Remote Maintenance Board (RMB)

CYN23AP and CYN24AP

PCI Version Release 1.0

Reference

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- Answered by the called station
- Answered by the attendant
- Routed to a recorded announcement that can be administered by the CPE user

This equipment returns answer-supervision signals on all DID calls forwarded back to the public switched telephone network. Permissible exceptions are:

- A call is unanswered
- A busy tone is received
- A reorder tone is received

Canadian Department of Communications (DOC)

Interference Information
This digital apparatus does not exceed the Class A limits for radio noise emissions set out in the radio interference regulations of the Canadian Department of Communications.

Le Présent Appareil Nomérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class A préscrites dans le reglement sur le brouillage radioélectrique édicté par le ministére des Communications du Canada.

Trademarks
See the section titled "About This Book."

Ordering Information
Order: Document No. 585-310-263
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European Union Declaration of Conformity
Avaya declares that the equipment specified in this document conforms to the referenced European Union (EU) Directives and Harmonized Standards listed below:

EMC Directive	89/336/EEC
Low-Voltage Directive	73/23/EEC

CE

The "CE" mark affixed to the equipment means that it conforms to the above directives.

About This Document

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

- Commands
- Remote access and security
- Events and actions
- Alarms
- Diagnostics
- 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.

Hardware and Software Versions

This document includes reference information for the PCI version of the Remote Maintenance Board.

The RMB consists of the following circuit packs:

- CYN23AP (comcode 108736067) for domestic use

  or

- CYN24AP (comcode 108736075) for international use

How This Document Is Organized

This document has nine chapters and five appendices:

- Chapter 1, ‘‘Introduction to the RMB’’, defines the RMB, its features and capabilities, functional and physical descriptions, and requirements.
- Chapter 2, ‘‘Remote Access’’, describes the RMB remote access feature. It also provides information about security under the platform and at host reset.
- Chapter 3, ‘‘Security and Authentication Methods’’ describes the security measures and the authentication systems for accessing the RMB.
- Chapter 4, ‘‘Troubleshooting’’ explains troubleshooting procedures for dealing with the RMB.
- Chapter 5, ‘‘RMB Commands’’, describes the levels of operation, types of users, and command requirements.
- Chapter 6, ‘‘Events and Actions’’, describes the RMB monitoring feature and the resulting events and actions.
- Chapter 7, ‘‘Alarms’’, describes alarms and how the RMB contacts the INADS system.
- Chapter 8, ‘‘Configuring the RMB’’, covers configuration programs, remote management process and onsite process.
- Appendix A, ‘‘Modem Communications’’, lists the 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, ‘‘Physical Description’’, lists the physical aspects of the RMB.
- Appendix C, ‘‘RMB Specifications and Regulatory Information’’, lists RMB environmental requirement information, as well as information required by regulatory agencies.

This document also includes a glossary and a cross-referenced index.

Conventions Used

The following conventions are used throughout this document.

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

Related Documentation

To protect against toll fraud, see the *BCS Products Security Handbook*, document number 555-025-600.

Trademarks and Service Marks

The following trademarked product is mentioned in this document:

- Hayes® is a registered trademark of Hayes Microcomputer Products, Inc.

Introduction to the RMB

1

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

- RMB use overview
- RMB definition
- 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 remotely 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.

RMB Definition

The RMB is an add-on hardware card targeted for a Peripheral Component Interconnect (PCI) PC. The RMB provides the following capabilities and features through its own firmware and hardware:

- Continuous monitoring of environmental and hardware conditions indicating the system's health as well as statusing the health of the operating system. When any condition exceeds an administered level, the RMB might respond with one or more actions, such as calling INADS.
- Services access through 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 (as long as power is on). 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 most of the capabilities of the local console.
- RMB hardware verification by means of a Built in Self-Test (BIST), which executes when the RMB is started or reset.

In addition to the hardware/firmware, there is also a software package (which runs on the host platform) comprised of the following processes:

- Communications daemon (**rmbd**)
- Log daemon (**rmblogd**)
- Sanity (heartbeat) daemon (**rmbdaemon**)

RMB Models

The RMB consists of 2 circuit packs.

- For domestic markets, the RMB circuit pack is CYN23AP.
- For global markets and external modem applications, the RMB circuit pack is CYN24AP.

Supported Platforms

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

- MAP 5P
- MAP 40/40P
- MAP 100P
- Message Store Server-S V1 (standard model)
- Message Store Server-S V1 (high availability model)

Supported Operating Systems

The RMB is compatible with the following operating systems:

- Linux 2.2 or greater
- UNIX 1.1 or greater

TSC Tools Compatibility

- RPSD lock and key
- PCS (Password Change System)
- DynaComm
- Connect2
- ASG Key Changer
- ASG Mobile
- ASG Guard
- Exceed
- PIE

Functional Overview

This section describes:

- Connectivity view
- Operating states
- RMB interfaces
- Flash PROM code integrity

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 RMB is connected to the platform that it supports and to services remote support.

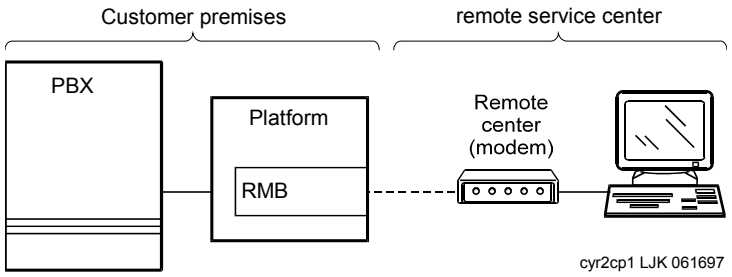

Figure 1-1. Conceptual RMB connections

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

Operating States

The RMB operates in one of the following states:

- Normal
- Independent

- Panic Dialout
- Built-in self-test
- Download
- Impaired
- Disabled
- Authentication

The RMB typically operates in Normal state. Figure 1-2 on page 1-6 gives a visual overview of how the RMB can either place itself or be placed in the various states. Table 1-1 on page 1-7 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.

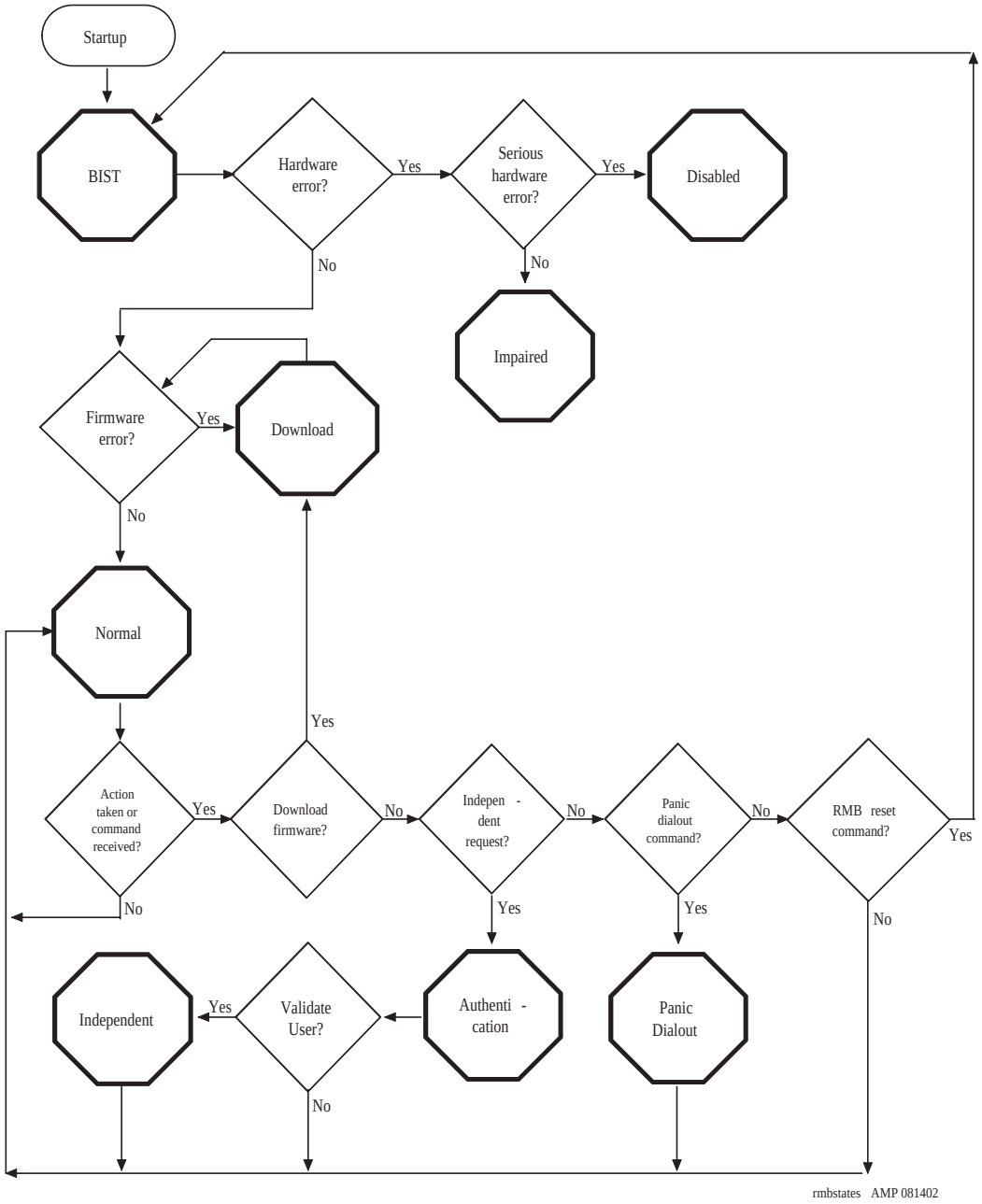

Figure 1-2. RMB states process flow

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 1-8.
	Capabilities	The RMB continuously monitors events and executes actions.The modem is available for platform use, for both placing and receiving calls. The 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 5-4.
Independent	**Cause**	■ RMB takes action 89 or receives the appropriate command. (See ‘‘Actions’’ on page 6-5) or ■ The escape sequence is pressed: Ctrl **c** Ctrl **c** Ctrl **c** or ■ The Com port is set to 0 via the **modem=** command. See the explanation of the **modem=** command on page 5-18.
	Capabilities	The RMB continuously monitors events and executes actions. The RMB uses the modem to send alarms. Most RMB commands can be used.
	RMB Action	RMB controls the modem. Events are still monitored and actions are taken.

Continued on next page

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

Download	**Cause**	The RMB: ■ finds an out-of-date or bad firmware image after restart of the communications daemon ■ receives a user request for a firmware update. ■ finds an out-of-date or bad firmware image after a reboot
	Capabilities	None.
	RMB Action	The RMB downloads firmware into its flash PROM from the platform's operating system. All other RMB functionality is disabled during this time.
Panic Dialout	**Cause**	Action 52 or 54 is performed. (see ''Actions'' on page 6-5.)
	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: ■ The RMB is powered up via the platform power switch ■ The RMB reset switch is pressed for 3.5 seconds or more ■ 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 non-disabling 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. Modem functionality may permit access to the RMB to troubleshoot the system. See Appendix C, ‘‘Diagnostic Codes’’.
	RMB Action	The RMB operates to the fullest extent possible. **NOTE:** *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 disabling or fatal problem with the processor complex or any problem that could degrade the host platform. The RMB and its modem are shut down. **NOTE:** *The presence of Disabled state means RMB replacement is required.*

Continued on next page

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

Authentication	**Cause**	■ A remote caller connects to the RMB when the platform is unavailable. ■ A remote caller escapes to the RMB from the Normal state. ■ An authenticated RMB Independent state user issues the **manager** command. ■ Upon reconnect, if disconnected while using system console redirection feature, if provided, or hardware diagnostics.
	Capabilities	The RMB continues to monitor events, execute actions, and respond to requests.
	RMB Action	RMB has control of the modem. The RMB issues a login prompt and ASG challenge or requests a password.

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, be aware that the modem connection may be dropped. 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 **normal!** command.

  The RMB returns to Normal state.

- Normal to Download, use **/rmb/bin/rmbdld** from the Linux prompt as shown in Table 5-7 starting on page 5-49.

Local, User-invoked Changes to Other States

If you want to change from Normal state to Download, use **/rmb/bin/rmbdld** from the operating system prompt as shown in Table 5-7 starting on page 5-49.

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.
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 firmware, which then goes to Normal state.
   - — corrupt, the RMB goes to Download state until the download succeeds.

RMB User Interfaces

The RMB has two 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 access to RMB commands. rmbcmd is used to send queries about system status or to change RMB settings. rmbcmd is used during Normal state only and can be run from the console, a network session, or a dial-in session. User must be authorized in the usertab. Authorization can be granted or removed by the use of **/rmb/bin/editUserTab**. See ‘‘editUserTab Application’’ on page 5-2.
- Independent state. Remotely 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 environmental status of the hardware platform, regardless of its operating state. Most RMB commands are available to interact with the operating system via specific commands when the operating system is up and running, but direct access to the operating system is not possible via the RMB Independent state.

Each of these interfaces is used with specific parts of the RMB and is in addition to the transparent, remote access provided to the platform.

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

	RMB Commands	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, 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 the 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 is older than what is stored on the platform. Download state loads a new copy of the firmware into the FLASH PROM. See Figure 1-2 on page 1-6 for more information.

Remote Access

2

Remote Access Overview

The RMB CYN23AP provides remote access to a host platform through the use of its internal Hayes-compatible modem. The CYN24AP provides remote access through an external modem. The CYN23AP/24AP can provide access to the host platform even when the operating system can no longer respond.

The RMB has three different remote access views:

- Normal state
- Independent state
- Diagnostics

This chapter describes the remote access to the RMB in these three remote access views. It includes:

- Remote access methods
- Remote access features

rmbmgetty Program

The traditional **mgetty** program is delivered with the operating system. It is designed to use Hayes-compatible data and data/fax modems. The **mgetty** program monitors a modem port and offers the dialed-in user a login prompt.

rmbmgetty is a customized mgetty program that is designed to support the RMB. **rmbmgetty** differs from the mgetty program in the following ways:

- Does not support fax transmissions
- Recognizes when the RMB is in Independent state

- Recognizes when the remote users runs a **Normal!** command and issues a login prompt
- Recognizes when the system has been rebooted and the modem is still connected and issues a login prompt

rmbmgetty should be used only with the RMB port.

For help in troubleshooting **rmbmgetty**, see “Troubleshooting rmbmgetty” on page 4-17.

Remote Access Methods

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

On-Board Modem

The RMB CYN23AP 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 CYN23AP’s on-board modem supports a set of common Hayes commands. The RMB CYN23AP firmware uses the modem with the same set of Hayes commands. It can use the modem, as needed, without regard to how it is configured.

For complete information on Hayes commands, see Appendix A, “Modem Communications”.

NOTE:
The RMB is shipped with a recommended configuration for the card and its modem. Be careful when modifying a setting, as changing the default modem configuration may significantly impact serviceability of the system.

External Modem

The RMB CYN24AP must be connected to an external modem.

Supported modems include, but are not limited to:

ASG Guard
Paradyne 3820
Paradyne 3910
Paradyne 3910 (international)
US Robotics 56k modem (38400 Baud)
US Robotics 56k modem
US Robotics 33.6k Faxmodem

Other modems can be configured to work with the RMB CYN24AP.

Terminals Supported

Any terminal emulation package supported by the operating system can be used to log in to the platform or reach the RMB's Independent state.

TSO access to the remote diagnostics and console redirection (if available) requires the use of a remote terminal emulation package and terminal type. These are:

- Supported terminal packages are DynaComm and Exceed.
- The recommended terminal type is ANSI-G.

Remote terminal software packages can be used from a server or a personal computer. Remote modem communication can be accomplished through a terminal server, a modem pool, or an individual modem.

Remote Access Features

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

Remote Session

The RMB remote session provides a unique feature. The host platform can be reset or rebooted at any time from the remote console, and the line will not be dropped during the reboot process. Any data sent to the RMB's COM port after the reboot process is sent to the remote console.

> **NOTE:**
> *It might take several minutes to see the operating system prompt when calling in to the remote platform. If the prompt does not appear after a reasonable amount of time, press* ENTER *several times, at approximately one minute intervals. If that doesn't work, then drop the call and try again.*

The remote session can also be used to run the RMB platform diagnostics.

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 -p** command by request of the platform's operating system.
- Independent state, the RMB controls the modem. Many of the same rmbcmd commands are still available.

Figure 2-1 on page 2-5 shows RMB access paths based on the user's location and the operating state.

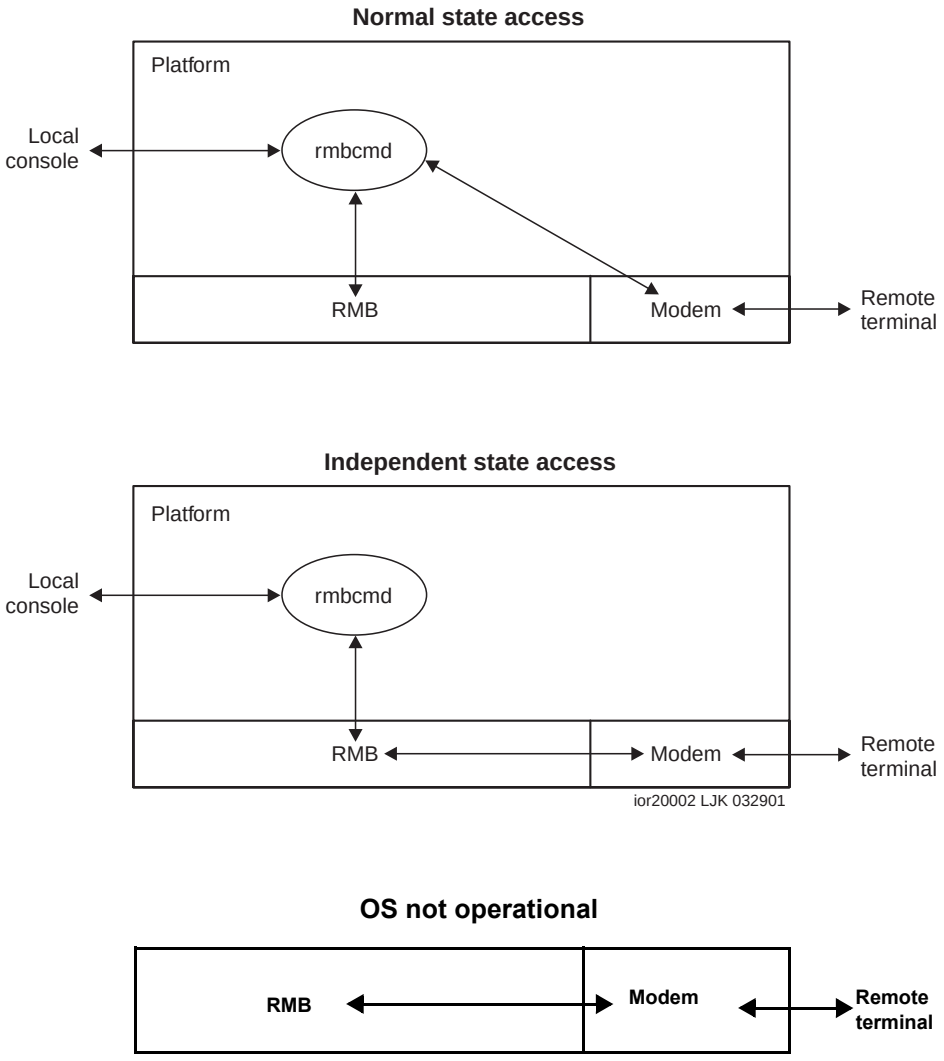

Figure 2-1. Operating state and location access differences

Security and Authentication Methods

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The RMB security consists of:

- Two different security levels:
  - User
  - Manager
- Two different authentication systems
  - Static password
  - Access Security Gateway (ASG)
- Two operating states (explained in “Operating States” on page 1-4)
  - Normal
  - Independent
- Two user locations
  - Local
  - Remote

This chapter

- Explains the security levels
- Explains the two different authentication systems
- Describes the procedures for using each authentication system for each remote access state
- Shows how all of these systems interrelate in the security procedures

NOTE:
Although the main audience of this book remotely accesses the RMB, this chapter sometimes refers to local users because the authentication systems vary somewhat for local versus remote users.

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 or authentication system.

- User level

  Has access primarily to queries about system status and RMB settings.

- Manager level

  Has all the access privileges of a user and can change system settings and reboot the host platform, if required.

Information about accessing the RMB at these levels and changing levels is explained in “RMB Authentication Systems” on page 3-3.

RMB Authentication Systems

Your system is set up for either static password or Access Security Gateway (ASG) user authentication.

NOTE:
*After logging in to the platform, you can bypass either authentication system by using the **rmbcmd -p** command. See "Recovering/Resetting Default Static Passwords or ASG Keys" on page 3-8.*

For security coverage requirements, see the following table.

Table 3-1 System BIOS console redirection features and RMB states.**

System feature	Remote with RMB (ASG)	Local console (ASG)	Remote with RMB (static)	Local console (static)
CMOS setup**	ASG user/manager on reconnects	not required	User on recon-nects	not required
Hardware diagnostics	ASG user/manager on reconnects	not required	User on recon-nects	not required
Independent state - user	ASG user	N/A	user	N/A
Independent state - manager	ASG manager	N/A	manager *	N/A
rmbcmd user Linux	ASG user	ASG user	user	user
rmbcmd man-ager Linux	ASG manager	ASG manager	manager *	manager *

* Requires one to become authenticated as user first.

** Only if system console redirection is provided by the platform vendor.

Static Password Authentication

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:

- In the factory, for testing purposes.

- By the technician, for programming the customer INADS identification number.
- By remote services, until the password is automatically changed by the Password Change System (PCS).
- An RMB application is available from the TSO to restore user and manager static passwords back to the default.

Changing Passwords

In the case where 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.

Static Passwords Procedures

The static password procedures are the same in these states:

- Normal local
- Normal remote

Password Procedure In Normal (Remote or Local) State

User must first pass operating system security and log in to the platform. User must be authorized in the usertab.

To use RMB from the operating system, enter the **rmbcmd -p** command. The usertab entries determine the access level.

The Normal prompt appears. The prompts are:

- User prompt: `User:`
- Manager prompt: `Manager:`

You can now enter any command appropriate to your level.

Password Procedure in Independent State

When a user performs one of the options to change from Normal to Independent state, the RMB requests the user password.

- If the correct password is entered, the user-level RMB prompt displays and query commands can be used. To switch to manager level, enter the **manager** command.

  The remote independent prompts are:

  — User prompt: `RMB?`

  — Manager prompt: `RMB!`

- If the correct password is not entered or 30 seconds pass with no input, the call is dropped.

Changing from Independent to Normal state

You can exit the RMB using the **normal!** command to go back to Normal state.

Changing from Manager to User Level (Independent State Only)

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

- The host platform is turned on or rebooted

  NOTE:
  If you are logged on remotely and the system changes state, the call may be dropped.

- The **rmbreset!** command is executed.
- The reset button on the RMB faceplate is pressed.
- The **user** command is executed.

CAUTION:
Two sessions on the RMB are possible at one time, with one on the local console and one through the modem. This action should not be used, as the RMB is not designed to handle two sessions at the same time.

See Chapter 5, ‘‘RMB Commands’’ for more information about the commands available for each privilege level.

ASG Authentication

Default Keys

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

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

- In the factory, for testing purposes
- By the technician, for programming the customer INADS identification number
- By remote services, until the keys are automatically changed by the ASG Key Changer Tool

An RMB application is available from the TSO to restore user and manager keys back to the default.

Changing Keys

You change the keys using the ASG Key Changer tool.

ASG Procedures

The ASG procedures are the same in these states:

- Normal local
- Normal remote

The ASG procedure is different in:

- Independent remote.

ASG Procedure in Normal (Local or Remote) State

User must first pass operating system security.

To use RMB:

Enter the **rmbcmd -p** command.

The Normal prompt appears. The prompts are:

- User prompt: `User:`
- Manager prompt: `Manager:`

You can now enter any command appropriate to your level.

ASG Procedure in Remote Independent State

If a remote user initiates the Independent state escape sequence from the Normal state or the RMB is already in Independent state, the `Login:` prompt displays.

Perform these steps:

1. Enter **user** or **manager**.

   A challenge appears.

2. Enter a response to the challenge.
   - — If the response is accepted before the login time expires, the remote independent RMB prompt displays and the remote user can enter commands.

     The remote independent prompts are:

     - — User prompt: `RMB?`
     - — Manager prompt: `RMB!`
   - — If the response is not accepted before the login time expires, the RMB drops the remote caller. The system gives you 3 attempts in 30 seconds to enter the correct response.

Changing from Manager to User Level (Independent State Only)

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

- The host platform is turned on or rebooted.

  NOTE:
  If you are logged on remotely and the system changes state, the call may be dropped.

- The **rmbreset!** command is executed.
- The reset button on the RMB faceplate is pressed.
- The **user** command is executed.

CAUTION:
Two sessions on the RMB are possible at one time, with one on the local console and one through the modem. This action should not be used, as the RMB is not designed to handle two sessions at the same time.

Recovering/Resetting Default Static Passwords or ASG Keys

An RMB application, **rmb_restore_defaults**, restores default passwords and keys. **rmb_restore_defaults** can be downloaded and executed only by Avaya Tier 3 support personnel and only in the rare event of password/key loss. You must run **rmb_restore_defaults** from Linux. **rmb_restore_defaults** removes itself after being used.

Whenever static passwords or secret keys are set to default by Tier 3, this information must be provided to the Database Administrator (DBA) Group. The Password Change System (PCS) is used to change static passwords only. **rmb_restore_defaults** is incorporated into PCS so that if PCS has access to the system, it can be used to change the passwords on all RMB releases back to default and provide new active passwords. The ASG Key Changer tool is used to change the ASG keys only.

Protecting BIOS Console Redirection, If Provided, or Hardware Diagnostics

Static Password Procedure

- If the correct user password is entered at the `password:` prompt, the remote user will enter the System BIOS Console Redirection screens or hardware diagnostics and CMOS setup screens, DOS, etc.
- If the correct user password is not entered, or 30 seconds pass with no input, the call will be dropped.

ASG Procedure

- If the correct user or manager login is entered at the `ASG Login:` prompt, the remote user/manager will enter the System BIOS Console Redirection screens or hardware diagnostics and CMOS setup screens, DOS, etc.
- If the challenge is not accepted before the login time-out expires, the RMB drops the remote caller. The system gives you 3 attempts in 30 seconds to enter the correct response.

NOTE:
The prompts for System BIOS Console Redirection, if provided, or RMB hardware diagnostics and the Independent state are exactly the same. At this point it is not known to the remote user/manager what state the RMB is in. If after authenticating, no Independent state prompt appears, one can assume the System BIOS Console Redirection, if provided, or RMB hardware diagnostics feature has been accessed and the appropriate screen should appear.

Troubleshooting

4

NO Console Login Prompt (No Access via RMB Modem)

Before You Begin

To diagnose this problem, you must first consider which operating system is being used and what service is providing the login prompt.

- The Victory platform is built on Red Hat's distribution of the Linux operating system. The program that is used to service serial communications is known as mgetty. This program is provided by Red Hat and is compiled from publicly available source code.

  The RMB has a highly modified version of this program known as rmbmgetty. rmbmgetty is started by the init process. It is init's responsibility to assure rmbmgetty is constantly running. When a user dials in, rmbmgetty waits for the "RING" result code from the modem to begin processing an inbound call. At this point, it issues an ATA string to the modem advising it to answer the call. It then looks for the CONNECT message so it can call the login process. In Linux systems, rmbmgetty monitors port **/dev/ttyS*x*** (where ***x*** is the comport number –1).

- The INTUITY AUDIX platform, on the other hand, is built on the UnixWare operating system. This is a self-contained proprietary operating system that has been modified by Santa Cruz Operations (SCO) from System V UNIX. Unixware implements port monitors with the use of the Service Access Controller (SAC) for handling logins through its registered ports.

The port the RMB is on must have a port monitor and it must be enabled. This can be confirmed by typing **pmadm –l –p alarm**. The RMB uses the port **/dev/alarm** which is a virtual device that is symbolically linked to the comport's hardware flow control **/dev** file. This is typically **/dev/term/0xh**.

Problems that can cause the RMB to not provide a login prompt include:

- Cabling problems
- Improper configuration
- Defective hardware
- Defective RMB
- System corruption

Cabling Problems

NOTE:
In the following process, do not place tension on any cables or cords. This process should take no force. If the cord or cable cannot be removed by gently pulling on it, then the connection is probably okay.

Check the cable connections:

3. Ensure that the cables are connected solidly to the RMB, host platform, and external modem (if so equipped).
   - For RMBs that have internal modems, a standard modular telephone cord with an RJ11 connector is secured to the RMB with an RJ11 jack. This connector is located towards the upper edge of the faceplate and can be difficult to reach to connect or disconnect the line. Gently pull on the cord and see if it becomes disconnected from the RMB. If it does, the barb may be broken or defective. If so, try replacing the cord and see it that resolves the problem.
   - Some RMBs will be equipped with an extender to facilitate removing and installing the cord. Gently pull on the extender first and then gently attempt to pull the extender and cord apart. If that doesn't resolve the problem, try removing the extender and connecting the cord directly to the RMB.

     NOTE:
     A bad or missing telephone cord should actually produce a ring-no-answer (RNA) condition.

4. Check to see if the COM port to RMB cable (if equipped) is connected properly and securely.

   On a CYN series RMB, it should be connected to the RMB with a D8W cord and an RJ45 jack located towards the center of the faceplate. The opposite end should be connected to a 9 pin DB-9 serial port adapter which is supplied with the RMB. The serial port adapter should in turn be connected to one of the platform's available COM ports.

   a. Check to make sure it is connected to the correct port. Again, gently try to remove the adapter from the platform. If it disconnects without force or has any movement, then check to make sure the screws that attach it to the platform are secure.

   b. Next, make sure the cable is securely connected to the RJ45 connector again by gently pulling on it. If it becomes disconnected, then the cord should be replaced.

   c. If the RMB is connected to an external modem, then you will need to check the cable between the RMB and the modem. On a CYN24, the connector for the serial port is an RJ45 style jack located directly above the comport connector. The ports look identical and it is possible that they may be swapped which could also be a cause for

a no login prompt condition. This is a problem because the modem may answer the call, but the platform will not have any connectivity to it for handling its communication. The AYC series board employs a standard 9 pin RS-232 DB-9 type connector.

5. Again, test each connector to make sure it is properly seated and in good condition as stated above.

NOTE:
It is important that only approved cabling be used. For instance if a cable is inserted in the communications path that has the RD and TD leads swapped, communication would stop at the modem and no login prompt would be generated.

Improper Configuration

Checking Configuration of All Systems

The comport speed is the digital data rate that occurs between the modem's UART (a.k.a. DCE) and the platform's UART (a.k.a DTE). The modem speed is the line rate negotiated with another analog modem. It is important the speed settings match between the platform's comport and the RMB's serial port. This speed is a fixed rate and does not auto-negotiate. There is no user method available for verifying the actual speed on the comport matches the speed of the RMB's serial port, so visual confirmation of the speed settings is required. If the platform's comport speed and RMB's serial port speed do not match, it can cause the platform to not present a login prompt, or cause garbage to be generated. The O/S specific sub-sections below discuss how to perform a visual confirmation of the speed configuration for its respective login service. However, it should be noted that setting of the **modem=** command is for the comport speed, not the modem speed. Modem speeds are always auto-negotiated.

Some BIOS allow the enabling and disabling of the communications ports. Check the platform's BIOS and determine the port the RMB is using is disabled for AYC series RMBs and enabled for all others before proceeding.

NOTE:
CONVERSANT assigns the RMB to COM port 1 and INTUITY AUDIX assigns it to COM port 2. ***/dev/alarm*** *should follow these settings.*

NOTE:
IMPORTANT: The RMB must always be set up to use hardware flow control. Using the wrong type of flow control should not prevent a login prompt from occurring, but could have undesirable side effects that could hamper your diagnostic efforts.

1. Using a separate connection or utilizing an on-site technician, log onto the platform and type **ls –l /dev/alarm** from the command line.

A line should be generated similar to one of the following examples.

Linux systems:

```
lrwxrwxrwx    1 root     root          10 Aug 21 08:02 /dev/alarm -> /dev/ttyS1
```

UnixWare Systems:

```
lrwxrwxrwx    1 root     other        13 Jul 22 17:55 /dev/alarm -> /dev/term/01h
```

or

```
lrwxrwxrwx    1 root     other         13 Jul 22 17:55 /dev/alarm -> /dev/tty01h
```

The “h” designation in the UnixWare systems indicates it is used for hardware flow control.

Adding one to the number shown in the device file name yields the COM port number the RMB is using.

2. Make certain **/dev/alarm** is pointing to the correct tty device being used by the RMB. Pointing to the incorrect tty device can cause there to be no login prompt. There are several scripts in the **/mtce/bin** and **/mtce/tools** directories that can cause the port to be changed or the port monitor to be reconfigured.

NOTE:
*IMPORTANT: You must check the modem manufacturer’s documentation for their Hayes settings. There may be differences. An incorrect Hayes command can disable the modem or give the appearance that the modem is in a non-functioning state. Only the modems listed in **/rmb/bin/rmbmodem** have been tested with the RMB and contain the correct Hayes commands for them.*

3. Check the init string. This requires checking in multiple locations. There are two principle things that you are looking for.

   NOTE:
   You must consult your modem’s documentation, as virtually all modem manufacturer’s have some variations on the Hayes commands and factory defaults.

   - Check to see that a Hayes command is setting the modem to always assert DSR.

     This is usually &S0 which is usually a default (&F) setting. While technically this will not cause a no login prompt condition, it can give the appearance that the modem is locked up. DTR MUST be asserted, or the RMB will not communicate with the modem. Any further efforts to get the RMB to work with the modem will end until DSR is reasserted.

   - Check to make sure the modem is set to display result codes.

This setting is typically Q0 and V0, which again are typically the defaults. This is particularly important for rmbmgetty as it begins its routines when it sees the “RING” result code. rmbmgetty’s interaction with the modem is very dependent on the appearance of the result codes.

Checking Configuration on UNIX systems

1. Type **pmadm –l –p alarm** or **pmadm –l –p serial**

   Output similar to the following should be displayed:

```
pmadm -l -p serial
PMTAG          PMTYPE         SVCTAG         FLGS ID       SCHEME   <PMSPECIFIC>
serial          ttymon          rMb            u    -         login  /dev/alarm
br 0 /usr/bin/shserv 60 38400 ldterm login:  - - - -  #
```

2. Make sure that **/dev/alarm** is displayed.
3. This output also displays the speed the port monitor is setting the port to. This speed should match the **modem=** setting.

   NOTE:
   Important: If another communications program uses the COM port at a different speed than that shown above, UnixWare will not reset it if the port monitor has already been started. Therefore, this is not a good indication of the platform’s speed setting.

   If you must reset the COM port’s speed, continue with one of the following procedures:

   NOTE:
   *All of the commands listed below can be executed one at a time from the RMB’s Independent state by typing **system! <command>**. Do not gang multiple commands as this could have undesirable results. For example, typing the following at the RMB! prompt:*
   system! ttymonSetup
   causes the ttymonSetup script to be executed on the platform. Typing
   system! sacadm –p serial –d; sacadm –p serial –k; sacadm –p serial –s; sacadm –p serial –e
   *causes all four commands to be run. This may not perform as expected, since some of these routines depend on the positive results from the previous commands (for example, **sacadm –p serial –e**).*

   - If the port monitor is functioning, run **/rmb/bin/ttymonSetup**.

     Running **/rmb/bin/ttymonSetup** takes approximately one minute to execute and should resynchronize the port monitor to the COM port.

- If the port monitor is disabled or not running, use the following procedure to reenable the port monitor and reset the COM port's speed.

  1. Type **sacadm –l –p serial** or **sacadm –l –p alarm**.

     Something similar to the following should be displayed:

```
sacadm -l -p serial
PMTAG          PMTYPE         FLGS RCNT STATUS     COMMAND
serial         ttymon         -    2    ENABLED    /usr/lib/saf/ttymon #
```

  2. Check that the status is either ENABLED or STARTING. Anything else indicates that the port monitor is experiencing a problem.

  3. To clear the problem, try typing the following commands

     sacadm –p serial –d
     sacadm –p serial –k
     sacadm –p serial –s
     sacadm –p serial –e

  4. Rerun **sacadm –l –p serial** or **sacadm –l –p alarm**.

     The status will most likely show STARTING. Again, only a status of STARTING or ENABLED will work. If this does not occur, either the port monitor is corrupted or a hardware condition is preventing it from starting. If that is the case, escalate the problem for further investigation.

  5. Check that only one ttymon command is running on the port. Do this by typing **sacadm –l**.

  6. If there is, then check to see which should be removed. For instance, if you see the following after entering the **sacadm –l** command:

```
PMTAG          PMTYPE         FLGS RCNT STATUS     COMMAND
alarm          ttymon         -    0    ENABLED    /usr/lib/saf/ttymon #
inetd        inetd        -   0   ENABLED   /usr/sbin/inetd #internet daemon
serial         ttymon         -    2    ENABLED    /usr/lib/saf/ttymon #
tcp            listen         -    3    ENABLED    /usr/lib/saf/listen -m
inet/tcp0 tcp 2>/dev/null #
```

     then type **pmadm –l**. Look for a port monitor that is running the rMb service. Disable and remove any OTHER port monitors running ttymon, by typing:

     sacadm –p <incorrect port monitor> –d
     sacadm –p <incorrect port monior> –k
     sacadm –p <incorrect port monior> –r

     NOTE:
     IMPORTANT: Do not remove the port monitor running the rMb or alarm SVCTAG. Do not remove any non-ttymon port monitor.

7. You should also make sure the async drivers are installed and enabled.

   — Determining this on UnixWare 1.1 systems is not a straightforward process. For comport 1, type: **/etc/conf/bin/idcheck –r –v 4** and for comport 2, type: **/etc/conf/bin/idcheck –r –v 3**. The output should be `asyc`. The argument to the **–v** option is the IRQ number. Comport 1 will use IRQ4 and comport 2 will use IRQ 3.

   — On UnixWare 2.1 and 7.1 systems, you can do the same thing by typing **/sbin/resmgr –m asyc**. The output should show one line for each active comport and the I/O port and IRQ that it is using, as in the following example output:

```
MODNAME MODNAME UNIT IPL ITYPE IRQ IOADDR MEMADDR DMAC BINDCPU BRDBUSTYPE
BRDID SLOT ENTRYTYPE BUSNUM
asyc asyc 1 9 1 4 3f8 3ff - - - - - - - 1 -
asyc asyc 1 9 1 3 2f8 2ff - - - - - - - 1 -
```

8. Make sure you are not using the asyhp driver . The RMB team has conducted research and communicated their finding with SCO that there is a bug in this driver.

   The asyhp driver probably will not cause a no login condition as much as it will prevent the ability to connect to the system altogether. You should be aware of the incorrect driver as part of you troubleshooting efforts, however, as it could lead to other conditions that do prevent a login prompt.

WARNING:
WARNING: Please escalate to knowledgeable personnel if you are unfamiliar with how to change the driver. The procedure involves modifications to the kernel that could potentially disable the system.

Checking Configuration on Linux Systems

NOTE:
NOTE: Additional information about troubleshooting rmbmgetty can be found on Page

1. Open the file **/etc/rmbmgetty/mgetty.config.**
2. Look for the line "`port ttyS`*x*" (where *x* is the comport number - 1).

   x should agree with the COM port the RMB is using. If it doesn't, change it to match.

3. A separate line "`speed x`" will show the speed rmbmgetty is setting the comport to. Make sure this speed matches the **modem=** speed. Unlike UnixWare's port monitor, rmbmgetty resets the speed once an hour on an idle port. Therefore, if the configuration is correct, rmbmgetty should not have to be reset.
4. Now open the **/etc/inittab** file and search for rmbmgetty.

   You should see a line similar to:

   `Sx::respawn:/sbin/rmbmgetty ttySx`

   where *x* is the comport number –1.

   x should agree with the RMB's COM port number and the port information from **/etc/rmbmgetty/mgetty.config**.
5. Edit the file if needed.
6. If a change was necessary, type:

   /sbin/init q

   ps –ef | grep rmbmgetty

   A line similar to the following line should appear:

```
root     10565     1  0 Aug20 ?       00:00:00 /sbin/rmbmgetty ttySx.
```

7. Type **kill *x***

   where ***x*** is the first number that appears. In the example above it would be 10565.
8. Retype **ps –ef | grep rmbmgetty**

   The line should re-appear with a new number in the second field.
9. Now attempt to log in.

   NOTE:
   If you are attempting to dial in while the system is rebooting, you may experience garbage and/or no login prompt. Normally you should remain connected to a system when you reboot it via the RMB; however, if the connection is lost, wait five minutes before dialing back. This will ensure that the RMB and the OS have stabilized and a login prompt is possible.

Checking the rmbmgetty Log

rmbmgetty maintains an active log. To see what speed and other configuration information is being sent to the COM port:

1. In **/etc/rmbmgetty/mgetty.config**, change the line "**debug *x***" to "**debug 9"**.
2. Restart rmbmgetty as indicated above.

This will now show additional diagnostic information. The log is maintained in **/var/log/rmbmgetty.ttyS*x*** (where ***x*** is the COM port the RMB is located on).

3. View the log and look for a line similar to:

   ```
   tss: set speed to 38400 (017)
   ```

   which should be displayed somewhere towards the bottom of the file. This speed should match the configuration information and the **modem=** setting.

NOTE:
Non-rmbmgetty machines will not have any logs to verify the settings that are being sent to the comport.

Defective Hardware

To find out whether the communications port on the platform is defective, try to assign the RMB to a different port.

NOTE:
IMPORTANT: If the RMB is assigned to a different port, it must be configured as well using the ***modem=*** *command.*

1. Since remote connectivity is in question, have an on-site technician log into rmbcmd at the manager level and type:

modem=*name_of_comport_to_move_to,speed,bits,parity,#_of_stop_bits*

2. Have an on-site technician reboot the platform and enter its BIOS setup program.
   - If this is an AYC series card, the on-site technician should disable the COM port the RMB is located on.
   - For any other RMB, the on-site technician should make sure that *all* COM ports are enabled, then the move the COM port to the RMB cable to another port. Typically, there are only two COM ports available on most systems.
3. Dial into the RMB. If you still do not obtain a login prompt use the Independent state escape sequence. If you are successful, the problem is in the platform and needs to be investigated there.
4. Make sure the RMB is using a different COM port and that you have changed its setting.

NOTE:
Setting the COM port *to 0 disables the RMB's use of the* COM port*. You may use this as a temporary setting to regain access to the* COM port *while you are performing troubleshooting steps.*

5. Install a modem on the COM port.
6. Dial into the platform through the modem.
    - If you get a login prompt, then the problem is with the RMB. See ‘‘Defective RMB’’ on page 4-12
    - If not, then the problem is on the platform hardware.

      Perform repair and troubleshooting procedures to the system’s main board. These procedures are beyond the scope of this manual.

Defective RMB

NOTE:
IMPORTANT: The RMB is an extremely reliable piece of hardware and it is very unlikely it will need replacement. Make absolutely certain that you have exhausted all troubleshooting methods before replacing it.

The RMB comes in two possible configurations:

- External modem
- Internal modem

This section applies to both configurations.

If the modem answers but does not present a login prompt, then it is possible that it is defective. To see if the modem is defective:

1. After checking the cables and ensuring that they are in good condition as outlined above, dial into the platform.
2. Use the RMB's Independent state escape sequence (^c^c^c) and see if the RMB login prompt is presented.

   If it is, then the RMB is not the problem and you should begin to investigate problems on the platform or software. Make sure you have checked all cables using the procedure above and that you cannot log in to the RMB's Independent state BEFORE replacing an RMB.

System Corruption

If all else fails, then it is possible that you may be dealing with a file corruption issue. The corrupted files could be:

- rmbmgetty

  or

- port monitor

rmbmgetty File Corruption

The easiest way to check for rmbmgetty file corruption is to remove and then reinstall the RMB software package.

Removing the package can be done in one of three ways:

- Using an advanced software removal utility
  - Victory platforms —Use the web browser interface and remove it using the advanced software removal utility.
  - INTUITY AUDIX platforms — Use Vex and use its advanced software removal utility.
  - CONVERSANT platforms — Use the software removal utility in cvis_menu.
- Using the pkgrm tool. Some INTUITY AUDIX systems may require that the full path (typically **/sbin/pkgrm**) be entered.
- **rpm –e rmb** (Victory only)

Reinstalling the packagecan also be done in three ways, similar to removing as stated above. These utilities can be found or entered in the same basic locations or using pkgadd, respectively.

NOTE:
This is a full package uninstall and reinstall of both the RMB and rmbmgetty and must be done by an onsite technician, or by using an alternative access method to the platform being serviced.

Port Monitor File Corruption

Port monitors are maintained in the SAC database. Port monitor file corruption will be found only on UnixWare systems and can be very difficult to isolate. SAC data is stored as a member of the System Access Facilities (SAF) configuration system, which can be found in /etc. SAC and SAF are tightly integrated with the kernel and cannot be removed from the system like rmbmgetty can. If, after checking the SAC configuration files, you cannot isolate the problems, perform file system checks or, potentially, a full reload of the system. Modifications of the SAF configuration files should only be performed by qualified personnel and escalated as necessary.

Troubleshooting a no login prompt issue can be very difficult. There are many things that can influence this problem. This is a basic list, but not in any way exhaustive or comprehensive. The RMB team maintains an FAQ of no login prompt issues at: http://info.dr.avaya.com/srvcs-rd/rmb/nologin.html. This website is updated as new “no login prompt” issues are identified and resolved. Please consult this web site, before replacing hardware or performing more labor intensive and potentially destructive resolutions, such as system reloads and file system checks.

Platform Reset

The RMB can be used to reset the platform in a number of ways. The following reset procedures can be used if the OS is unavailable.

1. Enter **reboot!**

   A new enhancement to the RMB is to first try to shut down the system in a graceful manner to avoid database corruption (which can occur when a system is rebooted while it is running). The **reboot!** command first tries a platform-defined reboot command (defined by RebootPgm) that attempts to bring the system down gracefully. If the platform is unresponsive then a hard reset is performed after a specified amount of time (defined by RebootTime). If no reboot command is specified or if RebootTime is 0, then only a hardware reset is performed. This is the same as using the power off switch or platform reset switch, which does not allow the operating system to close files or to complete any other preventive measures.

   NOTE:
   *If **reboot!** is used without the reset cable attached, the platform may not reset.*

2. An alternative to using the **reboot!** command is to perform these steps at the host platform:
   a. Press the Ctrl ALT DEL keys at the same time on the host console.
   b. Press the platform's reset switch.
   c. Turn the platform power switch off, then on.

RMB Reset

An RMB reset happens under three conditions:

- When power is first applied to the platform.

  The RMB functions as the platform initializes to support a remote console.
- The RMB's reset button is pressed for more than 3.5 seconds.
- The **rmbreset!** command is run.

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 4-1 on page 4-15.

Table 4-1 Reset conditions

Occurrence	Description	RMB Response
Platform power up	The platform power is turned on.	The RMB follows these steps: 1. Initializes essential RMB hardware during RMB BIST state. 2. Checks the integrity of the main FLASH PROM code. If the code appears to be: — intact, control is passed to the main code, which completes the hardware initialization, then goes to Normal state. — 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. 3. Initializes the modem with the configured string. 4. Resets all event counters, except event 8. 5. Loads the platform-stored configuration into the RMB.
RMB Reset command	The **rmbreset!** command is entered	Same as *platform power up*. The RMB modem will be reset even if the RMB doesn't have control over it at the time.
Platform reset	Reset via operating system shutdown command. Hard Reset via the reset signal to the platform.	■ RMB resets event counters. ■ Modem remains in current state (e.g., keeps an active call up). ■ BIOS loads extended BIOS routines. ■ Event 8 is incremented.

Continued on next page

Table 4-1 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 and held for more than 3.5 seconds or if firmware watchdog timer expires.	■ Same as *platform power up*, except for loading BIOS routines. **NOTE:** *The modem is reset even if the RMB does not have control over it at the time (e.g., drops an active call).*

Modem Reset

WARNING:
Whenever you reset the modem or the RMB, the telephone connection is dropped.

You may need to reset the RMB modem. Take one of these actions:

- Enter the **modemreset!** command.
- Enter the **rmbreset!** command.

  RMB and modem are reset.
- Press the reset button on the RMB faceplate.

  Button must be pressed for less than 3.5 seconds to reset the modem and reset the RMB (internal modem only).

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. By default, the RMB uses hardware flow control to meter data.

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

Troubleshooting rmbmgetty

It is possible to troubleshoot the **rmbmgetty** program by using the **system!** command from the RMB in Independent state.

To verify that **rmbmgetty** is running, use the **ps –ef | grep** command:

ps –ef | grep rmbmgetty

The output should show one line containing `/sbin/rmbmgetty tty`*`XX`* where `tty`*`XX`* is the serial port number.

If **rmbmgetty** is not running (or is running but not working correctly) take the following steps:

1. Verify that **rmbmgetty** is servicing the comport the RMB is on. `ttyS0` represents comport 1 and `ttyS1` represents comport 2.
2. Verify that the RMB software package is installed by running **rpm –q rmb**.
3. Check that **rmbmgetty** is set to `respawn` in **/etc/inittab** by running **grep rmbmgetty /etc/inittab**.
4. Verify that the file **/etc/rmbmgetty/mgetty.config** exists.

   If is does not exist, the RMB package was not installed correctly.
5. Tail the **/var/log/rmbmgetty.tty*XX*** log file (where **tty*XX*** is the serial port number). This may give a clue as to the reason for the failure. You can increase the amount of information in the log by changing the debug level in **/etc/rmbmgetty/mgetty.config** and restarting the **rmbmgetty** process. See "Working with the rmbmgetty Log File".

Working with the rmbmgetty Log File

The log file is named **/var/log/rmbmgetty.tty*XX*** (where **tty*XX*** is the serial port number). This log file is written to **/var/log/rmbmgetty.tty*XX*.old** when the log file grows to 2 Mbytes. The verbosity of the contents of the log file is controlled by the **debug=*n*** line in the **/etc/rmbmgetty/mgetty.config** file. The value of ***n*** is initially set to 2, but can be increased to 9 to get more information written to the log.

Updating the rmbmgetty Init String

The init string initializes the modem so that it is compatible with **rmbmgetty**. The init string is contained in the **/etc/rmbmgetty/mgetty.config** file and is updated by **rmbmodem** or through the voice system administration screens. You must run

rmbmodem if the external modem is changed or if the RMB is changed from one with an internal modem to one that supports an external modem or visa-versa. Use **rmbmodem** to make administrative changes to the modem. This utility ensures that both the OS and RMB configurations are correctly set for the RMB's internal modem or an RMB connected to an external modem. Failure to correctly set the RMB and/or the OS's configuration information can cause the RMB or OS to function improperly.

Recommended DIP Switch Settings

Some **rmbmgetty** problems can be traced to incorrect DIP switch settings. (This applies only to an RMB using an external modem that has DIP switches.) In particular, if your modem supports "Smart Mode" (U.S. Robotics modems) it must be enabled; otherwise the modem will not respond to AT commands. The following table shows the recommended DIP switch settings for a US Robotics modem:

Table 4-2 Recommended DIP switch settings for a US Robotics modem

DIP Switch #	Function	Correct Setting	DIP Switch Position
1	Date Terminal Ready	Normal	Up
2	Result Codes	Verbal	Up
3	Result Code Display	Display	Down
4	Echo Offline Commands	Enable	Up
5	Auto Answer	Enable	Up
6	Carrier Detect	Normal	Up
7	Load Factory Defaults	Enable	Up
8	Smart Mode	Enable	Down

Conditions for a Dropped Telephone Connection

When a user is remotely logged in, the RMB makes every effort to keep the connection up. However, the following circumstances may still cause the telephone connection to drop:

- Noisy connection
- Conditions described in the modem reset section
- RMB **rc** script fails to execute during shutdown

More Troubleshooting Sources

For reference information to aid in troubleshooting, see the Remote Maintenance Board Project Home Page (**http://info.dr.avaya.com/srvcs-rd/rmb/index.html)** for links to Application Notes, Checklists, and Frequently Asked Questions.

All commands currently write to a log that TSO can utilize in troubleshooting. The log files are located in **/rmb/logs/*mmdd***.

where ***mm*** = month, ***dd*** = day

RMB Commands

5

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
- OS commands

Levels of Operation

rmbcmd and Independent state include a manager level and a user level.

Users permitted to use commands are listed in the file **/rmb/data/usertab** and must have an access level of user or manager specified in the file. Initially the **craft**, **root**, and **vexvm** logins are placed in the file. If additional logins are required, TSO personnel logged in as **tsc** may add them via the editUserTab application.

editUserTab Application

The editUserTab application is used to maintain the relationship between OS login IDs and permission levels. The editUserTab application can be executed only by the **tsc** login. Additional authentication is required at the manager level, either through the RMB manager password or through ASG authentication.

The editUserTab application allows addition and deletion of entries in the usertab. Only existing OS login IDs can be added to the usertab.

Command Conventions

rmbcmd -p uses unique command prompts and suffixes to display the current privilege level.

This section details command:

- Prompts
- Suffixes
- Tables listing commands with corresponding security levels

Prompts

Depending on the privilege and operating state, the RMB responds with a different prompt. The user must enter the correct command, password, or ASG response to enter either privilege level. For more information on operating states, see “Operating States” on page 1-4.

Table 5-1 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.

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 5-2 Suffixes

Suffix	Description	Privilege Level
?	Queries. Lists information only.	User and manager
!	Takes an action	Manager
=	Change parameter	Manager

RMB Commands

The commands in Table 5-3 are available after entering the **rmbcmd** command. **rmbcmd** is the preferred 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. Most of the commands in Table 5-3 on page 5-5 can be used from Normal state or Independent state. Whether a command can be used depends on the privilege level and RMB state.

NOTE:
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.

Table Conventions

The table has several conventions to simplify its use:

- Commands that have off/on or disable/enable parameters redisplay or echo what was entered.

  NOTE:
  Commands that have off/on or disable/enable parameters can also be entered as 0 or 1.
  0= off and 1= on
  0= disable and 1= enable

- 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.

NOTE:
*Changes made in manager mode are not permanent until the **configure!** command is used. Refer to “Configuration Management Overview” on page 8-5.*

Table 5-3 RMB commands

action=	
Level	Manager
Description	Sets the alarm levels and the corresponding actions and thresholds for each event. See Table 6-4 on page 6-8 for more information.
Parameter	Event number (**0-38**), Warning level number (**0**-**2**), Event Threshold (**0-9999**), action (**#**,**#**,**#**,**#**,**#**)
Example	`Manager:` **action= 2,2,30,70,25,51** ENTER Means event 2 (platform ambient temperature is high) shall enter the major alarm state (2) when it reaches a count of 30. The set of actions to take include writing a message to the log (action 70), writing a message to the console followed by 5 linefeeds (action 25), and calling out on phone 1 (action 51).
action?	
Level	User
Description	Displays the parameters defined for a particular event number and warning level, as requested by the user.
Parameter	Event number, warning level number
Example	`User:` **action? 2,2** ENTER `30 70,25,51,00,00`
actionflag=	
Level	Manager
Description	Allows enabling or disabling of the Event/Action handler.

Continued on next page

Table 5-3 RMB commands — *Continued*

Parameter	**Off** for disable. **On** for enable. **NOTE:** *Changing **actionflag=** to **on** from the **off** state resets all event counters to zero.* **NOTE:** *Also takes **0** for **Off**, **1** for **On**, and no case sensitivity for **On** or **Off**.*
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 thresholds. "Off" status means that events are monitored but no actions are taken.
Parameter	none
Example	`User:` **actionflag?** ENTER `On`
alarm!	
Level	Manager
Description	Increments software alarm counter. Software alarms 1-16 equate to RMB events 11-26. See Table 6-4 on page 6-8 for more information.
Parameter	Number from **1** to **16**
Example	`Manager:` **alarm! 16** ENTER Means increment software alarm counter and perform the actions in event 26.

Continued on next page

Table 5-3 RMB commands — *Continued*

alarm?	
Level	User
Description	Displays the count of software alarm *n* or all alarm counts.
Parameter	Alarm number **1** -**16** or **a** (all)

Example	`User:` **alarm? a** ENTER
	`1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0, 6 = 0, 7 = 0`
	`8 = 0, 9 = 0, 10 = 0, 11 = 0, 12 = 0, 13 = 0, 14 = 0`
	`15 = 0, 16 = 0`

bios?	
Level	User
Description	Displays the BIOS information, including product name and version (BEC must be installed). **NOTE:** ***bios?*** *does not return the BIOS vendor name.*
Parameter	none

Example	`User:` **bios?** ENTER
	`AMI BIOS Copyright (c) 1997`
	or
	`BIOS version is unavailable.`

boardtype?	
Level	User
Description	Displays the circuit pack type: CYN23AP or CYN24AP
Parameter	none
Example	`User:` **boardtype?** ENTER `0 - CYN24 1 - CYN23`
boottimeout=	
Level	Manager
Description	Sets the allowable amount of time for a reboot to occur, 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. Increments event 7.
Parameter	Number of minutes (**1** - **10**)
Example	`Manager:` **boottimeout= 5** ENTER

Continued on next page

Table 5-3 RMB commands — *Continued*

boottimeout?	
Level	User
Description	Displays the current boot timeout value in minutes. The value is the allowable amount of time for a reboot to occur, 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	none
Example	`User:` **boottimeout?** ENTER 5
callqueue?	
Level	User
Description	Displays the number of panic calls in each queue (n calls in modem queue and m calls in IP queue).
Parameter	none

Example	`User:` **callqueue?** ENTER
	`Modem Alarm Queue: 5`
	`IP Alarm Queue: 0`

clearalarm!	
Level	Manager
Description	Clears a software alarm counter.
Parameter	Number from **1** to **16**
Example	`Manager:` **clearalarm! 16** ENTER
clearconfig!	
Level	Manager

Continued on next page

Table 5-3 RMB commands — *Continued*

Description	Makes the default configuration (the configuration established during installation) active and permanent with the exception of Phone1, ID, and Security mode, which are set to match the voice system. **NOTE:** *See Chapter 8, "Configuring the RMB".* **NOTE:** *Always use **configure!** after using this command if you want to make the change permanent.*
Parameter	none
Example	`Manager:` **clearconfig!** ENTER
clearevent!	
Level	Manager
Description	Clears current event counter.
Parameter	Number from **0** to **38**
Example	`Manager:` **clearevent! 12** ENTER
clearqueue!	
Level	Manager
Description	Clears both the modem queue and IP queue (the IP queue is a future feature).
Parameter	none
Example	`Manager:` **clearqueue!** ENTER
configure!	
Level	Manager
Description	Makes the Active configuration permanent with the exception of Phone1, ID, and security mode, which are set to match the voice system. **NOTE:** *Works only in rmbcmd, not in Independent state. See Chapter 8, "Configuring the RMB" for more information.*
Parameter	none
Example	`Manager:` **configure!** ENTER

Continued on next page

Table 5-3 RMB commands — *Continued*

consolemsg=	
Level	Manager
Description	Turns the writing of messages to the console on or off.
Parameter	**1** or **on** = on, **0** or **off** = off **NOTE:** *No case sensitivity for **On** or **Off**.*
Example	`Manager:` **consolemsg= 1** ENTER
consolemsg?	
Level	User
Description	Displays the status of writing messages to the console.
Parameter	none
Example	`User:` **consolemsg?** ENTER `On`
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 USA
date=	
Level	Manager
Description	Sets the current date in the RMB Real Time Clock. **NOTE:** *The parameter is set by the heartbeat daemon once per hour.*

Continued on next page

Table 5-3 RMB commands — *Continued*

Parameter	month, day, year in mm/dd/yy format
Example	`Manager:` **date= 05/01/02** ENTER
date?	
Level	User
Description	Displays RMB Real Time Clock date.
Parameter	none
Example	`User:` **date?** ENTER `05/01/98`
dialout=	
Level	Manager
Description	Sets the Hayes dial string used before a phone number to create the modem dialout string. The phone number (phone 1, phone 2) is appended to this command. **NOTE:** *This string is employed by the voice system and the RMB when sending an automated alarm. Changing it may disturb alarming.*
Parameter	Up to 10 characters
Example	`Manager:` **dialout= atdt** ENTER
dialout?	
Level	User
Description	Displays the Hayes dial string used before a phone number to create the modem dialout string. The phone number (phone 1, phone 2) is appended to this command.
Parameter	none
Example	`User:` **dialout?** ENTER `ATDT`

Continued on next page

Table 5-3 RMB commands — *Continued*

dir	
Level	User
Description	Displays currently-available RMB commands (same as **help** and **ls** commands).
Parameter	none
Example	`User:` **dir** ENTER (*displays all available commands*)
dst=	
Level	Manager
Description	RMB adjusts the RTC daylight savings time flag. If you are in a DST zone, set this flag.
Parameter	**0** or **off** = off **1** or **on** = on **NOTE:** *No case sensitivity for **on** or **off**.*
Example	`Manager:` **dst= 1** ENTER
dst?	
Level	User
Description	Displays RMB RTC daylight savings time flag.
Parameter	none
Example	`User:` **dst?** ENTER `On`

Continued on next page

Table 5-3 RMB commands — *Continued*

event?	
Level	User
Description	Displays the current value of a specific event counter or all event counters.
Parameter	**0** - **38** or **a** for all.

Example	`User:` **event? a** ENTER
	`0 = 0, 1 = 0, 2 = 0, 3 = 0, 4 = 0, 5 = 0`
	`6 = 0, 7 = 0, 8 = 0, 9 = 0, 10 = 0, 11 = 0`
	`12 = 0, 13 = 0, 14 = 0, 15 = 0, 16 = 0, 17 = 0`
	`18 = 0, 19 = 0, 20 = 0, 21 = 0, 22 = 0, 23 = 0`
	`24 = 0, 25 = 0, 26 = 0, 27 = 0, 28 = 0, 29 = 0`
	`30 = 0, 31 = 0, 32 = 0, 33 = 0, 34 = 0, 35 = 0`
	`36 = 0, 37 = 0, 38 = 0`

eventlabel=	
Level	Manager
Description	Labels user-definable event counters.
Parameter	***event_counter*** **(11** - **26)** and ***label_string*** (32 character limit)
Example	`Manager:` **eventlabel= 26 This is only a test** ENTER
eventlist?	
Level	User
Description	Displays the current value of a specific event counter and its label or all event counters and their labels.
Parameter	**0** - **38** or **a** for all.
Example	`User:` **Eventlist? 26** ENTER `event 26: 0 occurrences of This is only a test`
exit	
Level	User
Description	*Normal state:* exits rmbcmd and displays the OS prompt. *Independent state:* Drops the modem connection and returns RMB to Normal state.
Parameter	none
Example	`User:` **exit** ENTER

Continued on next page

Table 5-3 RMB commands — *Continued*

fanp=	
Level	Manager
Description	Sets fan polarity.
Parameter	**0** = a logic level 0 on the RMB fan pin is considered a failure. **1** = a logic level 1 is considered a failure. **T** = (Tachometer) If thelogic level on the fan pin does not change frequently in each 6-second interval, then the fan is assumed to have failed. **NOTE:** *No case sensitivity for **T**.*
Example	`Manager:` **fanp= 0** ENTER
fanp?	
Level	User
Description	Reports fan polarity.
Parameter	none
Example	`User:` **fanp?** ENTER `0`
fans=	
Level	Manager
Description	Sets status of monitoring of the fans.
Parameter	**0** or **off** = off **1** or **on** = on **NOTE:** *No case sensitivity for **on** or **off**.*
Example	`Manager:` **fans= 1** ENTER

Continued on next page

Table 5-3 RMB commands — *Continued*

fans?	
Level	User
Description	Displays the status of monitoring of fans, if it is enabled. See status messages in ‘‘Fans? Command’’ on page 5-41.
Parameter	none
Example	`User:` **fans?** ENTER See the examples in ‘‘Fans? Command’’ on page 5-41.
flowcntl=	
Level	Manager
Description	Sets flow control.
Parameter	**0**= none **1**= software **2**= hardware
Example	`Manager:` **flowcntl= 0** ENTER
flowcntl?	
Level	User
Description	Displays status of flow control: none, hardware, or software.
Parameter	none
Example	`User:` **flowcntl?** ENTER `0 - None`
help	
Level	User
Description	Displays currently-available commands (same as **ls** and **dir** commands).
Parameter	none
Example	`User:` **help** ENTER (*`user or manager command list`*)
id=	
Level	Manager

Continued on next page

Table 5-3 RMB commands — *Continued*

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. **NOTE:** *The effect of this change may be overridden by settings in the voice system.* **NOTE:** *ID will be reset by platform software.*
Parameter	Character string up to ten characters
Example	`Manager:` **id= 1000000000** ENTER
id?	
Level	User
Description	Displays the RMB ID string that is used in the INADS alarm message.
Parameter	none
Example	`User:` **id?** ENTER `1000000000`
incall= (future feature)	
incall? (future feature)	
init=	
Level	Manager
Description	Sets the modem initialization string for the next initialization. **rmbmodem** or using the modem settings from the administration screens is the preferred method for setting **init**. **NOTE:** *Use of this command is not recommended.* **CAUTION:** *Use of an invalid string can block modem access. Request assistance from Tier IV before changing the init string, then change it back after you finish.*
Parameter	Character string up to 32 characters
Example	`Manager:` **init= at&f0s0=3** ENTER

Continued on next page

Table 5-3 RMB commands — *Continued*

init?	
Level	User
Description	Displays the modem initialization string and active or pending status. Pending status means the string has not been sent to the modem yet.
Parameter	none
Example	`User:` **init?** ENTER `active:at&f`
ipalarm= (future feature)	
ipalarm? (future feature)	
ipalarmtime= (future feature)	
ipalarmtime? (future feature)	
ls	
Level	User
Description	Displays currently-available commands. Same as **dir** and **help** commands.
Parameter	none
Example	`User:` **ls** ENTER (*`user or manager command list`*)
manager	
Level	User
Description	If manager password or challenge/response succeeds, puts RMB in manager mode.
Parameter	none
Example	`User:` **manager** ENTER `Password:` (***enter password or ASG challenge/response here***) `Manager:` For security reasons, no password characters are echoed.

Continued on next page

Table 5-3 RMB commands — *Continued*

modem=	
Level	Manager
Description	Sets COM port's operating parameters. The setting is the default COM port speed, not the modem speed. **NOTE:** *The default settings should not be changed. Incorrect values may make it impossible to access the system remotely.* The COM port is changed immediately, but the other settings are not changed until the call drops. **NOTE:** *The platform cannot use the RMB's modem if the COM port is zero. This value keeps the RMB in Independent state.*
Parameter	COM Port number (**0**-**4**); Baud rate (**1200, 2400**, **4800**, **9600**, **14400, 19200, 28800, 38400, 57600, 115200**); Parity (**N** for none, **E** for even, **O** for odd); data bits (**7** or **8**); stop bits (**1** or **2**). **NOTE:** *The current default for the communications port (COM1 or COM2) is configured by the **rmbinteg** package.*
Example	`Manager:` **modem= 2,38400,N,8,1** ENTER
modem?	
Level	User
Description	Displays COM port, modem baud rate, data bits, parity, stopbits.
Parameter	none
Example	`User:` **modem?** ENTER `2,38400,N,8,1`

Continued on next page

Table 5-3 RMB commands — *Continued*

modemreset!	
Level	Manager
Description	Resets the RMB's internal modem only. **NOTE:** *This does not reset the RMB. It has no effect on external modems.*
Parameter	none
Example	`Manager:` **modemreset:** ENTER (No output or confirmation occurs.)
modemtype=	
Level	Manager
Description	Changes the RMB's modem from internal to external. **NOTE:** *A setting of external disables the RMB's onboard internal modem.* **NOTE:** *Does not apply to CYN23AP/CYN24AP.*
Parameters	**1** = internal **2** = external
Example	`Manager:` **modemtype= 1** ENTER
modemtype?	
Level	User
Description	Displays the RMB's active and stored config (internal or external).
Parameter	none
Example	`User:` **modemtype?** ENTER `Active: 1-Internal, Stored: 1-Internal`
msg=	
Level	Manager

Continued on next page

Table 5-3 RMB commands — *Continued*

Description	Sends a message to the circular buffer. **NOTE:** *The message buffer currently stores the last 128 messages.*
Parameter	A message up to 128 characters
Example	`Manager:` **msg= disk backed up on 4/6/2000** ENTER
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	No parameter: Displays messages in descending chronological order. **a/A** : Displays messages in ascending chronological order.

Example	`User:` **msgall?** ENTER
	`(displays all existing messages with most recent message first)`
	
	`User:` **msgall? a** ENTER
	`(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 the *n*th message from buffer.
Parameter	Number from **0** - **127**
Example	`Manager:` **msgclearn! 34** ENTER

Continued on next page

Table 5-3 RMB commands — *Continued*

msgn?	
Level	User
Description	Displays the date, time, and a specific message from the circular buffer. **NOTE:** *If:* *— No argument is given* *— That message does not exist* *or* *— Other invalid input such as **msgn? t** is sent.* *The **msgn?** command always responds with:* `Not that many messages: Usage: msgn? (up to number of messages in buffer)`
Parameter	Message number
Example	`User:` **msgn? 2** ENTER (*date, time, and message*)
msgnum?	
Level	User
Description	Displays the number of messages currently held in the circular message buffer.
Parameter	none
Example	`User:` **msgnum?** ENTER `12`
msgspace?	
Level	User
Description	Displays the number of messages available to be placed in the message buffer.
Parameter	none
Example	`User:` **msgspace?** ENTER `14`
normal!	
Level	Manager

Continued on next page

Table 5-3 RMB commands — *Continued*

Description	Initiates request to connect modem to platform. **NOTE:** *Works only in Independent state. See Chapter 8, "Configuring the RMB" for more information.*
Parameter	none
Example	`RMB!` **normal!** ENTER
ok?	
Level	User
Description	Displays the results of the last BIST.
Parameter	none
Example	`User:` **ok?** ENTER `No RMB test failures detected`
outcall=	
Level	Manager
Description	Turns outcalling ability to generate a panic call (action 54, 52) off or on.
Parameter	**0** or **off** = off **1** or **on** = on **NOTE:** *No case sensitivity for **on** or **off**.*
Example	`Manager:` **outcall= 1** ENTER
outcall?	
Level	User
Description	Displays outcalling ability to generate a panic call (action 54, 52) status (**0** = off, **1** = on).
Parameter	none
Example	`User:` **outcall?** ENTER `On`
panicmsg=	
Level	Manager
Description	Sets the panic message that is used in the generic format. See the **style=** command.

Continued on next page

Table 5-3 RMB commands — *Continued*

Parameter	Up to 126 characters
Example	`Manager:` **panicmsg= emergency** ENTER
panicmsg?	
Level	User
Description	Displays the current panic message that is used in the generic format.
Parameter	none
Example	`User:` **panicmsg?** ENTER `emergency`
phone1=	
Level	Manager
Description	Sets outdialing attributes for phone number 1, including area code and international code. **NOTE:** *The effects of this change may be overridden by changes in the voice system.* **NOTE:** *Phone1 will be set by the platform software.*
Parameter	Up to 32 characters. Use "," (comma) for a dial pause.
Example	`Manager:` **phone1= 9,18005353573** ENTER
phone1?	
Level	User
Description	Displays phone number 1.
Parameter	none
Example	`User:` **phone1?** ENTER `9,18005353573`
phone2=	
Level	Manager

Continued on next page

Table 5-3 RMB commands — *Continued*

Description	Sets outdialing attributes for phone number 2, including area code and international code. **NOTE:** *Use "," (comma) for a dial pause.*
Parameter	Up to 32 characters
Example	`Manager:` **phone2= 9,18005353573** ENTER
phone2?	
Level	User
Description	Displays phone number 2.
Parameter	none
Example	`User:` **phone2?** ENTER `9,18005353573`
primetime= (future feature)	
primetime? (future feature)	
ps=	
Level	Manager
Description	Sets the status of monitoring the power supplies.
Parameter	**0** or **off** = off **1** or **on** = on *No case sensitivity for **on** or **off**.*
Example	`Manager:` **ps= 0** ENTER
ps?	
Level	User
Description	Reports the status of monitoring of power supplies. See status messages in ''Ps? Command'' on page 5-41.
Parameter	none
Example	`User:` **ps?** ENTER For examples of output, see ''Ps? Command'' on page 5-41.
psp=	
Level	Manager
Description	Sets the power supply polarity.

Continued on next page

Table 5-3 RMB commands — *Continued*

Parameter	**0** = logic level 0 on the RMB power supply input pin indicating power supply failure, logic level 1 indicating power supply normal operation. **1** = logic level 1 indicating power supply failure, logic level 0 indicating power supply normal operation.
Example	`Manager:` **psp= 0** ENTER
psp?	
Level	User
Description	Reports power supply polarity.
Parameter	none
Example	`User:` **psp?** ENTER `0`
reboot!	
Level	Manager
Description	May first attempt a graceful shutdown. See **rebootpgm=** and **reboottime=** . If the graceful shutdown fails (or is not attempted), it resets the platform via the reset cable. The phone connection should stay active. **NOTE:** *This command is available only from the Independent state.* **NOTE:** *When executing **reboot!**, the sanity timer and the sanity reboot timer get reset.*
Parameter	none
Example	`RMB!` **reboot!** ENTER
rebootpgm=	
Level	Manager
Description	(Normal mode only) Sets the platform-defined reboot command, which will attempt to bring the system down gracefully. If the platform is unresponsive, then a hard reset is performed after a specified amount of time (see **reboottime?**) If no reboot command is specified, then a hardware reset is performed immediately.

Continued on next page

Table 5-3 RMB commands — *Continued*

Parameter	Full path to reboot program, limited to 255 characters.
Example	`Manager:` **rebootpgm= /sbin/init 6** ENTER
rebootpgm?	
Level	User
Description	(Normal mode only) Reports the platform-defined reboot command that will attempt to bring the system down gracefully. If the platform is unresponsive, then a hard reset is performed after the time specified. If no reboot command is specified, then a hardware reset is performed immediately without attempting a graceful reboot.
Parameter	none
Example	`User:` **rebootpgm?** `/sbin/init 6`
reboottime=	
Level	Manager
Description	Sets the time (in) minutes that the RMB will wait for a graceful shutdown to occur before activating the hardware reset line. If set to **0**, then only a hardware reset is performed immediately.
Parameter	0-60 (minutes)
Example	`User:` **reboottime= 5** ENTER
reboottime?	
Level	User
Description	Reports the time (in minutes) that the RMB will wait for a graceful shutdown to occur before activating the hardware reset line.
Parameter	none
Example	`User:` **reboottime?** ENTER 5
rev?	
Level	User

Continued on next page

Table 5-3 RMB commands — *Continued*

Description	Displays the board's serial number, version numbers of the RMB hardware, boot code, BEC (if applicable), and firmware. The format is: **S/N #, HW *hardware_vintage_resistors*, Boot *boot_vintage*, BEC *BEC_vintage*, Core *firmware_vintage* [*Suffix boot_suffix*]**
Parameter	none
Example	`User:` **rev?** ENTER `S/N xxxxxx, HW 1, Boot 1.0, BEC n/a, Core 1.00` **NOTE:** *The hardware (HW) revision number may be followed by a letter.*
rmbreset!	
Level	Manager
Description	Resets RMB hardware (including modem) and makes the permanent configuration Active with the exception of Phone1, ID, and Security mode, which are set to match the voice system. **NOTE:** *The call is dropped. Wait a couple of minutes before calling back.*
Parameter	none
Example	`Manager:` **rmbreset!** ENTER
rmbstate?	
Level	User
Description	Displays the current state of the RMB. See Table 1-1 on page 1-7.
Parameter	none
Example	`User:` **rmbstate?** ENTER `Normal`

Continued on next page

Table 5-3 RMB commands — *Continued*

sanity=	
Level	Manager
Description	Enables or disables the checking of the sanity timer.
Parameter	**0** or **off** = disable **1** or **on** = enable **NOTE:** *No case sensitivity for **on** or **off**.*
Example	`Manager:` **sanity= on** ENTER
sanity?	
Level	User
Description	Displays the sanity check status, whether enabled or disabled.
Parameter	none
Example	`User:` **sanity?** ENTER `On`
sanitytime=	
Level	Manager
Description	Sets the time between sanity checks before generating Event 6.
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 `5`

Continued on next page

Table 5-3 RMB commands — *Continued*

setpw1!	
Level	Manager
Description	Sets the user password. **NOTE:** *Works only in Normal state. See Chapter 8, "Configuring the RMB" for more information.* **CAUTION:** *Type the new password characters carefully: the RMB verifies that the old password is correct and that the new password meets the criteria in "Changing Passwords" on page 3-4. Give the new password to all authorized parties.*
Parameter	Old password, new password. **NOTE:** *10 characters maximum, 7 minimum. The first character must be alphabetic.*
Example	RMB! **setpw1! butt3rfly, po2sies** ENTER
setpw2!	
Level	Manager
Description	Sets the manager password. **NOTE:** *Works only in Normal state. See Chapter 8, "Configuring the RMB" for more information.* See the caution under **setpw1**.
Parameter	Old password, new password. **NOTE:** *10 characters maximum, 7 minimum. The first character must be alphabetic.*
Example	RMB! **setpw2! monk3ys, pe6nuts** ENTER
showcfg?	
Level	User

Continued on next page

Table 5-3 RMB commands — *Continued*

Description	Writes the current Active, Default, or Permanent configuration to the daily log file. This command does not appear on the menu and is available only from Normal state.
Parameter	**1** - Active configuration **2** - Permanent configuration **3** - Default configuration
Example	`User:` **`showcfg? 1`** ENTER `ShowCfg output sent to Logger.`
style=	
Level	Manager
Description	Sets the emergency outcall message style and maximum number of retry attempts for phone 1 and phone 2.
Parameter	Syntax: **style= *style,retry_attempts, phone*** where: ***style*** = **0** (generic) or **1** (INADS) and ***retry_attempts*** **= 0**-**4** ***phone*** = **1** or **2** (optional) (If not included, ***style*** and ***retry_attempts*** apply equally to both phone 1 and phone 2.) See Table 7-1 on page 7-3 for the alarm format.
Example	`Manager:` **`style= 1,2`** ENTER
style?	
Level	User
Description	Displays panic outdial message style and maximum number of retry attempts for phone 1 and phone 2.
Parameter	none

Example	`User:` **`style?`** ENTER
	`phone1= 1,2`
	`phone2= 1,2`

system!	

Continued on next page

Table 5-3 RMB commands — *Continued*

Description	Allows users to execute OS commands from within **rmbcmd** (Normal State) or the Independent state. **NOTE:** *Independent State: Non interactive commands ONLY. Commands that read the standard input will not work and may result in a failure message. For example,* ***System! sh*** *produces no output. Output may be delayed up to 30 seconds due to heartbeat daemon latency. A delay greater than 30 seconds plus time to execute the command may indicate a problem with the rmbdaemon or the platform OS. See Chapter 4, "Troubleshooting".*
Parameter	an OS command

Examples	Example 1: Normal state use of **system!**
	
	Example 2: Independent state use of **system!**
	
	Normal State
	
	`Manager:` **system! ps –ef | grep rmb** ENTER
	
	root 1129 1 0 Jul30 ? 00:00:39 /rmb/bin/rmbdaemon
	root 1130 1 0 Jul30 ? 00:03:48 /rmb/bin/rmbd
	root 1131 1 0 Jul30 ? 00:00:00 /rmb/bin/rmblogd
	root 1746 1 0 Jul30 ? 00:00:00 /sbin/rmbmgetty ttyS1
	
	`Manager:`
	
	Independent State
	
	`RMB!` **system! ps –ef | grep rmb** ENTER
	
	`Processing System! Please wait.`
	
	`RMB!` (Prompt returns immediately)
	
	(Up to 30 second delay)
	
	`RMB! Start of System! Output`
	
	root 1129 1 0 Jul30 ? 00:00:40 /rmb/bin/rmbdaemon
	root 1130 1 0 Jul30 ? 00:03:52 /rmb/bin/rmbd
	root 1131 1 0 Jul30 ? 00:00:00 /rmb/bin/rmblogd
	root 7433 1 0 11:03 ? 00:00:00 /sbin/rmbmgetty ttyS1
	root 7436 1129 0 11:04 ? 00:00:00 /bin/sh -c ps -ef | grep rmb 2>
	root 7438 7436 0 11:04 ? 00:00:00 /bin/sh -c ps -ef | grep rmb 2>
	root 7439 7436 0 11:04 ? 00:00:00 /bin/sh -c ps -ef | grep rmb 2>
	
	`End of System! Output`
	
	(Press ENTER to see another prompt)

Continued on next page

Table 5-3 RMB commands — *Continued*

temp?	
Level	User
Description	Displays temperature (in Fahrenheit and Celsius) of the 2 onboard temperature sensors, maximum before alarm, minimum before alarm. The maximum and minimum are set by the **tempmax=** and **tempmin=** commands.
Parameter	none
Example	`User:` **temp?** ENTER Temp1: 75.6 F (24.2 C) Temp2: 80.0 F (26.7 C) Temp Min: 50.0 (12.0 C) Temp Max: 120.0 (48.0 C)
tempmax=	
Level	Manager
Description	Sets the maximum value for the temperature (in Fahrenheit or Celsius) of RMB temperature sensors 1 and 2. If the temperature exceeds this value, an event counter is incremented.
Parameter	Any number between 50°-200°F (**50F**-**200F**) or 12°-48°C (**10C**-**48C**) ***n*F** = Fahrenheit ***n*C** = Celsius ***n*** = Fahrenheit
Example	`Manager:` **tempmax= 120F** ENTER
tempmin=	
Level	Manager
Description	Sets the minimum value for the temperature (in Fahrenheit or Celsius) of RMB temperature sensors 1 and 2. If the temperature falls below this value, an event counter is incremented.
Parameter	Any number between 50°-200°F (**50F**-**200F**) or 12°-48°C (**10C**-**48C**) ***n*F** = Fahrenheit ***n*C** = Celsius ***n*** = Fahrenheit
Example	`Manager:` **tempmin= 50F** ENTER

Continued on next page

Table 5-3 RMB commands — *Continued*

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?** ENTER `15:14:35`
user	
Level	Manager
Description	Changes from manager mode to user mode.
Parameter	none
Example	`Manager:` **user** ENTER `User:`

Continued on next page

Table 5-3 RMB commands — *Continued*

volts=	
Level	Manager
Description	Sets the percent of tolerance allowable on the voltage rails.
Parameter	Syntax: **volts= [*supply_voltage*] *tolerance_allowable*** where: ***supply_voltage*** = **+3.3**, **+5**, or **+/- 12** V ***tolerance_allowable* =** from 2% to 25% (**2**-**25**) **NOTE:** *If you do not specify supply voltage, you will change the tolerance allowable for all voltage lines.*
Example	`Manager:` **volts= 7** ENTER or `Manager:` **volts= +12 8** ENTER (where **+12** is the supply voltage, and **8** is the voltage tolerance)
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
	`+12v: Actual +11.91, Min +11.16, Max +12.84`
	`-12v: Actual -12.06, Min -12.84, Max -11.16`
	`+5v: Actual +5.06, Min +4.65, Max +5.35`
	`+3.3v: Actual +3.5, Min +3.26, Max +3.75`

NOTE:
Manager commands that change the RMB configuration and that are made during Independent state are stored only temporarily. The next time the RMB returns to the Normal state, is configured or reset, or the platform is rebooted, these changes are lost.
See Chapter 8, "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 5-4 RMB commands - functional groups

Group	*Commands*	*Purpose*
RMB firmware	**boardtype?**	Displays the circuit pack type: CYN23AP or CYN24AP
	ok?	Reports results of last RMB POST and results of background maintenance.
	rev?	Reports hardware, boot, BEC, and firmware core revision numbers.
	rmbreset!	Resets RMB hardware (including modem). **NOTE:** ***rmbreset!*** *copies the permanent configuration (stored on the platform's hard disk) to the active configuration.*
	rmbstate?	Reports RMB state.
Configuration	**clearconfig!**	Makes the Default configuration (the configuration established during installation) Active and permanent.
	configure!	Makes Active board configuration permanent.
	country?	Reports country label.
	country=	Sets country label.
	id?	Reports ID field.
	id=	Sets ID field. **NOTE:** *ID will be reset by platform software.*
	phone1?	Displays phone number 1.
	phone1=	Sets phone number 1.
	phone2?	Displays phone number 2.

Continued on next page

Table 5-4 RMB commands - functional groups — *Continued*

Group	*Commands*	*Purpose*
	phone2=	Sets phone number 2.
	showcfg?	Writes the current Active, Default, or Permanent configuration to the daily log file.
	style?	Reports panic outdial message style for phone 1 and phone 2.
	style=	Sets panic outdial message style and maximum number of outcall retries for phone 1 and phone 2.
RMB user interface	**dir, help, ls**	Displays available RMB commands.
	exit	Normal state: exits rmbcmd and displays command prompt. Independent state: drops modem connection, returns RMB to Normal state.
	manager	Allows configuration changes (sets Manager level) if Manager password is matched.
RMB Host Interface	**bios?**	Displays the BIOS information, including product name and version.
	boottimeout?	Reports Boot Sanity Timeout time.
	boottimeout=	Sets Boot Sanity Timeout time (in minutes).
	consolemsg?	Displays the status of writing messages to the console.
	consolemsg=	Turns the writing of messages to the console on or off.
	normal!	Switches user to Normal state and initiates a login to the platform.
	primetime?	Future feature
	primetime=	Future feature

Continued on next page

Table 5-4 RMB commands - functional groups — *Continued*

Group	*Commands*	*Purpose*
	reboot!	First attempts a soft boot. If there is no response from the platform, the command initiates a platform reset via the reset cable. **reboot!** should be the last thing you try when attempting to fix a problem.
	rebootpgm=	(Normal mode only) Sets the platform-defined reboot command, which will attempt to bring the system down gracefully.
	rebootpgm?	(Normal mode only) Reports the platform-defined reboot command that will attempt to bring the system down gracefully.
	reboottime=	Sets the time (in) minutes that the RMB will wait for a graceful shutdown to occur before activating the hardware reset line.
	reboottime?	Reports the time (in minutes) that the RMB will wait for a graceful shutdown to occur before activating the hardware reset line.
	sanity?	Reports sanity checking status.
	sanity=	Enables or disables the checking of the sanity timer.
	sanitytime?	Reports sanity timeout time.
	sanitytime=	Sets sanity timeout time in minutes.
	system!	Allows users to execute OS commands from within **rmbcmd** (Normal State) or the Independent state.
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.
	callqueue?	Reports the number of panic calls in both modem and IP queues.

Continued on next page

Table 5-4 RMB commands - functional groups — *Continued*

Group	*Commands*	*Purpose*
	clearalarm!	Clears platform alarm counter *n*.
	clearevent!	Clears current event count.
	clearqueue!	Clears both the modem queue and IP queue (the IP queue is a future feature).
	event?	Reports current event count.
	eventlabel=	Labels user-definable event counters 11-26.
	eventlist?	Displays the current value of a specific event counter and its label or all event counters and their labels.
	ipalarm?	Future feature
	ipalarm=	Future feature
	ipalarmtime?	Future feature
	ipalarmtime=	Future feature.
	ps?	Displays states of power supply alarms.
	ps=	Sets the status of monitoring the power supplies.
Msg Buffer	**msg=**	Sends a message to circular buffer.
	msgall?	Reports all messages in buffer.
	msgclearall!	Erases all messages in buffer.
	msgclearn!	Erases a single message from buffer.
	msgn?	Reports a single message from buffer.
	msgnum?	Reports the number of messages in buffer.
	msgspace?	Displays the number of messages available to be placed in the message buffer.
Temperatures and Voltages	**temp?**	Reports all platform temperatures and control values.
	tempmax=	Sets maximum allowable temperature.
	tempmin=	Sets minimum allowable temperature.

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Table 5-4 RMB commands - functional groups — *Continued*

Group	*Commands*	*Purpose*
	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.
Fans, Polarities	**fanp?**	Reports fan polarity.
	fanp=	Sets fan polarity.
	fans?	Reports fan status.
	fans=	Sets status of monitoring of the fans.
	psp?	Reports power supply polarity.
	psp=	Sets the power supply polarity.
Modem	**dialout?**	Reports dial out string.
	dialout=	Sets Hayes dial out string.
	flowcntl?	Displays status of flow control (None, hardware, or software).
	flowcntl=	Sets flow control.
	incall?	future feature
	incall=	future feature
	init?	Reports modem initialization string.
	init=	Sets the modem initialization string for the next initialization.
	modem?	Reports com port, modem baud, data bits, parity, stopbits.

Continued on next page

Table 5-4 RMB commands - functional groups — *Continued*

Group	*Commands*	*Purpose*
	modem=	Sets COM port's operating parameters. The COM port is changed immediately, but the other settings are not changed until the call drops.
	modemreset!	Resets the RMB's internal modem.
	modemtype?	Displays the RMBs if RMB is using internal or external modem.
	modemtype=	Changes the RMB's modem from internal to external.
	outcall?	Displays outcalling status.
	outcall=	Turns outcalling off or on.
	panicmsg?	Displays panic message.
	panicmsg=	Sets panic message.
Static Password Security	**setpw1!**	Sets the user password.
	setpw2!	Sets the manager password.
	user	Disallows configuration changes (sets User mode).

Special Commands

The following commands display specialized information or require special consideration before use:

- **fans?**
- **ps?**

The following sections further explain these commands:

Fans? Command

The RMB displays one or more of the following messages regarding the fan status when the fan monitoring is enabled (**fans= 1**) and the **fans?** command is used. For information about **fans?** command use, see page 5-15.

If ...	The firmware reports ...
there are no failures:	`Ok`

there are any failures:	One or more of these messages:
	`FAN 0 failed`
	`FAN 1 failed`
	`FAN 2 failed`
	`FAN 3 failed`

When the fan monitoring is not enabled, the RMB reports: `Off`

Ps? Command

The RMB displays one or more of the following messages regarding the power supply status when the **ps?** command is used. For information about **ps?** command use, see page 5-24.

If . . .	The firmware reports . . .
there are no failures:	`Ok`
there are any failures:	This message appears: `Power Supply 0 Failed`

A technician will have to look at the LCDs on the power supplies to determine which one is defective. It is not alway power supply 0.

Error Messages using RMB Platform Commands

For corrective actions with numbered steps, try the steps in order. Replacement of the RMB board should always be a last resort.

Error Messages during rmbcmd

While using rmbcmd, the error messages below might display.

Table 5-5 rmbcmd error messages

Item	Message	Reason	Corrective Action
1	`The request could not be performed.`	■ The board does not follow the protocol between software and firmware and is malfunctioning. ■ The board receives a valid RMB command with a valid argument but can't perform the request.	1. Wait a few minutes and try again. 2. Press the RMB Reset button for 3.5 seconds or more. 3. Download the current firmware. 4. Replace the board.
2	`Timed out`	A command is sent by software to the board but did not receive a reply. Occurs when: ■ The board is stuck somewhere (during a failed download following a boot, as an example). ■ 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. 2. Follow item #1 steps.

3	`RMB interface message queue not available.`	This program communicates with the RMB via a message queue which is dependent upon the RMB communications daemon, **rmbd**. Check the log **/rmb/logs/*mmdd*** to determine why it stopped. The most likely reasons are listed below. Please see **rmbd** for more information. ■ The communications daemon has just started and a firmware download is in progress. ■ The configuration file is being rebuilt. ■ The daemon is not running. See the log.	1. Wait about five minutes and try again. 2. See error messages for **rmbd**.
4	*`username`* `is not authorized to use this program.`	Only users authorized in the usertab can execute RMB software. Any other user sees this error. Please see editUserTab.	Log out and log back in as an authorized user.
5	`Invalid Command`	This is not one of the accepted commands of **rmbcmd**.	1. Check the manual for the correct command syntax. 2. Re-enter the command and parameters.
6	`Usage: … …`	A command that requires certain parameters was issued with invalid or missing parameters.	Same as item #5.
7	`Invalid Password - Access Denied`	■ In static password mode, a user makes 1 unsuccessful login attempt. ■ In ASG mode, a user makes 3 unsuccessful login attempts.	Must start again at OS login.

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 5-6.

Table 5-6 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 rear I/O board is connected to the platform, the platform reboots. **NOTE:** *This message is written into the message buffer to confirm that the remote host reset:* `Attempting to reset RMB platform.`	None. Normal operation.
`Executing` *`rebootpgm reboottime`* `Hard reboot in` *`reboottime`* `minutes if system does not shut down gracefully.`	`Reboot time is non-zero, so an attempt is first made to gracefully shut down the platform.`	None. Normal operation.
`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.

Continued on next page

Table 5-6 Independent state messages — *Continued*

Message	Reason	Corrective action
`Escaping to RMB Authentication state.`	The remote user entered the Independent state escape sequence while the RMB was in Normal state. After entering the escape sequence: ■ In password mode — Independent state password prompt appears. ■ In ASG mode — a login prompt appears. If valid RMB user password or response is entered, the RMB goes to Independent state. If security violation occurs as described below: ■ The caller is dropped ■ The RMB is returned to Normal state (Only if the caller escaped Normal state to enter Independent state).	■ In password mode — Enter a valid password. ■ In ASG mode — enter a correct response to a challenge
`Invalid password`	User-level password incorrectly entered	Enter correct password
`Invalid RMB command.`	The remote user entered a string that is not a valid RMB command.	Retype the correct command.
`Unsupported RMB command.`	The remote user entered an RMB command that has not yet been implemented.	Wait for next release.

Continued on next page

Table 5-6 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.`	■ Password mode — 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. ■ ASG mode — After being presented with the Independent state challenge, the remote caller failed to enter the valid response within three attempts. The call is dropped.	Remote caller will have to call the RMB and try again.

`Processing System!`
`Please wait.`
`Start of System! Output`
 	
`End of System! Output`
	This message is sent when the remote manager enters a system! command. The system! command is executed by the host platform, Command output follows within 30 seconds. See the explanation of the **system!** command.	See the explanation of the **system!** command.

Platform Commands

The RMB works under a platform OS (operating system). Several commands are required for functions outside of the RMB, communicating directly with the OS. These commands are available in Normal state, the platform shell prompt, or the **system!** interface of rmbcmd.

RMB Daemon Processes

The RMB-BOP version of the platform software utilizes three daemon processes to control and manage RMB tasks on the platform. These processes are started when the system boots via inittab and should remain running while the system is up. The daemons can be stopped with the service command available under the OS. The daemons log most activities and all errors in the daily log file, **/rmb/logs/mmdd**. The system will store logs from the past 90 days.

rmblogd: The RMB log daemon. Makes entries in the log file and manages the **/rmb/logs** directory. Each day a new log file is created, named ***mmdd***, where ***mm*** is the two-digit month and ***dd*** is the two-digit day. This process must be running before the communications daemon (rmbd) and the heartbeat daemon (rmbdaemon) will start.

Each line in the log has the format:

mm/dd/yy:*hh*:*mm*:*ss*:*Program Name*:*User Name* or (null) if a daemon process:*function name* (optional):*message text*:

For example, following is an example of a normal log message that appears once an hour when the system is healthy:

```
07/08/02:21:56:41:rmbdaemon:(null):Date and time
successfully updated:
```

rmbd: The RMB Communications daemon. This process manages data transfer to and from the RMB's driver and platform applications. It also downloads data, firmware, and BEC and boot code to the RMB and sets up the configuration database. Most platform commands communicate with the RMB via this daemon and show the error message, `RMB interface message queue not available`, if the daemon is not running. Usually when a daemon will not stay running, the platform operating system will write a message to the console, such as `Warning: /rmb/bin/rmbd re-spawning too fast .`

rmbdaemon: The heartbeat daemon. This process has two main functions:

- Sending an indication of OS sanity
- Monitoring messages from the RMB's firmware

The sanity messages are sent to the RMB every 30 seconds. Absence of these messages causes the RMB to generate a sanity timeout alarm. The firmware

sends the daemon messages to request a download of firmware or to indicate when the RMB is reset or a **system!** command is entered from the Independent state. The daemon either processes the message or sends it to rmbd.

Stopping the RMB daemons

To stop the RMB daemons, execute the following commands.

NOTE:
Stopping the daemons should only be done to pursue special troubleshooting or to download new code to the RMB as most RMB programs will not work without the daemons running.

/sbin/service rmb stop	This command tells the RMB to stop monitoring platform sanity. *Stopping the daemons without stopping sanity may cause a false alarm.*
/sbin/service rmb off	This command stops the daemons.

Starting the RMB daemons

/sbin/service rmb respawn	This command starts the RMB daemons, rmbd, rmblogd and rmbdaemon.
/sbin/service rmb start	This command tells the RMB to start monitoring platform OS sanity.

Recommendations for starting the RMB daemons:

- Except where noted, you must be in the RMB user table to use these commands.
- To avoid errors due to differences in shell PATH settings, always use the full path.

Except where noted, the program leaves a trace in the daily log file.

Table 5-7 Platform commands

Command	Description	Notes
/bin/rpm -q rmb-5	Displays the RMB software package installed and does not require special privileges.	Sample output: `rmb-5.1.1-7` Does not write to RMB log
/etc/rmbalarm *n* where ***n*** is an integer from 1 to 16	This command sends alarm ***n*** to the board. It then queries the board and prints out the alarm count to the screen. This program validates the input argument and prints out a usage message when an invalid argument is entered by the user. If the command fails to send alarm ***n*** to the RMB, it prints out an error message.	See error messages in ‘‘Error Messages during rmbalarm’’ on page 5-53.
/etc/rmbcmd -p	The interactive application used to query the RMB or to change its operating parameters. Without the **-p** option, rmbcmd will prompt for passwords if in static mode or login response if in ASG mode.	See error messages in ‘‘Error Messages during rmbcmd’’ on page 5-42.

Continued on next page

Table 5-7 Platform commands — *Continued*

Command	Description	Notes
/rmb/bin/rmbdld	This command forces a download of core or BEC code to the RMB. **NOTE:** *It is usually not necessary to use this command to upgrade firmware.* Command syntax: **rmbdld –c cyn_*X*_*Y*.bin** downloads new firmware (the RMB's operating system). **rmbdld –d bec_*X*_*Y*.bin** downloads new BEC (BIOS extension code) containing diagnostic programs. ***X*_*Y*** is the RMB firmware release number. **NOTE:** *Any valid firmware file can be downloaded to the RMB with this command; however, the communications daemon, rmbd, will work only with the most recent firmware. See Chapter 8, "Configuring the RMB".*	The communications daemon, rmbd, should be stopped when using this command. See ''Stopping the RMB daemons'' on page 5-48. If the current firmware on the RMB is not the most recent, rmbd will load it when it starts.

Continued on next page

Table 5-7 Platform commands — *Continued*

Command	Description	Notes
/rmb/bin/rmbdontpanic	Disables RMB panic calls for the duration of a login. Panic dial out calls are then re-enabled by dropping the modem connection or by running the application with the argument **off**. Command syntax: **rmbdontpanic [on | off]** **on** – panic outcalling is disabled for the duration of the call **off** – normal RMB alarming	This command is often placed in the **/etc/profile** Only works from the alarming port.
/rmb/bin/rmbmodem	Makes administrative changes to support various RMB modems. **rmbmodem** ensures that both the OS and RMB configurations are correctly set for an RMB with an internal modem or an RMB connected to an external modem. Use **rmbmodem** when a new modem is installed or when a new RMB board is installed. **NOTE:** *The rmbmodem usage message below indicates the other options available:*	**rmbmodem** executed without any options is an interactive program that presents the user with a list of supported modems. The user then chooses the appropriate modem from the menu and confirms the choice. The system is then configured to support that modem.

```
Usage: rmbmodem [-mV?h] [-f]<Name of custom modem file>
-m Displays menu of possible modem
-V Displays versioning information for this program
-f Allows input of a custom (not on the menu (-m)) modem from a
   file <Full path to custome modem file>
-?
-h Displays this message
```

Continued on next page

Table 5-7 Platform commands — *Continued*

Command	Description	Notes
/rmb/bin/rmbop	Primarily used as a diagnostic tool. It requires one parameter that indicates the action to be carried out. **rmbop check** checks and reports on error conditions in the RMB's driver. **rmbop verify** performs the rmbop check then tests the RMB's semaphore port.	Diagnostic tool
/rmb/bin/rmbrev	Displays the hardware, firmware, software, and Linux versions of the RMB. Parameters: none	Sample output, see following row.

```
HW: S/N 01DR02310217, HW 1, Boot 1.0, BEC n/a, Core 1.08,
SW: 5.1.1 Red Hat Linux 7.3
```

Boardtype: CYN24

Files:

firmware: <cyn_1_08.bin>

srccfg: <srccfg_5_01_cyn_1_08>

config: <config.db>

semTab: <semTab_5_01_cyn_1_08

BEC: <no file>

boot: <no file>

Error Messages during rmbalarm

These errors might display during the use of the **rmbalarm** command as listed in Table 5-7. For corrective actions with numbered steps, try the steps in order.

Table 5-8 rmbalarm error messages

#	Message	Reason	Corrective Action
1	(Any one of messages 1through 10 in Table 5-5 starting on page 5-44.)	See the reasons in Table 5-5 for each error message.	See Table 5-5 actions for each error message.
2	`rmbalarm` *n*	(Where n is 1 to 16) Either the alarm number is missing or is not a number between 1 and 16.	Re-enter the command correctly.
3	`The alarm was NOT incremented!`	The request to increment the counter of the specified alarm failed.	Try these steps: 1. Wait about a minute to see whether the RMB corrects itself. 2. Press the RMB Reset button for 3.5 seconds or more. 3. Download the current firmware. 4. Replace the board.

Error Messages during rmbdld

These errors might display during the use of the **rmbdld** command as listed in Table 5-7. For corrective actions with numbered steps, try the steps in order.

Table 5-9 rmbdld error messages

Message	Reason	Corrective Action
`You must have root privilege to execute this program`	You are not logged in with root privilege.	Switch user to root or log back in with an ID with root privilege.
`./rmbdld` *`option`* [*`optional filename`*] where option is either **-c** or **-d**: **-c** to download firmware to RMB **-d** to download diagnostics (BEC) to RMB The *optional filename* is the full path of the file to be downloaded. If the filename is absent, then the program will download the latest version of the applicable file.	The parameters entered do not meet the criteria. Either the **–c** or the **–d** is required.	Re-enter the command correctly.
`rmbdld: can't open download file` *filename*	A file named *filename* could not be opened for read.	Verify the name of the file.
`download: file is corrupt`	The download file does not have the correct format.	Transfer a new copy of the file into **/rmb/data** or reinstall the software.
`rmbdld: download file does not have the right format`	The download file does not have the correct record header.	Transfer a new copy of the file into **/rmb/data** or reinstall the software.
`rmbdld: Error in download file`	Unknown file format.	Transfer a new copy of the file into **/rmb/data** or reinstall the software.
`download: can't open rmb device: device busy`	The RMB device file could not be opened.	Stop the RMB daemons and try again.

Continued on next page

Table 5-9 rmbdld error messages

Message	Reason	Corrective Action
`rmbdld: DLFW semaphore failed`	The RMB rejected the request to download the firmware	1. Reset the RMB. 2. Start the RMB daemons and wait 5 minutes. 3. Try again. If that doesn't work, replace the board.
`rmbdld: can't erase FLASH. Replace board`	Erase of FLASH memory failed.	Replace the board.
`rmbdld: can't write FLASH. Replace board`	Write to FLASH memory failed.	Replace the board.
`rmbdld: Unknown error`	An unknown error occurred.	1. Reset the RMB. 2. Start the RMB daemons and wait 5 minutes. 3. Try again. If that doesn't work, replace the board.
`download: rmbd did not restart, exiting`	The daemon did not start automatically.	Stop and restart the daemons manually.

Error Messages during rmbop

These errors might display during the use of the **rmbop** command as listed in Table 5-7. For corrective actions with numbered steps, try the steps in order.

Table 5-10 rmbop error messages

#	Message	Reason	Corrective Action
1	`rmbop failed to open /dev/rmb: Device Busy`	Another program has the RMB's port open.	Wait two minutes and try again. If this persists, contact the TSC.

RMB Communications Daemon Error Messages

The rmbd process is started when the system boots via inittab and should remain running while the system is up. It logs most activities and all errors in the daily log file, **/rmb/logs/mmdd**.

Table 5-11 rmbd error messages

Error Message in Log	Possible Cause	Corrective Action
`RMB Driver not installed.`	■ The special device file **/dev/rmb** is missing, the file is not pointing to the correct device or the driver could not initialize. ■ The RMB board is missing or defective.	1. Verify the physical installation of the RMB board and reinstall the RMB software package. 2. Replace the RMB board and reinstall the software package.
`:main: waiting for rmblogd: (not followed by :rmbd:main: Starting )`	rmbd requires the log daemon and waits indefinitely for it after posting this message. This message when followed by "`main: Starting`" is not an error.	Examine the log for messages from rmblogd to determine why it fails to start. Reinstalling the software package may resolve this.
`:main: is currently running PID = nnnnn:`	Only one rmbd process may run at a time. If init is attempting to start multiple rmbd processes, something is wrong.	This program is not intended to be run from the command line. use **kill *nnnnn*** where ***nnnnn*** is the process id of the current rmbd. Allow init to start a new process.
`:main: createCfg Failed!:`	The configuration database could not be created. This is a fatal error and the preceding lines of the log should be examined for cause. Some possibilities are: ■ The file system containing **/rmb/data** is out of space. ■ The **/rmb/data** directory does not exist. ■ The process owner is not root.	Resolve the problem and restart the system.

Continued on next page

Table 5-11 rmbd error messages

Error Message in Log	Possible Cause	Corrective Action
`:main: initDb failed`	The database would not initialize. This is a fatal error and the preceding lines of the log should be examined for cause.	Resolve the problem and restart the system.
`:main: configureRmb failed.`	The RMB board failed to accept the stored configuration. This is a fatal error as some parameter stored in the database is not acceptable to the current RMB board and its firmware. The solution is to get a good configuration and allow init to restart the process. The file saved in the last system backup may be a copy of the bad data, in which case, removing the configuration file will cause the daemon to recreate a default configuration the next time it is started. See error messages below where the function name is `:configureRmb:`	1. Recover the **/rmb/data** directory and run **/sbin/init q** 2. Remove the file **/rmb/data/config*** and run **/sbin/init q**
`:main: copyCfg stored to active failed!`	See the error `:rmbd:main: createCfg Failed!:`	See the error `:rmbd:main: createCfg Failed!:`
`:configureRmb: RmbDownload(BOOT) Failed.`	The BOOT code failed to load into the RMB board. This is a fatal error and the preceding lines of the log should be examined for cause.	Resolve the problem and restart the system or contact Tier 4 support.
`:configureRmb: RmbDownload(BEC) Failed.`	The BEC code failed to load into the RMB board. This is a fatal error and the preceding lines of the log should be examined for cause.	Resolve the problem and restart the system or contact Tier 4 support.
`:configureRmb: RmbDownload(BEC) Failed`	The CORE code failed to load into the RMB board. This is a fatal error and the preceding lines of the log should be examined for cause.	Resolve the problem and restart the system or contact Tier 4 support.
`:configureRmb: RMPPW failed!`	The RMB firmware failed to accept the configuration password.	Contact Tier 4 support.

Continued on next page

Table 5-11 rmbd error messages

Error Message in Log	Possible Cause	Corrective Action
`configureRmb: ToFromRmb failed {semaphore} {parameter} {RMB's response}`	The RMB's firmware did not accept this semaphore/parameter combination. This is the value in the configuration that is preventing it from starting. See `:main: configureRmb failed` for resolution.	See `:main: configureRmb failed` for resolution.
`:configurermb: setRmbSec FAILED`	The RMB's firmware did not accept the stored security configuration. See `:main: configureRmb failed` for resolution.	See `:main: configureRmb failed` for resolution.
`:mainloop: malloc failed`	The OS (platform operating system) denied the process the required memory. This is a fatal error.	1. Reboot the system. 2. If that fails, contact tier 4.
`:mainloop: msgctl IPC_RMID FAILED`	The OS failed to remove a message queue. This is a fatal error. The previous log message will disclose the message queue ID and use it to remove the queue manually.	1. Log in to the platform as **tsc** and run **ipcrm msg *id*** where ***id*** is the queue id in the previous log entry. 2. Reboot the system. 3. Contact tier 4.
`:mainloop: unable to start message queue <reason>`	The OS denied the process the required message queue. Note the reason for reporting to Tier 4.	1. Reboot the system. 2. If that fails, contact tier 4.

Continued on next page

Table 5-11 rmbd error messages

Error Message in Log	Possible Cause	Corrective Action
`mainloop: cannot open /rmb/data/rmbd_`*`pid`* `for write` *`reason`*	The file **/rmb/data/rmbd_*pid*** could not be opened for write. This is similar to `:main: createCfg Failed!:`	See `:main: createCfg Failed!:`
`:mainloop: msgrcv failed` *`reason`*	If reason is *not* "`Interrupted System call`" then this message is of interest. Note reason for further troubleshooting.	1. If this problem is persistent—for example, init complains the process respawns too rapidly—then reboot the system. 2. If that fails, contact tier 4.
`:msgsnd failed` *`reason`*	The OS could not place the message on the queue. This is a fatal error.	1. If this problem is persistent—for example, init complains the process respawns too rapidly—then reboot the system. 2. If that fails, contact tier 4.

Using rmbmodem

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

ASG Guard
Paradyne 3820
Paradyne 3910
Paradyne 3910 (international)
US Robotics 56k modem
US Robotics 33.6k Faxmodem

To use the RMB Modem Command:

1. At the OS prompt, type **/rmb/bin/rmbmodem** and press ENTER.

   The following is a sample of the text displayed:

   ```
   Intuity vicrmb% /rmb/bin/rmbmodem
   1)ASG Guard
   2)Paradyne 3820
   3)Paradyne 3910
   4)Paradyne 3910 (International)
   5)US Robotics 56 K Modem
   6)US Robotics 33.6 K Faxmodem
   7)Custom modem initialization string,   for example, AT&F&R1
   Enter your choice (number between 1 and 7, otherwise program
   terminates):
   ```

2. Enter the number selection.

If you select:	Then:
1-6	The modem is configured.

7	This prompt displays:
	`Current init setting is: current_init_setting`
	`Enter new init string (pressing enter accepts current value):`
	Type the characters required to initialize the modem correctly and press ENTER, or just press ENTER.

The modem is initialized, either with the predetermined string or with the string you entered. After executing the **rmbmodem** command, you must run **rmbcmd,** authenticate as manager, and run the **rmbreset!** command.

The **rmbmodem** command logs all activity in **/rmb/logs/*date***. Only logins specified in the file **/rmb/data/usertab** with a level of 1 or 2 are permitted to use **rmbmodem**.

NOTE:
The default settings should not be changed. Incorrect values may make it impossible to access the system remotely.

Generic Modem Settings

An 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. Initialization strings are modem-specific. Consult your modem documentation. A listing of the RMB's internal modem commands is available 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 the criteria in the following section for the modem to function properly.

RMB External Modem Initialization Specification

This section specifies how the RMB (the DTE) expects external modems to be configured and initialized. The Hayes commands are referred to as “typical” because not all modems adhere to the official Hayes standard. **Check your modem's manual to be sure.** The proper initialization string for any RMB external modem sets up the following operating parameters:

Table 5-12 External modem initialization

Note	Requirement	Typical Hayes Command
0	Ensure that the modem is in some known state, or factory mode, if necessary. If hardware has a hardware flow control template, use its setting. Typically it is &F1.	&F
1	Set RLSD control to follow the standard RS-232 protocol. **NOTE:** *The RLSD signal (from which the RMB DCD signal is derived) between the modem and the RMB (DB-9 pin 1) must be active only while a remote modem's carrier is detected, or else inactive. This corresponds to the standard RS-232 action.*	&C1
2	Set DTR action to follow the standard RS-232 protocol **NOTE:** *DTR must remain under control of the DTE. The RMB asserts DTR (RMB DB-9 pin 4) to keep remote users connected when the platform is reset.*	&D2 *
3	Modem must continually assert DSR. **NOTE:** *The modem must assert DSR (RMB DB-9 pin 6). This signal tells the RMB that an external modem is connected to it.*	&S0

Table 5-12 External modem initialization

4	Set RTS action to follow the standard RS-232 protocol. **NOTE:** *The modem must react to the RTS signal from the RMB (DB-9 pin 7) in accord with the standard RS-232 protocol.*	&R0	*
5	Set CTS control to the standard RS-232 protocol. **NOTE:** *The modem must provide the CTS signal to the RMB (DB-9 pin 8) in accord with the standard RS-232 protocol.*	\D1	*
6	Set flow control of DTE (sends RTS to modem) and modem (sends CTS to DTE). **NOTE:** *The modem must use the CTS and RTS signals (typically set up by &R0, &K3, and \D1) for hardware handshaking.*	\Q3, &K3	**
7	Answer incoming calls after the third ring. **NOTE:** *The modem must be configured to answer after the third ring.*	S0=3	
8	Enable the reporting of result codes to the DTE. **NOTE:** *The modem must be enabled to report its result codes to the DTE.*	Q0	
9	Return result codes to the DTE as text. **NOTE:** *The modem must be enabled to report its result codes to the DTE as text (OK, ERROR, CONNECT, etc). For operating systems equipped with mgetty, avoid use of additional protocol's result codes (typically &An).*	V1	
10	Disable the echoing of modem commands to the DTE. **NOTE:** *The modem must not be enabled to echo any commands received while in command mode back to the DTE.*	E0	

* Typically the modem's default action

** Typically the modem's default action, especially if &F1 is available

NOTE:
If a modem implements any of these requirements as its default operation, it does not have to be specified again in the initialization string. This keeps the string as compact as possible. For example, items 3 and 7 through 9, above, are defaults for many modems. If this is so, the &S0, S0=1, Q0, and V1 parameters should be omitted from the string, so something like AT&F&C1&D2&R0\D1&K3\E0 should work. A data analyzer (and modem control panel LEDs, if applicable) should confirm that DSR, DTR, RTS, and CTS are active, but RLSD (i.e., CD) is inactive (unless a call is active).

The following table summarizes the RS-232 signals at the RMBPCI DB-9 RS-232 serial port connector and their purpose:

Table 5-13 CYN24AP D8W RS-232 serial port connector pin-out

D8W Pin Number	Signal Name	RS-232 Mnemonic	Direction Relative to DTE (RMB)	Purpose or Indication
1	data carrier detect	DCD	Input	Remote modem carrier detected
2	receive data	RX	Input	Transports data from modem to RMB
3	transmit data	TX	Output	Transports data from RMB to modem
4	data terminal ready	DTR	Output	RMB is powered-up and ready
5	signal ground	GRD	N/A	RS-232 signal ground reference
6	data set ready	DSR	Input	Modem is powered-up and ready
7	request to send	RTS	Output	RMB is ready to transmit data to modem
8	clear to send	CTS	Input	Modem is ready to accept data from RMB
9	ring indicator	RI	Input	Modem detects an incoming call

RMB External Modem Installation

Issue the **boardtype?** command from within rmbcmd. If it does not say `cyn24ap`, replace the RMB.

NOTE:
CYN23AP cannot be configured to work on an external modem.

CAUTION:
Perform this procedure only on site or via a network connection. Do not perform it while connected via the RMB modem.

1. Connect the modem to the RMB D8W port, power-up the modem, and connect the phone line to it.
2. Issue the OS command:

   /rmb/bin/rmbmodem

RMB Modem Initialization

All external modems should be initialized via the **/rmb/bin/rmbmodem** application, which sends an initialization string to the modem and updates the OS configuration files. The initialization string may be verified by the **rmbcmd init?** query. It will be reported as either “Active” (the string has been sent to the modem) or “Pending” (the string has not yet been sent to the modem because RMB firmware could not get control of it). If reported as “Pending”, issue an **rmbreset!** command.

Although the modem initialization string may be reported as “Active,” it could have been rejected by the modem. The **rmbmodem** and **rmbcmd** applications are not aware if the modem accepted or rejected any part of the initialization string. The next section, ‘‘Testing a New Initialization String’’, describes how to verify that the target modem will actually accept a new initialization string.

WARNING:
*Due to the complex nature and multiple steps needed for the proper setup of a modem, and the potential disabling modem functions, use of the **rmbcmd** commands for setting up a modem should be avoided. Use **rmbmodem**.*

Testing a New Initialization String

After specifying a new initialization string, execute any of the following tests on all applicable modems:

- Use a data analyzer to verify that the initialization string is accepted by the modem. Result codes are ignored - and not displayed - by RMB software and firmware. A data analyzer will confirm the init sequence.

- Check that the modem answers, connects to the OS, and carrier drops upon exit.
- Call the platform, escape to RMB Independent State, and exit (carrier should drop).
- Perform a **cu** operation (in both directions).
- Log into the OS and issue a reboot command.

  Prior to issuing the shutdown command, run **stop_vs** and ensure that all platform applications have been properly shut down first by typing **ss**. And confirm that only mtce processes are running.
- Make panic calls from **rmbcmd** and Independent state, via the **rmbalarm** command. Verify connection to INADS terminal. Allow a panic call to time out; terminate panic calls with ACK and NAK from the INADS terminal; verify connections drop and appropriate messages in the RMB message buffer.
- Perform and check **uucp** file transfers (in both directions, receive and transmit).

Events and Actions

6

This chapter describes the RMB event monitoring feature and the resulting actions. Included are:

- Event/Action Overview
- Events
- Actions
- Recommended Event/Action Table

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 (or set of actions), 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 triggers their occurrences:

Table 6-1 Event types

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

Monitored events include the following:

Table 6-2 RMB monitored events

Event #	Event Description	Default Event Label	Event Type
0	RMB POST has detected an RMB problem.	RMB self-test failure	At RMB boot
1	Reserved	Reserved	
2	Platform ambient temperature is high	Temperature above max specified	Periodic
3	Platform ambient temperature is low	Temperature below min specified	Periodic
4	One or more voltages is out of range.	Voltage(s) outside range	Periodic
5	Reserved	Reserved	
6	Operating system Sanity Time-out occurs (time between checks is administerable)	Sanity indicator not received	Sanity check
7	Sanity Bootup Time-out (The time it takes for the operating system to come up is longer than the administerable time)	Boot sanity timeout occurred	Sanity check
8	Platform reboot detected by the PCI reset signal going active.	Platform PCI reset occurred	Episodic

Table 6-2 RMB monitored events

Event #	Event Description	Default Event Label	Event Type
9	Power Supply Failure	Power supply failure	Periodic
10	Fan status	One or more fans malfunctioning	Periodic
11-25*	Application Alarm 1-15	Application alarm counter 1-15	Episodic
26*	INADS test alarm (Alarm 16)	This is only a test	Episodic
27-35*	Reserved	Reserved	
36	IP alarm failure (future feature)		
37	Primary connection sanity strobe (counter is cleared when timer expires).	Primary connection active	Episodic
38	Primary connection sanity timeout (counter is cleared when a primary connection sanity strobe is received from the platform).	Primary connection failure	Episodic

NOTE:
** Denotes that the default label can be changed via the RMB command **eventlabel=**. These event labels shall be soft-setable so that an ASCII error string can be administered and written to the error log or sent to INADS for each event. This will allow labels to be associated with each event so that an event can be associated with a distinctive alarm condition.*

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 within administered levels. If the duration 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 that after the event occurs, it must be manually cleared.
- Sanity checks rely on messages from the platform's operating system, so when messages no longer arrive, the RMB considers this an event. As long as the platform operates normally, this type of event continues to be cleared.

Event counters are cleared when any of the following occurs:

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

The **clearalarm!** command resets events 11 through 26, which are incremented by signals sent from an application. For example, **clearalarm! 1** clears event 11.

Event Severity Levels

RMB events have three levels of severity:

- Warning alarm
- Minor alarm
- Major alarm

The event/action table, Table 6-4 starting on page 6-8, contains the recommended threshold and action list for each level of severity. Each level can trigger up to five actions whenever the event counter reaches the threshold value.

Actions

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

- Rebooting the platform
- 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 6-3.

Table 6-3 Action codes

Action Code	Description
00	Do nothing
01-09	Delay recheck of this event for 1-9 minutes
10*	Sound platform speaker
11	Enable in-calling (future feature)
12	Turn in-calling off (disable) (future feature)
(13-19)	Reserved
20-29*	Write event message to console preceded by 0-9 CR/LFs (Carriage Return Line Feed). The event message is: `Event` *`event_number`* `has reached count` *`counter_value`*`, creating a warning/minor/major alarm` *`event_label`*
50	Reset RMB internal modem (CYN23AP only) with the configured modem initialization string. This will drop any current RMB modem connection.
51*	If IP alarming enabled, then IP alarm. The platform must acknowledge sending the IP alarm within a configurable timeout. If no acknowledgement is received and outcalling is enabled, panic dial out phone 1 (Action 54). If IP alarming is disabled and outcalling is enabled, panic dial out per action 54 immediately. IP alarming is a future feature. Until this feature becomes available, action 51 is equivalent to action 54.
52	If outcalling is enabled, Panic Outcall Phone number 2. This will include dialing the INADS or Trouble Tracker systems with smart alarms.
53	Write Panic Message to circular buffer

Table 6-3 Action codes

Action Code	Description
54	If outcalling is enabled, Panic Outcall Phone number 1. This will include dialing the INADS or Trouble Tracker systems with smart alarms.
55*	Run an OS script contained in the **/rmb/bin/script** file.
60	Reset an individual event's counter
70	Write an event's message to RMB's circular buffer. The event message is: `Event event_number has reached count counter_value, creating a warning/minor/major alarm event_label`
80-86*	Send "`/sbin/init n`" message to PC, where *n* is 0-6 (Linux and UNIX only)
89	If the RMB is in Normal state, put it in Independent state.
99	Reboot the system via hard reset signal First attempts a soft boot. If there is no response from the platform, the command initiates a platform reboot or cold boot via the reset cable.

NOTE:
** Denotes that these actions require an active system running the RMB OS 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, +3.3v) on any power supply voltage, results in the following:

Severity Level	Threshold	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	70,25,54,00,00

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 CR/LFs.

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 CR/LFs, and a panic outcall is made to the phone number in the phone 1 field. The alarm uses the format described under "Alarm Messages" on page 7-3.

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, Severity Level, Event Threshold, Action, Action, Action, Action, Action

The characteristics of each component are:

- Event Number — Range from 0 to 38 as shown in Table 6-2 on page 6-2
- Severity Level — 0 (warning), 1 (alarm), or 2 (major alarm)
- Event Threshold — specifies how many times the event can occur before the action list is executed (0-9999)
- Action — Up to five actions can be taken

Actions are processed in the order they are listed, in rapid succession.

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

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

Table 6-4 Recommended events/actions

#	Event Name	Severity	Action List	Description
0	RMB POST has detected an RMB problem	minor	0,1,30,70,25, 0,0,0	Write a message to the buffer and console
0	RMB POST has detected an RMB problem	major	0,2,100,70, 25,51,0,0	Write more messages, IP alarm or call INADS
2	Platform ambient temperature is high	warning	2,0,10,70,0,0, 0,0	Write a message to the buffer
2	Platform ambient temperature is high	minor	2,1,20,70,25, 0,0,0	Write a message to the buffer and console
2	Platform ambient temperature is high	major	2,2,30,70,25, 51,0,0	Write more messages, IP alarm or call INADS
3	Platform ambient temperature is low	warning	3,0,10,70,0,0, 0,0	Write a message to the buffer
3	Platform ambient temperature is low	minor	3,1,9998,25, 60,0,0,0	Write a message to the console and reset the counter
4	One or more voltages out of range	warning	4,0,10,70,0,0, 0,0	Write a message to the buffer
4	One or more voltages out of range	minor	4,1,20,70,25, 0,0,0	Write a message to the buffer and console

Table 6-4 Recommended events/actions

#	Event Name	Severity	Action List	Description
4	One or more voltages out of range	major	4,2,30,70,25, 51,0,0	Write more messages, IP alarm or call INADS
6	Sanity timeout	minor	6,1,1,70,0,0, 0,0	Write a message to the buffer
6	Sanity timeout	major	6,2,2,70,54, 89,11,0	Write a message to the buffer, call INADS, go into Independent state, enable in-calling
7	Sanity boot time out	major	7,2,13,70,54, 11,0,0	Write a message to the buffer, call INADS, enable in-calling
8	Platform reboot detected	warning	8,0,1,70,60,0, 0,0	Write a message to the buffer and reset the counter
9	Power Supply failure	warning	9,0,10,70,0,0, 0,0	Write a message to the buffer
9	Power Supply failure	minor	9,1,20,70,25, 0,0,0	Write a message to the buffer and console
9	Power Supply failure	major	9,2,30,70,25, 51,0,0	Write more messages, IP alarm or call INADS
10	Fan status	warning	10,0,10,70,0, 0,0,0	Write a message to the buffer
10	Fan status	minor	10,1,20,70, 25,0,0,0	Write a message to the buffer and console
10	Fan status	major	10,2,30,70, 25,51,0,0	Write more messages, IP alarm or call INADS
11-25	Application alarms 1-15		Typically none	Typically not used. Can be used to send platform software alarms
26	INADS test alarm (Alarm 16)	warning	26,0,1,70,54, 60,0,0,	Write a message to the message buffer, send a test call to INADS and reset the counter

Table 6-4 Recommended events/actions

#	Event Name	Severity	Action List	Description
36	IP alarm failure (future feature)	major	36,2,1,70,25, 54,11,0	Writes a message to the message buffer and console, calls INADS, and turns in-calling on
37	Primary connection sanity strobe (future feature)	warning	37,0,1,70,12, 0,0,0	Writes a message to the message buffer and turns in-calling off
38	Primary connection sanity timeout (future feature)	major	38,2,1,70,25, 51,11,0	Writes a message to the message buffer and console, IP alarm or call INADS, and turn in-calling on

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.

It is also advisable to place a message of any changes in the TSC ***.profile****.*

Event/Action Qualifiers

For event/action processing to occur:

- 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 severity 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! *x***. This also allows you to make sure that the event will be triggered. Make sure the event counter is incrementing through the alarm threshold.

- (future feature) For IP alarms, check **ipalarm?** Configuration and Active must both be on. Configuration is set with **ipalarm=**, and Active is set by the platform IP software.

Alarms

7

This chapter describes alarms and how the RMB contacts the INADS system. Included are:

- Alarms
- Buffer Messages

There are two methods for reporting the RMB alarms:

- The RMB on-board or external modem
- The NIC LAN (future feature)

Alarms

The RMB can dial out and send alarm information to either of two telephone numbers, or over a network connection (future feature), 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.

The RMB supports the ability to outdial an alarm action in response to any of the monitored events. It supports two different, administerable phone numbers, each of which can have separate styles, both of which can be either INADS or customer Trouble Tracker targets.

The RMB supports transfer of alarm information according to the INADS protocol given in Table 7-1 below (if the style is INADS). If the RMB modem is currently in use and is in the normal state, the connection is dropped before the alarm dial-out is attempted. This can be blocked by temporarily disabling event/action handling through use of the **actionflag= 0** command.

When the RMB is in the Normal state, Services (TSO/GSO) has the ability to automatically turn off panic outcalling and turn it back on when disconnecting by configuring their platform/application login profiles accordingly. This action is accomplished through the **rmbdontpanic** feature.

Before logging off, the TSO/GSO should check the message buffer to see if any events occurred while logged in. Any event occurring while the TSO/GSO is logged in will not generate a panic call out but will be queued for later disposition. When the RMB is in the Independent state and no one is logged in, panic calls are allowed. Customers dialed through the RMB shall not be allowed to activate the **rmbdontpanic** feature, thus ensuring the connection is dropped so the alarm dial-out can be attempted. Access to rmbmodem is controlled through **/rmb/data/usertab**. **/rmb/data/usertab** is controlled through the use of **/rmb/bin/editUserTab**.

If outcalling is turned on and **alarm! 16** is used to test panic call dial out in the Normal or Independent state, the modem call is dropped immediately and the test call initiated.

Alarm Messages

Alarm messages are sent to INADS in the following format:

Table 7-1 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	Day of month 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 RES CLR	Active Resolved Cleared
23	1	Field separator	|	ASCII code 7CH
24-XXX, where XXX ≤ 240	≤ 217	Alarm information	This text is inserted as default: `INADS Event` *`event_number`* `count` *`cntr_value`*`:`*`warning/major/minor event_label`* For example, Alarm! 16 generates: `INADS Event 26count 0: Major Alarm - This is only a test`	
XXX+1	1	End of record, terminator	DEL	ASCII code 7FH

Table 7-1 shows the INADS message format. The non-INADS format is simply a time-stamped panic message similar to the following:

`23:12:05` *`product_ID`* `Emergency` *`panic_msg`*

This message can be tailored using **panicmsg=**. See Table 5-3 starting on page 5-5.

Software Alarm Numbers

Software alarms are actually a subset of the monitored set of events, as found in Table 6-3 starting on page 6-5. The alarm number found in the INADS message corresponds to an event. Table 7-2 shows the correlation between the software alarm and its related event. These alarms can be generated by a platform application allowing the RMB to call INADS to report application-specific problems.

Table 7-2 Software alarm numbers

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

Administering Your Own Application Alarms

The purpose of software alarms is to provide an interface between the platform and the RMB for sending an administrable alarm. A program or script can be written to issue the **/etc/rmbalarm *n*** (where ***n*** is the alarm number from 1-16). Actions for the related event (11-26) would also need to be administered to perform the desired activity in response to the software alarm. For instance, a

cron job could be programmed to issue a script that monitors disk space. The script could issue the **rmbalarm 1** command. This would increment the counter for alarm 1 by one, thus also incrementing the counter for event 11 by one. When event 11 (alarm 1) reached the preset threshold, the actions for that event would be executed. Such actions could include dialing a pager, recording the alarm in the message buffer, and sending a message to the console.

There are 3 alarm levels that can be programmed, similar to monitored events:

- warning (**action=*m*,0...**)
- minor (**action=*m*,1...**)
- major (**action=*m*,2...**)

where ***m*** is an event 11-26

See Chapter 6, ‘‘Events and Actions’’.

Alarm Calls Sent through the Modem

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 7-1. The OSS responds with POSACK or NEGACK.
4. If the response is:

- POSACK

  The RMB sends the asterisk character **(*)** and drops the telephone line.

- NEGACK or some other type of failure

  The RMB executes a call attempt retry strategy based on the **style=** command.

5. If the RMB receives no response within 30 seconds, it drops the line, and executes the call attempt retry strategy until it reaches the administered value for the maximum number of outcall retries.

NOTE:
*The call attempt retry strategy can be continued by using the **style?** command.*

There is a 3-minute delay between each call attempt. If all attempts fail, the alarm is stored in the RMB circular alarm buffer. In addition, each failed attempt is stored in the buffer.

IP Alarming (Future Feature)

The RMB implements an IP alarming strategy via platform software and hardware. The RMB does not have a NIC or an interface to the LAN directly. Thus, it does not have LAN drivers or a TCP/IP protocol stack, nor does it have direct access to the NIC. All LAN access is indirectly through platform and RMB software.

The IP alarm generation is integrated into the RMB alarm mechanism. That is, there is an action 51, defined to mean “if IP alarming is enabled, then IP alarm to the platform software”. If after an administerable timeout period, the alarm is not sent and acknowledged (ACK) via the LAN, queue the alarm via action 54 to be sent to INADS via the RMB modem. IP alarm software on the platform generates the semaphore acknowledging receipt of the alarm so the firmware can cancel the timer. The timeout also increments an event 36 “IP Alarm Failure” triggering configurable actions such as queue an alarm to be sent to INADS via the RMB modem, write a message to the buffer and write a message to the local console.

The platform via a forms screen or **rmbcmd** determines if IP alarming is enabled. The default is off or disabled.

Multiple RMB IP alarms per action 51 are queued so only one is sent to the platform software, at a time.

For events 6 (sanity timeout) and 7 (sanity boot timeout), in order to not send an unnecessary RMB IP Failure Alarm to INADS, action 51 is not configured. If the platform goes down or doesn't boot after an administerable amount of time, action 54 sends the alarm to INADS without incrementing event 36.

In order to implement a platform/application IP alarm failure via the RMB, the platform/application software, via an application, informs the RMB software of an IP alarm failure which in turn informs RMB firmware via a semaphore. The firmware consequently increments event 36 "IP Alarm Failure" triggering configurable actions such as queue an alarm to be sent to INADS via the RMB modem, write a message to the buffer and write a message to the local console. When a platform/application IP alarm failure occurs, if possible, platform/application alarms are sent via the RMB just as if IP alarming was disabled at the platform level. It is possible that an IP alarm failure indication from the platform is generated before or after the RMB IP alarm timer expires. If the RMB IP alarm failure timer has not expired, event 36 is incremented and the action list triggered. If the RMB alarm failure timer expired thus incrementing event 36, since the event is a chronic alarm, only one IP Alarm Failure alarm is sent to INADS. In either case, the platform via an application provides an indication to RMB software when IP alarming has been restored so RMB firmware, via a semaphore, can rearm the event 36 counter so it can react to a new IP alarm failure condition.

If IP alarming becomes inactive for any reason (RMB IP alarm failure or platform reported alarm failure), any queued alarms are passed to the modem.

In-Calling (future feature)

The TSO/GSO has access to the RMB via the onboard or external modem. This access is called In-calling. In-calling can be enabled or disabled.

When In-calling is enabled, the RMB modem will accept calls at all times.

When In-calling is disabled:

- The RMB modem will not accept calls if the primary connection (the LAN) is in effect.
- The RMB modem will accept calls if the primary connection fails.

If In-calling's configured state is off, the following conditions enable the active state:

- If there is a Primary Connection Sanity Strobe Timeout (event 38) triggering an action 11, In-calling is enabled.

This sanity strobe must be generated from platform software indicating that the primary connection (the LAN) is not working.

- Event 6, Operating System sanity timeout triggers an action 11 to enable In-calling.
- You can use the forms screen to permanently turn on in-calling.

  CAUTION:
  Using the forms screen to permanently turn on in-calling can jeopardize the security of the customer's network by leaving In-calling on.

- Event 7, Sanity Bootup Timeout triggers an action 11 to enable In-calling.

If In-calling is configured to on, the platform sends the Primary Connection sanity strobe, triggering the Primary Connection Sanity, event 37, which turns In-calling off, via action 12.

Modem IP Alarm and Panic Call Queuing

The RMB queues modem panic calls and IP alarms initiated by event/action processing (action 51, 52 or 54). There are separate queues for modem panic calls and IP alarms. Queuing typically occurs while the modem is in use. There is a maximum of eight (8) panic calls for each queue. The TSO/GSO can check the event log or call queue before logging off to see if any events took place while logged on. If appropriate, the TSO/GSO can clear the queue via the **clearqueue!** rmbcmd before logging off. This prevents already known alarms or alarms inadvertently generated while logged on from being sent. **actionflag** must be set to **1** for this feature to work.

- If outcalling is configured to on and turned off, any modem queued items are discarded.
- If outcalling is set to on when it is already on, the queue is not cleared.
- If IP alarming is configured to on and turned off, any IP alarm queued item is discarded.
- If IP alarming is enabled and the **ipalarm** command is given to enable it, the queue is not cleared.

If any actions are programmed to generate an IP alarm or panic call, the panic call and/or IP alarm are queued separately.

Eight panic calls for the modem and an additional eight panic calls for IP alarming are queued. The **clearqueue!** command clears the modem and IP queues. The **callqueue?** command shows the status of the queues (*n* calls in modem and IP queues). If either queue is full and new actions require another panic call, the most recent is discarded. **alarm! 16** has no special priority and is queued like any other alarm.

Modem panic calls are sent and receive a positive or negative acknowledgment.

- If a positive acknowledgment is received, then the call is done and the next call is sent out.
- If a negative acknowledgment is received, the call is retried up to the maximum number of retries given by the **style=** command.

  When the maximum number of retries is used up and a negative acknowledgment is still received, then a notation of this is made in the message buffer and the next alarm is processed.

If there are calls in the panic call or IP alarm queue and **actionflag** is turned off, calls in the queues are held. However, when **actionflag** is turned back on, the callqueues and all event counters are set back to 0 (zero)

Additional Buffer Messages

Besides the Action 53 and 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 7-3 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, the platform reboots.	If the platform fails to reset, try these steps: ■ Make sure that the CYN23AP/ CYN24AP is installed and the reset cable is correctly plugged in. ■ Replace reset cable. ■ If the CYN23AP/CYN24AP is installed correctly and the platform does reset when the platform 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, 52, or 54. The remote user is disconnected so the panic call may be completed.	To stay connected while dialed in through the RMB modem, run the platform command **rmbdontpanic** or 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 because the initial or previous attempt failed. The remote user is disconnected so the panic call may complete.	To stay connected while dialed in through the RMB modem, run the platform command **rmbdontpanic** or turn action processing off with the **actionflag= 0** command. Use the **actionflag= 1** command to turn action processing back on before exiting.

Continued on next page

Table 7-3 Additional buffer messages

Message	Description	Corrective Action
`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 within 30 seconds, so it disconnected. 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 phone numbers are valid. See **phone1=**, **phone2=**, **style=**, and related commands in Table 5-7 starting on page 5-49.
`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 it disconnected. 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 ID is valid. See **id=** and related commands in Table 5-7 starting on page 5-49.
`RMB reset`	The user, local or remote, commanded the RMB to be reset via the **rmbreset**! command.	None

Continued on next page

Table 7-3 Additional buffer messages

Message	Description	Corrective Action
`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 within 30 seconds. Firmware responded to the INADS ACK by sending the character '*' and disconnecting. 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 configuration failed.`
 	
or
 	
`Modem configuration command failed.`
	The modem reported an error, or the modem's DSR signal was not detected during the modem configuration attempt.	*All Modems*: Make sure the modem configuration parameters are valid for the RMB modem in use. To confirm the modem entry, use the **modem?** and **init?** commands. If a change is required, use the **rmbmodem** command from the platform operating system. See **modem=** and related commands in Table 5-7 starting on page 5-49.
		
		External modem: Check the modem hardware, including cables, adapters, and power supply. Make sure that dial tone is present at the phone jack.
		
		If all else fails, replace the RMB.

Continued on next page

Table 7-3 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. 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. If panic calls to this remote system always fail, make sure that the RMB phone numbers are valid. See the **rmbmodem** utility on page 5-51, or **modem=** and related commands in Table 5-3 starting on page 5-5. ■ 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. ■ Verify that the D8W is connected correctly to the COM port platform and RMB jack. ■ *External Modem*: If an external modem is in use, check the modem hardware, including cables, adapters, and power supply. ■ If all else fails, replace the RMB.

Continued on next page

Table 7-3 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 positive acknowledgment or INADS negative acknowledgment. In non-INADS mode, the time-stamped panic message is transmitted, but the remote system disconnected too soon from the RMB (which normally disconnects 5 seconds after transmitting the panic message). 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. ■ If panic calls to this remote system always fail, make sure that the RMB phone numbers are valid. See the **rmbmodem** utility under "Platform Commands" on page 5-47, or the **modem=** command and related commands in Table 5-7 starting on page 5-49. ■ *External Modem*: If an external modem is in use, check the modem hardware, including cables, adapters, and power supply. ■ If using non-INADS equipment, ensure that it will stay up the required length of time. ■ If all else fails, replace the RMB.

`Modem initial-ization failed.`
 	
or
 	
`Modem initialization command failed.`
	Internal modem: After configuring the modem, the RMB was unable to initialize it with the modem initialization string.
	
	External modem: The DSR signal was not detected during the modem initialization attempt.
		■ Make sure the modem initialization string is valid for the RMB modem in use. See the **rmbmodem** utility under "Platform Commands" on page 5-47, or the **init?** command and related commands in Table 5-7 starting on page 5-49.
		
		■ If an external modem is in use, check the modem hardware, including cables, adapters, and power supply.
		
		■ If all else fails, replace the RMB.

Continued on next page

Table 7-3 Additional buffer messages

Message	Description	Corrective Action
`RMB remote connection dropped unexpectedly.`	A remote Independent state user was disconnected before entering the RMB **exit** command by: ■ escaping to modem command mode, which drops the connection ■ exiting via application software ■ 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 ‘‘Platform Commands’’ on page 5-47, or the **init?**, **modem=** and related commands in Table 5-7 starting on page 5-49. ■ If an external modem is in use, check the modem hardware, including cables, adapters, and power supply. ■ If all else fails, replace the RMB.
`Security violation. Disconnecting remote caller.`	The remote user did not enter a valid RMB user password or valid ASG response to enter Independent state or system BIOS console redirection feature within three attempts and/or thirty seconds.	The remote user must use the valid RMB user password or valid ASG response. If the password has been lost, it must be restored to its default.
`date time day/time_of_initial_alarm``, ACT|INADS Event` *`X`* `Count` *`Y`*`: Major Alarm-` *`alarm_text`*		
	The RMB attempted to send the alarm to the remote system, but all attempts, including retries, also failed.	Same as ‘‘`Modem connection attempt failed.`’’ on page 7-13.

Configuring the RMB

8

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, active or stored, configurations 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 designed to work with a specific version of firmware and tailored to the platform at installation time. The parameters were developed to maximize the value of the information collected by the RMB for the largest number of applications.

Configuration Design

The platform software stores three values for each parameter in its database. They are:

- **Default**

  Determined at installation time and stored on the platform. Cannot be changed by RMB commands.

- **Active**

  The current settings loaded into the RMB. Can be changed.

- **Permanent**

  Stored on the platform and set by the **Configure!** command.

Figure 8-1 illustrates the relationship between rmbd and the Default, Permanent, and Active parameters.

Figure 8-1. Relationship between rmbd and the Default, Permanent, and Active parameters

The RMB configuration is installed and maintained by this method:

- **Default 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, yet tailored for the specific platform. Use the **clearconfig!** command to restore the default configuration (see Table 5-7 starting on page 5-49). Exceptions to this are the ID, phone1, ASG Security Mode, and passwords.
- **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 5-7 starting on page 5-49). If the RMB is reset or rebooted, this memory is cleared and restored from permanent storage. If the RMB changes from Independent to Normal state, this memory is cleared and restored from the active values in rmbd process.

- **Permanent changes:** Changes in temporary active memory are written to permanent storage by using the **configure!** command. The Product ID, Phone1 and security mode are obtained from the voice system, if available. The RMB's nonvolatile RAM is updated with the subset of parameters.
- **Replacement RMBs:** Storing the configuration on the platform's hard drive ensures that the same configuration can be used, regardless of the installed hardware.
- **Independent state changes:** Changes can be made to the configuration in the RMB's active temporary memory using Independent state commands. However, these changes cannot be saved to permanent storage. The rmbd process clears the changes when the RMB returns to Normal state. If the RMB is rebooted, the permanent configuration is loaded. Permanent changes can be made only through **rmbcmd** and sealed with the **configure!** command.

rmbcmd

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

The rmbcmd program can be used when the RMB is in Normal or Independent state. However, conflicts may occur, as the RMB is a single-user device.

Configuration Management

RMB configuration management ensures that user-selected operating parameters are stored in protected areas of non-volatile 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, parameters can be changed.

Configuration Management Overview

The RMB contains copies of the configuration options to be used while the software, firmware and hardware operates. These options can be viewed from 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. Therefore, files on the platform and a daemon process maintain the RMB and manage the download automatically.

This file is only updated using the **configure!** command, which requires manager privilege. 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.

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.

Permanently Changing the Configuration

To make permanent changes to the configuration file:

1. Use the **rmbcmd -p** command (with manager privilege).
2. Use the RMB commands to make configuration changes.
3. Compare all settings to Table 9-1 and to Table 6-4 starting on page 6-8. (Security options cannot be read.)
4. Enter the **configure!** command.

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

Configuration Options

Table 8-1 RMB configuration options

RMB Parameter	Purpose/ Values	Default	Notes
Country	28 characters	USA	This value is provided to the RMB software package so that country-specific RMB options can be administered by the RMB software package. For example, the modem init string may be country specific.
Fan Monitoring	on or off	off	Turns the monitoring of the platform fans on or off
Power Supply Monitoring	on or off	off	Turns the monitoring of power supplies on or off.
Power Supply Polarity	0 or 1	0	Sets the power supply polarity. 0 = logic level 0 on the RMB power supply input pin, indicating power supply failure, logic level 1 indicating power supply normal operation 1 = logic level 1 indicating power supply failure, logic level 0 indicating normal operator of power supply

Continued on next page

Table 8-1 RMB configuration options — *Continued*

RMB Parameter	Purpose/ Values	Default	Notes
Fan polarity	0, 1, T or t (Tachometer)	0	Sets the fan polarity. ■ 0 = a logic level 0 on the RMB, fan input pin is considered a failure ■ 1 = a logic level 1 is considered a failure ■ T = if the sense does not change for frequent samples in 6 seconds, then it is considered a failure.
Modem COM Port	0-4	2	RMB needs to know COM port so that RMB diagnostics (if provided and enabled) serial port test doesn't test RMB's COM port. The platform cannot use the RMB's modem if the value is 0. (This is the value that keeps the RMB in the Independent state).
Date	*mm/dd/yy*	*current date*	Setting this updates the RMB firmware real time clock. This is set by (and periodically updated by) the RMB software package to match the PC's real time clock whenever the system reboots, using the 'time' Linux system call.
Time	*hh:mm:ss* in military format	*current time*	Setting this update the RMB firmware real time clock. This is set by (and periodically updated by) the RMB software package to match the PC's real time clock whenever the system reboots, using the 'time' Linux system call.

Continued on next page

Table 8-1 RMB configuration options — *Continued*

RMB Parameter	Purpose/ Values	Default	Notes
Minimum Temperature	+50 to +200	+50° Fahrenheit	May be adjusted to meet system needs.
Maximum Temperature	+50 to +200	+120° Fahrenheit	May be adjusted to meet system needs.
DST	on/off	on	The Firmware Real Time Clock (RTC) will automatically adjust for daylight savings time if this parameter is set to on.
Voltage Tolerance	2 to 25	negative rails 8, positive rails 7	5 is +/-5% tolerance, 6 is +/-6%, etc. The % tolerance is configurable for each voltage separately. Inaccuracy of hardware sensors must be taken into account.
Product ID	10 characters	*INADS_ID*	The product ID for the platform and the RMB are always the same. This value is required in order to authenticate via an ASG challenge/response routine and identify the machine in alarms.
ASGSecurity	on/off	off	Security protection mode. Static passwords or ASG.
User Static Password	7-10 characters		Required to access RMB when static passwords are turned on
Manager Static Password	7-10 characters		Required to perform destructive tests and change passwords and other critical data when static passwords are turned on.
User Secret Key	56 bits	Assigned by Avaya Security Group	Required to access RMB when ASG is turned on. The ASG key changer software tool changes the secret keys periodically.

Continued on next page

Table 8-1 RMB configuration options — *Continued*

RMB Parameter	Purpose/ Values	Default	Notes
Manager Secret Key	56 bits	Assigned by Avaya Security Group	Required to reboot platform, change secret keys and other critical data when ASG is turned on. The ASG key changer software tool changes the secret keys periodically.
Panic Message	126 chars -sent during certain emergency dialouts	Emergency	This message can be written to the circular buffer using action 53. When the RMB dials out an alarm using the standard message style (Style= 0), this message appears at the end of the ASCII string.
Console Message	on/off	on	Turns the writing of messages to the console on or off.
BEC Enable	on/off 1/0	on	Controls whether the BEC (RMB diagnostics) is enabled during the platform BIOS POST.
User Definable Event Label	32 characters	events 11-25, per Table 6-2 on page 6-2	Labels events 11-25
Modem Speed	1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 115200	38400	DTE Speed used by the firmware core when the RMB owns the modem. If the platform has been using the modem, the firmware uses the last known speed.

Continued on next page

Table 8-1 RMB configuration options — *Continued*

RMB Parameter	Purpose/ Values	Default	Notes
Flow Control	0=no flow control 1=software flow control 2=hardware flow control	2	Since the RMB is in the data path between the 16550 UART and the MODEM and it buffers data, it must have the option of implementing flow control. This is for internal RMB flow control and does not control the modem's flow control, which is administered from the AT command set. This value doesn't change the method of flow control selected by the platform.
Parity	(E)ven, (O)dd, (N)one	N	Whether or not the modem will use the parity bit during byte transfer. N is compatible with “strm” and the equipment at the TSO/GSO.
No. of Data Bits	7,8	8	Number of data bits in a transmitted segment. 8 is compatible with "strm" and the equipment at the TSO/GSO.
No. of Stop Bits	1,2	1	Number of stop bits in a transmitted segment.
Initialization String	32 characters	AT&F	Initialization string sent to the modem. This string supports all known RMB MODEM applications and should not be changed without consulting the RMB development team as it is impossible for the RMB to work properly with all possible AT options.
Dial-out command	10 characters	ATDT	Dial out command used by the modem prior to the phone number dialed.

Continued on next page

Table 8-1 RMB configuration options — *Continued*

RMB Parameter	Purpose/ Values	Default	Notes
Phone Number 1	32 characters	Null	Typically, this would be the INADS system phone number. Besides numbers, this field will support the comma character, indicating the modem should pause 2 seconds as a default (e.g., 9,5551212).
Phone Number 2	32 characters	Null	Typically, this would be the secondary INADS system phone number. Besides numbers, this field will support the comma character, indicating the modem should pause 2 seconds as a default (e.g. 9,5551212).
Outcall Retry Count	0 to 4	2	RMB will try a total of 3 times to call Phone 1 or Phone 2. Can be separate retries for phone 1 and phone 2.
Outcall Message Style	message style 0 = standard, 1 = INADS/ Trouble Tracker style	1 (for both phone 1 and phone 2)	Must be set to 1 for INADS. Can have different styles for phone 1 and phone 2. Style 0 provides a standard ASCII message in the format: `mm/dd/yy hh:mm:ss product_ID panic_msg`
Out Calling	on/off	on	Determines whether panic calls via the RMB modem are allowed.

Continued on next page

Table 8-1 RMB configuration options — *Continued*

RMB Parameter	Purpose/ Values	Default	Notes
Sanity Checking	on or off	on	Sanity checking must always be turned on so that an event/action list can be configured for the RMB to go into Independent state when the platform crashes. Another option is to reset the platform (action 99) when sanity is lost.
Sanity Boot Time	1-10	5	This time (in minutes) is used to monitor the time the system takes to re-boot. Always set the event counter to at least 2 before taking any action since the first count may be short. The event counter may be more than 2 to allow time for file system checks, etc. The best way to use this feature is to keep the time at 5 minutes and increase the event counter before taking any actions.
Sanity Timeout	1-10	5	Time, in minutes, to allow for operating system Sanity timer to check with RMB. This time (in minutes) must be greater than the time it takes for the operating system to reboot. This time includes a safety factor of an additional 2 minutes (the actual calculation is 3 minutes). If the PC does a spontaneous reboot, and the RMB dials out to report the loss of sanity during the reboot, the RMB modem may not be seen by the PC as it reboots. If this happens the PC will not be able to use the RMB modem.

Since there is no Real Time Clock (RTC) device on the RMB, firmware keeps track of real time. Updates from the operating system set the time and date.

The firmware RTC does not have default values. If the operating system fails to boot, any panic dial-out or message stored in the circular buffer may have an incorrect time stamp. Since INADS and INADS Lite time-stamps all tickets, this should not be a problem.

INADS-style panic messages and IP alarms use the following timestamp format:

- Day = `01`
- Hour = `00`
- Minute = `00`

There is an indication in the circular buffer against messages, in response to the **TIME?** and **DATE?** rmbcmds and in the standard message style for panic messages and IP alarms, stating that the time and date is not available ("`D/T Unavailable`"). The messages in the circular buffer are in sequential order for troubleshooting purposes. The Sanity Boot Time Out feature is maintained with the functionality provided by firmware, independent of the time provided or not provided by the operating system.

Table 8-1. Summary of events that affect configuration

Events	Effect on configuration	Note
Platform Started or Rebooted	Permanent configuration is loaded into the RMB	Firmware may be downloaded to the RMB first
The **rmbd** process restarted	Permanent configuration is loaded into the RMB	Firmware may be downloaded to the RMB first
Configure! issued from **rmbcmd**	Active configuration is stored in Permanent storage.	Saves Active changes
Clearconfig! issued from **rmbcmd**	Default configuration is made Active and loaded into the RMB.	Clears Active changes

Table 8-1. Summary of events that affect configuration

Events	Effect on configuration	Note
RMBReset! issued from **rmbcmd** or Independent state menu	Permanent configuration is made Active and loaded into the RMB	Clears Active changes
Reset button on RMB is pressed and held for 3.5 seconds	Permanent configuration is made Active and loaded into the RMB	Clears Active changes
RMB returns to Normal state from Independent state	Active configuration is reloaded into the RMB	Clears Active changes

Setting Communication Port # to Zero

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

- OS remote access is not available via the RMB's modem.
- INADS alarms cannot be sent from the application software.
- Remote diagnostics are not available because no COM port is available.
- RMB stays in the Independent state.

Modem Communications

A

This appendix lists the command set for internal modem communication and the default settings for the internal CYN23AP modem.

These commands are used to change the modem's configuration with the platform **rmbmodem** command, found in Table 5-7 on page 5-49.

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.

NOTE:
The information in this appendix was taken from:

AT Commands for RCVDL56ACF, RCVDL56ACFL/SP, RC56D/RC336D, RC56LD/RC336LD Modems Reference Manual (Preliminary)

by Conexant Systems, Inc.

Syntax and Procedures

The command and response syntax and procedures generally conform to referenced recommendations and standards. Since these recommendations and standards describe characteristics universal to a large installed base of modems to a maximum degree, there may be syntax and procedural differences due to extensions and behavioral differences in implemented commands, parameters, and responses beyond that described in these recommendations and standards.

The syntax and procedures described in this section are based on V.25ter with additional information included for implemented extensions and behavioral differences beyond V.25ter.

Alphabet

The T.50 International Alphabet 5 (IA5) is used in this document. Only the low-order seven bits of each character are significant to the modem; any eighth or higher-order bit(s), if present, are ignored for the purpose of identifying commands and parameters. Lower-case characters are considered identical to their upper-case equivalents when received by the modem from the DTE. Result codes from the modem are in upper case.

DTE Command Lines

Words enclosed in <angle brackets> are references to syntactical elements. The brackets are not used when the words appear in a command line. Words enclosed in [square brackets] represent optional items which may be omitted from the command line at the specified point. The square brackets are not used when the words appear in the command line. Other characters that appear in syntax descriptions must as included as shown.

Any modem responses are mentioned in terms of their alphabetic format; the actual response issued will depend on the setting of parameters that affect response formats, e.g., Q and V commands (see 2.7) [of original Conexant document].

Command Line General Format

A command line is made up of three elements: the prefix, the body, and the termination character.

The command line prefix consists of the characters "AT" or "at" or, to repeat the execution of the previous command line, the characters "A/" or "a/".

The body is made up of individual commands described in this document. Space characters (IA5 2/0) are ignored and may be used freely for formatting purposes, unless they are embedded in numeric or string constants. The termination

character may not appear in the body. The modem can accept at least 40 characters in the body.

The termination character may be selected by a user option (parameter S3), the default being CR.

Command Line Editing

The character defined by parameter S5 (default, BS) is interpreted as a request from the DTE to the modem to delete the previous character. Any control characters (IA5 0/0 through 1/15, inclusive) that remain in the command line after receipt of the termination character are ignored by the modem.

The modem checks characters from the DTE first to see if they match the termination character (S3), then the editing character (S5), before checking for other characters. This ensures that these characters will be properly recognized even if they are set to values that the modem uses for other purposes. If S3 and S5 are set to the same value, a matching character will be treated as matching S3 (S3 is checked before S5).

Command Line Echo

The modem may echo characters received from the DTE during command state and online command state back to the DTE, depending on the setting of the E command. If so enabled, characters received from the DTE are echoed in the same format as received. Invalid characters in the command line or incomplete or improperly-formed command line prefixes may not be echoed.

Repeating a Command Line

If the prefix "A/" or "a/" is received, the modem immediately executes once again the body of the preceding command line. No editing is possible, and no termination character is necessary. A command line may be repeated multiple times in this manner. Responses to the repeated command line are issued using format of the original command line. If "A/" is received before any command line has been executed, the preceding command line is assumed to have been empty (that results in an OK result code).

Types of DTE Commands

There are two types of commands: action commands and parameter commands. Commands of either type may be included in command lines, in any order.

Action commands may be "executed" (to invoke a particular function of the equipment, which generally involves more than the simple storage of a value for later use), or "tested" (to determine whether or not the equipment implements the action command, and, if subparameters are associated with the action, the ranges of subparameter values that are supported).

Parameters may be "set" (to store a value or values for later use), "read" (to determine the current value or values stored), or "tested" (to determine whether or not the equipment implements the parameter, and the ranges of values supported).

Basic Syntax Commands

Basic Syntax Command Format

The format of Basic Syntax commands, except for the D and S commands, is as follows:

<command>[<number>]

where <command> is either a single character, or the "&" character followed by a single character per V.25 ter. In addition, <command> can be the "%" character followed by a single character.

<number> may be a string of one or more characters from "0" through "9" representing a decimal integer value. Commands that expect a <number> are noted in the description of the command. If a command expects <number> and it is missing (<command> is immediately followed in the command line by another <command> or the termination character), the value "0" is assumed. If a command does not expect a <number> and a number is present, an ERROR is generated. All leading "0"s in <number> are ignored by the modem.

Additional commands may follow a command (and associated parameter, if any) on the same command line without any character required for separation. The actions of some commands cause the remainder of the command line to be ignored (e.g., A).

See the D command for details on the format of the information that follows it.

S-Parameters

Commands that begin with the letter "S" are known as "S-parameters". The number following the "S" indicates the "parameter number" being referenced. If the number is not recognized as a valid parameter number, an ERROR result code is issued.

Immediately following this number, either a "?" or "=" character must appear. "?" is used to read the current value of the indicated S-parameter; "=" is used to set the S-parameter to a new value.

S<parameter_number>?

S<parameter_number>=[<value>]

If the "=" is used, the new value to be stored in the S-parameter is specified in decimal following the "=". If no value is given (i.e., the end of the command line occurs or the next command follows immediately), the S-parameter specified may be set to 0, or an ERROR result code issued and the stored value left unchanged. The ranges of acceptable values are given in the description of each S-parameter.

If the "?" is used, the modem transmits a single line of information text to the DTE. The text portion of this information text consists of exactly three characters, giving the value of the S-parameter in decimal, with leading zeroes included.

Data Command Set

Command Guidelines

The commands (see Table A-1) used to control and report modem operation in data modem mode are defined in this section. The default values are the RMB V4 factory defaults for both factory profiles.

Commands will only be accepted by the modem once the previous command has been fully executed, which is normally indicated by the return of an appropriate result code. Execution of commands D and A, either as a result of a direct command or a re-execute command, will be aborted if another character is entered before completion of the handshake.

Escape Code Sequence

When the modem has established a connection and has entered on-line data mode, it is possible to break into the data transmission in order to issue further commands to the modem in an on-line command mode. This is achieved by the DTE sending to the modem a sequence of three ASCII characters specified by register S2. The default character is '+'. The maximum time allowed between receipt of the last character of the three escape character sequence from the DTE and sending of the OK result code to the DTE is controlled by the S12 register.

Table A-1 AT commands summary

Command	Description	Range	Saved	Default
A/	Re-execute last command			—
AT=*x*	Write current S register			—
AT?	Read current S register			—
A	Answer command			—
B*n*	CCITT or Bell	0-1	*	B1
D*n*	Dial command			—
E*n*	Command Echo	0-1	*	E0
H*n*	Hook switch command	0-1		—
I*n*	Identification	0-6		—
N*n*	Automode/autospeed enable	0-1	*	N1
O*n*	Return to online command	0-1		—
P	Set pulse dial default		*	{no}
Q*n*	Quiet result codes	0-1	*	Q0
T	Set tone dial default		*	{yes}

Table A-1 AT commands summary

Command	Description	Range	Saved	Default
V*n*	Result code form	0-1	*	V1
W*n*	Connect message control	0-2	*	W0
X*n*	Extended result codes / Blind Dialing	0-4	*	X3
Y*n*	Long space disconnect	0-1	*	Y0
Z*n*	Soft Reset and set profile command	0-1		—
&C*n*	DCD options	0-1	*	&C1
&D*n*	DTR options	0-3	*	&D2
&F*n*	Restore factory configuration command	0-1		—
&G*n*	Select guard tone	0-2	*	&G0
&K*n*	Flow control	0,3-6	*	&K3
&P*n*	Set pulse dial make/break ratio	0-3	*	&P0
&Q*n*	Mode	0,5,6	*	&Q5
&R*n*	RTS/CTS options	0-1	*	&R1
&S*n*	DSR options	0-1	*	&S0
&T*n*	Test and diagnostics	0-8	*	&T5
&V	Display current configuration			—
&V1	Display last connection statistics			—
&W*n*	Store current configuration command	0-1		—
&Y*n*	Designate default reset profile	0-1	*	&Y0
&Z*n*=*x*	Store telephone number command	0-3		—
\A*n*	Maximum MNP block size	0-3	*	\A1
\B*n*	Transmit BREAK command	1-9		—
\K*n*	BREAK control	0-5	*	\K5
\N*n*	Operating mode	0-5	*	\N3
\V*n*	Connect message display	0-1	*	\V0
%C*n*	Data compression control	0-3	*	%C3
%E*n*	Line quality monitor and retrain control	0-2	*	%E2
%L	Report line signal level status			—
%Q	Report line signal quality status			—

* Command setting may be stored in one of two user profiles with the &W command.

Data Commands

The modem will respond to the commands detailed below. Parameters applicable to each command are listed with the command description. The defaults shown for each configuration command are those used in both factory profiles.

Generic Modem Control

Zn - Soft Reset and Restore Profile

The modem performs a soft reset and restores (recalls) the configuration profile according to the parameter supplied. If no parameter is specified, zero is assumed.

Z0	Soft reset and restore stored profile 0.
Z1	Soft reset and restore stored profile 1.

Result Codes:

OK	n = 0 or 1.
ERROR	Otherwise.

In - Identification

The modem reports to the DTE the requested result according to the command parameter.

I0	Reports product code, e.g., 33600
I1	Reports the least significant byte of the stored checksum in decimal, e.g., 243.
I2	Reports "OK".
I3	Reports identification codes in the form *VX.X-F_A* where:

VX.X = Firmware version (e.g., V2.300)

F = Firmware model and ROM Size:

V34 = V34 in 1M ROM

A = Application

DLS = Desktop serial

Example: V2.300-V34_DLS

I4	Reports the RMB V4 identifier string in ASCII format, for example, Avaya Inc. Remote Maintenance Board Version 3 (RMB V4 - Rev. a)
I5	Reports Country Code parameter, e.g., 022
I6	Reports modem data pump model and internal code revision (for example, RCV3366DPF L8571A Rev 36.00/36.00)

Result Codes:

OK	n = 0 to 6.
ERROR	Otherwise.

&Fn - Restore Factory Configuration (Profile)

The modem loads the factory default configuration (profile). The factory defaults are identified for each command and in the S-Register descriptions. A configuration (profile) consists of a subset of S-Registers.

&F0	Restore factory configuration 0.
&F1	Restore factory configuration 1.

Result Codes:

OK	n = 0 or 1.
ERROR	If the modem is connected.

&Tn - Test and Diagnostics

The modem will perform selected test and diagnostic functions according to the parameter supplied. A test can be run only when in an asynchronous operation in non-error-correction mode (normal - &Q6 or direct - &Q0 mode). To terminate a test in progress, the escape sequence must be entered first, except for parameters 7 and 8 (see Section 3.1.3). If S18 is non-zero, a test will terminate automatically after the time specified by S18 and display the OK message. Note: For tests 3, 6, and 7, a connection between the two modems must first be established.

&T0	Terminates test in progress. Clears S16.
&T1	Initiates local analog loopback, V.54 Loop 3. Sets S16 bit 0. If a connection exists when this command is issued, the modem hangs up. The CONNECT XXXX message is displayed upon the start of the test.

&T0	Terminates test in progress. Clears S16.
&T2	Returns ERROR.
&T3	Initiates local digital loopback, V.54 Loop 2. Sets S16 bit 2. If no connection exists, ERROR is returned. Sets S16 bit 4 when the test is in progress.
&T4	Enables digital loopback acknowledgment for remote request, i.e., an RDL request from a remote modem is allowed. Sets S23 bit 0.
&T5	Disables digital loopback acknowledgment for remote request, i.e., an RDL request from a remote modem is denied. Clears S23 bit 0. (**Default**.)
&T6	Requests a remote digital loopback (RDL), V.54 Loop 2, without self test. If no connection exists, ERROR is returned. Sets S16 bit 4 when the test is in progress. The CONNECT XXXX message is displayed upon the start of the test.
&T7	Requests a remote digital loopback (RDL), V.54 Loop 2, with self test. (In self test, a test pattern is looped back and checked by the modem.) If no connection exists, ERROR is returned. When the test is terminated either via expiration of S18, or via the &T0 or H command, the number of detected errors is reported to the DTE. Sets S16 bit 5 when the test is in progress.
&T8	Initiates local analog loopback, V.54 Loop 3, with self test. (In self test, a test pattern is looped back and checked by the modem.) If a connection exists, the modem hangs up before the test is initiated. When the test is terminated either via expiration of S18, or via the &T0 or H command, the number of detected errors is reported to the DTE. Sets S16 bit 6 when the test is in progress.

&Yn - Designate a Default Reset Profile

This command selects which user profile will be used after a hard reset.

&Y0	The modem will use profile 0.
&Y1	The modem will use profile 1.

Result Codes:

OK	n = 0 or 1.
ERROR	If n > 1.

&Wn - Store Current Configuration

Saves the current (active) configuration (profile), including S-Registers, in one of the two user profiles in NVRAM as denoted by the parameter value.

The current configuration is comprised of a list of storable parameters illustrated in the &V command. These settings are restored to the active configuration upon receiving a Zn command or at power up (see &Yn command).

&W0	Store the current configuration as profile 0.
&W1	Store the current configuration as profile 1.

Result Codes:

OK	n = 0 or 1.
ERROR	Otherwise.

&Zn=x - Store Telephone Number

The modem can store up to four telephone numbers and each telephone number dial string can contain up to 34 digits.

&Zn=x	n = 0 to 3 and x = dial string.

Result Codes:

OK	For n ≤ 3, and x ≤ 34 digits.
ERROR	If n > 3, x > 35 digits.

DTE-Modem Interface commands

The parameters defined in this section control the operation of the interface between the DTE and modem.

En - Command Echo

The modem enables or disables the echo of characters to the DTE according to the parameter supplied. The parameter value, if valid, is written to S14 bit 1.

E0	Disables command echo. (**Default**.)
E1	Enables command echo.

Result Codes:

OK	n = 0 or 1.
ERROR	Otherwise.

Qn - Quiet Results Codes Control

The command enables or disables the sending of result codes to the DTE according to the parameter supplied. The parameter value, if valid, is written to S14 bit 2.

Q0	Enables result codes to the DTE. (**Default**.)
Q1	Disables result codes to the DTE.

Result Codes:

OK	n = 0 or 1.
ERROR	Otherwise.

Vn - Result Code Form

This command selects the sending of short-form or long-form result codes to the DTE. The parameter, if valid, is written to S14 bit 3.

V0	Enables short-form (terse) result codes. Line feed is not issued before a short-form result code.
V1	Enables long-form (verbose) result codes. (**Default**.)

Result Codes:

OK	n = 0 or 1.
ERROR	Otherwise.

Wn - Connect Message Control

This command controls the format of CONNECT messages. The parameter value, if valid, is written to S31 bits 2 and 3. Note that the Wn command can be overridden by register S95 bits (see S95 description).

W0	Upon connection, the modem reports only the DTE speed (e.g., CONNECT 19200). Subsequent responses are disabled. (**Default**.)
W1	Upon connection, the modem reports the line speed, the error correction protocol, and the DTE speed, respectively. Subsequent responses are disabled.
W2	Upon connection, the modem reports the DCE speed (e.g., CONNECT 14400). Subsequent responses are disabled.

Result Codes:

OK	n = 0, 1, or 2.
ERROR	Otherwise.

Xn - Extended Result Codes

This command selects which subset of the result messages will be used by the modem to inform the DTE of the results of commands.

For blind dialing, if the user wishes to enforce dial tone detection, a "W" can be placed in the dial string (see D command). Note that the information below is based upon the default implementation of the X results table. Table A-2 indicates the messages which are enabled for each X value.

X0	Disables monitoring of busy tones; send only OK, CONNECT, RING, NO CARRIER, ERROR, and NO ANSWER result codes. Blind dialing is enabled. If busy tone detection is enforced and busy tone is detected, NO CARRIER will be reported. If dial tone detection is enforced or selected and dial tone is not detected, NO CARRIER will be reported instead of NO DIAL TONE. The value 000b is written to S22 bits 6, 5, and 4, respectively.
X1	Disables monitoring of busy tones; send only OK, CONNECT, RING, NO CARRIER, ERROR, NO ANSWER, and CONNECT XXXX (XXXX = rate). Blind dialing is enabled. If busy tone detection is enforced and busy tone is detected, NO CARRIER will be reported instead of BUSY. If dial tone detection is enforced or selected and dial tone is not detected, NO CARRIER will be reported instead of NO DIAL TONE. The value 100b is written to S22 bits 6, 5, and 4, respectively.
X2	Disables monitoring of busy tones; send only OK, CONNECT, RING, NO CARRIER, ERROR, NO DIALTONE, NO ANSWER, and CONNECT XXXX. If busy tone detection is enforced and busy tone is detected, NO CARRIER will be reported instead of BUSY. If dial tone detection is enforced or selected and dial tone is not detected, NO DIAL TONE will be reported instead of NO CARRIER. The value 101b is written to S22 bits 6, 5, and 4, respectively.
X3	Enables monitoring of busy tones; send only OK, CONNECT, RING, NO CARRIER, ERROR, NO ANSWER, and CONNECT XXXX. Blind dialing is enabled. If dial tone detection is enforced and dial tone is not detected, NO CARRIER will be reported. The value 110b is written to S22 bits 6, 5, and 4, respectively. (**Default**.)
X4	Enables monitoring of busy tones; send all messages. The value 111b is written to S22 bits 6, 5, and 4, respectively.

Result Codes:

OK	n = 0 to 4.
ERROR	Otherwise.

Table A-2 Result codes

Short Form	Long Form	n Value in ATXn Command				
		0	1	2	3	4
0	OK	x	x	x	x	x
1	CONNECT	x	x	x	x	x
2	RING	x	x	x	x	x
3	NO CARRIER	x	x	x	x	x
4	ERROR	x	x	x	x	x
5	CONNECT 1200	1	x	x	x	x
6	NO DIALTONE	3	3	x	x	x
7	BUSY	3	3	3	x	x
8	NO ANSWER	x	x	x	x	x
9	CONNECT 0600	1	x	x	x	x
10	CONNECT 2400	1	x	x	x	x
11	CONNECT 4800	1	x	x	x	x
12	CONNECT 9600	1	x	x	x	x
13	CONNECT 7200	1	x	x	x	x
14	CONNECT 12000	1	x	x	x	x
15	CONNECT 14400	1	x	x	x	x
16	CONNECT 19200	1	x	x	x	x
17	CONNECT 38400	1	x	x	x	x
18	CONNECT 57600	1	x	x	x	x
19	CONNECT 115200	1	x	x	x	x
22	CONNECT 75TX/1200RX	1	x	x	x	x
23	CONNECT 1200TX/75RX	1	x	x	x	x
24	DELAYED	4	4	4	4	x
35	DATA	x	x	x	x	x
40	CARRIER 300	x	x	x	x	x
44	CARRIER 1200/75	x	x	x	x	x
45	CARRIER 75/1200	x	x	x	x	x
46	CARRIER 1200	x	x	x	x	x
47	CARRIER 2400	x	x	x	x	x

Table A-2 Result codes

Short Form	Long Form	n Value in ATXn Command				
		0	1	2	3	4
48	CARRIER 4800	x	x	x	x	x
49	CARRIER 7200	x	x	x	x	x
50	CARRIER 9600	x	x	x	x	x
51	CARRIER 12000	x	x	x	x	x
52	CARRIER 14400	x	x	x	x	x
53	CARRIER 16800	x	x	x	x	x
54	CARRIER 19200	x	x	x	x	x
55	CARRIER 21600	x	x	x	x	x
56	CARRIER 24000	x	x	x	x	x
57	CARRIER 26400	x	x	x	x	x
58	CARRIER 28800	x	x	x	x	x
59	CONNECT 16800	1	x	x	x	x
61	CONNECT 21600	1	x	x	x	x
62	CONNECT 24000	1	x	x	x	x
63	CONNECT 26400	1	x	x	x	x
64	CONNECT 28800	1	x	x	x	x
66	COMPRESSION: CLASS 5	x	x	x	x	x
67	COMPRESSION: V.42 bis	x	x	x	x	x
69	COMPRESSION: NONE	x	x	x	x	x
70	PROTOCOL: NONE	x	x	x	x	x
77	PROTOCOL: LAPM	x	x	x	x	x
78	CARRIER 31200	x	x	x	x	x
79	CARRIER 33600	x	x	x	x	x
80	PROTOCOL: ALT	x	x	x	x	x

Table A-2 Result codes

Short Form	Long Form	n Value in ATXn Command 0	1	2	3	4
84	CONNECT 33600	1	x	x	x	x
91	CONNECT 31200	1	x	x	x	x

Notes:

1. An 'x' in a column indicates that the message (either the long form if verbose, or the value only for short form) will be generated when that particular value of 'n' (shown at the top of the column) has been selected by the use of ATXn. A numeral indicates which less explicit message (verbose or short form) will be output for that X option.
(Also, see Section ‘‘S-Registers’’ on page A-33)

Yn - Long Space Disconnect

This command enables/disables the generation and response to long space disconnect. The parameter value, if valid, is written to S21 bit 7.

Y0	Disables long space disconnect. (**Default**.)
Y1	Enables long space disconnect. In non-error correction mode, the modem will send a long space of four seconds prior to going on-hook. In non-error correction mode, the modem will respond to the receipt of a long space (i.e., a break signal greater than 1.6 seconds) by going on-hook.

Result Codes:

OK	n = 0 or 1.
ERROR	Otherwise.

&Cn - RLSD (DCD) Option

The modem controls the RLSD output in accordance with the parameter supplied. The parameter value, if valid, is written to S21 bit 5.

&C0	RLSD remains ON at all times.
&C1	RLSD follows the state of the carrier. (**Default**.)

Result Codes:

OK	n = 0 or 1.
ERROR	Otherwise.

&Dn - DTR Option

This command interprets the ON to OFF transition of the DTR signal from the DTE in accordance with the parameter supplied. The parameter value, if valid, is written to S21 bits 3 and 4. Also, see S25.

&D0	DTR is ignored (assumed ON). Allows operation with DTE's which do not provide DTR.
&D1	DTR drop is interpreted by the modem as if the escape sequence had been entered. The modem returns to command state without disconnecting.
&D2	DTR drop causes the modem to hang up. Auto-answer is inhibited. (**Default**.)
&D3	DTR drop causes the modem to perform a soft reset as if the Z command were received. The &Y setting determines which profile is loaded.

Result Codes:

OK	n = 0 to 3.
ERROR	Otherwise.

&Kn - Flow Control

This command defines the DTE/DCE (terminal/modem) flow control mechanism. The parameter value, if valid, is written to S39 bits 0, 1, and 2.

&K0	Disables flow control.
&K3	Enables RTS/CTS flow control. (**Default**.)
&K4	Enables XON/XOFF flow control.
&K5	Enables transparent XON/XOFF flow control.
&K6	Enables both RTS/CTS and XON/XOFF flow control.

Result Codes:

OK	n = 0, 3, 4, 5, or 6.
ERROR	Otherwise.

&Mn - Asynchronous Mode Selection

This command determines the DTR operating mode. The modem treats the &M command as a subset of the &Q command.

&M0	Selects direct asynchronous operation. Note that the command sequence &M0\N0 selects normal buffered mode, but the command sequence \N0&M0 selects direct mode. This is because the \N0 command is analogous to the &Q6 command. The value 000b is written to S27 bits 3, 1, and 0, respectively. (See &Q).

Result Codes:

OK	n = 0 to 3.
ERROR	Otherwise.

&Qn - Async Mode

This command is an extension of the &M command and is used to control the connection modes permitted. It is used in conjunction with S36 and S48. (Also, see \N.)

NOTE:
When the &Q0 command is issued to select the mode, the subsequent connect message will report the DCE speed regardless of the W command and S95 settings.

&Q0	Selects direct asynchronous operation. The value 000b is written to S27 bits 3, 1, and 0, respectively. See &M0.
&Q5	The modem will try to negotiate an error-corrected link. The modem can be configured using S36 to determine whether a failure will result in the modem returning on-hook or will result in fallback to an asynchronous connection. The value 101b is written to S27 bits 3, 1, and 0, respectively. (**Default**.)
&Q6	Selects asynchronous operation in normal mode (speed buffering). The value 110b is written to S27 bits 3, 1, and 0, respectively.

Result Codes:

OK	n = 0 to 3, 5, or 6.
ERROR	Otherwise.

&Rn - RTS/CTS Option

This selects how the modem controls CTS. CTS operation is modified if hardware flow control is selected (see &K command). The parameter value, if valid, is written to S21 bit 2.

&R0	CTS is normally ON and will turn OFF only if required by flow control.
&R1	CTS is normally ON and will turn OFF only if required by flow control. (**Default**.)

Result Codes:

OK	n = 0 or 1.
ERROR	Otherwise.

&Sn - DSR Override

This command selects how the modem will control DSR. The parameter value, if valid, is written to S21 bit 6.

&S0	DSR will remain ON at all times. (**Default**.)
&S1	DSR will become active after answer tone has been detected and inactive after the carrier has been lost.

Result Codes:

OK	n = 0 or 1.
ERROR	Otherwise.

\Vn - Single Line Connect Message Enable

This command enables or disables the single line connect message format as follows:

\V0	Connect messages are controlled by the command settings X, W, and S95. (**Default**.)
\V1	Connect messages are displayed in the single line format described below subject to the command settings V (Verbose) and Q (Quiet). In Non-Verbose mode (V0), single line connect messages are disabled and a single numeric result code is generated for CONNECT DTE.

The parameter value, if valid, is written to S31 bit 0. When single line connect messages are enabled, there are no CARRIER, PROTOCOL, or COMPRESSION messages apart from the fields described below.

The single line connect message format is:

CONNECT <DTE Speed> </Modulation> </Protocol> </Compression> </Line Speed>

Where:

DTE Speed =	DTE speed, e.g., 57600.
Modulation =	"V34" for V.34 modulation.
	"V32" for V.32 or V.32bis modulation.
	Note: Modulation is omitted for all other modulations.
Protocol =	"NONE" for no protocol.
	"ALT" for Microcom Network Protocol.
	"LAPM" for LAP-M protocol.
Compression =	"CLASS5" for Microcom MNP5 compression.
	"V42BIS" for V.42bis compression.
	Note: Compression is omitted if protocol is NONE.
Line Speed =	Asymmetric rates are displayed as /rate:TX/rate:RX, e.g., / 1200 TX/75 RX.
	Symmetric rates are displayed as a single DCE rate, e.g., 14400.
LAPM-SREJ =	Selective reject.

Result Codes:

OK	n = 0 or 1.
ERROR	Otherwise.

&V - Display Current Configuration and Stored Profiles

Reports the current (active) configuration, the stored (user) profiles, and the four stored telephone numbers.

Result Code:

OK

Example:

```
AT&V

ACTIVE PROFILE:
B1 E0 L0 M0 N1 QO T V1 W0 X3 Y0 &C1 &D2 &G0 &K3 &Q5 &R1 &S0 &T4 &X0 &Y0
S00:001 S01:000 S02:043 S03:013 S04:010 S05:008 S06:002 S07:050 S08:002
S09:006
S10:030 S11:095 S12:050 S18:000 S25:005 S26:001 S36:007 S37:000 S38:020
S46:138
S48:007 S95:000

STORED PROFILE 0:
B1 E0 L0 M0 N1 QO T V1 W0 X3 Y0 &C1 &D2 &G0 &K3 &Q5 &R1 &S0 &T4 &X0
S00:001 S02:043 S06:002 S07:050 S08:002 S09:006 S10:030 S11:095 S12:050
S18:000
S36:007 S37:000 S40:104 S41:195 S46:138 S95:000

STORED PROFILE 1:
B1 E0 L0 M0 N1 QO T V1 W0 X3 Y0 &C1 &D2 &G0 &K3 &Q5 &R1 &S0 &T4 &X0
S00:001 S02:043 S06:002 S07:050 S08:002 S09:006 S10:030 S11:095 S12:050
S18:000
S36:007 S37:000 S40:104 S41:195 S46:138 S95:000

TELEPHONE NUMBERS:
0 =  1 =
2 =  3 =

OK
```

&V1 - Display Last Connection Statistics

Displays the last connection statistics in the following format (shown with typical results):

```
TERMINATION REASON..... LOCAL REQUEST
LAST TX rate..... 33600 BPS
HIGHEST TX rate..... 33600 BPS
LAST RX rate..... 33600 BPS
HIGHEST RX rate..... 33600 BPS
PROTOCOL..... LAPM
COMPRESSION..... V42Bis
Line QUALITY..... 033
Rx LEVEL..... 015
Highest Rx State..... 67
Highest TX State..... 67
EQM Sum..... 00C2
RBS Pattern..... FF
Rate Drop..... FF
Digital Loss..... None
Local Rtrn Count..... 00
Remote Rtrn Count..... 00
```

Termination Reason: Shows the reason for the last call termination.

NONE	Online or after modem reset.
LOCAL REQUEST	Disconnected with ATH or DTR drop.
LINK DISCONNECT	Remote end disconnected.
KEY ABORT	Dialing attempt aborted with local keypress.
RETRAIN FAILURE	Line physically disconnected or modem retrain failures.
CALL WAITING	Call Waiting carrier interruption detected (see S10 register).

RBS Pattern: Shows the number of least significant bits robbed per 6 bytes.

Digital Loss: Shows if a pad was encountered and if so, what was the digital loss.

%L - Report Line Signal Level

Returns a value which indicates the received signal level. The value returned is a direct indication of the receive level at the modem data pump (MDP), not at the telephone line connector.
For example, 009 = -9 dBm, 043 = -43 dBm, and so on.

Result Codes:

OK	If connected.
ERROR	If not connected.

%Q - Report Line Signal Quality

Reports the line signal quality (DAA dependent). Returns the higher order byte of the EQM value. Based on the EQM value, retrain or fallback/fall forward may be initiated if enabled by %E1 or %E2.

Example:

AT%Q

015

Result Codes:

OK	If connected.
ERROR	If not connected, or connected in 300 bps or V.23 modes.

Call Control

A - Answer

The modem will go off-hook and attempt to answer an incoming call if correct conditions are met. Upon successful completion of answer handshake, the modem will go on-line in answer mode.

The modem will enter the connect state after exchanging carrier with the remote modem. If no carrier is detected within a period specified in register S7, the modem hangs up. Any character entered during the connect sequence will abort the connection attempt.

Dn - Dial

This command directs the modem to go on-line, dial according to the string entered and attempt to establish a connection. If no dial string is supplied, the modem will go on-line and attempt the handshake in originate mode. **NOTE:** If the ATD command is issued before the S1 register has cleared, the modem will respond with the NO CARRIER result code.

The modem will attempt to connect to another data modem. The modem will have up to the period of time specified by register S6 or S7 to wait for carrier and complete the handshake. If this time expires before the modem can complete the handshake, the modem will go on-hook with the NO CARRIER response. This command will be aborted in progress upon receipt of any DTE character before completion of the handshake.

Dial Modifiers

The valid dial string parameters are described below. Punctuation characters may be used for clarity, with parentheses, hyphen, and spaces being ignored.

0-9	DTMF digits 0 to 9.
*	The 'star' digit (tone dialing only).
#	The 'gate' digit (tone dialing only).
A-D	DTMF digits A, B, C, and D.
L	Re-dial last number: the modem will re-dial the last valid telephone number. The L must be immediately after the D with all the following characters ignored.
P	Select pulse dialing: pulse dial the numbers that follow until a "T" is encountered. Affects current and subsequent dialing.
T	Select tone dialing: tone dial the numbers that follow until a "P" is encountered. Affects current and subsequent dialing.
R	This command will be accepted, but not acted on.

S=n	Dial the number stored in the directory (n = 0 to 3). (See &Z.)
!	Flash: the modem will go on-hook for a time defined by the value of S29.
W	Wait for dial tone: the modem will wait for dial tone before dialing the digits following "W". If dial tone is not detected within the time specified by S7, the modem will abort the rest of the sequence, return on-hook, and generate an error message.
@	Wait for silence: the modem will wait for at least 5 seconds of silence in the call progress frequency band before continuing with the next dial string parameter. If the modem does not detect these 5 seconds of silence before the expiration of the call abort timer (S7), the modem will terminate the call attempt with a NO ANSWER message. If busy detection is enabled, the modem may terminate the call with the BUSY result code. If answer tone arrives during execution of this parameter, the modem handshakes.
&	Wait for credit card dialing tone before continuing with the dial string. If the tone is not detected within the time specified by S7, the modem will abort the rest of the sequence, return on-hook, and generate an error message.
,	Dial pause: the modem will pause for a time specified by S8 before dialing the digits following ",".
;	Return to command state. Added to the end of a dial string, this causes the modem to return to the command state after it processes the portion of the dial string preceding the ";". This allows the user to issue additional AT commands while remaining off-hook. The additional AT commands may be placed in the original command line following the ";" and/or may be entered on subsequent command lines. The modem will enter call progress only after an additional dial command is issued without the ";" terminator. Use "H" to abort the dial in progress, and go back on-hook.
^	Toggles calling tone enable/disable: applicable to current dial attempt only.
( )	Ignored: may be used to format the dial string.
-	Ignored: may be used to format the dial string.
<space>	Ignored: may be used to format the dial string.
<i>	Invalid character will be ignored.

Hn - Disconnect (Hang-Up)

This command initiates a hang up sequence.

H0	The modem will release the line if the modem is currently on-line, and will terminate any test (AT&T) that is in progress. Modulation specific and error correction protocol specific (S38) processing is handled outside of the H0 command.

H1 If on-hook, the modem will go off-hook and enter command mode and remain off-hook.

Result Codes:

OK n = 0 or 1.

ERROR Otherwise.

On - Return to On-Line Data Mode

This command determines how the modem will enter the on-line data mode. If the modem is in the on-line command mode, it enters the on-line data mode with or without a retrain. If the modem is in the off-line command mode (no connection), ERROR is reported.

O0 Enters on-line data mode without a retrain. Handling is determined by the Call Establishment task. Generally, if a connection exists, this command connects the DTE back to the remote modem after an escape (+++).

O1 Enters on-line data mode with a retrain before returning to on-line data mode.

Result Codes:

OK n = 0 or 1 and a connection exists.

ERROR Otherwise or if not connected.

P - Set Pulse Dial Default

This command forces pulse dialing until the next T dial modifier or T command is received. Sets S14 bit 5.

As soon as a dial command is executed which explicitly specifies the dialing mode for that particular call (e.g., ATDT...), this command is overridden so that all future dialing will be tone dialed. (See T command.)

Result Code:

OK

T - Set Tone Dial Default

This command forces DTMF dialing until the next P dial modifier or P command is received. The modem will set an S-Register bit to indicate that all subsequent dialing should be conducted in tone mode. Note that the DP command will override this command. Clears S14 bit 5.

Result Code:

OK

&Pn - Select Pulse Dial Make/Break Ratio

This command determines the make/break ratio used during pulse dialing. The parameter value, if valid, is written to S28 bits 3 and 4.

&P0	Selects 39%-61% make/break ratio at 10 pulses per second. (**Default**.)
&P1	Selects 33%-67% make/break ratio at 10 pulses per second.
&P2	Selects 39%-61% make/break ratio at 20 pulses per second.
&P3	Selects 33%-67% make/break ratio at 20 pulses per second.

Result Codes:

OK	n = 0 to 3.
ERROR	Otherwise.

&Gn - Select Guard Tone

The modem generates the guard tone selected by this command according to the parameter supplied (DPSK modulation modes only). The parameter value, if valid, is written to S23 bits 6 and 7.

&G0	Disables guard tone. (**Default**.)
&G1	Disables guard tone.
&G2	Selects 1800 Hz guard tone.

Result Codes:

OK	n = 0 to 2.
ERROR	Otherwise.

Modulation Control Commands

Bn - CCITT or Bell

When the modem is configured to allow either option, the modem will select Bell or CCITT modulation for a line speed connection of 300 or 1200 bps according to the parameter supplied. Any other line speed will use a CCITT modulation standard. The parameter value, if valid, is written to S27 bit 6.

B0	Selects CCITT operation at 300 or 1200 bps during Call Establishment and a subsequent connection.
B1	Selects BELL operation at 300 or 1200 bps during Call Establishment and a subsequent connection. (**Default**.)

Result Codes:

OK	n = 0 or 1.
ERROR	Otherwise.

Nn - Automode Enable

This command enables or disables automode detection. The parameter value, if valid, is written to S31 bit 1.

N0	Automode detection is disabled. A subsequent handshake will be conducted according to the contents of S37 or, if S37 is zero, according to the most recently sensed DTE speed.
N1	Automode detection is enabled. A subsequent handshake will be conducted according the automode algorithm supported by the modem, e.g., according to the contents of S37 or, if S37 is zero, starting at 33600 bps V.34. (**Default**.)

Result Codes:

OK	n = 0 or 1.
ERROR	Otherwise.

%En - Enable/Disable Line Quality Monitor and Auto-Retrain or Fallback/Fall Forward

Controls whether or not the modem will automatically monitor the line quality and request a retrain (%E1) or fall back when line quality is insufficient or fall forward when line quality is sufficient (%E2). The parameter value, if valid, is written to S41 bits 2 and 6. If enabled, the modem attempts to retrain for a maximum of 30 seconds.

%E0	Disable line quality monitor and auto-retrain.
%E1	Enable line quality monitor and auto-retrain.
%E2	Enable line quality monitor and fallback/fall forward. (**Default**.)

Result Codes:

OK	n = 0, 1, or 2.
ERROR	Otherwise.

Fallback/Fall Forward. When %E2 is active, the modem monitors the line quality (EQM). When line quality is insufficient, the modem will initiate a rate renegotiation to a lower speed within the V.34/V.32 bis/V.32 modulation speeds. The modem will keep falling back within the current modulation if necessary until the speed reaches 2400 bps (V.34) or 4800 bps (V.32). Below this rate, the modem will only do retrains if EQM thresholds are exceeded. If the EQM is sufficient for at least one minute, the modem will initiate a rate renegotiation to a higher speed within the current modulation speeds. The rate renegotiations will be done without a retrain if a V.32 bis connection is established. Speeds attempted during fallback/fall forward are those shown to be available in the rate sequences exchanged during the initial connection. Fallback/fall forward is available in error correction and normal modes, but not in direct mode.

Error Correction and Data Compression Commands

%C - Enable/Disable Data Compression

Enables or disables data compression negotiation. The modem can only perform data compression on an error corrected link. The parameter value, if valid, is written to S41 bits 0 and 1.

%C0	Disables data compression. Resets S46 bit 1.
%C1	Enables MNP 5 data compression negotiation. Resets S46 bit 1.
%C2	Enables V.42 bis data compression. Sets S46 bit 1.

%C3	Enables both V.42 bis and MNP 5 data compression. Sets S46 bit 1. (**Default**.)

Result Codes:

OK	n = 0, 1, 2, or 3.
ERROR	Otherwise.

\An - Select Maximum MNP Block Size

The modem will operate an MNP error corrected link using a maximum block size controlled by the parameter supplied. The parameter value, if valid, is written to S40 bits 6 and 7.

\A0	64 characters.
\A1	128 characters. (**Default**.)
\A2	192 characters.
\A3	256 characters.

Result Codes:

OK	n = 0 to 3.
ERROR	Otherwise.

\Bn - Transmit Break to Remote

In non-error correction mode, the modem will transmit a break signal to the remote modem with a length in multiples of 100 ms according to parameter specified. If a number in excess of 9 is entered, 9 is used. The command works in conjunction with the \K command.

In error correction mode, the modem will signal a break through the active error correction protocol, giving no indication of the length.

\B1-\B9	Break length in 100 ms units. (**Default = 3**.) (Non-error corrected mode only.)

Result Codes:

OK	If connected in data modem mode.
NO CARRIER	If not connected.

NOTE:
When the modem receives a break from the remote modem, break is passed to the DTE as follows: In non-error correction mode direct, the break length is passed; in non-error correction mode normal and in error correction mode, a 300 ms break is passed.

\Kn - Break Control

Controls the response of the modem to a break received from the DTE or the remote modem or the \B command according to the parameter supplied. The parameter value, if valid, is written to S40 bits 3, 4, and 5.

The response is different in three separate states.

The first state is where the modem receives a break from the DTE when the modem is operating in data transfer mode:

\K0	Enter on-line command mode, no break sent to the remote modem.
\K1	Clear data buffers and send break to remote modem.
\K2	Same as 0.
\K3	Send break to remote modem immediately.
\K4	Same as 0.
\K5	Send break to remote modem in sequence with transmitted data. (**Default**.)

The second case is where the modem is in the on-line command state (waiting for AT commands) during a data connection, and the \B is received in order to send a break to the remote modem:

\K0	Clear data buffers and send break to remote modem.
\K1	Clear data buffers and send break to remote modem. (Same as 0.)
\K2	Send break to remote modem immediately.
\K3	Send break to remote modem immediately. (Same as 2.)
\K4	Send break to remote modem in sequence with data.
\K5	Send break to remote modem in sequence with data. (Same as 4.) (**Default**.)

The third case is where a break is received from a remote modem during a non-error corrected connection:

\K0	Clears data buffers and sends break to the DTE.

\K1	Clears data buffers and sends break to the DTE. (Same as 0.)
\K2	Send a break immediately to DTE.
\K3	Send a break immediately to DTE. (Same as 2.)
\K4	Send a break in sequence with received data to DTE.
\K5	Send a break in sequence with received data to DTE. (Same as 4.) (**Default**.)

Result Codes:

OK	n = 0 to 5.
ERROR	Otherwise.

\Nn - Operating Mode

This command controls the preferred error correcting mode to be negotiated in a subsequent data connection.

\N0	Selects normal speed buffered mode (disables error-correction mode). (Forces &Q6.)
\N1	Selects direct mode and is equivalent to &M0, &Q0 mode of operation. (Forces &Q0.).
\N2	Selects reliable (error-correction) mode. The modem will first attempt a LAPM connection and then an MNP connection. Failure to make a reliable connection results in the modem hanging up. (Forces &Q5, S36=4, and S48=7.)
\N3	Selects auto reliable mode. This operates the same as \N2 except failure to make a reliable connection results in the modem falling back to the speed buffered normal mode. (Forces &Q5, S36=7, and S48=7.)
\N4	Selects LAPM error-correction mode. Failure to make an LAPM error-correction connection results in the modem hanging up. (Forces &Q5 and S48=0.)
\N5	Selects MNP error-correction mode. Failure to make an MNP error-correction connection results in the modem hanging up. (Forces &Q5, S36=4, and S48=128.)

Result Codes:

OK	n = 0 to 5.

ERROR Otherwise.

S-Registers

The S-Registers are summarized in Table A-3 along with their default values; registers denoted with an '*' may be stored in one of the two user profiles by entering the &Wn command. One of these profiles may be loaded at any time by using the Zn command. Registers or register fields quoted as "reserved" are reserved for current or future use.

All bit-mapped registers are read-only. The appropriate AT command which controls the relevant bits in the S-Register should be used to change the value.

Sn - Read/Write S-Register

The modem selects an S-Register, performs an S-Register read or write function, or reports the value of an S-Register.

n	Establishes S-Register n as the last register accessed.
n=v	Sets S-Register n to the value v.
n?	Reports the value of S-Register n.

The parameter n can be omitted, in which case the last S-Register accessed will be assumed. The S can be omitted for AT= and AT?, in which case the last S-Register accessed will be assumed.

For example:

ATS7 establishes S7 as the last accessed register.

AT=40 sets the contents of the last register accessed (S7) to 40.

ATS=20 sets the contents of the last register accessed (S7) to 20.

If the number "n" is beyond the range of the S-Registers available, the modem will return the ERROR message. The value "v" is "MOD"ed with 256. If the result is outside the range permitted for a given S-Register, the values will still be stored, but functionally the lower and higher limits will be observed. Input and output are always in decimal format. Note that some S-Registers are read-only.

In some cases, writing to the S-Register will appear to be accepted but the value will not actually be written.

Due to country restrictions, some commands will be accepted, but the value may be limited and replaced by a maximum or minimum value.

Factory Defaults

The factory default values are stored in ROM and are loaded into the active configuration at power up or by the ATZn command. In addition, the designated default profile is subsequently loaded, and may change some of the factory default values. The designated default profile can be changed by entering the &Yn command where n is one of the two possible user profiles. The defaults shown are those used by the RMB V4 in both factory profiles.

The factory default values may be loaded at any time by entering the &Fn command

.

Table A-3 S-Register Summary

Register	Function	Range	Units	Saved	Default
S0	Rings to Auto-Answer	0-255	rings	*	1
S1	Ring Counter	0-255	rings		0
S2	Escape Character	0-255	ASCII	*	43
S3	Carriage Return Character	0-127	ASCII		13
S4	Line Feed Character	0-127	ASCII		10
S5	Backspace Character	0-255	ASCII		8
S6	Wait Time for Dial Tone	2-255	s	*	2
S7	Wait Time for Carrier	1-255	s	*	50
S8	Pause Time for Dial Delay Modifier	2-255	s	*	2
S10	Carrier Loss Disconnect Time or Call Waiting Disconnect	1-255	0.1 s	*	15
S11	DTMF Tone Duration	50-255	1 ms	*	95
S12	Escape Prompt Delay	0-255	20 ms	*	50
S14	General Bit Mapped Options Status	-	-	*	136 (88h)
S16	Test Mode Bit Mapped Options Status (&T)	-	-		0
S18	Test Timer	0-255	s	*	0
S21	V.24/General Bit Mapped Options Status	-	-	*	52 (34h)
S22	Results Bit Mapped Options Status	-	-	*	96 (60h)
S23	General Bit Mapped Options Status	-	-	*	62 (3Eh)
S24	Sleep Inactivity Timer	0-255	s	*	0

Table A-3 S-Register Summary

Register	Function	Range	Units	Saved	Default
S25	Delay to DTR Off	0-255	10 ms		5
S27	General Bit Mapped Options Status	-	-	*	73 (49h)
S28	General Bit-Mapped Options Status	-	-	*	0
S29	Flash Dial Modifier Time	60-80	10 ms		70
S30	Disconnect Inactivity Timer	0-255	10 s		0
S31	General Bit-Mapped Options Status	-	-	*	194 (C2h)
S32	XON Character	0-255	ASCII		17 (11h)
S33	XOFF Character	0-255	ASCII		19 (13h)
S36	LAPM Failure Control	-	-	*	7
S37	Line Connection Speed	-	-	*	0
S38	Delay Before Forced Hangup	0-255	s		20
S39	Flow Control Bit Mapped Options Status	-	-	*	3
S40	General Bit-Mapped Options Status	-	-	*	104 (68h)
S41	General Bit-Mapped Options Status	-	-	*	195 (C3h)
S46	Data Compression Control	-	-	*	138
S48	V.42 Negotiation Control	-	-	*	7
S86	Call Failure Reason Code	0-255	-	-	21
S95	Result Code Messages Control	-	-	*	0

* Register value may be stored in one of two user profiles with the &W command.

S-Register Definitions

S0 - Number of Rings to Auto-Answer

S0 sets the number of the rings required before the modem automatically answers a call. Setting this register to zero disables auto-answer mode.

Range: 0-255 rings

Default: 1

S1 - Ring Counter

S1 is incremented each time the modem detects a ring signal on the telephone line. S1 is cleared if no rings occur over an eight second interval.

Range: 0-255 rings

Default: 0

S2 - Escape Character

S2 holds the decimal value of the ASCII character used as the escape character. The default value corresponds to an ASCII '+'. A value over 127 disables the escape process, i.e., no escape character will be recognized.

Range: 0-255, ASCII decimal

Default: 43 (+)

S3 - Carriage Return Character

S3 sets the command line and result code terminator character.

Range: 0-127, ASCII decimal

Default: 13 (Carriage Return)

S4 - Line Feed Character

S4 sets the character recognized as a line feed. The Line Feed control character is output after the Carriage Return control character if verbose result codes are used.

Range: 0-127, ASCII decimal

Default: 10 (Line Feed)

S5 - Backspace Character

S5 sets the character recognized as a backspace. The modem will not recognize the Backspace character if it is set to a value that is greater than 32 ASCII. This character can be used to edit a command line. When the echo command is enabled, the modem echoes back to the local DTE the Backspace character, an ASCII space character and a second Backspace character; this means a total of three characters are transmitted each time the modem processes the Backspace character.

Range: 0-32, ASCII decimal

Default: 8 (Backspace)

S6 - Wait Time before Blind Dialing

Sets the length of time, in seconds, that the modem will wait before starting to dial after going off-hook when blind dialing. This operation, however, may be affected by some ATX options. The "Wait for Dial Tone" call progress feature (W dial modifier in the dial string) will override the value in register S6, using register S7 instead.

Range: 2-255 seconds

Default: 2

S7 - Wait Time for Carrier, Silence, or Dial Tone

1. Sets the length of time, in seconds, that the modem will wait for carrier before hanging up. The timer is started when the modem finishes dialing (originate), or 2 seconds after going off-hook (answer). In originate mode, the timer is reset upon detection of answer tone.
2. Sets the length of time, in seconds, that modem will wait for silence when encountering the “@” dial modifier before continuing with the next dial string parameter.
3. Sets the length of time, in seconds, that the modem will wait for dial tone when encountering a "W" dial modifier before continuing with the next dial string parameter.

Range: 1-255 seconds

Default: 50

S8 - Pause Time For Dial Delay

S8 sets the time, in seconds, that the modem will pause when the "," dial modifier is encountered in the dial string.

Range: 2-255 seconds

Default: 2

S10 - Lost Carrier To Hang Up Delay or Call Waiting Detection

1. If S10 is set to a value between 1 and 15, the modem waits that amount of time, in tenths of a second, before hanging up after a loss of carrier. This allows for a temporary carrier loss without causing the local modem to disconnect.
2. If S10 is set to a value of 255, the modem functions as if a carrier is always present.

3. If the S10 value is greater than 15 and less than 255, the modem will detect the Call Waiting carrier interruption and hang-up the line.

Range: 1-255 tenths of a second

Default: 15 (1.5 seconds)

S11 - DTMF Tone Duration

S11 sets the duration of tones in DTMF dialing (has no effect on pulse dialing).

Range: 50-255 milliseconds

Default: 95 (95 milliseconds)

S12 - Escape Prompt Delay (EPD)

S12 defines the maximum period, in fiftieths of a second, allowed between receipt of the last character of the three escape character sequence from the DTE and sending of the OK result code to the DTE. If any characters are detected during this time, the OK will not be sent. Note that sending of the OK result code does not affect entry into command mode. (See the section ‘‘Escape Code Sequence’’ on page A-6)

Range: 0-255 1/50 of a second

Default: 50 (1 second)

S14 - General Bit Mapped Options Status

S14 indicates the status of command options.

Default: 136 (88h) (10001000b)

Bit 0	This bit is ignored. (0)
Bit 1	Command echo (En) 0 = Disabled (E0) (**Default**.) 1 = Enabled (E1)
Bit 2	Quiet mode (Qn) 0 = Send result codes (Q0) (**Default**.) 1 = Do not send result codes (Q1)
Bit 3	Result codes (Vn)

0 = Numeric (V0)

1 = Verbose (V1) (**Default**.)

Bit 4 Reserved (0)

Bit 5 Tone (T)/Pulse (P)

0 = Tone (T) (**Default**.)

1 = Pulse (P)

Bit 6 Reserved (0)

Bit 7 Originate/Answer

0 = Answer

1 = Originate (**Default**.)

S16 - General Bit Mapped Test Options Status

S16 indicates the test in progress status.

Default: 0

Bit 0 Local analog loopback

0 = Disabled (**Default**.)

1 = Enabled (&T1)

Bit 1 Not used (0)

Bit 2 Local digital loopback

0 = Disabled (**Default**.)

1 = Enabled (&T3)

Bit 3 Remote digital loopback (RDL) status

0 = Modem not in RDL (**Default**.)

1 = RDL in progress

Bit 4 RDL requested (AT&T6)

0 = RDL not requested (**Default**.)

1 = RDL requested (&T6)

Bit 5 RDL with self test

0 = Disabled (**Default**.)

1 = Enabled (&T7)

Bit 6 — Local analog loopback (LAL) with self test

0 = Disabled (**Default**.)

1 = Enabled (&T8)

Bit 7 — Not used (0)

S18 - Test Timer

S18 sets the length of time, in seconds, that the modem conducts a test (commanded by &Tn) before returning to the command mode. If this register value is zero, the test will not automatically terminate; the test must be terminated from the command mode by issuing an &T0 or H command. When S18 is non-zero, the modem returns the OK message upon test termination.

Range: 0-255 seconds

Default: 0

S21 - V.24/General Bit Mapped Options Status

S21 indicates the status of command options.

Default: 52 (34h) (00110100b)

Bit 0 — Reserved (0)

Bit 1 — Reserved (0)

Bit 2 — CTS behavior (&Rn)

1 = CTS always on (&R1) (**Default**.)

Bits 3-4 — DTR behavior (&Dn)

0 = &D0 selected

1 = &D1 selected

2 = &D2 selected (**Default**.)

3 = &D3 selected

Bit 5 — RLSD (DCD) behavior (&Cn)

0 = &C0 selected

1 = &C1 selected (**Default**.)

Bit 6	DSR behavior (&Sn) 0 = &S0 selected (**Default**.) 1 = &S1 selected
Bit 7	Long space disconnect (Yn) 0 = Y0 (**Default**.) 1 = Y1

S22 - Results Bit Mapped Options Status

S22 indicates the status of command options.

Default: 96 (60h) (01100000b)

Bits 0-1	Reserved (0)
Bits 2-3	Reserved (0)
Bits 4-6	Limit result codes (Xn) 0 = X0 4 = X1 5 = X2 6 = X3 (**Default**.) 7 = X4
Bit 7	Reserved (0)

S23 - General Bit Mapped Options Status

S23 indicates the status of command options.

Default: 62 (3Eh) (00111110b)

Bit 0	Grant RDL 0 = RDL not allowed (&T5) (**Default**.) 1 = RDL allowed (&T4)
Bits1-3	DTE Rate 0 = 0 - 300 bps 1 = 600 bps 2 = 1200 bps

3 = 2400 bps

4 = 4800 bps

5 = 9600 bps

6 = 19200 bps

7 = 38400 bps or higher (**Default**.)

Bits 4-5 Assumed DTE parity

0 = Even

1 = Not used

2 = Odd

3 = None (**Default**.)

Bits 6-7 Guard tone (&Gn)

0 = None (&G0) (**Default**.)

1 = None (&G1)

2 = 1800 Hz (&G2)

S24 - Sleep Inactivity Timer

S24 sets the length of time, in seconds, that the modem will operate in normal mode with no detected telephone line or DTE line activity before entering low-power sleep mode. The timer is reset upon any DTE line or telephone line activity. If the S24 value is zero, neither DTE line nor telephone inactivity will cause the modem to enter the sleep mode.

Range: 0-255 seconds

Default: 0

S25 - Delay To DTR

S25 sets the length of time that the modem will ignore DTR for taking the action specified by &Dn. Its units are one hundredths of a second.

Range: 0-255 (0.01 second)

Default: 5 (50 ms)

S27 - Bit Mapped Options Status

S27 indicates the status of command options.

Default: 73 (49h) (01001001b)

Bits 0,1,3	Asynchronous selection (&Mn/&Qn) **3 1 0** 0 0 0 = &M0 or &Q0 0 0 1 - 1 0 1 = &Q5 (**Default**.) 1 1 0 = &Q6 1 1 1 = Reserved
Bit 2	Reserved (0)
Bits 4 - 5	Clock select (&Xn) 0 = Internal clock (&X0) (**Default**.)
Bit 6	CCITT/Bell mode select (Bn) 0 = CCITT mode (B0) 1 = Bell mode (B1) (**Default**.)
Bit 7	Reserved (0)

S28 - Bit Mapped Options Status

S28 indicates bit mapped options status.

Default: 0

Bits 0 - 1	Reserved (0)
Bit 2	Reserved (always 0).
Bits 3 - 4	Pulse dialing (&Pn) 0 = 39%-61% make/break ratio at 10 pulses per second (&P0) (Default.) 1 = 33%-67% make/break ratio at 10 pulses per second (&P1) 2 = 39%-61% make/break ratio at 20 pulses per second (&P2)

3 = 33%-67% make/break ratio at 20 pulses per second (&P3)

Bit 5-7 Reserved (0)

S29 - Flash Dial Modifier Time

S29 sets the length of time, in units of 10 ms, that the modem will go on-hook when it encounters the flash (!) dial modifier in the dial string.

Range: 60-80 10 ms intervals

Default: 70 (700 ms)

S30 - Disconnect Inactivity Timer

S30 sets the length of time, in tens of seconds, that the modem will stay online before disconnecting when no data is sent or received. In error-correction mode, any data transmitted or received will reset the timer. In other modes, any data transmitted will reset the timer.

Range: 0-255 tens of seconds (0-2550 seconds)

Default: 0 (disabled)

S31 - Bit Mapped Options Status

S31 indicates bit mapped options status.

Default: 194 (C2h) (11000010b)

Bit 0 Single line connect message enable/disable (\Vn)

0 = Messages controlled by S95, Wn and Vn (\V0) (**Default**.)

1 = Single line connect message (\V1)

Bit 1 Auto line speed detection (Nn)

0 = Disabled (N0)

1 = Enabled (N1) (**Default**.)

Bits 2-3 Error correction progress messages (Wn)

0 = DTE speed only (W0) (**Default**.)

1 = Full reporting (W1)

2 = DCE (line) speed only (W2)

Bits 4-5	Reserved (0)
Bits 6-7	Reserved (**Default = 11b**)

S32 - XON Character

S32 sets the value of the XON character.

Range: 0-255, ASCII decimal

Default: 17 (11h)

S33 - XOFF Character

S33 sets the value of the XOFF character.

Range: 0-255, ASCII decimal

Default: 19 (13h)

S36 - LAPM Failure Control

Default: 7 (00000111b)

Bits 0-2 This value indicates what should happen upon a LAPM failure. These fallback options are initiated immediately upon connection if S48=128. If an invalid number is entered, the number is accepted into the register, but S36 will act as if the default value has been entered.

0 = Modem disconnects.

1 = Modem stays on-line and a Direct mode connection is established.

2 = Reserved.

3 = Modem stays on-line and a Normal mode connection is established.

4 = An MNP connection is attempted and if it fails, the modem disconnects.

5 = An MNP connection is attempted and if it fails, a Direct mode connection is established.

6 = Reserved.

7 = An MNP connection is attempted and if it fails, a Normal mode connection is established. (**Default**.)

Bits 3-7 Reserved (0)

S37 - Desired Line Connection Speed

S37 specifies the desired line connection speed.

Default: 0

Bits 0-4 Desired line connection speed. If an invalid number is entered, the number is accepted into the register, but S37 will act as if the default value has been entered.

0 = Attempt automode connection. If N0 is active, connection is attempted at the most recently sensed DTE speed. If N1 is active, connection is attempted at the highest possible speed. (**Default**.)

1-3 = Attempt to connect at 300 bps.

4 = Reserved.

5 = Attempt to connect at V.22 1200 bps.

6 = Attempt to connect at V.22 bis 2400 bps.

7 = Attempt to connect at V.23.

8 = Attempt to connect at V.32 bis/ V.32 4800 bps.

9 = Attempt to connect at V.32 bis/ V.32 9600 bps.

10 = Attempt to connect at V.32 bis 12000 bps.

11 = Attempt to connect at V.32 bis 14400 bps.

12 = Attempt to connect at V.32 bis 7200 bps.

Bits 5-7 Reserved (0)

S38 - Delay Before Forced Hang Up

S38 specifies the delay between the modem's receipt of the H command to disconnect (or ON-to-OFF transition of DTR if the modem is programmed to follow the signal), and the disconnect operation. Applicable to error-correction connection only. This register can be used to ensure that data in the modem buffer is sent before the modem disconnects.

1. If S38 is set to a value between 0 and 254, the modem will wait that number of seconds for the remote modem to acknowledge all data in the modem buffer before disconnecting. If time expires before all data is sent, the NO CARRIER result code will be issued to indicate that data has been lost. If all data is transmitted prior to time-out, the response to the H0 command will be OK.

2. If S38 is set to 255, the modem does not time-out and continues to attempt to deliver data in the buffer until the connection is lost or the data is delivered.

Range: 0-255 seconds

Default: 20

S39 - Flow Control Bit Mapped Options Status

Default: 3 (00000011b)

Bits 0-2	Status of command options
	0 = No flow control
	3 = RTS/CTS (&K3) (**Default**.)
	4 = XON/XOFF (&K4)
	5 = Transparent XON (&K5)
	6 = Both methods (&K6)
Bits 3-7	Reserved (0)

S40 - General Bit Mapped Options Status

S40 indicates the status of command options.

Default: 104 (68h) (01101000b)

Bits 0-1	Reserved (0)
Bit 2	Reserved (0)
Bits 3-5	Break Handling (\Kn)
	0 = \K0
	1 = \K1
	2 = \K2
	3 = \K3
	4 = \K4
	5 = \K5 (**Default**.)
Bits 6-7	MNP block size (\An)
	0 = 64 chars (\A0)
	1 = 128 chars (\A1) (**Default**.)

2 = 192 chars (\A2)

3 = 256 chars (\A3)

S41 - General Bit Mapped Options Status

S41 indicates the status of command options.

Default: 195 (C3h) (11000011b)

Bits 0-1	Compression selection (%Cn) 0 = Disabled (%C0) 1 = MNP 5 (%C1) 2 = V.42 bis (%C2) 3 = MNP 5 and V.42 bis (%C3) (**Default**.)
Bits 2, 6	Auto retrain and fallback/fall forward (%En) Bit 6 Bit 2 0 0 = Retrain and fallback/fall forward disabled (%E0) 0 1 = Retrain enabled (%E1) 1 0 = Fallback/fall forward enabled (%E2) (**Default**.)
Bit 3	Reserved (0)
Bits 4-5	Reserved (0)
Bit 7	Reserved (1)

S46 - Data Compression Control

S46 controls selection of compression. The following actions are executed for the given values:

Range: 136 or 138

Default: 138

S46=136	Execute error correction protocol with no compression.
S46=138	Execute error correction protocol with compression. (**Default**.)

S48 - V.42 Negotiation Action

The V.42 negotiation process determines the capabilities of the remote modem. However, when the capabilities of the remote modem are known and negotiation is unnecessary, this process can be bypassed if so desired.

Range: 0, 7, or 128 If an invalid number is entered, it is accepted into the S-Register, but S48 will act as if 128 has been entered.

Default: 7

S48=0	Disable negotiation; bypass the detection and negotiation phases; and proceed with LAPM.
S48=7	Enable negotiation. (**Default**.)
S48=128	Disable negotiation; bypass the detection and negotiation phases; and proceed at once with the fallback action specified in S36. Can be used to force MNP.

S86 - Call Failure Reason Code

When the modem issues a NO CARRIER result code, a value is written to this S-Register to help determine the reason for the failed connection. S86 records the first event that contributes to a NO CARRIER message. The cause codes are:

Range: 0, 3, 4, 5, 9, 12, 13, 14, 20, 21, or 23

Default: 21

S86=0	Normal disconnect, no error occurred.
S86=3	Call waiting carrier interruption (see S10).
S86=4	Loss of carrier.
S86=5	V.42 negotiation failed to detect an error-correction modem at the other end.
S86=9	The modems could not find a common protocol.
S86=12	Normal disconnect initiated by the remote modem.
S86=13	Remote modem does not respond after 10 re-transmissions of the same message.
S86=14	Protocol violation.
S86=20	Aborted call attempt.
S86=21	Initial state.
S86=23	Retrain failure.

S95 - Extended Result Codes

The bits in this register can be set to override some of the W command options. A bit set to a 1 in this register will enable the corresponding result code regardless of the W setting. However, the /V command (page A-20) has precedence over the X, W, or S95 settings. (Also, refer to Table A-2 on page A-15).

Default: 0

Bit 0	CONNECT result code indicates DCE speed instead of DTE speed.
Bit 1	Append/ARQ to CONNECT XXXX result code in error-correction mode (XXXX = rate).
Bit 2	Enable CARRIER XXXX result code (XXXX = rate).
Bit 3	Enable PROTOCOL XXXX result code (XXXX = protocol identifier).
Bit 4	Reserved.
Bit 5	Enable COMPRESSION result code (XXXX = compression type).
Bit 6	Reserved.
Bit 7	Reserved.

Physical Description

B

About this Appendix

This appendix includes a list of the RMB major components and connectors. 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 how to attach external circuitry and external connectors
- Use the comcodes to order the RMB

Hardware Overview

The RMB hardware includes the following major components:

- Processor complex with static RAM and FLASH EEPROM
- PCI interface complex
- Power-on reset circuit
- Circuitry necessary to interface to internal and external hardware interfaces

The on-board hardware interfaces are:

- Two sensors to measure on-board ambient temperature
- Power supply voltage sensors to measure +3.3V, +5V and +/-12V

The RMB external hardware interfaces are:

- A PCI add-on board
- 56 Kbps Hayes-compatible “V.90 compatible” modem under control of the RMB, which is accessed via a RJ-11 jack on the faceplate (CYN23AP only)
- An on-board external modem interface that is accessed via an 8-pin modular jack on the faceplate (CYN24AP only)
- A momentary contact front faceplate switch to reset the RMB and the modem
- An 8-pin modular jack for connection to a COM port on the PC located on the faceplate

The internal hardware interfaces are:

- Power supply status inputs
- 4 fan status inputs
- 1 reset output to the PC
- No connection to the H.110 bus

RMB Circuit Packs

The following figures show the RMB circuit packs.

Figure B-1 shows the RMB CYN23AP. Figure B-2 shows the CYN24AP. Both are inserted from the front into the correct slot of the Message Store Server-S V1 (standard model) or the Message Store Server-H V1 (high availability model).

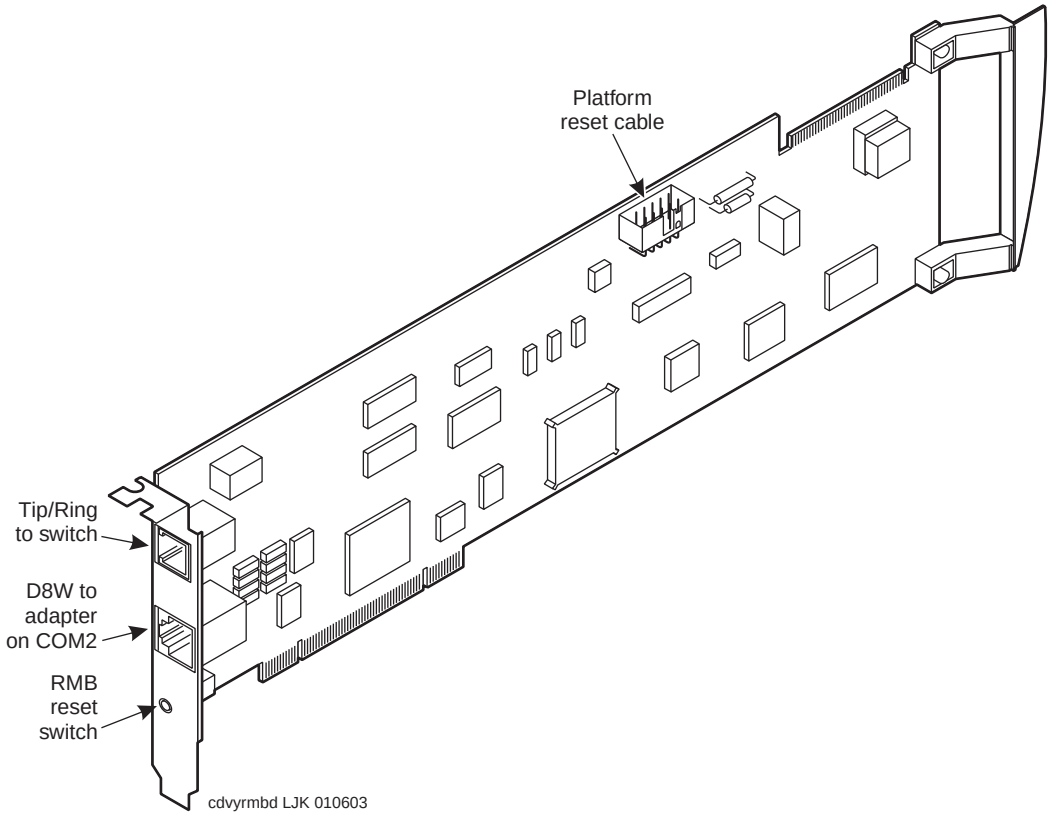

Figure B-1. The RMB CYN23AP circuit pack

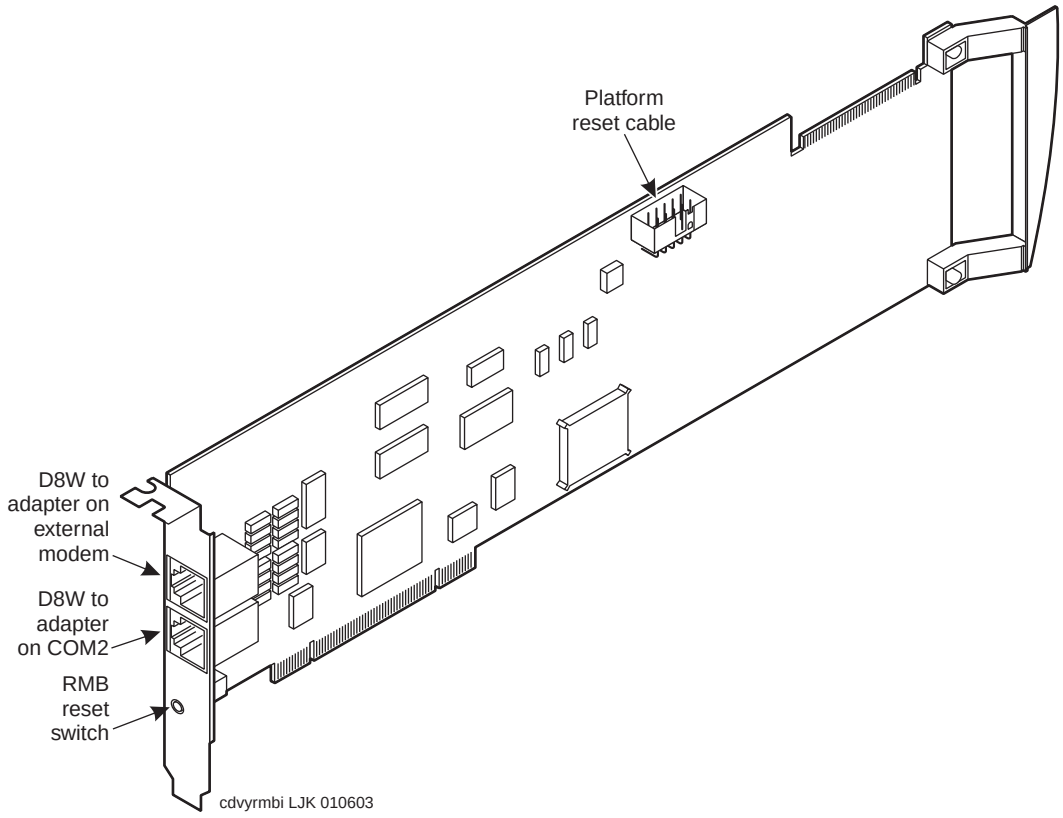

Figure B-2. The RMB CYN24AP circuit pack

RJ-11 Tip/Ring Connector (CYN23AP only)

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.

Table B-1 shows pin-out information.

Table B-1 RJ-11 tip/ring connector (CYN23AP)

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

External Modem Connector (CYN24AP only)

An 8-pin DTE RS-232 modular jack 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. An 8-pin modular jack to a 25-pin RS-232 adapter is required. The pinouts for the connector are listed in Table B-2. The pinouts for the adapter are listed in Table B-3.

Table B-2 8-pin modular jack pinout for RS-232 DTE external modem (CYN24AP)

8-Pin Modular Jack	Signal Name	mnemonic	DB 25 Pin *
1	data carrier detect	DCD	8
2	transmit data	TX	2
3	receive data	RX	3
4	signal ground	GRD	7
5	data set ready	DSR	6
6	data terminal ready	DTR	20
7	request to send	RTS	4
8	clear to send	CTS	5

The following figure shows the external modem adapter.

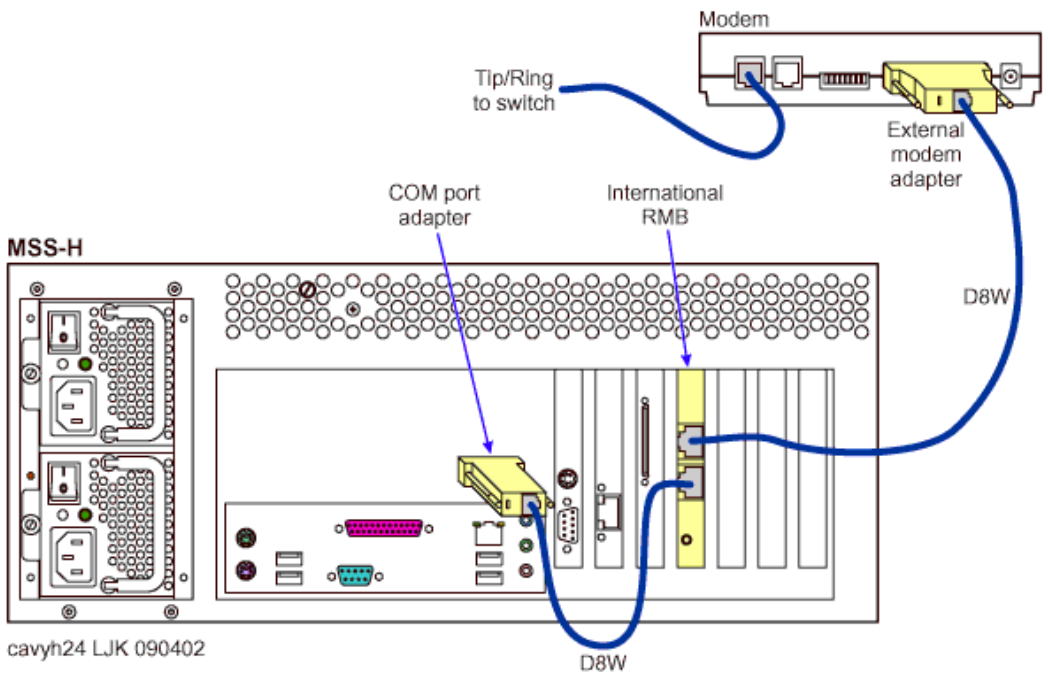

Figure B-3. External modem adapter for CYN24AP

Table B-3 Pinouts for external modem adapter

RMB < - > PC	
6-pin	**DB-25**
1	**8**
2	**2**
3	**3**
4	**7**
5	**6**
6	**20**
7	**4**
8	**5**

Host COM Port DCE Connector

This connector is used to connect the RMB modem to a COM port on the HOST PC. The connection is indirect, in that the RMB microprocessor sits between the COM port connection and the RMB modem. An 8-pin modular jack to 9-pin RS-232 adapter is required.

The pinouts for the DCE HOST connector are listed in Table B-4. The pinouts for the adapter are listed in Table B-5.

Table B-4 8-Pin Modular Jack Pinout for RS-232 DCE HOST Connection (CYN23AP/24AP)

DB9S Pin	Signal Name	DCE Label	8-Pin Modular Jack
1	data carrier detect	DCD	1
2	transmit data	TX	3
3	receive data	RX	2
4	data terminal ready	DTR	6
5	signal ground	GRD	4
6	data set ready	DSR	5
7	request to send	RTS	7
8	clear to send	CTS	8

The following figure shows the COM port adapter.

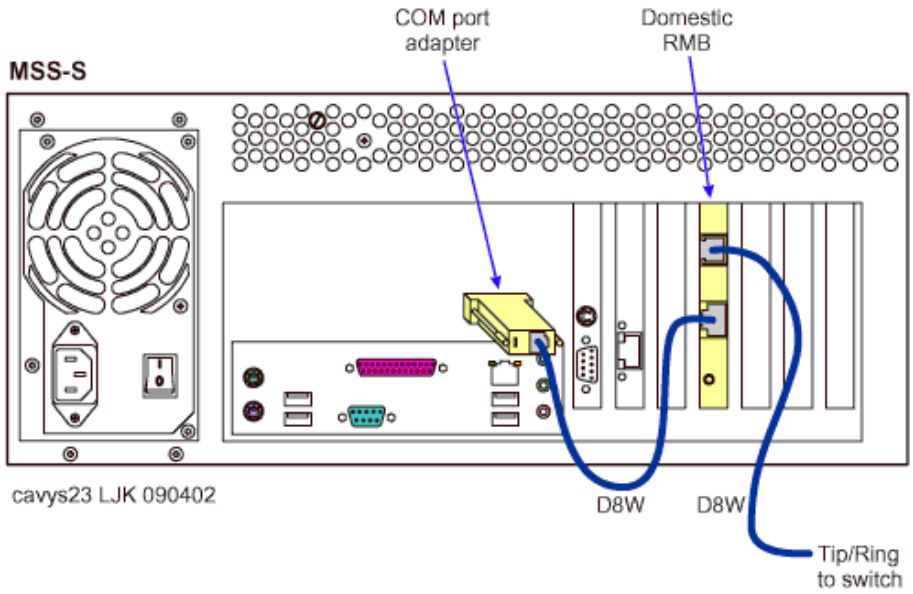

Figure B-4. COM port adapter

Table B-3 shows pin-out information for the COM port adapter.

Table B-5

RMB < - > PC	
6-pin	**DB-9**
1	**1**
2	**3**
3	**2**
4	**5**
5	**6**
6	**4**
7	**7**
8	**8**

RMB Ordering Information

If you need to order an RMB or related equipment, use the comcodes or part numbers listed in Table B-6:

Table B-6 RMB-related comcodes

Group	Part	Comcode/Part number
RMB	CYN23AP	108736067
	CYN24AP	108736075

RMB Specifications and Regulatory Information

C

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

- Environmental specifications
- Toll fraud
- Safety requirements
- 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
- Required platform resources
- Compatible terminals.

Table C-1 shows the basic requirements of the RMB.

Table C-1 RMB environmental specifications

Item	Requirements
PCI form factor	The RMB complies with the standard form factor for PC-based cards and fits into a single PCI bus slot.
Environmental	The RMB requires the following physical environment: ■ Stable environments where the ambient temperature can range between +5 and +55 degrees Centigrade ■ Stable environments where the operating relative humidity can range between 10% and 55% non-condensing ■ Environments where the short-term relative humidity can be a minimum of 20% and a maximum of 80% non-condensing ■ 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 C-1 RMB environmental specifications — *Continued*

Item	Requirements
Power	The RMB requires the following power: ■ +5V and +12V and +3.3V and -12V Typical power consumption: Volts — Watts +5 — 1.8 w +12 — 1.2 w -12 — 0.6 w +3.3 — 0.3 w
System	The RMB operates in adjuncts running Linux® version 6.2 and above. Applications that use color and/or direct screen memory updates are not supported. 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 C-2.

Table C-2 RMB required platform resources

Item	Resource	Size
COM port	Administerable as COM 1 or 2, or any standard RS-232 port supported by operating system	8 I/O bytes
Semaphore Port	Read and write semaphore port	128 I/O bytes
DMA channel	none	not applicable
Interrupts	one	not applicable
Local Configuration Registers	Controls configuration of interface between PCI bus and RMB	128 bytes memory
PCI Configuration Registers	Read and written by plug and play BIOS to configure RMB's PCI bus addresses	64 bytes in Configuration space

Compatible Terminals

The RMB operates in remote mode with the VT100 and any terminal that emulates the VT100 function. A terminal must meet these requirements:

Table C-1. Terminal emulation requirements

For	Meaning ...	Needs ...
BIOS Extension Memory	BIOS window size for loader	8 Kbytes
BIOS Extension Data Window	system memory space	4 Kbytes
File Space	file space that includes the memory required for RMB software	8 Mbytes

Toll Fraud

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

⚠ SECURITY ALERT:

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. Avaya 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. Avaya will not be responsible for any charges that result from such unauthorized use.

Safety Requirements

⚠ CAUTION:

To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cord.

ATTENCION: *Pour réduire les risques d'incendie, utiliser uniquement des conducteurs de télécommunications 26 AWG au de section supérleure.*

⚠ WARNING:

Sneak current protection is required for any direct or out-of-building telecommunication network connections. Use ITW-LINX Model SCP-1 (comcode 403617632)

AVERTISSEMENT: *Une protection contre les courants parasites doit être prévue pour toutes connexions a un réseau de téléconnunications, que ce soit a l'intériur d'un batiment, ou entire batiments.*

Employez ITW-LINX SCP-1 modèle (comcode 403617632.

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 CYN23AP on the component side of the board. Figure C-1 shows the label placement. A second label is provided to be permanently affixed to the back of the equipment cabinet.

Figure C-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 circuit card as shown in Figure C-1.
- 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.
- The Facility Interface Code (FIC) is 02LS2.
- 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

If trouble is experienced with this equipment, for repair or warranty information, please contact the Technical Support Organization Technician Hotline at 1-800-248-1234. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

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.

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.

Supplier’s Declaration of Conformity

Place of Issue: Denver Regulatory Compliance Lab

Date of Issue: Aug 9, 2001

Avaya Inc. located at 211 Mount Airy Road, Basking Ridge, NJ 07920 in the United States of America hereby certifies that the Remote Maintenance Board, model CYN23AP bearing labeling identification number US: AV1MD10BM001 complies with the Federal Communications Commission’s ("FCC") Rules and Regulations 47 Part 68, and the Administrative Council on Terminal Attachments ("ACTA") - adopted technical criteria TIA/EIA/IS-968, Telecommunications - Telephone Terminal Equipment - Technical Requirements for Connection of Ternminal Equipment To the Telephone Network, July 2001.

Glossary

A

Access Security Gateway (ASG)
An authentication tool that secures the two RMB logins supported by RMB circuit packs. ASG uses an authentication protocol to confirm the validity of RMB users and reduce the opportunity for unauthorized access.

Successful authentication is accomplished when ASG-enabled devices communicate with compatible keys. (In this analogy, the RMB ASG is the lock, and the RMB user must possess the key.) The authentication transaction consists of a challenge (essentially a random number), issued by the RMB, and followed by the receipt of a response entered by the user. At the core of this scheme is a secret key, which is information possessed by the RMB and an authorized RMB user. Interception of the challenge or the response will not compromise the security of the system, as the relevance of the authentication token used to perform the challenge/response is limited to the current challenge/response exchange.

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 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 11-25 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)*.

ASGI
See *Access Security Gateway (ASG)*.

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
BIOS Extension Code

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)*.

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
In this document, refers to the non-volatile memory where certain platform configuration information is stored, for example, indicating the number and type of permanent storage devices connected.

CMOS RAM
See *complementary metal oxide semiconductor (CMOS) RAM*.

co-located
An Avaya INTUITY system installed in the same physical location as the host switch.

co-located 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 Avaya. 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 Avaya 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.

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 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)*.

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*.

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.

EMS
Expanded memory system.

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.

F

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

I2C bus
Industry standard serial communication bus.

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.

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.

IP
Internet Protocol.

IRQ
See *interrupt request (IRQ)*.

K

Kbps
Kilobits per second; one thousand bits per second.

Kbyte
Kilobytes, or 1024 bytes.

L

LAN
Local area network.

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.

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.

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 part of the RMB 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
A 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 52 or 54.

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)*.

PCI
Peripheral component interconnect bus for interconnecting the host bus add-on cards.

PCS
Password Change System.

pinouts
The signal description per pin number for a particular connector.

platform
In this document, refers to the PCI computer system that Avaya adjuncts/switches run on and the RMB resides in.

Plug and Play (PnP)
Automatically assigns memory, I/O addresses, IRQs, and BIOS Extension Code addresses on system power-up.

PnP
See *Plug and Play (PnP)*

Point to Point Protocol (PPP)
A protocol for communications between 2 computers using a serial interface.

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.

PPP
See *Point to Point Protocol (PPP)*

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 part of the RMB 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 Avaya 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 Avaya 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
An Avaya or Avaya-certified organization that provides remote support to Avaya 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.

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.

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 or independent state. 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, RMBALARM, and other OS commands. See *boot code* and *firmware*.

RMB state
See *operating state*.

RMB user
A level of RMB security that allows the user to query the platform's status, but not change settings.

ROM
See *read-only memory (ROM)*.

RPSD
Remote Port Security Device.

RS-232
See *EIA interface.*

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. 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.

SNMP
simple network management protocol.

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

TCP
Transport communication protocol.

Technical Support Organization (TSO)
The set of remote service organizations that respond to and meet customer's requirements for support in using Avaya'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.

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 11-25. 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.

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