| 88 | Protocol: MNP 3,4,10 |

## S registers

In Table A-5, an asterisk (*) indicates the default.

**Table A-5. S registers**

| | | |
|---|---|---|
| S0 | Ring to auto-answer on | |
| | Range: | 0-255 rings |
| | Default: | 1 rings |
| S1 | Ring count | |
| | Range: | 0-255 rings |
| | Default: | 0 rings |
| S2 | Escape character | |
| | Range: | 0-255 |
| | Default: | 43 |
| S3 | Carriage return character | |
| | Range: | 0-127 |
| | Default: | 13 |
| S4 | Line feed character | |
| | Range: | 0-127 |
| | Default: | 10 |
| S5 | Backspace character | |
| | Range: | 0-127 |
| | Default: | 8 |
| S6 | Wait before dialing | |
| | Range: | 2-255 seconds |
| | Default: | 2 seconds |
| S7 | Wait for carrier | |
| | Range: | 1-255 seconds |
| | Default: | Configured without MNP 10 and V.32/V.32bis mode: 50 seconds<br>Configured with MNP 10 or V.32/V.32bis mode: 90 seconds |

*Continued on next page*

**Table A-5. S registers — *Continued***

| | | |
|---|---|---|
| S8 | Pause time for command or dial modifier | |
| | Range: | 0-255 seconds |
| | Default: | 2 seconds |
| S9 | Carrier recovery time | |
| | Range: | 1-255 (10ths second) |
| | Default: | 6 (10ths second) |
| S10 | Lost carrier hang up delay | |
| | Range: | 1-254 (10ths second) |
| | 255 | Do not hang up after carrier loss |
| | Default: | 30 (10ths second) |
| S11 | DTMF dialing speed | |
| | Range: | 50-255 milliseconds |
| | Default: | 95 milliseconds |
| S12 | Guard time | |
| | Range: | 0-255 (50ths second) |
| | Default: | 50 (50ths second) |
| S13 | Reserved | |
| S14 | Bit mapped options | |
| | Bit 0 | Reserved |
| | Bit 1 | 0 *E0 is selected (default)<br>1 E1 is selected |
| | Bit 6,2 | 0 *Q0 is selected<br>1 Q1 is selected |
| | Bit 3 | 0 V0 is selected<br>1 *V1 is selected |
| | Bit 4 | 0 *Dumb mode off (normal)<br>1 Dumb mode on |
| | Bit 5 | 0 *T is selected<br>1 P is selected |

*Continued on next page*

**Table A-5. S registers — *Continued***

| | | |
|---|---|---|
| | Bit 7 | 0 Answer<br>1 *Originate |
| S15 | Reserved | |
| S16 | Modem test options | |
| | Bit 0 | 0 *Local analog loopback disabled<br>1 Local analog loopback enabled (&T1) |
| | Bit 1 | 0 Reserved |
| | Bit 2 | 0 *Local digital loopback disabled<br>1 Local digital loopback enabled (&T3) |
| | Bit 3 | 0 *Remote digital loopback (RDL) off<br>1 RDL in progress (&T6) |
| | Bit 4 | 0 *RDL not active<br>1 RDL request from distant end is in service |
| | Bit 5 | 0 *RDL with self-test disabled<br>1 RDL with self-test enabled (&T7) |
| | Bit 6 | 0 *Analog loopback with self-test disabled<br>1 Analog loopback with self-test enabled (&T8) |
| | Bit 7 | 0 Reserved |
| S17 | Reserved | |
| S18 | Modem test timer | |
| | Range: | 0-255 seconds |
| | Default: | 0 seconds |
| S19-S20 | Reserved | |
| S21 | Bit mapped options | |
| | Bit 0 | 0 *&J0 is selected<br>1 &J1 is selected |
| | Bit 1 | 0 Reserved |
| | Bit 2 | 0 &R0 is selected<br>1 *&R1 is selected |

*Continued on next page*

**Table A-5. S registers — *Continued***

| | | |
|---|---|---|
| | Bit 4,3 | 00 &D0 is selected<br>01 &D1 is selected<br>10 *&D2 is selected<br>11 &D3 is selected |
| | Bit 5 | 0 &C0 is selected<br>1 *&C1 is selected |
| | Bit 6 | 0 *&S0 is selected<br>1 &S1 is selected |
| | Bit 7 | 0 *Y0 is selected<br>1 Y1 is selected |
| S22 | Bit mapped options | |
| | Bit1,0 | 00 Reserved |
| | Bit 3,2 | 00 M0 is selected |
| | Bit 6,5,4 | 000 X0 is selected<br>001 Reserved<br>010 Reserved<br>011 Reserved<br>100 X1 is selected<br>101 X2 is selected<br>110 X3 is selected<br>111 *X4 is selected |
| | Bit 7 | 0 *&P0 is selected<br>1 &P1 is selected |
| S23 | Bit mapped options | |
| | Bit 0 | 0 &T5 is selected<br>1 *&T4 is selected |

*Continued on next page*

**Table A-5. S registers — *Continued***

| | | |
|---|---|---|
| | Bit 3,2,1 | 000- 0-300 bps communications rate<br>001 1200 bps<br>010 2400 bps<br>011 4800 bps<br>100 7200 bps<br>101 9600 bps<br>110 19.2K bps<br>111 *38.4K bps |
| | Bit 5,4 | 00 Even parity<br>01 *Space parity/no parity<br>10 Odd parity<br>11 Mark |
| | Bit 7,6 | 00 *&G0 is selected<br>01 &G1 is selected<br>10 &G2 is selected<br>11 Reserved |
| S24 | Reserved | |
| S25 | Detect DTR change | |
| | Range: | 0-255 (100ths second if on line or on-line command state)<br>0-255 (1 second otherwise) |
| | Default: | 5 |
| S26 | RTS to CTS delay interval | |
| | Range: | 0-255 (100ths second) |
| | Default: | 1 (100ths second) |
| S27 | Bit mapped options | |

*Continued on next page*

**Table A-5. S registers — *Continued***

| | | |
|---|---|---|
| | Bit 3,1,0 | 000 *&Q0 is selected<br>001 &Q1 is selected<br>010 &Q2 is selected<br>011 &Q3 is selected<br>100 &Q4 is selected<br>101 Not used<br>110 Not used<br>111 Not used |
| | Bit 2 | 0 *&L0 is selected<br>1 &L1 is selected |
| | Bit 5,4 | 00 *&X0 is selected<br>01 &X1 is selected<br>10 &X2 is selected<br>11 Reserved |
| | Bit 6 | 0 B0 is selected<br>1 *B1 is selected |
| | Bit 7 | Reserved |
| S28-S29 | Reserved | |
| S30 | Inactivity timer value | |
| | Range: | 0-90 minutes |
| | Default: | 0 |
| S31-S36 | Reserved | |
| S37 | Desired DCE speed for incoming and outgoing calls | |
| | Range:0 | Attempt to connect at the last AT speed |
| | 1, 2, 4 | Reserved |
| | 3 | Attempt a 300 bps connection |
| | 5 | Attempt a 1200 bps connection |
| | 6 | Attempt a 2400 bps connection |
| | 7 | Attempt a 4800 bps connection |

*Continued on next page*

**Table A-5. S registers — *Continued***

| | | |
|---|---|---|
| | 8 | Attempt a 7200 bps connection |
| | 9 | Attempt a 9600 bps connection |
| | 10 | Attempt a 12.0K bps connection |
| | 12 | Attempt a 16.8K bps connection |
| | 13 | Attempt a 19.2K bps connection |
| | 14 | Attempt a 21.6K bps connection |
| | 15 | Attempt a 24.0K bps connection |
| | 16 | Attempt a 26.4K bps connection |
| | 17 | Attempt a 28.8K bps connection |
| | 18 | Attempt a 31.2K bps connection* |
| | 19 | Attempt a 33.6K bps connection* |
| | 20 | Attempt a 36.0K bps connection* |
| | 21 | Attempt a 38.4K bps connection* |
| | Default | 17 for Rev B, 21 for Rev C |
| | * This option is not available on earlier vintages of the circuit pack | |
| S38-S62 | Reserved | |
| S63 | Leased line transmit level | |
| | Range: | 0-15 |
| | Default: | 9 |
| S64-S90 | Reserved | |
| S91 | Select transmit level | |
| | Range: | 0-15 |
| | Default: | 9 |
| S92-S94 | Reserved | |
| S95 | Extended result code bit map | |
| | Bit 0 | Verbose CONNECT result code indicates the DCE speed (rather than the DTE speed) |
| | Bit 1 | Append ″/ARQ″ to the verbose CONNECT result code if the protocol is not ″NONE″. |

*Continued on next page*

**Table A-5. S registers — *Continued***

| | | |
|---|---|---|
| | Bit 2 | Enable the CARRIER result codes |
| | Bit 3 | Enable the PROTOCOL result codes |
| | Bit 4 | Reserved |
| | Bit 5 | Enable COMPRESSION result codes |
| | Bit 6 | Enable PROTOCOL result codes 81-83 for MNP connections (in place of results code 80) |
| | Default: | 0 |
| S108 | Signal quality selector | |
| | Range:0 | No limit |
| | 1 | Low quality |
| | 2 | Medium quality |
| | 3 | High quality |
| | Default: | Configured as V.32bis modem: 1 |
| | | Configured as non-V.32bis modem: 2 |
| S109: | V.32bis carrier speed selector | |
| | Range:1 | Reserved |
| | 2 | 4800 bps |
| | 4 | 7200 bps |
| | 8 | 9600 bps |
| | 16 | 12.0K bps |
| | 32 | 14.4K bps |
| | 64 | 16.8K bps |
| | 128 | 19.2K bps (reserved) |
| | Default: | 255<br><br>**NOTE:**<br>The values may be added to specify several speeds. When viewed as an 8-bit number, the register is bit mapped. |
| S110 | V.32/V.32bis selector | |
| | Range:0 | V.32 enabled |

*Continued on next page*

**Table A-5. S registers — *Continued***

| | | |
|---|---|---|
| | 1 | V.32bis enabled |
| | 2 | V.32bis and automatic rate re-negotiation enabled |
| | 3 | V.34 enabled |
| | Default: | Configured as V.34: 3<br>Configured as V.32bis: 2<br>All others: 0 |
| S112 | DTE speed select during data transfer | |
| | Range:0 | *Last AT speed |
| | 1 | Reserved |
| | 2 | 300 bps |
| | 3 | 1200 bps |
| | 4 | 2400 bps |
| | 5 | 4800 bps |
| | 6 | 7200 bps |
| | 7 | 9600 bps |
| | 8 | 12.0K bps |
| | 9 | 14.4K bps |
| | 10 | 16.8K bps |
| | 11 | 19.2K bps |
| | 12 | 38.4K bps |
| | 13 | 57.6K bps |
| | 14 | 600 bps |
| S113 | V.34 (TX/RX) High Speed Carrier Selector | |
| | Range: 1 | 21.6K bps |
| | 2 | 24.0K bps |
| | 4 | 26.4K bps |
| | 8 | 28.8K bps |
| | 16 | Reserved (for 31.2K bps) |
| | 32 | Reserved (for 33.6K bps) |

*Continued on next page*

**Table A-5. S registers — *Continued***

| | | |
|---|---|---|
| | 64 | Reserved (for 36.0K bps) |
| | 128 | Reserved (for 38.4K bps) |
| | Default | Configured as V.34 modem: 15<br>Configured as non-V.34 modem: 0<br>**NOTE:** The values may be added to specify several speeds. When viewed as an 8-bit number, the register is bit mapped. |
| S114 | V.34 Modulation Characteristics | |
| | Range: 1 | Precoding |
| | 2 | Shaping |
| | 4 | Preemphasis |
| | 8 | Warping |
| | 16 | Transmit power control |
| | 32 | Allow high carrier |
| | 64 | Allow low carrier |
| | 128 | Reserved |
| | Default | Configured as V.34 modem: 127<br>Configured as non-V.34 modem 0<br>**NOTE:** The values may be added to specify several speeds. When viewed as an 8-bit number, the register is bit mapped. |
| S115 | V.34 Modulation Symbol Rates | |
| | Range: 1 | 2400 |
| | 2 | 2743 |
| | 4 | 2800 |
| | 8 | 3000 |
| | 16 | 3200 |
| | 32 | 3429 |

*Continued on next page*

**Table A-5. S registers — *Continued***

| | |
|---|---|
| 64 | Reserved |
| 128 | Reserved |
| Default | Configured as V.34 modem: 63<br>Configured as non-V.34 modem:0<br>**NOTE:**<br>The values may be added to specify several speeds. When viewed as an 8-bit number, the register is bit mapped. |

# Diagnostic codes

# B

This appendix lists codes given by or through the RMB. These code lists are displayed by:

- the fault tests run during the built-in self test (BIST)
- POST codes sent from the MAP5/P processor
- POST codes sent from the MAP/40 or MAP/100 processors

## Fault tests

Fault tests are run during the built-in self-test (BIST). The results are stored in the processor RAM of the RMB and can be viewed using the **ok?** command. If any of the fault codes are displayed, there is some failure in the RMB's software, core firmware or hardware and the RMB state is impaired. Usually, when the card is in Impaired state, replacement is required.

However, if card replacement is not immediately practical, you can use this procedure to check which parts of the card are still reliable. Then you can determine what tests can be used until the card can be replaced.

To check the test values:

1. Log in to the RMB.
2. If the RMB prompt:
   - does not display, use the escape sequence. Press Ctrl **c** Ctrl **c** Ctrl **c** .
   - displays, run the **rmbstate?** command.

     The state will be `Normal/Impaired` or `Independent/Impaired`.
3. If the RMB prompt displays, use the **ok?** command to display fault codes, which indicate the reliability of the RMB.

The Test value column in Table B-1 displays the results of the **ok?** command.

**Table B-1. Fault codes**

| Test value | Description |
|---|---|
| 01 | High SRAM test/audit failure |
| 02 | Low SRAM test/audit failure |
| 04 | UART test/audit failure |
| 08 | System clock test/audit failure |
| 10 | 68356 CPU test/audit failure |
| 20 | 68356 CPU internal RAM test/audit failure |
| 40 | Flash PROM test/audit failure |
| 80 | Timer test/audit failure |
| 100 | COM port/16550/SCC2 test/audit failure |

*Continued on next page*

**Table B-1. Fault codes — *Continued***

| Test value | Description |
|---|---|
| 200 | Modem test/audit failure |
| 400 | RTC test/audit failure |
| 800 | Voltage sensor test/audit failure |
| 1000 | Thermistor test/audit failure |
| 2000 | Fans test/audit failure |
| 4000 | UPS test/audit failure |
| 8000 | User I/O test/audit failure |
| 10000 | User I/O Reset PC bit test/audit failure |
| 20000 | High stack RAM failure |
| 40000 | A-to-D convertor test/audit failure |
| 80000 | Mid SRAM test/audit failure |

# MAP/5P POST codes

Power on self test (POST) codes are sent by the processor to the RMB when the system is rebooted. Use the information in this section to troubleshoot the MAP/5P. All of the information in the MAP5/P section was reproduced from the Acer® V5 SLA Service Guide, part number 49.57302.001.

## Power-On Self-Test (POST)

The Power-On Self Test (POST) is a BIOS procedure that boots the system, initializes and diagnoses the system components, and controls the operation of the power-on password option. If POST discovers errors in system operations at power-on, it displays error messages, generates a check point code at port 80h or even halts the system if the error is fatal.

The main components on the system board that must be diagnosed and/or initialized by POST to ensure system functionality are as follows:

- Microprocessor with built-in numeric coprocessor and cache memory subsystem
- Direct memory access (DMA) controller (8237 module)
- Interrupt system (8259 module)

- Three programmable timers (system timer and 8254 module)
- ROM subsystem
- RAM subsystem
- CMOS RAM subsystem and real time clock/calendar with battery backup
- Onboard serial interface controller
- Onboard parallel interface controller
- Embedded hard disk interface and one diskette drive interface
- Keyboard and auxiliary device controllers
- I/O ports
  - two RS232 serial ports
  - one parallel port
  - one PS/2-compatible mouse port
  - one PS/2-compatible keyboard port

## POST check points

When POST executes a task, it uses a series of preset numbers called check points to be latched at port 80h, indicating the stages it is currently running. This latch can be read and shown on a debug board.

Table B-2 describes the Acer common tasks carried out by POST. A unique check point number represents each task.

**Table B-2. POST check points**

| Check Point | Descriptions |
|---|---|
| 04H | ■ Determines if the current booting procedure is from cold boot (press reset button or turn the system on), from warm boot (press + + ) or from exiting BIOS setup.<br>At the beginning of POST, port 64 bit 2 (8042 system flag) is read to determine whether this POST is caused by a cold or warm boot. If it is a cold boot, a complete POST is performed. If it is a warm boot, the chip initialization and memory test is eliminated from the POST routine.<br>■ Dispatches shutdown path |
| 08H | ■ Resets video frame buffer<br>■ Disables non-maskable interrupt (NMI), alarm interrupt enable (AIE), periodical interrupt enable (PIE), and update-ended interrupt enable (UIE).<br>These interrupts are disabled during the POST routine. |
| 09H | ■ Sets M1521 initial status |
| 0AH | ■ Sets M1523 initial status |
| 10H | ■ Tests and initializes DMA controller (8237) |
| 14H | ■ Tests and initializes system timer (8254) |
| 18H | ■ Memory refresh test; refresh occurrence verification (IRQ0)<br>■ Sets default SS:SP= 0:400 |

*Continued on next page*

**Table B-2. POST check points — *Continued***

| Check Point | Descriptions |
|---|---|
| 1CH | ■ Verifies CMOS shutdown byte, battery, and check sum<br>Several parts of the POST routine require the system to be in protected mode. When returning to real mode from protected mode, the processor resets, thereby reentering POST. To prevent system re-initialization, POST reads the shutdown code stored in location 0Fh in CMOS RAM. Then it jumps around the initialization procedure to the appropriate entry point.<br>■ The CMOS shutdown byte verification assures that CMOS 0Fh area can execute POST properly.<br>■ Initializes CMOS default setting<br>■ Initializes RTC time base<br>The RTC has an embedded oscillator that generates 32.768 KHz frequency. To initialize RTC time base, turn on this oscillator and set a divisor to 32768 so that RTC can count the time correctly. |
| 1DH | ■ Scans the number of memory bank with memory installed |
| 1EH | ■ Determines the DRAM type |
| 20H | ■ Tests keyboard controller (8041/8042)<br>■ Determines keyboard type (AT, XT, PS/2)<br>Write the default command byte during the keyboard type determination. |
| 24H | ■ Tests programmable interrupt controller (8259)<br>■ Initializes the system interrupt |
| 2CH | ■ Tests 128K base memory<br>The 128K base memory area is tested for POST execution. The remaining memory area is tested later. |
| 30H | ■ Tests shadow RAM and sets RAM BIOS by setup request |
| 34H | ■ Determines DRAM sizing |
| 3CH | ■ Sets interrupt service for POST |
| 4BH | ■ Checks CPU board and ID |
| 4CH | ■ Checks CPU frequency and Mux |

*Continued on next page*

**Table B-2. POST check points — *Continued***

| Check Point | Descriptions |
|---|---|
| 35H | ■ PCI pass 0 |
| 4EH | ■ Isolates PnP card and scans the number of PnP cards |
| 4FH | ■ Sets PnP card configuration |
| 50H | ■ Initializes video display<br>Any display card is initialized here via its I/O ROM or corresponding initialization program. |
| 54H | ■ Checks shadow video BIOS |
| 58H | ■ Sets POST screen mode (graphic or text)<br>■ Displays the Acer (or OEM) logo (if necessary)<br>■ Displays the Acer copyright message (if necessary)<br>■ Displays the BIOS serial number |
| 5CH | ■ Memory test (except the 128K base memory) |
| 5AH | ■ SRAM test<br>■ Copies SMI handler to SRAM<br>■ Changes SMBASSE (if necessary) |
| 60H | ■ Initializes SRAM cache capacity<br>■ Enables the cache function |
| 64H | ■ Tests the keyboard interface<br>The keyboard LEDs should flash once. |
| 68H | ■ Enables UIE, then checks the RTC update cycle<br>The RTC executes an update cycle every second. When the UIE is set, an interrupt (IRQ8) occurs after every update cycle and indicates that over 999ms are available to read valid time and date information. |
| 6CH | ■ Tests and initializes FDD<br>The FDD LED should flash once and its head should be positioned. |
| 70H | ■ Initializes the parallel port(s) |
| 74H | ■ Initializes the serial port(s) |

*Continued on next page*

**Table B-2. POST check points — *Continued***

| Check Point | Descriptions |
|---|---|
| 78H | ■ Math coprocessor test |
| 7CH | ■ Resets pointing device<br>■ Checks pointing device |
| 80H | ■ Sets security status |
| 84H | ■ Initializes keyboard device<br>■ Enables keyboard device |
| 88H | ■ Sets HDD type and features (for example, transfer speed or mode)<br>■ Tests HDD controller |
| 8AH | ■ Initialize HDD enhanced features |
| 90H | ■ Display POST status. If necessary, change POST mode to default text mode |
| 94H | ■ Initializes I/O ROM<br>I/O ROM is an optional extension of the BIOS located on an installed add-on card as a part of the I/O subsystem. POST detects I/O ROMs and gives them opportunity to initialize themselves and their hardware environment. |
| 96H | ■ Initializes PCI I/O ROM |
| A0H | ■ Sets the time and the date |
| A2H | ■ Initialize Setup Items |
| A4H | ■ Initializes the security feature |

*Continued on next page*

**Table B-2. POST check points — *Continued***

| Check Point | Descriptions |
|---|---|
| A8H | ■ Sets the power saving timer<br>■ Initializes APM<br>■ Sets monitored event |
| ACH | ■ Enables NMI<br>■ Enables parity check<br>■ Sets video mode |
| B0H | ■ Checks power-on password<br>■ Displays configuration mode table<br>■ Booting |

## POST error messages

The power-on self-test (POST) is a program routine performed by the system BIOS. If there is any error during the POST routine, BIOS detects it and shows the corresponding error message on the CRT screen to guide the technical service engineer on the repair procedure.

**Table B-3. POST error messages**

| Error message | Possible cause and corrective action |
|---|---|
| `Memory Error at MMMM:SSSS:OOOOh (R:xxxxh, W:xxxxh)` | DRAM, SIMMs, or add-on memory card may be defective.<br>Replace the DRAM chips or the SIMMs. |
| `SMM RAM Bad` | System Management Memory (SMM) is bad. This may be caused by the malfunction of the system green function.<br>Replace the DRAM chips or the SIMMs. |
| `Keyboard Interface Error` | POST detects an error in the interface between the system board and the keyboard. The keyboard circuit module may be defective.<br>Check the keyboard interface circuit or change the keyboard. |
| `Keyboard Error or Keyboard Not Connected` | POST detects an error in the keyboard; or the keyboard is not connected.<br>Reconnect or replace the keyboard. |
| `Keyboard Locked` | The keyboard lock feature prevents any access to the keyboard.<br>Unlock the keyboard. |
| `Pointing Device Error` | The pointing device installed may be bad or the device is improperly connected.<br>Reconnect or replace the pointing device. |
| `Pointing Device Interface Error` | POST detects an error in the interface between the system board and the pointing device.<br>Check the keyboard interface circuit. |
| `Pointing Device IRQ Conflict` | The IRQ setting of the add-on card and/or system board conflict with the onboard pointing device.<br>Enter Setup and change the setting of IRQ12. |

*Continued on next page*

**Table B-3. POST error messages — *Continued***

| Error message | Possible cause and corrective action |
|---|---|
| `Hard Disk 0 Error`<br>`Hard Disk 1 Error`<br>`Hard Disk 2 Error`<br>`Hard Disk 3 Error` | The hard disk drive may be bad, type mismatched, or not properly installed.<br>Replace the disk drive or the hard disk drive controller. Check the HDD cable connections and CMOS setup configuration. |
| `Diskette Drive A Type Mismatch`<br>`Diskette Drive B Type Mismatch` | Diskette A (or B) may be bad, not properly installed, or type mismatched.<br>Replace diskette drive, checking its cabling and its configuration in Setup. |
| `Diskette Drive A Error`<br>`Diskette Drive B Error` | Diskette A or B may be bad.<br>Replace the diskette drive. |
| `Diskette Drive Controller Error` | This error is caused by any of the following:<br>1. The power supply cable is not connected to the diskette drive connector.<br>2. The diskette drive cable is not plugged to the diskette drive interface on the system board.<br>3. The diskette drive controller is defective.<br>Check the diskette drive cable and its connections. If the cable is good and properly connected, the diskette drive controller may be the problem. Change the diskette drive controller or disable the onboard controller by installing another add-on card with a controller. |
| `Serial Port 1 Conflict`<br>`Serial Port 2 Conflict` | Onboard serial port address conflicts with the add-on card serial port.<br>Change the onboard serial port address in Setup or change the add-on card serial port address. |
| `Parallel Port Conflict` | Onboard parallel port address conflicts with the parallel port of add-on card.<br>Change onboard parallel port address in CMOS Setup or set the parallel port address of add-on card to others. |

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**Table B-3. POST error messages — *Continued***

| Error message | Possible cause and corrective action |
|---|---|
| `Real Time Clock Error` | POST detects a real-time clock error.<br>Check RTC circuit or replace the RTC. |
| `CMOS Battery Bad` | CMOS battery power lost.<br>Replace the onboard lithium battery |
| `CMOS Checksum Error` | CMOS RAM error.<br>Run Setup again and reconfigure the system. |
| `NVRAM checksum Error` | The NVRAM in the EISA model contains EISA configuration information. Accidental data writes in the NVRAM area causes an error. POST detects the error and displays the corresponding error message.<br>Run EISA configuration utility (ECU) to restore the original EISA configuration data. |
| `PCI Device Error` | PCI device may be bad.<br>Check the PCI card. Replace if bad. |
| `System Resource Conflict` | Some system resources conflict with the resources required by the PCI device.<br>Run Setup to reconfigure the system. |
| `IRQ Setting Error` | Wrong IRQ setting for the PCI device.<br>Run Setup to reconfigure the system. |
| `Expansion ROM Allocation Fail` | The I/O expansion ROM fails to allocate for the PCI device.<br>Change the I/O expansion ROM address. |

## NMI Error and warning messages

Non-Maskable Interrupt (NMI) causes the CPU routines to be interrupted and the system to be halted.

**Table B-4. NMI Error and Warning message**

| Error Message | Possible Cause and Corrective Action |
|---|---|
| `RAM Parity Error` | DRAM chips, SIMMs, or add-on memory card may be defective.<br>Replace the DRAM chips or SIMMs, or disable parity check in Setup if the model supports it. |
| `I/O Parity Error` | The I/O access is not correct.<br>Check all I/O related circuits (i.e. system I/O controller, memory controller, interrupt controller, DMA controller, etc.) |
| `Press Ctrl_Alt_Esc key to enter SETUP or F1 key to Continue...` | A system configuration error is detected, or the hardware configuration does not match the Setup configuration data in CMOS.<br>Press Ctrl ALT ESC to reconfigure the system. |
| `Press F1 key to enter SETUP or other key to continue...` | This message appears on the screen when a terminal instead of a console monitor is installed.<br>Press F1 to enter Setup and check the configuration. Pressing any other key prevents entering Setup. |
| `Press ESC to turn off NMI, or any key to reboot` | A non-maskable interrupt (NMI) occurs.<br>Press ESC to reject NMI error or press any other key to reboot the system. |

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**Table B-4. NMI Error and Warning message — *Continued***

| Error Message | Possible Cause and Corrective Action |
|---|---|
| `Insert system diskette and press <Enter> key to reboot` | A non-bootable diskette is detected on the diskette drive when the system boots.<br>Insert a bootable disk in the diskette drive or remove this disk if a hard disk drive is installed. |
| `Equipment Configuration Error` | The hardware configuration does not match the Setup configuration data.<br>Run Setup and reconfigure the system. |
| `EISA Configuration Error` | This message appears in any one of the following conditions:<br>1. An add-on card is plugged into the wrong expansion slot.<br>2. The ECU was not executed when a new add-on card is installed.<br>3. A old add-on card was move to another slot.<br>Run ECU. |

## MAP/40 and MAP/100 POST codes

Power on self test (POST) codes are sent by the processor to the RMB when the platform is rebooted. Use the tables below to determine the source of the problem, if you are troubleshooting the MAP/40 or MAP/100.

### DIAGNP output codes

The DIAGNP output codes are sent to the diagnostic status port to indicate tests in progress or failed tests. If the FAILBEEP option is selected, the beep codes are sent to the speaker only if a fatal failure is detected. For instance, 2-1-4 (two beeps, one beep, four beeps) indicates a failure of bit 3 in the first 64K of RAM. Both set of codes are only used prior to screen initialization and screen retrace verification.

Once the screen is believed operable, any diagnostic reporting is via screen messages, except if MANLOOP EQU TRUE and the jumpers say to loop on POST. In this case, it is assumed that no video adapter is attached and some additional errors will be reported via DIAGNP and the speaker.

**Table B-5. DIAGNP codes**

| DIAGNP output | Beep codes | Test or failure description |
|---|---|---|
| 00H | | System normal |
| 01h | | 80286 register test in progress |
| 02H | 1-1-3 | CMOS write/read test in progress or failure |
| 03h | 1-1-4 | BIOS ROM checksum in progress or failure |
| 04h | 1-2-1 | Programmable interval timer test in progress or failure |
| 05h | 1-2-2 | DMA initialization in progress or failure |
| 06h | 1-2-3 | DMA page register write/read test in progress or failure |
| 08h | 1-3-1 | RAM refresh verification in progress or failure |
| 09h | | First 64K RAM test in progress |
| 0Ah | 1-3-3 | First 64K RAM chip or data line failure: multi-bit |
| 0Bh | 1-3-4 | First 64K RAM odd/even logic failure |
| 0Ch | 1-4-1 | First 64K RAM address line failure |
| 0Dh | 1-4-2 | First 64K parity test in progress or failure |
| 10h | 2-1-1 | First 64K RAM chip or data line failure: bit 0 |
| 11h | 2-1-2 | First 64K RAM chip or data line failure: bit 1 |
| 12h | 2-1-3 | First 64K RAM chip or data line failure: bit 2 |
| 13h | 2-1-4 | First 64K RAM chip or data line failure: bit 3 |
| 14h | 2-2-1 | First 64K RAM chip or data line failure: bit 4 |
| 15h | 2-2-2 | First 64K RAM chip or data line failure: bit 5 |
| 16h | 2-2-3 | First 64K RAM chip or data line failure: bit 6 |
| 17h | 2-2-4 | First 64K RAM chip or data line failure: bit 7 |
| 18h | 2-3-1 | First 64K RAM chip or data line failure: bit 8 |

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**Table B-5. DIAGNP codes — *Continued***

| DIAGNP output | Beep codes | Test or failure description |
|---|---|---|
| 19h | 2-3-2 | First 64K RAM chip or data line failure: bit 9 |
| 1Ah | 2-3-3 | First 64K RAM chip or data line failure: bit A |
| 1Bh | 2-3-4 | First 64K RAM chip or data line failure: bit B |
| 1Ch | 2-4-1 | First 64K RAM chip or data line failure: bit C |
| 1Dh | 2-4-2 | First 64K RAM chip or data line failure: bit D |
| 1Eh | 2-4-3 | First 64K RAM chip or data line failure: bit E |
| 1Fh | 2-4-4 | First 64K RAM chip or data line failure: bit F |
| 20h | 3-1-1 | Slave DMA register test in progress or failure |
| 21h | 3-1-2 | Master DMA register test in progress or failure |
| 22h | 3-1-3 | Master interrupt mask register test in progress or failure |
| 23h | 3-1-4 | Slave interrupt mask register test in progress or failure |
| 25h | | Interrupt vector loading in progress |
| 27h | 3-2-4 | Keyboard controller test in progress or failure |
| 28h | | CMOS power failure and checksum checks in progress |
| 29h | | CMOS configure information validation in progress |
| 2Bh | 3-3-4 | Screen memory test in progress or failure |
| 2Ch | 3-4-1 | Screen initialization in progress or failure |
| 2Dh | 3-4-2 | Screen retrace tests in progress or failure |
| 2Eh | | Search for video ROM in progress |
| 30h | | Screen believed operable or running with video ROM |
| 31h | | Monochromatic screen believed operable |
| 32h | | 40-column color screen believed operable |
| 33h | | 80-column color screen believed operable |

*Continued on next page*

**Table B-5. DIAGNP codes — *Continued***

| DIAGNP output | Beep codes | Test or failure description |
|---|---|---|
| 34h | 4-2-1 | Timer tick interrupt test in progress or failure |
| 35h | 4-2-2 | Shutdown test in progress or failure |
| 36h | 4-2-3 | Gate A20 failure |
| 37h | 4-2-4 | Unexpected interrupt in protected mode |
| 38h | 4-3-1 | RAM test in progress or failure above address 0FFFFh |
| 3Ah | 4-3-3 | Interval timer channel 2 test in progress or failure |
| 3Bh | 4-3-4 | Time of day clock test in progress or failure |
| 3Ch | 4-4-1 | Serial port test in progress or failure |
| 3Dh | 4-4-2 | Parallel port test in progress or failure |
| 3Eh | 4-4-3 | Math coprocessor test in progress or failure |
| 3Fh | | Shadow CPU BIOS |
| 40h | | Cache initialization |
| 41h | | No memory found on CPU board |
| 42h | | Chipset initialization |
| 43h | | Cache sizing algorithm |

## PCI port 80 codes

The following EQUs represent the port 80 codes that are displayed by diagnostic branches in all PCI components. Each of the error codes start with PT80_PCI_.

**Table B-6. PCI port 80 codes for systems with CPUs prior to P200**

| Error code | Port 80 codes | Description |
|---|---|---|
| ALIGN_ERROR | 70h | Occurs in PCI_CFG_CYCLE if a word access is not work-aligned or if a dword access is not dword-aligned. Indicates a BIOS coding error and results in a TFAIL. |
| BAD_CFG_TYPE | 71h | Occurs in PCI_CFG_CYCLE if an unknown access type is specified. Indicates a BIOS coding error and results in a TFAIL. |
| INVALID_PFA | 72h | Occurs in the routines pciMarkFcnForConfig, pciMarkFcmForNoConfig, or pciCongifurePcn if the specified PFA is greater than the NUM_OF_PFAS constant. (NUM_OF_PFAS determines the size of the CONFIGURE_FCN_BITMAP.) Results in a TFAIL. |
| OUT_OF_BARDS | 73h | Occurs in the routine pciGetNextFreeBARD if the BARD pool is exhausted. Results in a TFAIL. |
| OUT_OF_FMDS | 74h | Occurs in the routine pciGetNextFreeFMD if the FMD pool is exhausted. Results in a TFAIL. |
| PRECFG_BARD_ERROR | 75h | Occurs in the routine pciAllocateResources if a PMD is not found that spans a PRECONFIGURED BARD. Results in a TFAIL. |
| INIT | 76h | Appears when the routine starts. |
| CONFIG_VGA | 77h | Appears when the routine starts. |
| CONFIG_NON_VGA | 78h | Appears when the routine starts. |
| PCIDSR_DISPATCH | 79h | Appears when the routine starts. |
| INIT_OPROM | 7Ah | Appears when the routine starts. |
| BEFORE_MEMSIZE | 7Bh | Appears when the routine starts. |

Following are post codes for all BIOS versions on P200 CPUs in MAP40P and MAP100P platforms. The P200 CPU is the current CPU on these platforms, and these codes are valid for the Lucent P5000HX, BIOS version [TAW 4.05a.2.1i, 4.05a.2.2].

Warmboots will follow the same path *after* the shutdown code determines that a warmboot was requested. The shutdown code will set a flag that prevents the memory test from displaying, and then uses the watchdog timer to reset the entire board (and all busses).

**Table B-7. PCI port 80 codes for systems with P200 CPUs**

| Error code | Port 80 codes | Description |
|---|---|---|
| postVerifyRealModeJ | 02 | Verify that the CPU is executing in real mode, not protected mode. |
| cpuGetTypeJ | 01 | Determine CPU type. |
| postHardwareInitializeJ | 04 | Perform a quick hardware initialization to ensure system stability. |
| postTimerInitJ | 06 | Set up the timers for POST. |
| postSetHugeESJ | 18 | Enter protected mode and set the ES segment descriptor for a flat 4Gb segment, then return to real mode, but do not reset the ES segment. This is Big Real Mode. |
| csInitializeJ | 08 | Perform chipset specific early configuration. |
| postRegInitializeJ | 11 | More pre-memory initialization. |
| OemJamRefreshJ | 21 | Ensure that refresh is running. |
| ioInitializeJ | 0E | Early IO initialization. |
| cacheInitializeJ | 0C | Set up the cache. |
| cachePreRamAutosizeJ | 17 | Perform chipset initialization required for memory sizing. |
| csRamAutosizeJ | 28 | Autosize and configure the DRAM bank registers. |
| cacheAutosizeJ | 3A | Autosize and configure the CACHE controller. |
| postZeroBaseRamJ | 2A | Clear the base memory. |
| postRealAddressTestJ | 2C | Test the DRAM address lines. |

*Continued on next page*

**Table B-7. PCI port 80 codes for systems with P200 CPUs — *Continued***

| Error code | Port 80 codes | Description |
|---|---|---|
| ParitySupportTestJ | 17 | Verify that x36 DRAMs are installed if parity or ECC mode has been selected, if not disable parity or ECC. |
| postBaseRamTestJ | 2E | Test the base memory. |
| cachePreSysShadowJ | 2F | Configure the cache prior to system shadowing. |
| readSwitch3J | 22 | Read switch 3 and jam CMOS defaults if on. |
| csSystemShadowConfigJ | 38 | Shadow and un-compress the BIOS. Note: this BIOS must be shadowed. |
| postRefreshTestJ | 20 | Verify proper refresh operation. |
| postSetInPostFlagJ | 09 | Set flag that indicates POST is running. |
| cpuInitializeJ | 0A | Processor initialization. |
| fdiskInitializeJ | 0F | Early IO initialization of FDISK controller. |
| postI8742InitJ | 14 | Early initialization of the keyboard controller. |
| postDmaInitJ | 1A | Early DMA initialization. |
| postResetPICJ | 1C | Clear and reset the 8259 interrupt controllers. |
| postI8742TestJ | 22 | Test the keyboard controller (not the keyboard) |
| postComputeSpeedJ | 32 | Determine the CPU clock speed. |
| postCmosTestJ | 34 | Test CMOS. |
| csAdvConfigJ | 3C | Advanced chipset configuration. |
| postAdvRegConfigJ | 3D | Advanced register configuration. |
| SetMemoryAttribJ | 3D | Advanced memory configuration (timing, parity). |
| postVectorInitJ | 42 | Write interrupt vectors in base memory. |
| postCopyrightCheckJ | 46 | Verify that the copyright message is intact. |
| csMiscShadowConfigJ | not available | Advanced shadow bios modifications (the BIOS is self-modifying, that is why it must be shadowed). |

*Continued on next page*

**Table B-7. PCI port 80 codes for systems with P200 CPUs — *Continued***

| Error code | Port 80 codes | Description |
|---|---|---|
| postScsiInitJ | 49 | Shadow the SCSI bios if enabled, and config the SCSI chip IDSEL line. This determines if the SCSI chip is visible or hidden. |
| pciOpRomInitJ | 47 | Look for ISA option roms and build a resource map. |
| pciInitJ | 49 | Walk the PCI bus, and build a device map. |
| postConfigCheckJ | 48 | Verify proper system configuration. |
| pciVideoInitJ | 4A | Scan for video devices, and initialize the video. |
| csVideoShadowConfigJ | 4C | Shadow and finish video initialization. |
| postSetHugeESJ | 24 | Enter big real mode (4Gb ES segment). |
| postKBTestJ | 52 | Preliminary keyboard test. |
| featSetupKeyclickJ | not available | Program the keyboard click feature. |
| postKeyboardTestJ | 76 | Keyboard test. |
| postHotInterruptTestJ | 58 | Check for any pending hardware interrupts (should be none). |
| quietBootStartJ | 4B | If quietboot is enabled, put up screen now. |
| getProductNameJ | 55 | Embed the CPU speed in with the product name in the shadowed BIOS. |
| PreRedirectJ | 4E | If redirection is enabled, config the serial port for proper operation. |
| consoleInitJ | 4F | Hook all associated video and keyboard vectors, and start redirection. |
| postCopyrightDisplayJ | 4E | Display the signon message if quietboot is disabled. |
| cpuDisplayJ | 50 | Show the cpu type and speed if quietboot is disabled. |
| switch3DisplayJ | 56 | Show switch 3 message if switch 3 is on and if quietboot is disabled. |
| postDisplayF2MessageJ | 5A | Display the "Press F2 to enter Setup" message. |

*Continued on next page*

**Table B-7. PCI port 80 codes for systems with P200 CPUs — *Continued***

| Error code | Port 80 codes | Description |
|---|---|---|
| cpuCacheOffJ | 5B | urn off the cache. |
| postMemoryTestJ | 5C | Test base memory (not irq vector or stack locations). |
| postExtendedMemoryTestJ | 60 | Test extended memory. |
| postExtendedAddressTestJ | 62 | Extended memory address test. |
| userPatch1J | 64 | Not used. |
| ResetWBflagJ | 65 | Reset the L1 cache write back flag. |
| cacheAdvConfigJ | 66 | Config and enable the chipset for L2 cache support. |
| cacheConfigureJ | 68 | Config the L2 cache. |
| postDisplayCacheSizeJ | 6A | Display the L2 cache size if quietboot is disabled. |
| postDisplayShadowsJ | 6C | Display shadow status if quietboot is disabled. |
| postDisplayNonDisposableJ | 6E | Display the BIOS non-disposable segment start address if quietboot is disabled. |
| postDisplayErrorMessagesJ | 70 | Show any error messages that have been detected prior to this step. These messages will represent the results of all test prior to this point, except memory test. These errors will only be displayed if quietboot is disabled. |
| postTestConfigJ | 72 | Verify system configuration. |
| postRTCTestJ | 74 | Test the RTC (Real Time Clock) |
| postSetupHardwareVectorsJ | 7C | Config the hardware interrupt vectors. |
| consoleVectorInitJ | not available | Final config for the interrupts used by the console. |
| cpuCoprocessorTestJ | 7E | Test the math coprocessor. |
| postClearHugeESJ | 96 | Exit big real mode by using the keyboard CPU reset line. |

*Continued on next page*

**Table B-7. PCI port 80 codes for systems with P200 CPUs — *Continued***

| Error code | Port 80 codes | Description |
|---|---|---|
| postConfigMemHoleJ | 97 | Config chipset for memory hole support, if enabled. |
| postScanForF2J | AA | See if a F2 key is in the buffer. |
| postDisableA20J | 94 | Disable A20. |
| ioBeforeInitJ | 80 | Configuration required before io port setup. |
| pciInitPccJ | 85 | Not used. |
| ioRS232TestCodeJ | 82 | Test and init RS232 port(s) (except ports used by redirection). |
| ioParallelTestCodeJ | 84 | Test and init parallel port(s). |
| ioAfterInitJ | 86 | Configuration after io port setup. |
| serr2nmiJ | EE | Config chipset NMI path. |
| postBiosInitJ | 88 | initialize timeouts, key buffer, and the soft reset flag. |
| postFloppyTestJ | 8C | Test the floppy controller and if enabled, perform a seek test on each configured floppy drive. |
| FdiskAutotype | 8E | Autotype and display drive info for all installed IDE drives if autotype feature is enabled. |
| fdiskPostTestJ | 90 | Test all configured IDE drives. |
| postInitExtBDAJ | 8A | Configure and initialize the Extended Bios Data Area (EBDA). |
| featMouseTestJ | 8B | Test and configure the PS/2 mouse, if feature is enabled and a mouse is detected. |
| userPatch2J | 92 | Not used. |
| pciRomAreaCheckJ | 98 | Initialize all ISA and PCI option ROMS. |
| postEnableIRQsJ | 9E | Enable all interrupts. |
| SysTimerWaitJ | 9F | Start timers and wait for interrupt 0. |
| postSetTimeOfDayJ | A0 | Place time and date in BDA. |
| postKeyLockTestJ | A2 | Test status of the key lock |

*Continued on next page*

**Table B-7. PCI port 80 codes for systems with P200 CPUs — *Continued***

| Error code | Port 80 codes | Description |
|---|---|---|
| featInitKeyboardRateJ | not available | Program the keyboard repeat and typematic rates. |
| postClearBootFlagJ | 0E | Clear the BIOS in post flag (used by the BIOS to determine if system has attempted to boot the OS yet). |
| postErrorCheckJ | B0 | Check for any error flags from previous operations, and display all logged errors. |
| postDoneJ | B2 | End of post. |
| postOneBeepJ | B4 | Beep the speaker. |
| quietBootEndJ | not available | If quietboot is enabled, remove screen here. |
| postEraseF2MsgJ | not available | Remove the "Press F2 to Enter Setup" message. |
| postClearParityJ | BC | Ensure that all parity reporting registers are clear. |
| postDMIConfigJ | BA | Build all DMI maps. |
| postClearScreenJ | BE | Clear the screen, not supported, we do not clear the screen prior to booting the OS. |
| postCheckRemindersJ | not available | Display any reminder messages (backup, virus check) if enabled. |
| postSetupCheckJ | AC | Enter setup if F2 key was detected during the memory test. |
| IOrecvj | not available | Set up the ISA IO recovery times. |
| FixPixJ | BC | Final programming of the interrupt controller. |
| PrebootInitJ | 98 | Verify that the time and date is valid, set up |
| postInt19 | C0 | Boot the OS |

*Continued on next page*

# Physical Description

# C

## About this appendix

This appendix includes a list of the RMB major components, physical components and connectors, hardware/firmware interfaces, and hardware/software interfaces. Use its contents to:

- find and describe the connections to remote installers
- learn protection information for the inputs and outputs of an uninterruptible power supply
- learn background information for interpreting the fault codes found in Table B-1 on page B-2
- Learn how to attach cables, external circuitry and external connectors
- use the cabling information to describe attaching cables properly to avoid damage to the RMB
- use the comcodes to order cables or the RMB

## Physical components

Table C-1, *RMB AYC54 Physical Components,* lists the main items that make up the RMB AYC54, and describes the items, and their functions.

**Table C-1. RMB AYC54 physical components**

| Item | Description | Function |
|---|---|---|
| Modem | Modulator/ demodulator that converts digital signals to analog signals and vice-versa | Most of the time, the RMB AYC54 will be performing the tasks associated with the 28.8k bps modem (or the 33.6K bps modem for c-chip circuit packs). The modem interfaces directly to a line card from a PBX or central office. |
| Processor | On-board, processor complex with static RAM and FLASH memory | The on board processor handles all information from the sensors, clock, status inputs, modem, and ISA bus. It contains an onboard DSP to provide a data pump function for the modem. The processor is programmed to emulate a 16550 UART to provide data transmission over the ISA bus. |
| ISA bus interfaces | Postcode port<br>BIOS extension<br>Com port<br>Semaphore port<br>Bus buffers | The ISA bus interface is the circuitry necessary to interface to internal and external hardware interfaces. It decodes four addresses on the ISA bus and passes information to the processor, allowing the RMB AYC54 to:<br>■ Capture postcode information and store it when the platform is booted<br>■ Respond to a BIOS extension address that is presented by the platform at boot time, and load BIOS Extended Code (BEC) into the processor on the motherboard<br>■ Pass information from the modem to the platform as serial COM port data<br>■ Allow RMB AYC54 software to pass commands to the processor using a semaphore port<br>The buffers are used to connect the ISA bus interface circuitry to the platform's ISA bus. These buffers maintain a uniform load on the bus and isolate it from the input current demands on the on-board circuitry. |

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**Table C-1. RMB AYC54 physical components — *Continued***

| Item | Description | Function |
|---|---|---|
| Line drivers | Drivers | The line drivers provide the proper voltage and current levels so that the processor can connect to a standard RS-232 interface. |
| Coder/ Decoder (CODEC) | Special-purpose A-to-D and D-to-A converter | Digital signals from the processor are converted to and from analog signals from the transformer. The CODEC contains registers that are programmed by the data pump firmware in the DSP portion of the RMB's processor. Programmable functions include coefficient loading, clock selection, baud generators, attenuation, synchronization, sampling, and phase shift. |
| Transformer | Safety device | The transformer acts as a safety device and isolates DC current. |
| Analog circuitry | Data Access Arrangement (DAA) | The analog circuitry (DAA) interfaces with the CODEC to the tip and ring leads. The primary functions of a DAA are:<br>■ Detect ringing<br>■ Provide an off-hook indication<br>■ Provide protection and isolation to the U.S. and Canadian agency requirement<br>■ Convert 2 wire to 4 wire<br>Dial pulsing is not supported. |
| Clocks | Oscillator-generated signals | The clocks provide signals to control the timing and some functions of the RMB, such as clocking the CODEC, which in turn clocks a portion of the processor. |
| Sensors | Temperature and voltage sensors | The voltage sensors feed the input of the A-to-D converter. Temperature sensors produce a voltage for the A-to-D converter. |
| A-to-D Converter | Multiple input channel converter | The A-to-D converter provides the processor with sampled data on the temperature of the RMB AYC54 and the amount of voltage of the four power supply rails in the platform. |
| Real Time Clock | Timing device | The real time clock provides the processor with the correct date and time. This information is used to time-stamp events to be stored in the error log. |

*Continued on next page*

**Table C-1. RMB AYC54 physical components — *Continued***

| Item | Description | Function |
|---|---|---|
| Hardware Control Registers | Temporary memory device | The 8 registers each have different functions including:<br>■ Controlling user-definable inputs and outputs<br>■ Providing the processor with the status of the internal fans and internal UPS<br>■ Containing the ISA bus addresses and telling the hardware which ISA bus address to use for COM port communications, postcode information, semaphore port data, and loading the BEC into the platform's memory<br>■ Enabling or disabling reception of any of the ISA bus addresses and selecting which, if any, Interrupt ReQuest (IRQ) line to drive. |
| General Purpose Inputs/ Outputs | Pins | The pins from the processor are used with the UART interface. |
| Power Management | Power supervisor | The power supervisor monitors the +5 volt power on the RMB. |
| Physical Connectors | Connectors | The connectors have various interface and pin provisions. Connectors are described in detail in the "Physical Connectors" section. |

## RMB AYC54 picture

Figure C-1 shows the connectors of the RMB AYC54. The connectors at the top of the card are the same on both the AYC54 and the AYC55. However, the faceplate connections are different for each card, as shown in Figure C-2 on page C-6.

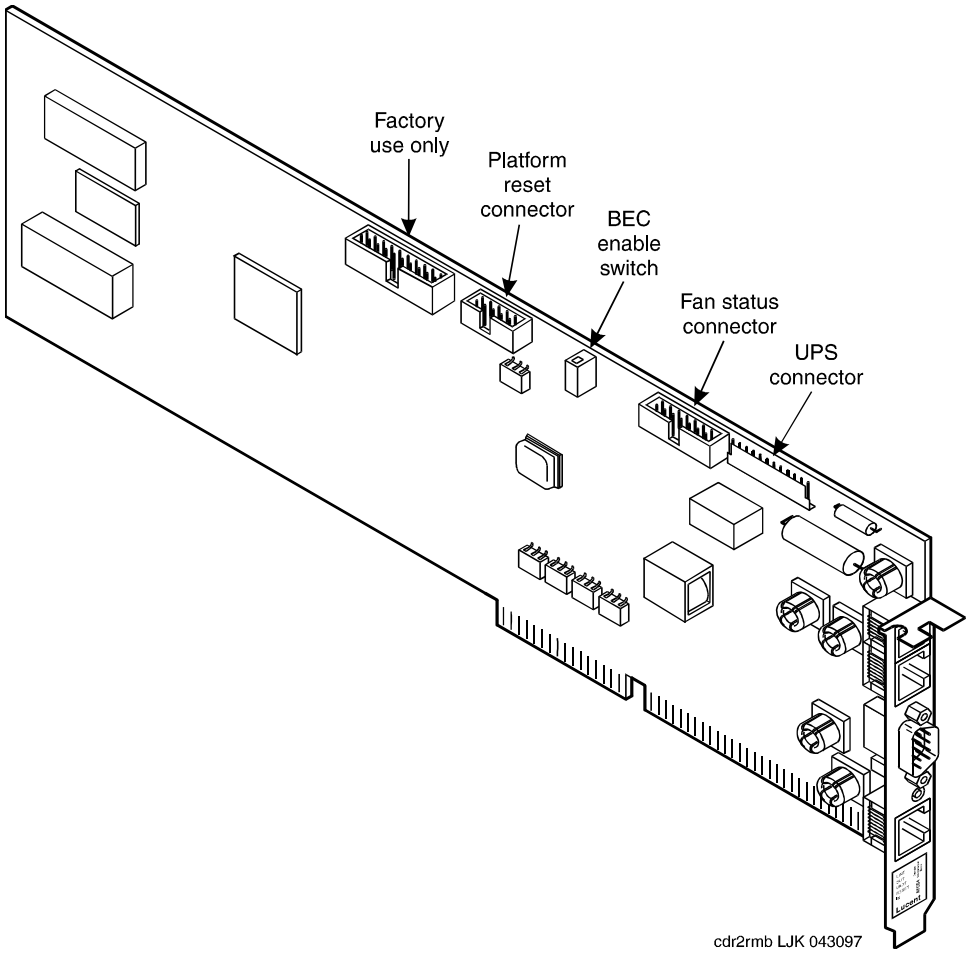


**Figure C-1. The RMB AYC54**

## Physical connectors

Figure C-2 shows the connectors for both RMB faceplates, including the RJ-11 Tip/Ring connector for the modem and the I/O connectors.

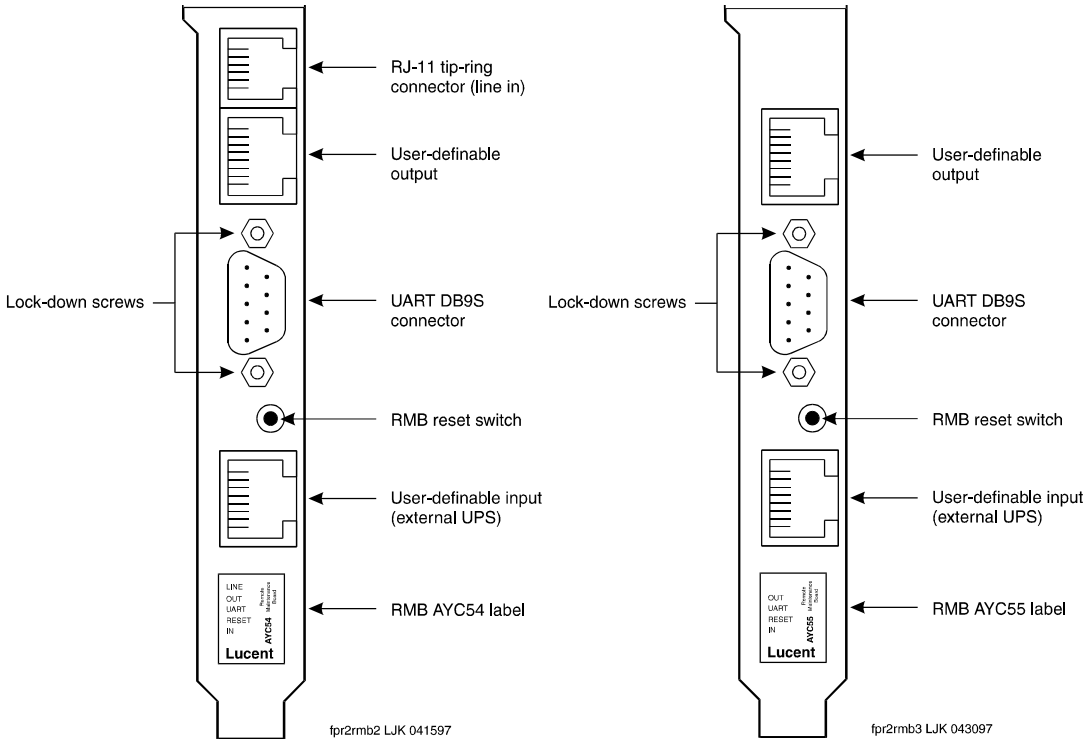


**Figure C-2. RMB faceplates**

Physical connectors allow communication with the platform and with external requests. Table C-2 lists the physical connectors, beginning in the upper left and moving clockwise around the illustration shown in Figure C-1 on page C-5. Detailed information about each connector is provided in subsequent pages.

**Table C-2. RMB AYC54 physical connectors**

| Connector | Description |
|---|---|
| Factory use only | Used by the factory to test the RMB after installation. Not for field use. |
| Platform reset output | Connects to two platform signals which can be used to reset the platform. |
| BEC enable switch | Enable or disable the recognition of a BIOS-extension address. |
| Fan status | Supplies the RMB with information about the fans in the platform. The fan status input connector can only be used with the MAP/100 and the MAP/100c. |
| Internal UPS status | Supplies the RMB with information about the UPS.<br><br>**NOTE:**<br>The internal UPS status connector can only be used with some MAP/100s.<br><br>**WARNING:**<br>*Connecting the UPS cable to a MAP/100 with dual/redundant power supplies damages the RMB when platform power is turned on.* |
| RJ-11 tip/ring (line in) | Connects the RMB AYC54 modem tip/ring to the telephone network. For information about connector pins, see Table C-8 on page C-14. |
| User-definable output | Provides 4 functions that are defined by the user. Typically the functions drive alarm lights and are for inbuilding use only. See Table C-11 on page C-16. |
| DB-9 UART | External modem connector. |
| Reset button | Has two functions. If pressed quickly, the modem is reset. If the button is pressed for over 3.5 seconds, the RMB and modem are reset and BIST is initiated. |
| User-definable input | Provides 4 functions that are defined by the user. Typically, the functions provide the RMB with status information from an external UPS. The input is for inbuilding use only. See Table C-10 on page C-15. |
| ISA bus | Interfaces with any ISA bus slot in the platform. |

## ISA-Bus connector

The ISA bus connector has gold contacts to interface with any ISA bus connector in the platform's ISA bus interface. The gold contacts are shown in *Figure 1-3, The RMB AYC54*.

### ISA-Bus pin designations

Table C-3 and Table C-4 list all the pin designations and signals on the standard AT connector. The signals in bold type are the ones that are used by the RMB AYC54; the others are not connected. In Table C-3, *ISA Bus Pin Identification-PI*, the faceplate end of the circuit pack is near pins B01 and A01. The component side of the RMB AYC54 is along the pins A01-A31.

**Table C-3. ISA-Bus pin identification-PI connector**

| Signal | Pin | Pin | Signal |
|---|---|---|---|
| **GRD** | B01 | A01 | IOCHK |
| **RESET** | B02 | A02 | **SD7** |
| **+5** | B03 | A03 | **SD6** |
| *IRQ9* | B04 | A04 | **SD5** |
| **-5** | B05 | A05 | **SD4** |
| DRQ2 | B06 | A06 | **SD3** |
| **-12** | B07 | A07 | **SD2** |
| SRDY | B08 | A08 | **SD1** |
| **+12** | B09 | A09 | **SD0** |
| **GRD** | B10 | A10 | **IOCHRDY** |
| **SMEMW** | B11 | A11 | **AEN** |
| **IOW** | B14 | A14 | **SA18** |
| **IOR** | B14 | A14 | **SA17** |
| DACK3 | B15 | A15 | **SA16** |
| *DRQ3* | B16 | A16 | **SA15** |
| DTACK1 | B17 | A17 | **SA14** |
| DRQ1 | B18 | A18 | **SA13** |
| REFRESH[1] | B19a | A19 | **SA12** |
| *BCLK* | B20 | A20 | **SA11** |

*Continued on next page*

**Table C-3. ISA-Bus pin identification-PI connector — *Continued***

| Signal | Pin | Pin | Signal |
|---|---|---|---|
| IRQ7 | B21 | A21 | **SA10** |
| IRQ6 | B22 | A22 | **SA9** |
| **IRQ5** | B23 | A23 | **SA8** |
| **IRQ4** | B24 | A24 | **SA7** |
| **IRQ3** | B25 | A25 | **SA6** |
| DACK2 | B26 | A26 | **SA5** |
| TC | B27 | A27 | **SA4** |
| BALE | B28 | A28 | **SA3** |
| **+5** | B29 | A29 | **SA2** |
| OSC | B30 | A30 | **SA1** |
| **GRD** | B31 | A31 | **SA0** |

1. REFRESH is used on series 4 and later boards.

Table C-4, *ISA Bus Pin Identification-P2*, shows the signals for the remainder of the ISA bus connector. There is a physical spacing between these two parts of the connector. Connector P2 supports 16-bit cards.

**Table C-4. ISA Bus Pin Identification - P2 Connector**

| Signal | Pin | Pin | Signal |
|---|---|---|---|
| MEMCS16 | D01 | C01 | SGHE |
| IOCS16 | D02 | C02 | LA23 |
| IRQ10 | D03 | C03 | LA22 |
| IRQ11 | D04 | C04 | LA21 |
| IRQ12 | D05 | C05 | SA20 |
| IRQ13 | D06 | C06 | LA19 |
| IRQ14 | D07 | C07 | LA18 |

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**Table C-4. ISA Bus Pin Identification - P2 Connector — *Continued***

| Signal | Pin | Pin | Signal |
|---|---|---|---|
| DACK0 | D08 | C08 | LA17 |
| DACK5 | D09 | C09 | MEMR |
| DRQ5 | D11 | C11 | MEMW |
| DACK6 | D12 | C12 | SD9 |
| DRQ6 | D13 | C13 | SD10 |
| DACK7 | D14 | C14 | SD11 |
| DRQ7 | D15 | C15 | SD12 |
| **+5** | D16 | C16 | SD13 |
| MASTER16 | D17 | C17 | SD14 |
| **GRD** | D18 | C18 | SD15 |

## Platform reset output connector

The platform reset output connector has the same affect as pushing the reset button on the platform.

The platform's internal cable, which connects to the RMB AYC54's platform reset output connector, is known as the keyboard/reset cable. Information from the platform's keyboard is also available on the platform reset output connector since it is preset on the cable that connects to it. The keyboard pins are not connected.

The reset connector has 10 pins as shown in Table C-5, *Reset Output Connector*.

**Table C-5. Reset output connector**

| Pin Number | Signal Name | Pin Number | Signal Name |
|---|---|---|---|
| 1 | KBD CLK (not connected) | 2 | GROUND (not connected) |
| 3 | KBD DATA (not connected) | 4 | Not connected |
| 5 | KBD INHIBIT (not connected) | 6 | Not connected |
| 7 | +5 VOLTS (not connected) | 8 | Not connected |
| 9 | RESET* | 10 | GROUND |

The asterisk (*) shown in some signal names is part of the signal name.

## Fan status input connector

Presently the MAP/100 is the only platform that has a cable to make use of the fan status input connector. The six inputs supply the RMB AYC54 with status information about the fans in the platform.

The fan status connector has 14 pins, as shown in Table C-6, *Fan Status Input Connector*.

**Table C-6. Fan Status Input Connector**

| Pin Number | Signal Name | Pin Number | Signal Name |
|---|---|---|---|
| 1 | (not connected) | 2 | (not connected) |
| 3 | Fan 4 | 4 | (not connected) |
| 5 | Fan 2 | 6 | Fan 3 |
| 7 | Exhaust fan | 8 | Fan 1 |
| 9 | Power fail (not connected) | 10 | Power supply fan |
| 11 | Ground (not connected) | 12 | GROUND (not connected) |
| 13 | +12 Volts (not connected) | 14 | +5 Volts (not connected) |

### Internal UPS Status Connector

Presently, the vintage MAP/100 (with an internal UPS) is the only platform that has a cable to make use of the UPS status connector. These five inputs supply the circuit pack with status information about the UPS.

The UPS status connector has 12 pins, as shown in Table C-7.

**WARNING:**
*Connecting the UPS cable to a MAP/100 with dual/redundant power supplies will damage the RMB when power is supplied to the platform.*

**Table C-7. Internal UPS Status Connector**

| Pin Number | Signal Description |
|---|---|
| 1 | UPS on battery, positive input |
| 2 | UPS on battery, negative input |
| 3 | UPS has a low battery, positive input |
| 4 | UPS has a low battery, negative input |
| 5 | UPS malfunction or overload, positive input |
| 6 | UPS malfunction or overload, negative input |
| 7 | (not connected) |
| 8 | (not connected) |
| 9 | UPS fast charging battery, positive input |
| 10 | UPS fast charging battery, negative input |
| 11 | UPS charge fault, positive input |
| 12 | UPS charge fault, negative input |

### UPS alarm adapter connection

Figure C-3 on page C-13 illustrates suggested connections for the RMB's user-definable input. It uses the Z3A2 UPS alarm adapter and the Exide Powerware UPS.

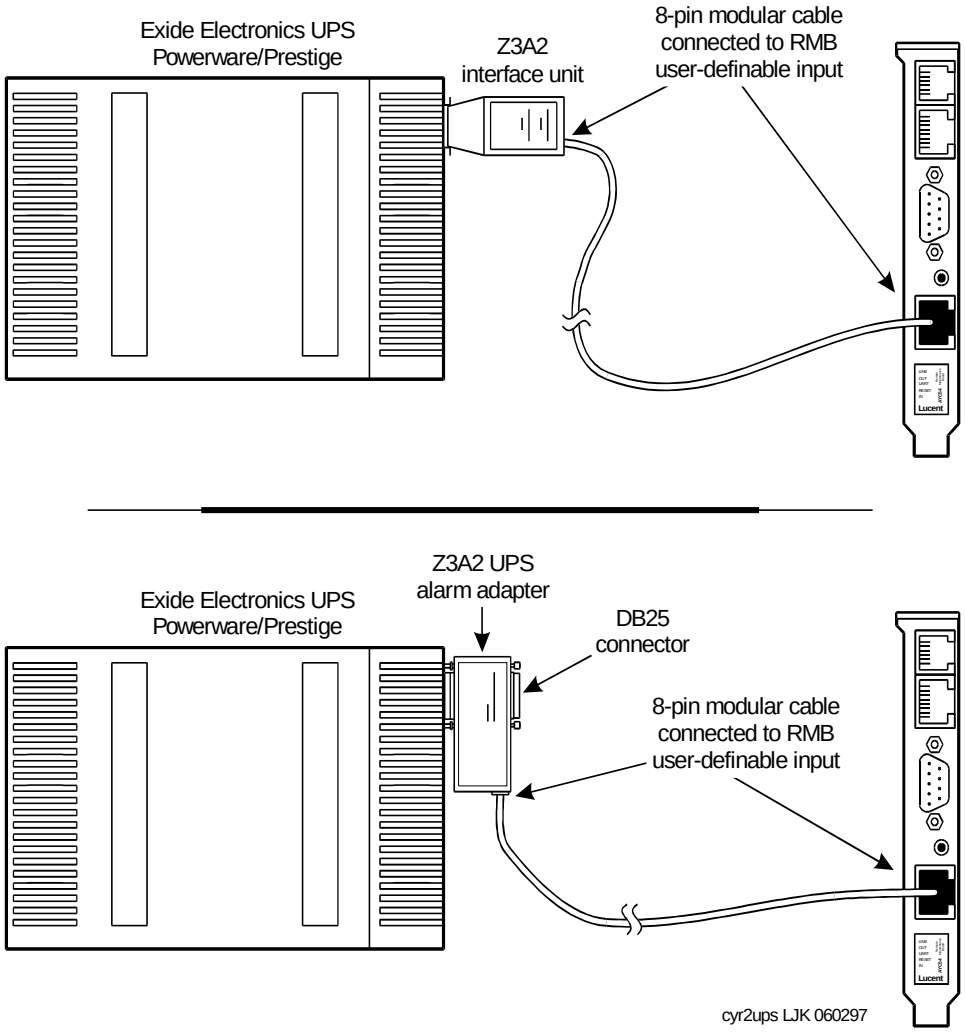


**Figure C-3. Z3A2 group 2 UPS alarm adapters**

## RJ-11 Tip/Ring connector

Although a standard 6-pin connector is used, only the center pins connect to on-board circuitry. The outside pairs of pins are not connected. A standard modular cord is used to connect the RMB AYC54 to the network. In some cases, the network will be accessed via a PBX.

In some cases, the DB-9 UART will be used with an external modem to connect the circuit pack to the network.

Table C-8, *RJ-11 Tip/Ring Connector*, shows pin-out information.

**Table C-8. RJ-11 Tip/Ring Connector**

| Pin Number | Signal Name |
|---|---|
| 1 | (not connected) |
| 2 | (not connected) |
| 3 | ring |
| 4 | tip |
| 5 | (not connected) |
| 6 | (not connected) |

## External modem connector

A DB-9 connector is present on the RMB faceplate for connection to an external modem. These are standard RS-232 signals. The distance limitation is 50 feet for these signals. This is the DTE side of the interface. The pinouts for this connector are listed in Table C-9.

**Table C-9. DB-9 Connector**

| Pin Number | Signal Name | Neumonic |
|---|---|---|
| 1 | data carrier detect | DCD |
| 2 | receive data | RX |
| 3 | transmit data | TX |
| 4 | data terminal ready | DTR |
| 5 | signal ground | GRD |
| 6 | data set ready | DSR |
| 7 | request to send | RTS |
| 8 | clear to send | CTS |
| 9 | ring indication | RI |

## User-Definable input connector

The user-definable input connector provides four functions which are defined by the customer. The functions may provide the RMB AYC54 with status information from an external Uninterruptible Power Supply (UPS). For example, the user can connect equipment containing contact closures to interface with the user-definable inputs. Contact closures may be in the form of mechanical relay, solid-state relay, opto-isolator, etc. The user-definable inputs are designed to detect contact closures.

Use the **inputn?** command to check input labels for the connections and the **inputn=** command to change the input labels. For more information on the commands, see page 3-15.

The connector is a standard 8-pin modular jack. The voltage drop across the contact closure and the connecting wiring must not exceed 1 volt. The RMB AYC54 provides less than 1 milliamp to this loop.

The equipment attached to the user-definable input connector must be in the same building with the RMB AYC54. The length of the cable between this equipment and the contact closures should be less than 250 feet, in order to limit the amount of voltage surges induced from lightning.

**Table C-10. User-Definable Input Connector**

| RJ-45 Pin # | User-definable input # | Signal direction | Default label for UPS=0 or UPS=1 | Default label for UPS=2 |
|---|---|---|---|---|
| 1 | 1 | Positive | External Faceplate Input 1 | UPS is on batteries |
| 2 | 1 | Negative | | |
| 3 | 2 | Positive | External Faceplate Input 2 | UPS batteries are low |
| 4 | 2 | Negative | | |
| 5 | 3 | Positive | External Faceplate Input 3 | UPS is in the bypass mode |
| 6 | 3 | Negative | | |
| 7 | 4 | Positive | External Faceplate Input 4 | External Faceplate Input 4 |
| 8 | 4 | Negative | | |

## User-Definable output connector

The user-definable output connector provides four functions that are defined by the user/customer. Functions include driving alarm lights. Solid state relays are used to provide a contact closure.

Use the **outputn?** command to check output labels for the connections and the **outputn=** command to change the output labels. For more information on the commands, see page 3-18.

This connector is a standard 8-pin modular jack. The on-resistance of the solid-state relay is specified to be ≤ 50 ohm. The solid-state relay switches load currents of 100 milliamps maximum. The user supplies a voltage source and output device. The voltage source should not be more than 80 volts DC. AC voltage sources are also supported.

The distance between the RMB AYC54 and the external device is determined by the user and depends on the voltage source, the wire gauge of the connecting wire, the amount of supply current available, and the current drain of the load. The length of the cable between this equipment and the contact closures should be less than 250 feet, to limit the amount of voltage surges induced from lightning.

**Table C-11. User-Definable output connector**

| RJ-45 Pin # | User-definable output # | Signal direction | Default label |
|---|---|---|---|
| 1 | 1 | Positive | External Faceplate Output 1 |
| 2 | 1 | Negative | |
| 3 | 2 | Positive | External Faceplate Output 2 |
| 4 | 2 | Negative | |
| 5 | 3 | Positive | External Faceplate Output 3 |
| 6 | 3 | Negative | |
| 7 | 4 | Positive | External Faceplate Output 4 |
| 8 | 4 | Negative | |

## RMB cables

The RMB uses several different cables, as shown in Figure C-4.

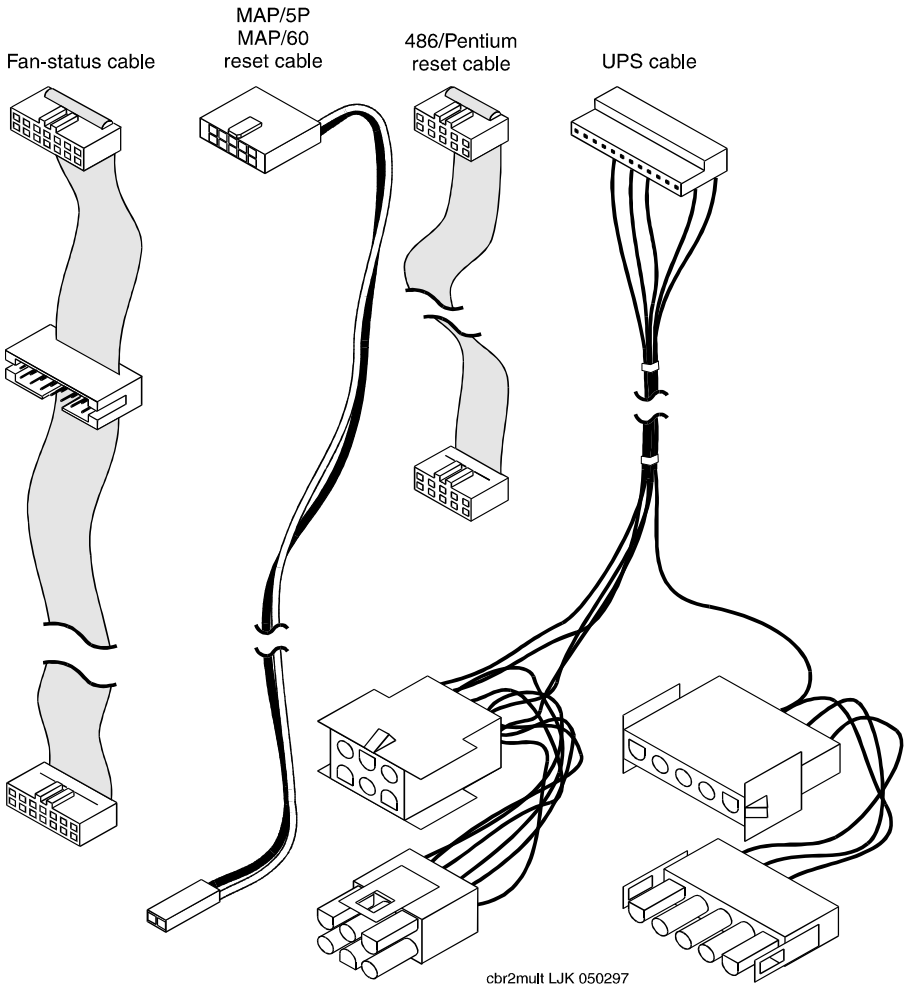


**Figure C-4. RMB cables**

## RMB ordering information

If you need to order an RMB or related equipment, use the comcodes or part numbers listed in Table C-12:

**Table C-12. RMB-related comcodes**

| Group | Part | Comcode/Part number |
|---|---|---|
| RMB | AYC54 | 107725467 |
| | AYC55 | 107765109 |
| Cables | 486/Pentium reset | 601436090 |
| | Fan status | 601436108 |
| | MAP/5P reset | 601844400 |
| | MAP/60 (MMCX) reset (Texas Micro Systems part number) | 23577/A KD03<br>9633 58961P |
| UPS Alarm adapter | Alarm adapter components (Exide part number) | B/M 101 690 007-001 |
| | Z3A2 Group 2 alarm adapter interface (old comcode) | 407274133 |
| | Z3A2 Group 2 alarm adapter interface and cable (new comcode) | 407691401 |

# RMB Specifications and Regulatory Information

# D

This appendix provides reference information about the operational requirements of the RMB and lists regulatory requirements. Included are:

- Environmental specifications
- Toll fraud
- Regulatory agency guidelines

## Environmental specifications

This section provides environmental, platform and terminal information about the operation of the RMB. This section also lists:

- RMB environmental specifications
- Compatible platforms
- Required platform resources
- Compatible terminals.

Table D-1, *RMB Requirements*, shows the basic requirements of the RMB.

**Table D-1. RMB environmental specifications**

| Item | Requirements |
|---|---|
| **ISA Form Factor** | The RMB complies with the standard form factor for PC-based cards and fits into a single ISA-bus slot. |
| **Environmental** | The RMB requires the following physical environment:<br>■ Stable environments where the ambient temperature can range between +5 and +55 degrees Centigrade<br>■ Stable environments where the operating relative humidity can range between 10% and 90% non-condensing<br>■ Environments where the short-term relative humidity can be a minimum of 20% and a maximum of 80% non-condensing<br>■ Storage, in the original shipping container, in relative humidity environment ranging between 5% and 95% non-condensing and for a temperature range between -40C and +60C |

*Continued on next page*

**Table D-1. RMB environmental specifications — *Continued***

| Item | Requirements |
|---|---|
| **Power** | The RMB requires the following power:<br>■ +5V and +12V<br>■ Not consuming more than 5 watts of power on the +5V ISA-bus line.<br>■ Power consumption on the +12V rail does not exceed 1 watt; on the -12V it does not exceed 0.3 watts; on the -5V rail it does not exceed 0.125 watts.<br>The -5V and -12V signals are brought onto the RMB for monitoring purposes only. -5V is required when the factory test cable is used. |
| **System** | The RMB operates in adjuncts running UNIX System Laboratories, System V, release 4.2, UnixWare version 1.1, UnixWare version 2.01 and above, Lynx version 2.3.<br>Applications that use color and/or direct screen memory updates are not supported.<br>The RMB functions in a system that contains Small Computer System Interface (SCSI) equipment. |

## Required platform resources

The RMB requires the platform resources shown in Table D-2, *RMB Required Platform Resources*.

**NOTE:**
The RMB accepts four-character hexadecimal entries, which is different than other system conventions. In this table, a BIOS memory address that may be written as DC00 is the same as 0xDC000 or DC000H in other notations. In the RMB, the last character is always 0, so its entry is assumed.

**Table D-2. RMB required platform resources**

| Item | Resource | Default |
|---|---|---|
| COM port | Administerable as COM 1 or 2, that is IRQ3 (I/O port address 02F8H) or IRQ4 (I/O port address 3F8H) | COM1: IRQ 4, I/O port address 03F8H |
| Port I/O address | Read and write semaphore port 180H (for semaphore)<br>Read port 80H (for POST codes) | Fixed at address 180H |
| DMA channel | none | not applicable |
| BIOS extension memory | No more than 4K of upper memory space, administerable in any 4K segment between C100H and FE00H | E100 |

## Compatible terminals

The RMB operates in remote mode with the VT 100 and any terminal that emulates the VT100 function.

# Toll fraud

This section defines toll fraud. Refer to it again when you see the symbol:

**SECURITY ALERT:**

This section also includes safety requirements.

*Toll fraud is the unauthorized use of your telecommunications system by an unauthorized party, for example, persons other than your company's employees, agents, subcontractors, or persons working on your company's behalf. Note that there may be a risk of toll fraud associated with your telecommunications system, and if toll fraud occurs, it can result in substantial additional charges for your telecommunications services. You and your System Manager are responsible for the security of your system, such as programming and configuring your equipment to prevent unauthorized use. The System Manager is also responsible for reading all installation, instruction, and system administration documents provided with this product in order to fully understand the features that can introduce risk of toll fraud and the steps that can be taken to reduce that risk. Lucent Technologies does not warrant that this product is immune from or will prevent unauthorized use of common-carrier telecommunication services or facilities accessed through or connected to it. Lucent Technologies will not be responsible for any charges that result from such unauthorized use.*

## Safety requirements

If there is an analog line coming from outside the building, as opposed to a PBX inside the building, then external sneak current protection is required. Two examples of sneak current protectors you can use are:

ITW-LYNX

SCP-1

## Regulatory agency guidelines

This section uses agency-required language and includes:

- FCC guidelines
- FCC statement
- Industry Canada Terminal Warnings

Follow the installation procedures in this document to ensure compliance with the current Federal Communication Commission (FCC) rules regarding radio frequency devices (FCC Rules, part 15) and FCC rules regarding connection of terminal equipment to the telephone network (FCC Rules, Part 68).

Also follow procedures for Industry Canada (IC) CS-03 installations when installing in Canada.

FCC/CSA/IC agency compliance labels are located on the rear surface of the chassis or individual circuit card.

Two labels are required in order to comply with FCC regulations. One label is located on the RMB AYC54 on the component side of the board. Figure D-1, *FCC Label Location*, shows the label in bold outline. A second label is provided to be permanently affixed to the back of the equipment cabinet.

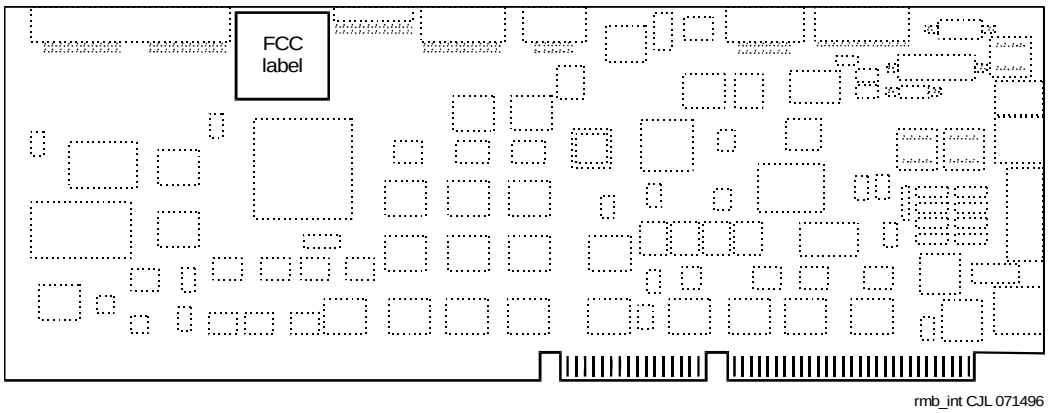


**Figure D-1. FCC label location**

## FCC guidelines

Follow the guidelines listed in this section to connect to the public telephone network and to comply with local telephone company procedures.

### Installation requirements

The mounting of the RMB in the final assembly must be made so that it is isolated from exposure to any hazardous voltages within the assembly. Adequate separation and restraint of cables and cords must be provided.

### Connection to the public telephone network

Before making any connections to the public telephone network, give the local telephone company the following information:

- Telephone and circuit numbers of the line to which the RMB will be connected
- FCC registration number of the RMB which is located on the upper left corner of the circuit card
- Ringer equivalence number (REN) of the RMB which is 1.0B

  **NOTE:**
  The REN is used to determine the quantity of devices which may be connected to the telephone line. Excessive RENs on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to a line, as determined by the total RENs, contact the local telephone company.

- The connection to the public telephone network is made via the RJ-11C line jack located on the faceplate of the circuit pack. This RJ-11C jack complies with Part 68, Subpart F requirements.
- Notice that this equipment is designed to be connected to the telephone network or premises wiring using a compatible modular cord which is Part 68 compliant.

### Type of telephone lines needed

Use the RMB with standard-device telephone line circuits.

Do not connect to telephone company-provided central office implemented systems (COIN) service.

Note that connecting to party line service is subject to state tariffs.

If you have any questions about the telephone lines, such as how many pieces of equipment can be connected to a line, contact the telephone company. It provides this information upon request.

The circuitry from the RMB to the telephone line must be provided in wiring that carries no other circuitry, unless specifically allowed by the Part 68 rules.

### Telephone company changes

Occasionally, the local telephone company changes its equipment, operations, or procedures. These changes can affect customer service or the operation of the customer's equipment. If this is the case, the telephone company provides notice, in writing, to allow the customer to make any changes necessary to maintain uninterrupted service.

### Telephone service and problems

**WARNING:**
*If any of the telephone equipment is not operating properly, remove it immediately from the telephone lines. Malfunctioning equipment can harm the telephone network.*

If the telephone company notes a problem with customer equipment, the telephone company:

- Discontinues service to the customer temporarily
- Notifies the customer as soon as possible
- Gives the customer an opportunity to correct the problem
- Informs the customer of the right to file a complaint with the FCC

### RMB repairs

In the unlikely event that repairs are needed for the RMB, replacement of the board is usually needed. Settings of the configuration may be changed, but there is no other software, firmware or hardware change that can be accomplished from an external location besides replacement.

### When to notify the telephone company

**WARNING:**
*Notify the telephone company immediately if the RMB is to be permanently or temporarily disconnected from its present line circuits.*

If you continually disconnect without giving notice, the telephone company can disconnect service permanently.

# Federal Communications Commission statement

## Part 15: Class A statement

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 instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user is required to correct the interference at his or her own expense.

## Part 68 network registration number

This equipment is registered with the FCC and complies with Part 68 of the FCC Rules.

Reg No.AS5USA-30598-MD-T

FIC 02LS2

REN 1.0B

# Industry Canada terminal warnings

## English

Notice: The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. The department does not guarantee the equipment operates to the user's satisfaction. Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that the compliance with the above conditions may not prevent degradation of service in some situations. Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions may give the telecommunications company cause to request the user to dislodge the equipment. Users should ensure, for their own protection, that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

**⚠ CAUTION:**

*Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.*

Notice: The load number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the sum of the load numbers of all the devices does not exceed 100.

## French

Avis: L'étiquette du ministère des communications du Canada identifie le matériel homologué. Cette étiquette prouve que le matériel est conforme a certaines normes de protection, d'exploitation et de sécurité des réseau de télécommunication. Le ministère n' assure toutefois pas que le matériel fonctionnera a la satisfaction de l'utilisateur. Avant d'installer ce matériel, l'utilisateur doit s'assurer qu'il est permis de le raccorder aux installations de l'entreprise locale de télécommunication le matériel doit également être installé en suivant une méthode acceptable de raccordement. L'abonné ne doit pas oublier qu'il est possible que la conformité aux conditions énoncées ci-dessus n'empêche pas la dégradation du service dans certaines situations. Les réparations de matériel homologué doivent être effectuées par un centre d'entretien canadien autorisé désigné par le fournisseur. La compagnie de télécommunication peut demander a l'utilisateur de débrancher un appareil a la suite de réparations ou de modifications effectuées par l'utilisateur ou a cause de mauvais fonctionnement. Pour sa propre protection, l'utilisateur doit s'assurer que tous les fils de mise a la terre de la source d'énergie électrique, des liges téléphonique et des canalisations d'eau métalliques, s'il y en a, sont raccordes ensemble. Cette précaution est particulièrement importante dans les régions rurales.

*L'utilisateur ne doit pas tenter de faire ces raccordements lui-même, il doit avoir recours a un service d'inspection des installations électrique, ou a un électricien, selon le cas.*

Avis: L'Indice de Charge (IC) assigné a chaque dispositif terminal indique, pour éviter toute surcharge, le pourcentage de la charge totale qui peut être raccordé a un circuit téléphonique boucle utilisé par ce dispositif. La terminaison du circuit boucle peut être constitue de n'importe quelle combinaison de dispositifs pourvu que la somme des indices de charge de l'ensemble des dispositifs ne dépasse pas 100.

# Glossary

## A

**action**
A response that the RMB takes to one or more events, depending on its configuration. For a major alarm, for example, the RMB could sound the platform speaker, close contacts to sound a local alarm, and initiate a panic call to INADS. Each of these responses are considered an action.

**action list**
The set of configured actions that the RMB takes in response to an event and its severity level.

**adjunct**
A separate system closely integrated with a switch, such as a Lucent INTUITY system or a call management system (CMS). Also called *platform*.

**administration**
The process of setting up a system (such as a switch or a messaging system) to function as desired. Options and defaults are normally set up (translated) by the system administrator or service personnel.

**alarm log**
A list of alarms that represent all of the active or resolved problems on a system. The alarm log is stored in the RMB and can be accessed either locally or remotely.

**alarms**
Hardware, software, or environmental problems that may affect system operation. Alarms are classified as *major*, *minor*, or *warning*.

**alarm number**
An event configured to take application-specific actions. In the event/action table, events 13-27 are reserved so that the application can assign specific actions.

**alphanumeric**
Consisting of alphabetic and numeric symbols or punctuation marks.

**American Standard Code for Information Interchange (ASCII)**
The most popular coding method used by small computers for converting letters, numbers, punctuation marks or control codes into digital form. Once defined, ASCII characters can be recognized and understood by other computers and communications devices.

**application**
A computer software program.

**ASCII**
See *American Standard Code for Information Interchange (ASCII)*.

**asynchronous communication**
A method of data transmission in which bits or characters are sent at irregular intervals and spaced by start and stop bits rather than time. See also *synchronous communication*.

**asynchronous transmission**
A form of serial communications where each transmitted character is bracketed with a start bit and one or two stop bits. The RMB provides asynchronous EIA-232 capabilities.

# B

**background testing**
Testing that runs continuously when the system is not busy doing other tasks.

**basic input/output system (BIOS)**
Program instructions that provide low-level control of peripheral devices, including status and error handling. Peripheral devices include keyboards, video, disks, printers and serial ports.

**baud**
A unit of measurement that describes the speed of transferred information.

**baud rate**
Transmission signaling speed.

**BEC**
See *BIOS extension code (BEC)*.

**binary digit (bit)**
Two-number notation that uses the digits 0 and 1. Low-order bits are on the right (for example, 0001=1, 0010=2, and so forth). Four bits make a nybble; eight bits make a byte.

**BIOS**
See *basic input/output system (BIOS)*.

**BIOS extension code (BEC)**
Platform hardware diagnostic software. The RMB checks the viability of the platform's components using a set of diagnostic tools when the machine starts up, if the BEC is enabled. The BEC switch and ForceBEC command must be set to *enable* for the test to run. If set to *enabled*, the user is given the option of running the diagnostic program or proceeding to normal operation at bootup.

**BIST**
See *built-in self-test (BIST)*.

**bit**
See *binary digit (bit)*.

**bits per second**
The number of binary units of information (1s or 0s) that can be transmitted per second. *Mbps* refers to a million bits per second; *Kbps* refers to a thousand bits per second.

**boot**
The operation to start a computer system by loading programs from disk to main memory (part of system initialization). Booting is typically accomplished by physically turning on or restarting the system. Also called *reboot*.

**boot code**
On-board firmware installed by the factory that is used to load the core firmware. Runs only on the RMB processor as it initializes.

**bps**
See *bits per second*.

**buffer**
A temporary storage area used to equalize or balance different operating speeds. A buffer can be used between a slow input device, such as a terminal keyboard, and the main computer, which operates at a very high speed.

**built-in self-test (BIST)**
RMB-specific hardware diagnostic software. It checks the viability of the RMB's components each time the board starts up.

**byte**
A unit of storage in the computer. On many systems, a byte is 8 bits (binary digits), the equivalent of one character of text.

# C

**card cage**
An area within the hardware platform that contains and secures all of the standard and optional circuit cards used in the system.

**central processing unit (CPU)**
The component of the computer that manipulates data and processes instructions coming from software.

**CCC**
See *Customer Care Center (CCC)*.

**clear to send (CTS)**
Located on Pin 5 of the 25-conductor RS-232 interface, CTS is used in the transfer of data between the computer and a serial device.

**CMOS RAM**
See *complementary metal oxide semiconductor (CMOS) RAM*.

**collocated**
A Lucent INTUITY system installed in the same physical location as the host switch.

**collocated adjunct**
Two or more adjuncts that are serving the same switch (that is, each has a connection to the switch) or that are serving different switches but can be networked through a direct RS-232 connection due to their proximity.

**comcode**
A numbering system for telecommunications equipment used by Lucent. Each comcode is a nine-digit number that represents a specific piece of hardware, software, or documentation.

**command**
An instruction or request given by the user or the system to the software to perform a particular function. An entire command consists of the command name and options.

**complementary metal oxide semiconductor (CMOS) RAM**
Memory which contains the platform's configuration information. CMOS RAM must have continuous power to preserve its memory, usually supplied by a lithium battery.

**configuration**
The particular combination of hardware and software components selected for a system, including external connections, internal options, and peripheral equipment.

**CPU**
See *central processing unit (CPU)*.

**CTS**
See *clear to send (CTS)*.

**Customer Care Center (CCC)**
One of the options the Lucent customer has for requesting support or repair service for a platform.

# D

**data communications equipment (DCE)**
Standard type of data interface normally used to connect to data terminal equipment (DTE) devices. The onboard RMB modem is a DCE.

**data terminal equipment (DTE)**
Standard type of data interface normally used for the endpoints in a connection. With the RMB, the remote terminal is the DTE, such as a VT100 or terminal emulation software.

**data terminal ready (DTR)**
A control signal sent from the data terminal equipment (DTE) to the data communications equipment (DCE) that indicates the DTE is on and ready to communicate.

**DCE**
See *data communications equipment (DCE)*.

**default**
A value that is automatically supplied by the system if no other value is specified.

**diagnostic testing**
A program run for testing and determining faults in the system.

**DIAGNP output codes**
Codes that are sent to the diagnostic status port to indicate that tests are in progress or that the tests have failed. These codes only apply to the MAP/40 and MAP/100. These codes are used prior to screen initialization and screen retrace verification.

**digital**
Discrete data or signals such as 0 and 1, as opposed to analog continuous signals.

**direct memory access (DMA)**
A quick method of moving data from a storage device directly to RAM, which speeds processing.

**disabled state**
The RMB operating state in which the board is inoperable because it failed its built-in self-test (BIST). Replacement of the RMB is necessary.

**display terminal**
A data terminal with a screen and keyboard used for displaying screens and performing maintenance or administration activities.

**DMA**
See *direct memory access (DMA)*.

**download**
1) The brief RMB operating state that loads the RMB operating firmware from the platform's hard drive to the board at each reboot or when requested. 2) A process in which files are requested and sent from an external location to the local system.

**DRAM**
See *dynamic random access memory (DRAM)*.

**DTE**
See *data terminal equipment (DTE)*.

**dual in-line package (DIP) switch**
A small switch, usually attached to a printed circuit card, in which there are only two settings: on or off (or 0 or 1). DIP switches are used to configure the card in a semipermanent way.

**dynamic random access memory (DRAM)**
The readable/writable memory used to store data on the platform. Must be continually refreshed due to its inability to store data longer than a few milliseconds. However, the chips are relatively inexpensive to manufacture and so are worth managing.

## E

**EIA interface**
A set of recommended standards developed by the Electrical Industries Association (EIA) that specifies various electrical and mechanical characteristics for interfaces between electronic devices such as computers, terminals, and modems. Also known as *RS-232*.

**EISA**
See *extended industry standard architecture (EISA)*.

**electrostatic discharge (ESD)**
Discharge of a static charge on a surface or body through a conductive path to ground. ESD can be damaging to integrated circuits.

**error message**
A message on the screen indicating that something is wrong and possibly suggesting how to correct it.

**errors**
Problems detected by the system during operation and recorded in the maintenance log. Errors can produce an alarm if they exceed a threshold.

**ESD**
See *electrostatic discharge (ESD)*.

**event**
An informational message about the system's activities. For example, an event is counted when the system is rebooted. Events may or may not be related to errors and alarms.

**event/action table**
The list of configured actions to be taken in response to certain events. Stored internally on the RMB.

**event counter**
A software device that tallies the number of times an event has occurred. If the number of times exceeds a configured amount, an action is taken.

**event message**
A text message that is transmitted to INADS when a configured event occurs, usually when an event counter passes a certain amount or another threshold is passed.

**extended industry standard architecture (EISA)**
A higher-performance alternative to the ISA bus standard. The electrical channel used for routing information or commands on the computer. EISA comes in 16- and 32-bit architectures.

## F

**FAILBEEP option**
A MAP/40 and MAP/100 diagnostics option that sends beep codes to the platform's speaker only if a fatal failure is detected. This code is used prior to screen initialization and screen retrace verification.

**field**
An area on a screen, menu, or report where information can be typed or displayed.

**file**
A collection of data treated as a basic unit of storage.

**filename**
Alphanumeric characters used to identify a particular file.

**file system**
A collection of related files (programs or data) stored on disk that are required to initialize a system.

**firmware**
The primary RMB software, which is downloadable from the platform hard drive. This software performs all of the primary RMB functions as described in this reference manual. Runs in the on-board processor. See *boot code* and *RMB software*.

**format**
To set up a disk, floppy diskette, or tape with a predetermined arrangement of characters so that the system can read the information on it.

## H

**hard disk drive (HDD)**
A high-capacity data storage/retrieval device that is located inside a computer. A hard disk drive stores data on nonremovable high-density magnetic media based on a predetermined format for retrieval by the system at a later date.

**hardware (HW)**
The physical components of a computer system. The central processing unit, disks, tape, and floppy drives are all hardware.

**HDD cable**
Hard disk drive cable. A ribbon cable that connects the HDD to the system.

**hertz (Hz)**
A measurement of frequency in cycles per second. A hertz is 1 cycle per second.

**HW**
See *hardware (HW)*.

**Hz**
See *hertz (Hz)*.

# I

**I/O**
Input/output.

**impaired state**
See *normal/impaired state* or *independent/impaired state*.

**INADS**
See *initialization and administration system (INADS)*.

**independent state**
During this state, a remote user is communicating directly with the RMB. Can be used to diagnose problems with the platform while retaining a modem connection, or to run diagnostics on the RMB without affecting the platform.

**independent/impaired state**
During this state, the RMB responds as during independent state, but some RMB component failed the BIST. Since some parts of the RMB are working properly, it can still be used temporarily. You can be determine the working parts by using the **ok?** command. However, the simplest action is to replace the RMB.

**industry standard architecture (ISA)**
The most common PC bus architecture. A bus is the electrical channel used for routing information or commands on the computer. ISA comes in 8- and 16-bit versions.

**initialization**
The process of bringing the RMB to a predetermined operational state. The start-up procedure tests hardware, verifies the firmware load, and starts normal service.

**initialization and administration system (INADS)**
A computer-aided maintenance system used by remote technicians to track alarms.

**input**
A signal fed into a circuit or channel.

**interface**
The device or software that forms the boundary between two devices or parts of a system, allowing them to work together.

**interrupt request (IRQ)**
Within a PC, a signal sent from a device to the CPU to temporarily suspend normal processing and transfer control to an interrupt handling routine.

**I/O address**
input/output address.

**ISA**
See *industry standard architecture (ISA)*.

**IRQ**
See *interrupt request (IRQ)*.

## K

**Kbps**
Kilobits per second; one thousand bits per second.

**Kbyte**
Kilobytes, or 1024 thousand bytes.

## L

**load**
The process of reading software from external storage (such as disk) and placing a copy in RMB memory.

## M

**maintenance**
The process of identifying system errors and correcting them, or taking steps to prevent problems from occurring.

**major alarm**
An alarm detected by software that affects at least one fourth of the ports in service. Often a major alarm indicates that service is affected.

**manloop equ true**
A diagnostic setting, that if set also with jumpers to POST, will send error messages to the system speakers, not to the screen.

**MAP**
See *multi-application platform (MAP)*.

**megabyte**
A unit of memory equal to 1,048,576 bytes (1024 x 1024).

**memory**
A device that stores logic states such that data can be accessed and retrieved. Memory may be temporary (such as system RAM) or permanent (such as disk).

**menu**
A list of options displayed on a computer terminal screen or spoken by a voice processing system. Users choose the option that reflects what action they want the system to take.

**minor alarm**
An alarm detected by maintenance software that affects less than one fourth of the ports in service, but has exceeded error thresholds or may impact service.

**modem**
A device that converts data from a form that is compatible with data processing equipment (digital) to a form compatible with transmission facilities (analog), and vice-versa.

**multi-application platform (MAP)**
The computer hardware platform used by the Lucent INTUITY system.

## N

**NMI**
See *Non-Maskable Interrupt (NMI)*.

**Non-Maskable Interrupt (NMI)**
A type of error signal that cannot be ignored, such as a RAM parity error.

**non-volatile RAM (NVRAM)**
The section of the processor that permanently stores information, even if platform power is shut off.

**normal state**
During this state, the RMB is used primarily as a pass-through to the platform. Commands sent from the remote user go to the platform's operating system.

**normal/impaired state**
During this state, the RMB responds as during normal state, but some RMB component failed the BIST. Since some parts of the RMB are working properly, it can still be used temporarily. You can be determine the working parts by using the **ok?** command. However, the simplest action is to replace the RMB.

**null**
Having no value. A dummy letter, letter symbol, or code group inserted in an encrypted message to delay or prevent its solution, or to complete encrypted groups for transmissions or transmission security purposes.

**NVRAM**
See *non-volatile RAM (NVRAM)*.

## O

**operating state**
An functioning mode of the RMB in which it can or does take certain actions that are different than during other modes. For example, during the normal operating state, the remote user communicates directly with the platform. However, during the independent operating state, remote users communicate directly with the RMB, and can then take diagnostic actions in the platform.

**operating system (OS)**
The set of software programs that runs the hardware and interprets software commands.

**operation support system (OSS)**
The set of TSO systems that: receive an alarm from a customer system, assign an expert system to address the alarm and/or begins the trouble ticket creation process.

**option**
A choice selected from a menu, or an argument used in a command line to specify program output by modifying the execution of a command. When you do not specify any options, the command executes according to its default options.

**OS**
See *operating system (OS)*.

**OSS**
See *operation support system (OSS)*.

# P

**panic dialout state**
During this state, the RMB takes control of the modem, drops the active call, dials and connects to the support center, sends a message, then disconnects. Occurs when events trigger action 51 or 52.

**password**
A character string recognized automatically by the RMB that allows a user access to RMB commands.

**password aging**
A feature that requires passwords to be changed after a defined set of criteria.

**PBX**
See *private branch exchange (PBX)*.

**pinouts**
The signal description per pin number for a particular connector.

**POST**
See *power on self test (POST)*.

**power on self test (POST)**
A set of diagnostics stored in ROM that tests components such as disk drives, keyboard, and memory each time the system is booted. If problems are identified, a message is sent to the screen.

**private branch exchange (PBX)**
An analog or digital telephone switching system where data and voice transmissions are not confined to fixed communications paths, but are routed among available ports or channels. See also *switch*.

**protocol**
A set of conventions or rules governing the format and timing of message exchanges (signals) to control data movement and the detection and possible correction of errors.

# R

**RAM**
See *random access memory (RAM)*.

**random access memory (RAM)**
The memory used in most computers to store the results of ongoing work and to provide space to store the operating system and applications that are actually running at any given moment.

**read-only memory (ROM)**
A form of computer memory that allows values to be stored only once; after the data is initially recorded, the computer can only read the contents. ROM is used to supply constant code elements such as bootstrap loaders, network addresses, and other more or less unvarying programs or instructions.

**real time clock (RTC)**
The section of the central processor that keeps time for the system. System events are controlled by and checked against this clock. The RMB also has an RTC that is used to time stamp messages sent to its buffer and to INADS.

**reboot**
See *boot*.

**remote access**
Sending and receiving data to and from a computer or controlling a computer with terminals or PCs connected through a telephone line or LAN connection.

**remote console**
Access to console commands and responses through a telephone line or LAN connection. Allows this access from any location, as long as technical limitations are addressed and correct password validation can be passed.

**remote maintenance**
The ability of Lucent personnel to interact with a remote computer through a telephone line or LAN connection to perform diagnostics and some system repairs. See also *remote service center*.

**remote maintenance board (RMB)**
The Lucent circuit pack that provides remote service center personnel with the ability to maintain or troubleshoot the application platform. The RMB also monitors the customer's platform and can send alarms when configured thresholds are reached. It is installed in the customer's platform and can be called by analog telephone line through the remote service center modem bank.

**remote service center**
A Lucent or Lucent-certified organization that provides remote support to Lucent customers. Depending upon the terms of the maintenance contract, your remote service center may be notified of all major and minor alarms and have the ability to remotely log in to your system and remedy problems. See also *remote maintenance*.

**remote terminal**
A terminal connected to a computer over a telephone line.

**REN**
See *ringer equivalence number (REN)*.

**request to send (RTS)**
One of the control signals on an EIA-232 connector that places the modem in the originate mode so that it can begin to send.

**ringer equivalence number (REN)**
A number required in the United States for registering your telephone equipment with a service provider.

**RMB**
See *remote maintenance board (RMB)*.

**RMBCMD**
The primary method of interacting with the RMB. Through this program, you can make queries of the platform or RMB and can set operating parameters, including the interface to the platform. **rmbcmd** runs on the RMB host platform, which must be operational. The commands can be used from normal state, independent state, or from diagnostics. Whether a command can be used depends on the security level and the RMB state.

**RMB manager**
A level of RMB security that allows the user certain capabilities, such as changing configuration settings or rebooting the platform. This level includes all capabilities of the RMB user.

**RMB software**
Runs in the platform's operating system. Used to administer and maintain the RMB. Includes RMBCMD, RMB_CUST , RMBALARM and other UNIX commands. See *boot code* and *firmware*.

**RMB state**
See *operating state*.

**RMB user**
A level of RMB security that allows the user to query about the platform's status, but not change settings.

**ROM**
See *read-only memory (ROM)*.

**RS-232**
See *EIA interface.*

**reset**
To restart or reboot the RMB or the platform. The RMB offers the unique ability of allowing remote users to reset the platform, if the platform has a reset cable attached.

**RTC**
See *real time clock (RTC)*.

**RTS**
See *request to send (RTS)*.

# S

**sanity**
A term used to describe the functional quality of the operating system, application, or the RMB. "Losing sanity" usually requires that the system must be stopped and restarted to return it to a reliable, correctly-operating level.

**SCSI**
See *small computer systems interface (SCSI)*.

**semaphore**
An encoded software message that is internal to the RMB or between the RMB and the platform. These messages are used to communicate certain relevant conditions, upon which actions can be taken by other parts of the system. This term is used to describe low-level operational communication; the user seldom needs to understand semaphore-level processing.

**severity level**
A configured response to an event or set of events that require action. Higher severity levels require that more serious and timely actions be taken. Severity levels include: warning, minor and major.

**SIMM**
See *single in-line memory module (SIMM)*.

**single in-line memory module (SIMM)**
A method of containing random access memory (RAM) chips on narrow strips that attach directly to sockets on the CPU circuit card. Multiple SIMMs are sometimes installed on a single CPU circuit card.

**shadow console**
Conceptually, the ability to view, through a remote console, the same commands and responses as the local console operator sees. This capability does not exist through the RMB. See *remote console*.

**small computer systems interface (SCSI)**
An interface standard defining the physical, logical, and electrical connections to computer system peripherals such as tape and disk drives.

**state**
See *operating state*.

**switch**
An automatic telephone exchange that allows the transmission of calls to and from the public telephone network. See also *private branch exchange (PBX)*.

**synchronous communication**
A method of data transmission in which bits or characters are sent at regular time intervals, rather than being spaced by start and stop bits. See also *asynchronous communication*.

**synchronous transmission**
A type of data transmission where the data characters and bits are exchanged at a fixed rate with the transmitter and receiver synchronized. This allows greater efficiency and supports more powerful protocols.

**system configuration**
See *configuration*.

# T

**Technical Support Organization (TSO)**
The set of remote service organizations that respond to and meet customer's requirements for support in using Lucent's set of products.

**terminal**
See *display terminal*.

**terminal type**
A number or name indicating the type of terminal from which a user is logging in to the system. Terminal type is the last required entry before gaining access to the display screens.

**tip/ring**
A term used to denote the analog telecommunications interface.

**T/R**
See *tip/ring*.

**TSO**
See *Technical Support Organization (TSO)*.

## U

**uninterruptable power supply (UPS)**
An auxiliary power unit that provides continuous power in cases where commercial power is lost.

**UNIX operating system**
A multi-user, multi-tasking computer operating system.

**upgrade**
An installation that replaces a circuit pack or system with a newer release.

**UPS**
See *uninterruptable power supply (UPS)*.

**user alarm counter**
The set of events that can be configured to respond to application-specific occurrences, including events 13-27. The application customizes the installation procedure to configure these events appropriately. See *alarm number*.

## V

**volt**
The unit of electromotive force required to produce a current of 1 ampere through a resistance of 1 ohm.

## W

**watt**
The unit of electrical power required to maintain a current of 1 amp under the pressure of 1 volt.

**window**
That portion of the user interface through which you can view system information or status.

# Index

## Symbols



## Numerics



## A



## B



## C

## D



## E



## F

## G



## H



## I



## L



## M

## N



## O



## P



## Q



## R

## S



## T



## U



## V

## W