CVMDBS
Compact Voice & Mobile Data Base Station

User's Guide

July 29, 1998

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Part Number 299-215-22 Rev 03

FCC Rules Part 15, Subpart B Notification

This equipment is designed 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 will be required to correct the interference at his own expense.

Proprietary Notice

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Service Information

Obtain a Return Material Authorization (RMA) before returning a unit for repair or replacement. Before calling, note the serial number of the equipment, module or assembly, symptom, and software version. For service information and RMA, call between 6:00 a.m. and 6:00 p.m. Pacific Time:

ADC Technical Support

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Table of Contents

FCC ID: NFRCVMDBS

CHAPTER 4. CVMDBS POWER-UP, PROGRAM LOAD, AND CONFIGURATION

CHAPTER 5. OPERATION NOTES

List of Figures

List of Tables

About This Manual

This manual is one volume of the documentation set for the ADC Compact Voice and Mobile Data Base Station (CVMDBS). This user's guide is intended for use as a ready reference by experienced telecommunications equipment operators to operate the CVMDBS.

This manual is supplemented by the *CVMDBS Quick Installation Guide.*

Below is a list of the current CVMDBS manuals.

- The *CVMDBS User's Guide,* P/N 299-215-22, dated July 29, 1998.
- The *CVMDBS Quick Installation Guide,* P/N 299-217, dated xx.

Applicable Documents

- The *CVMDBS Quick Installation Guide,* P/N 299- 217, dated xx.
- *CVMDBS Software Release Notes,* ADC P/N 299-083-22 (Shipped with CVMDBS software release).
- CVMDBS Product Specification, Appendix A: CVMDBS Allocated Requirements, ADC P/N 590S045-001, Rev B, dated July 28, 1998.

Revision History

Revision	Date	ECN#	Comments
03	7/29/98	TBD	Draft

1. OVERVIEW

1.1 Network Architecture

The Network architecture is illustrated in Figure 1-1.

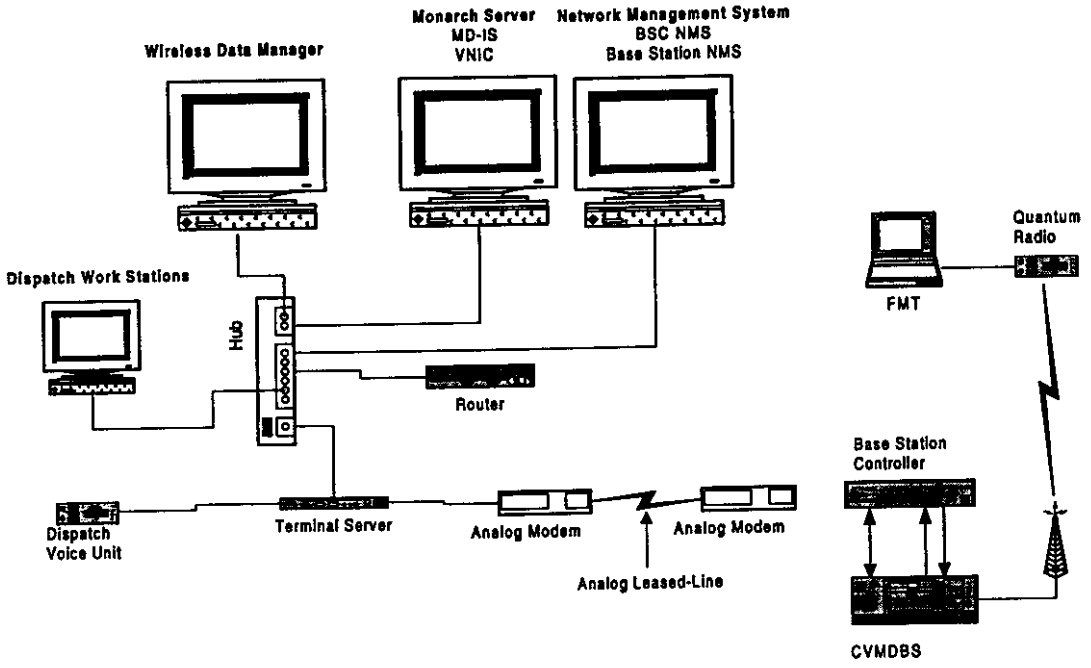

Figure 1-1. Network Architecture

1.2 CVMDBS General Description

The Compact Voice and Mobile Data Base Station (CVMDBS) unit is a 19-inch, rack-mountable, EMI/RFI-shielded unit as depicted in Figure 1-2 and 1-3. The CVMDBS unit serves as a transceiver for the transmission and reception of digital data and digitized voice packets. The CVMDBS unit interfaces with the Base Station Controller (BSC) unit for control and digital modem signals. The CVMDBS also consists of the equipment necessary to interface the transceiver to the antennas. This includes transmit power amplifiers, receive low noise amplifiers, and an optional Tx/Rx Duplexer or Rx Pre-select Filter.

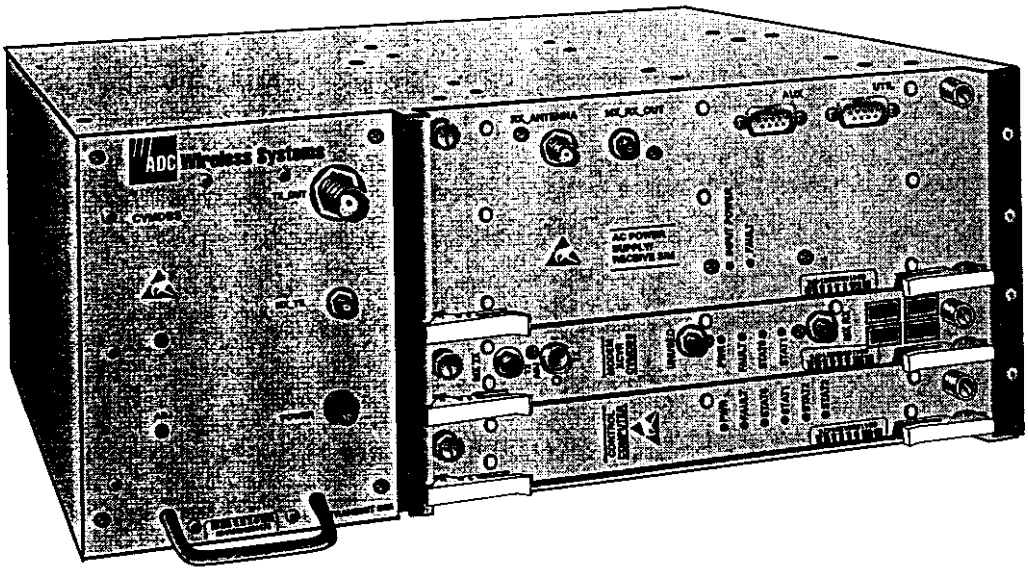

Figure 1-2. CVMDBS Unit

The CVMDBS unit has six types of functional modules and assemblies:

1. Control Computer (CC) Module
2. Modem / Transceiver (MX) Module
3. Power Converter (PC) Module
4. Rx Site Interface Module (Rx SIM)
5. Tx Site Interface Module (Tx SIM)
6. CVMDBS Chassis Assembly

The PC Module and Rx SIM are physically housed together as one module referred to as the PC / Rx SIM. The remaining functional modules are each separate physical modules, for a total of four physical modules. All the listed modules plug into the CVMDBS Chassis Assembly. The modules communicate with each other on the backplane as depicted in Figure 1-4.

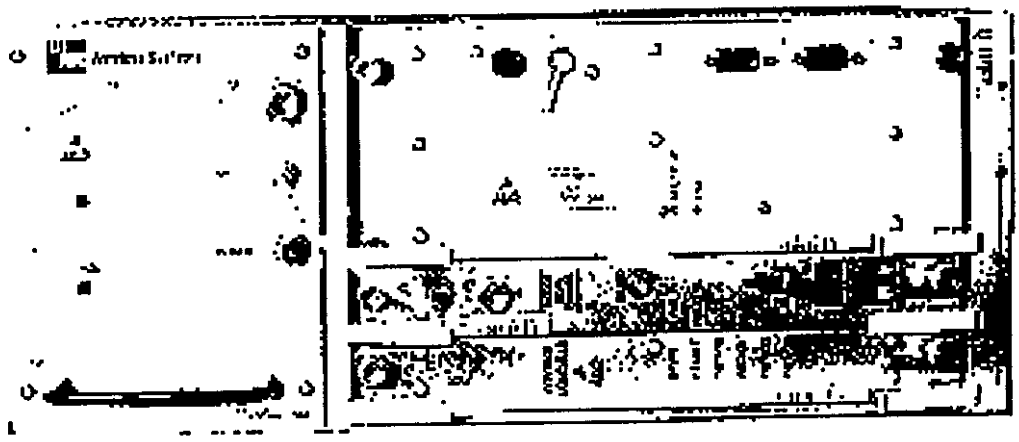

Figure 1-3. CVMDBS Front View

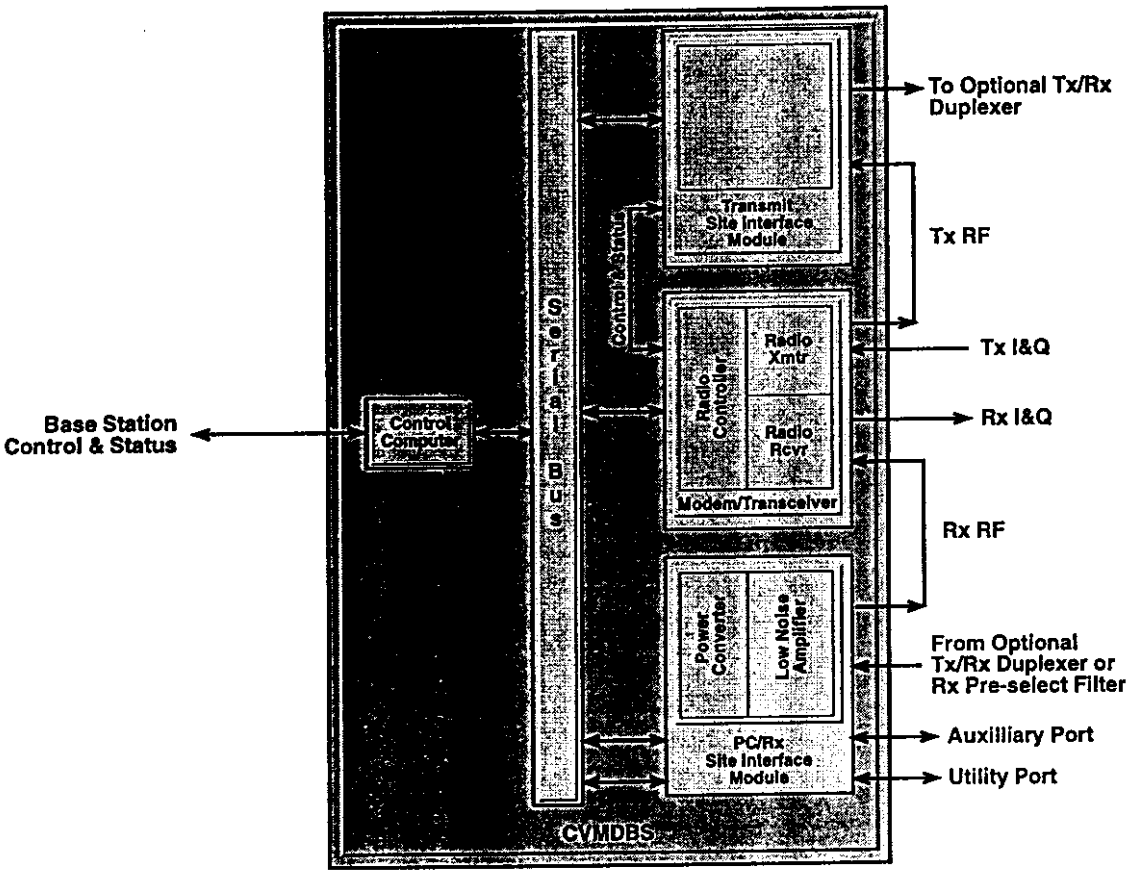

Figure 1-4. CVMDBS Block Diagram

1.2.1 Control Computer (CC) Module

The Control Computer (CC) Module consists of a single board unit that slides into the bottom right slot of the CVMDBS Chassis Assembly.

The CC Module is the management point for both control and data routing within the CVMDBS unit.

1. The CC Module acts as the primary interface to the Base Station Controller (Unit) for the purpose of controlling and monitoring the CVMDBS unit.
2. The CC Module is responsible for controlling itself and the MX Module.
   a) The CC Module controls which RF channel is the MX Module is using for transmitting and receiving.
   b) The CC Module monitors itself and the MX Module for determination and reporting of health and status. This information is reported to the Network Management System via the Base Station Controller (BSC) unit and available locally via software tools.
3. The CC Module provides itself and the MX Module with operating software and configuration information.
   a) The CC Module contains all of the CVMDBS configuration information. The CC Module contains a miniature hard disk drive on which it stores its own software, the software for MX Module, and all the configuration data needed by the CVMDBS unit. Software tools can be used to transfer the RAM-based software and configuration information to the disk.

1.2.1.1 CC Module LED Indicators

The CC Module LED indicators are shown in Figure 1-5. The CC Module LED indicators relate different information depending on the CC Module software state. That is, the CC Module LED indicators provide one set of information when the CC Module is operating under the control of ROM-based software and another set of information when the CC Module is operating under the control of RAM-based software (see Table 1-3).

- Under normal conditions, the Fault LED is "off," the STAT0 and STAT2 LEDs are "flashing" (at a 1/3 second rate), and the STAT1 and STAT3 LEDs are "off."

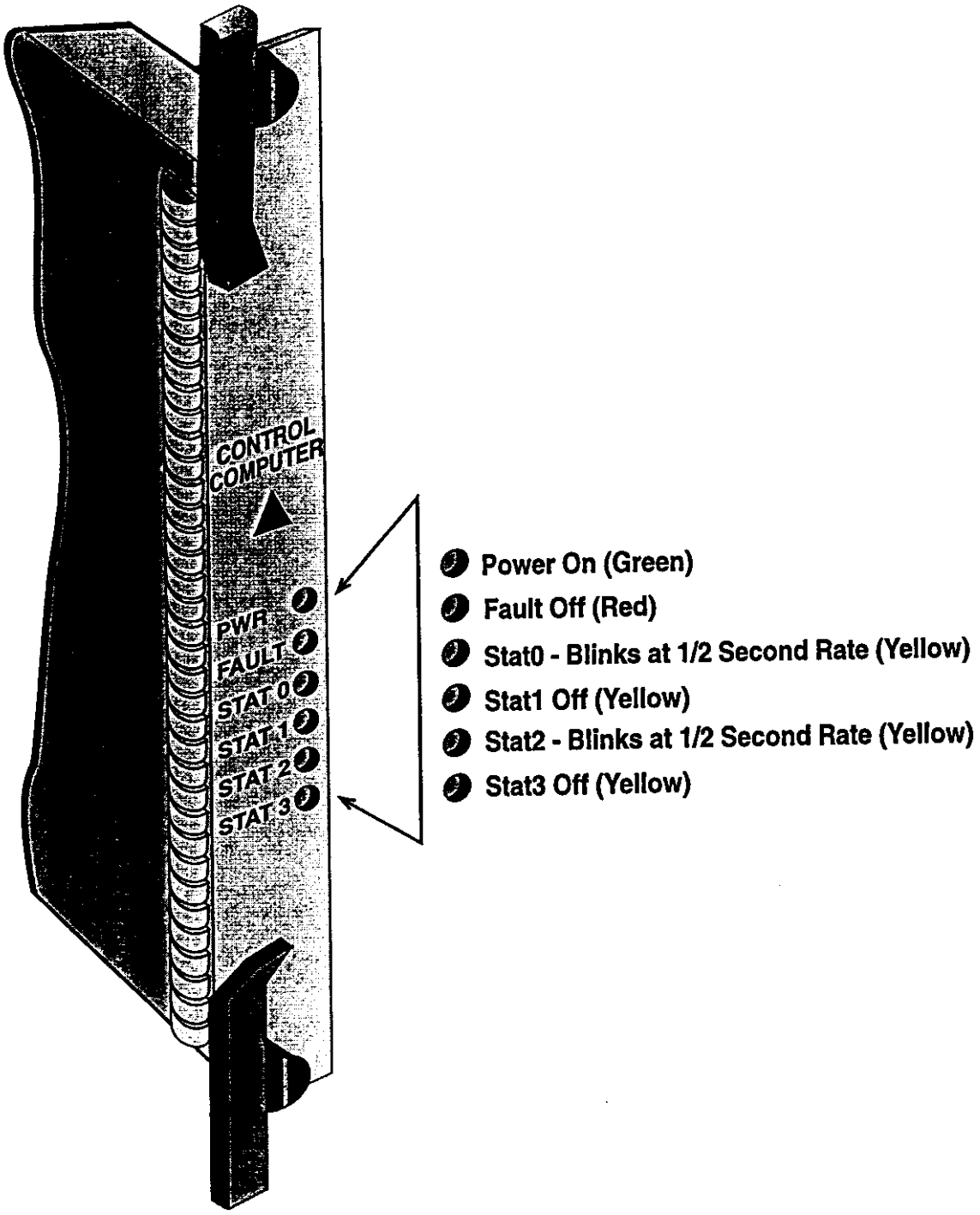

Figure 1-5. CC Module LEDs

Table 1-3. CC Module LED Indicators

Control Computer ROM State					
	FAULT	**STAT0**	**STAT1**	**STAT2**	**STAT3**
Power-On / BIT	On	Blink Pattern	Blink Pattern	Blink Pattern	Blink Pattern
Fatal Error	Error Code Pattern[2]	Fast Blinking[3]	Off	Error Code Pattern[2]	Off
Non-fatal Error or Code Fault	On	Slow Blinking[4]	Off	Slow Blinking[4]	Off

Control Computer RAM State					
	FAULT	**STAT0**	**STAT1**	**STAT2**	**STAT3**
Power-On / BIT	On	Blink Pattern	Blink Pattern	Blink Pattern	Blink Pattern
Fatal Error	Error Code Pattern[2]	Fast Blinking[3]	Off; then restart	Error Code Pattern[2]	Off; then restart
Non-fatal Error	On	Fast Blinking[3]	Off	Fast Blinking[3]	Off
Normal Operation	Off	Fast Blinking[3]	Off	Fast Blinking[3]	Off

[1] Built-in test (self-diagnostics).

[2] Error Code Blinking Patterns are used by ADC technical staff for diagnostic purposes.

[3] Fast Blinking is approximately three blinks per second.

[4] Slow Blinking is approximately one blink every other second.

1.2.2 Modem/Transceiver (MX) Module

The Modem/Transceiver (MX) Module is a single board unit that slides into the middle right slot of the CVMDBS Chassis Assembly.

The MX Module will support one channel stream and includes the radio transceiver for that channel stream. At the physical layer, the MX Module supports Gaussian filtered 4-level FSK modulation at a baud rate of 9.6 kbaud, or a bit rate of 19.2 kbps.

The radio transceiver portion of the Modem/Transceiver Module performs frequency up-conversion and down-conversion to and from the configured RF channel within the SMR band as commanded by the CC Module.

1. The synthesizer section of the radio transceiver provides the conversion between RF channel number and the desire RF frequencies.
2. The transmitter section of the radio transceiver outputs a forward channel transmit signal to the mobile unit by way of the Tx Site Inteface Module (Tx SIM).
   a) The transmitter modulates the transmit In-phase and Quadrature baseband received from the BSC unit onto the transmitted carrier.
   b) The transmitter output drives the power amplifier in the Tx SIM. The output signal is normally turned on or off under microprocessor control, but there is also a front-panel toggle switch which allows the output stage of the transmitter to be manually disabled.
3. The receiver section of the radio transceiver inputs the reverse channel receive channel from the mobile unit by way of the PC / Rx Site Interface Module (PC / Rx SIM).
   a) The receiver accepts amplified RF input from the RX Site Interface Module (Rx SIM).
   b) The receiver demodulates the receive RF carrier signal into receive In-phase and Quadrature baseband signal for output to the BSC unit.

The remaining portion of the Modem / Transceiver controls the MX Module's radio transceiver as well as controls the Tx SIM.

1.2.2.1 MX Module LED Indicators

The MX Module LED indicators are shown in Figure 1-6. The MX Module LED indicators relate different information depending on the MX Module software state. That is, the MX Module LED indicators provide one set of information when the MX Module is operating under the control of ROM-based software and another set of information when the MX Module is operating under the control of RAM-based software (see Table 1-5).

- When the MX Module is operational, the Fault LED is "off," Code LED is "flashing," and the Online LED is "illuminated."

Table 1-5. Modem / Transceiver Module LED Indicators

Modem / Transceiver ROM State			
	FAULT	**CODE**	**ONLINE**
Power-On / BIT[1]	On	|--------Blinking Pattern---------|	
Fatal Error	Error Code Pattern[2]	Fast Blinking[3]	Off
Code Fault or Non-fatal Error	On	Slow Blinking[4]	Off

Modem / Transceiver RAM State			
	FAULT	**CODE**	**ONLINE**
Power-On / BIT[1]	On	|--------Blinking Pattern---------|	
Fatal Error	Error Code Pattern[2]	Fast Blinking[3]	Off (then restart)
Non-fatal Error	On	Fast Blinking[3]	Off
Normal Operation	Off	Fast Blinking[3]	Off

[1] Built-in test (self-diagnostics).

[2] Error Code Blinking Patterns are used by ADC technical staff for diagnostic purposes.

[3] Fast Blinking is approximately three blinks per second.

[4] Slow Blinking is approximately one blink every other second.

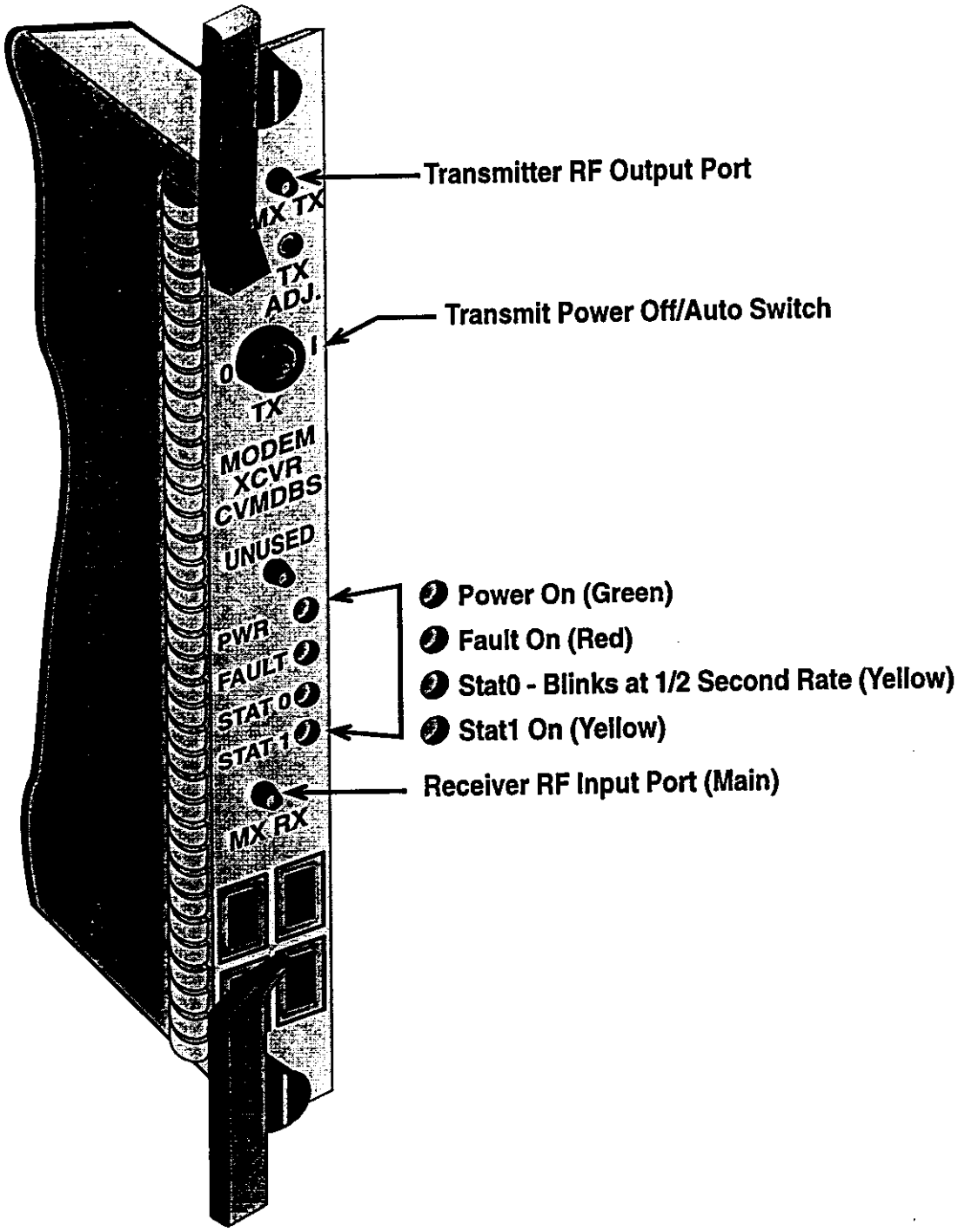

Figure 1-6. ~~CVMDBS~~ MX Module LEDs

NOTE:
When the MX Module is operating from RAM-based software, the Online LED indicates when the transmitter is enabled (by software control) to transmit.

1.2.2.2 MX Module Transmit Power Switch

The Transmit Power Off/Auto Switch, shown in Figure 1-6, can be used to control the transmitter output power for local test purposes. In the **0** position, transmitter output is disabled. In the **1** position, transmitter output power is controlled by the configuration file, the CC Module, and the Network Management System.

1.2.2.2.1 Transmitter Failure Detection

The *Transmit Power OFF/AUTO switch* (shown in Figure 1-6) uses detection circuitry that senses when the switch is in the Off position and provides the information to the MX Module central processor. If the MX Module processor detects the switch in the Off position, and the associated channel stream is *enabled*, the MX Module generates a **TX Power Failure** alarm. The MX Module also generates a **TX Power Failure** in the reverse situation where the switch is set to Auto, and the channel stream is disabled.

1.2.3 Power Converter / Receive Site Interface Module

The Power Converter / Receive Site Interface Module (PC / Rx SIM) slides into the middle right slot of the CVMDBS Chassis Assembly.

The power converter portion of the PC / Rx SIM converts 115 VAC to the internal power levels required by the CVMDBS modules.

1. The PC Section will control the sequencing of the voltage forms during power turn-on as required by the CVMDBS modules.
2. The PC / Rx SIM has two status lines which are periodically read by the CC Module. The first line is an **over-voltage** status line and the second is an **under-voltage** status line. Their operational status is reported via alarms.
3. The PC / Rx SIM has two control lines that can be asserted by the CC Module in the event of a power supply fault, *i.e.*, over-voltage, under-voltage (over-current) condition. In normal conditions, the CC Module cannot assert control over the power supply through these two control lines. However, after these control inputs are enabled, the CC Module can turn-off the power supply at any time regardless of internal power supply conditions.

The receive portion of the PC / Rx SIM provides an RF signal interface between an external antenna / filters / duplexer and the MX Module.

1. The Receive Site Interface Section **shall** provide gain to receive RF signals as a precursor to passing the signals to the CVMDBS MX Module.

1.2.3.1 PC / Rx SIM LED Indicators

The PC / Rx SIM LED indicators are shown in Figure 1-7. When the PC / Rx SIM Module is operating normally, the LEDs are illuminated as follows:

- Green = On, indicates that power is applied to the power supply.
- Red = remains Off (if it is On, there is a fault condition)

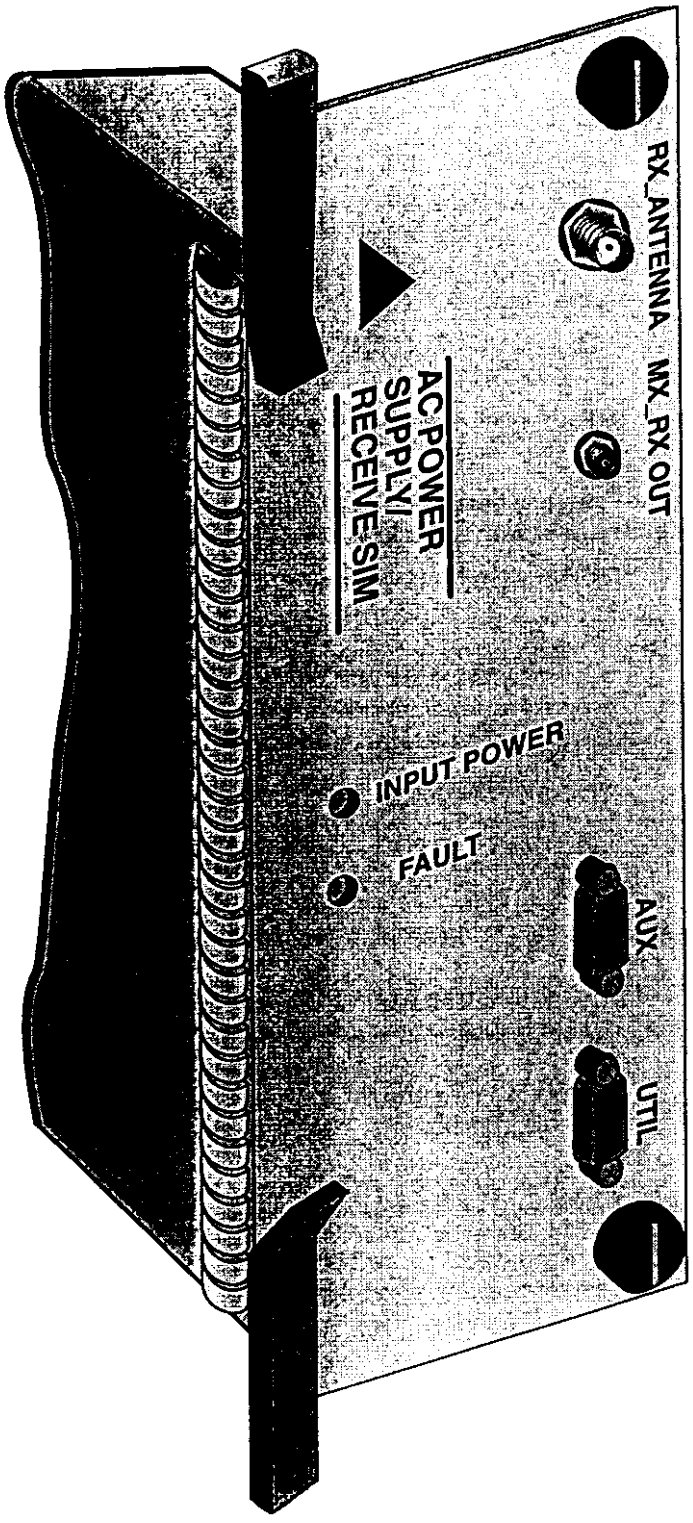

Figure 1-7. Power Converter/Rx SIM LEDs

1.2.4 Transmit Site Interface Module

The Transmit Site Interface Module (Tx SIM) houses the Power Amplifier (PA) in an enclosure that slides into the left slot of the CVMDBS Chassis Assembly.

The Tx SIM provides an RF interface between the MX Module and an external antenna / filters / duplexers.

1. The Tx SIM provides high power gain to transmit RF carrier signal supplied by the MX Module.
   a) RF power can be manually adjusted from less than 10W to more than 75 Watts, allowing easy adjustment to the power requirements of individual sites.

Digital control of output power is driven by the MX module which, in turn, is controlled via the configuration file, the CC Module, and the Network Management System. In particular, once the PA's power level has been manually set, it can be adjusted downward via software commands a total of 7 steps where each step is 4 dB. Thus, the PA can be adjusted via software down a total of 28 dB.

> **NOTE**
> The input signal to Tx SIM from the MX module is at a relatively low level - approximately, 0 dBm.

1.2.5 CVMDBS Chassis Assembly

The CVMDBS Chassis Assembly is the primary building block for the CVMDBS unit, providing support for the CVMDBS modules.

1. The CVMDBS Chassis Assembly provides housing and mounting for the CVMDBS modules. As part of this role, the CVMDBS Chassis Assembly contains a backplane to interface the CVMDBS modules.
2. The CVMDBS Chassis provides mounting and cooling for the entire CVMDBS unit. The CVMDBS provides mounting flanges for mounting in a standard 19 inch rack. Two fans provide airflow across the other CVMDBS modules.
3. The CVMDBS Chassis provides power filtering for the entire CVMDBS unit.
4. The CVMDBS Chassis provides a power circuit breaker, which also acts as an ON/OFF Switch.

> **NOTE**
> The circuit breaker is rated at 10 Amps @ 115 VAC.

5. The CVMDBS Chassis provides an internal reference clock.

2. INPUT / OUTPUT

2.1 Connector Identification

The CVMDBS unit provides external front access to the connectors identified in Table 2-1 and shown in Figure 2-1.

Table 2-1. Front Connectors

NAME	IDENTIFIER	CONNECTOR	Module	INTERFACES WITH
Receive I Baseband	RX_I	SMB Jack	MX	BSC Unit
Receive Q Baseband	RX_Q	SMB Jack	MX	BSC Unit
Transmit I Baseband	TX_I	SMB Jack	MX	BSC Unit
Transmit Q Baseband	TX_Q	SMB Jack	MX	BSC Unit
MX Receive	MX_RX	SMA female	MX	PC / Rx SIM
MX Transmit	MX_TX	SMA female	MX	Tx SIM
Power Amplifier Out	TX_OUT	N female	Tx SIM	Antenna, Duplexer, or Filter
MX Transmitter In	MX_TX	SMA female	Tx SIM	MX
Receive Antenna	RX_ANTENNA	N female	PC / Rx SIM	Antenna, Duplexer, or Filter
MX Receive Out	MX_RX_OUT	SMA female	PC / Rx SIM	MX
Utility Port	UTIL	DB-9P	PC / Rx SIM	BSC Unit or PC Tool
Auxiliary Port	AUX	DB-9P	PC / Rx SIM	LSAM

The CVMDBS unit provides external front access to the connectors identified in Table 2-2 and shown in Figure 2-2.

Table 2-2. Rear Connectors

NAME	IDENTIFIER	CONNECTOR	Module	
Network Port	NET_P	DB-25P	CVMDBS Chassis Assembly	Network Access Device
Main Input Power (AC)	MN_PWR	IEC standard 3 pin connector	CVMDBS Chassis Assembly	External Power

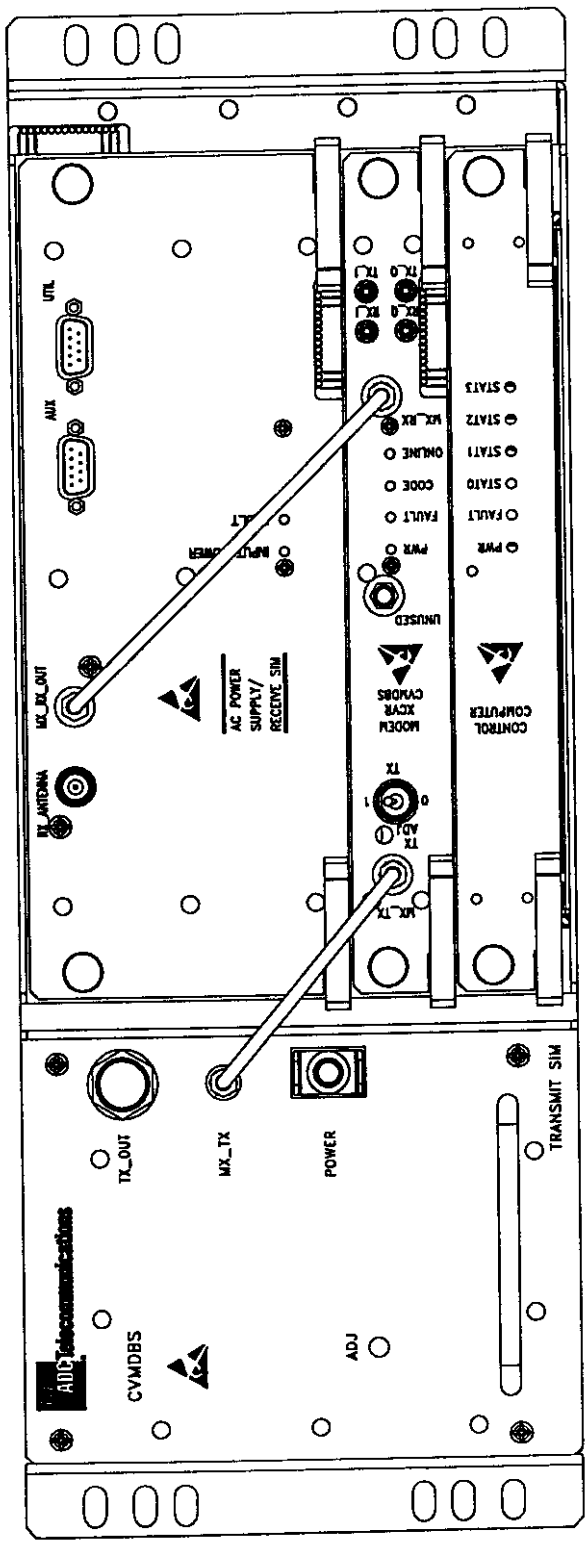

Figure 2-1 CVMDBS Front Connectors

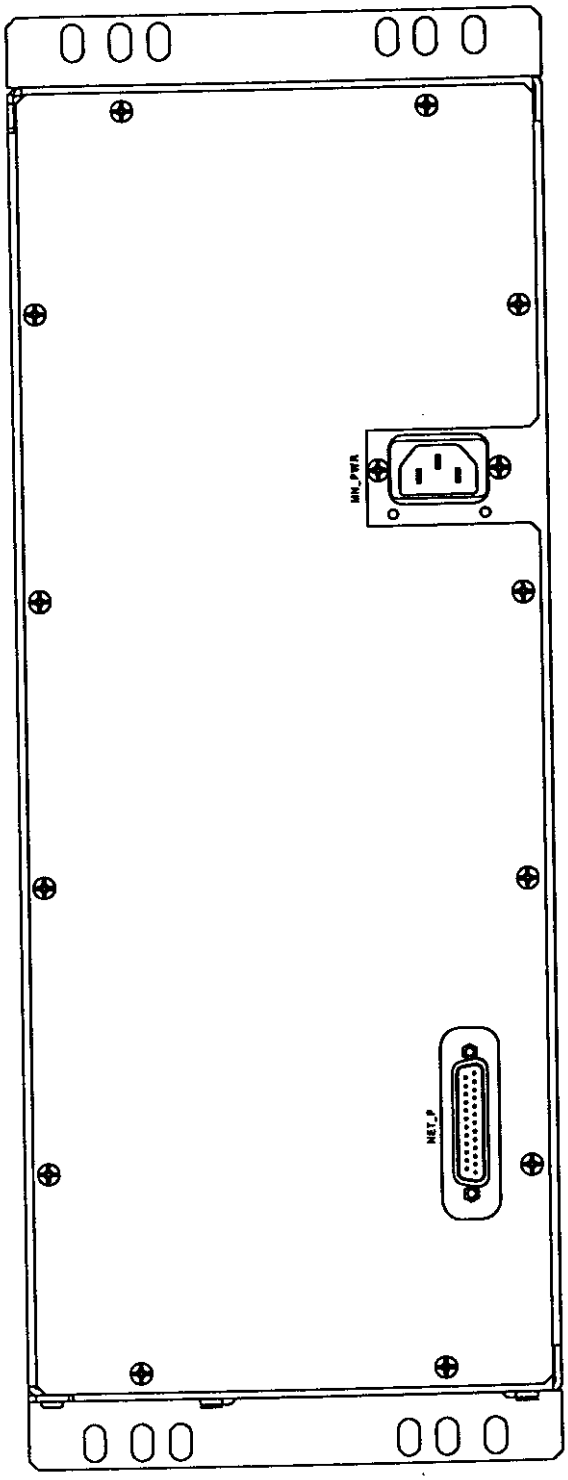

Figure 2-2 CVMDBS Rear Connectors

2.1.1 Utility Port

The CVMDBS unit's Utility Port is used for base station control and statusing, maintenance, and configuration purposes.

1. The Base Station Controller (BSC) unit provides limited control and accepts limited status via the utility port.
2. An IBM-compatible PC can be connected to this port to download code, transfer code and configuration files to the CC Module hard disk, and perform limited control and statusing.
3. The Utility Port is an asynchronous RS-232 type serial interface supporting data rates from 1.2 kbps up to 38.4 kbps.
4. The Utility Port pin and signal assignments are shown in Table 2-3.

Table 2-1 Utility Port Pin Assignments

Pin	Signal Name	Signal Description	Input / Output
1	---	---	N/C
2	UP_RXD	Utility Port Receive Data	Input
3	UP_TXD	Utility Port Transmit Data	Output
4	---	---	N/C
5	GND	Ground	-
6	---	---	N/C
7	---	---	N/C
8	---	---	N/C
9	---	---	N/C

2.1.2 Auxiliary Port

The CVMDBS unit's Auxiliary Port provides an interface to the optional Local Status and Alarm Monitor (LSAM) unit.

1. The Auxiliary Port is an asynchronous RS-232 type serial interface.
2. The Auxiliary Port pin and signal assignments are shown in Table 2-3.

Table 2-3 Auxiliary Port Pin Assignments

Pin	Signal Name	Signal Description	Input / Output
1	---	---	N/C
2	AUX RX	Receive Data In	Input
3	AUX TX	Transmit Data	Output
4	---	---	N/C
5	GND	Shield Ground	Note
6	---	---	N/C
7	---	---	N/C
8	---	---	N/C
9	---	---	N/C

Note: Pin 5 is connected to Shield Ground through Backplane jumper

2.1.3 Network Port (NET_P)

The CVMDBS unit's Network Port interface provides an interface for remote Network Management System control separate from the BSC unit.

1. The Network Port interface is changeable between V.35 and RS232. The standard serial connection will be RS232, but this can be changed in the field.

> **NOTE**
> The RS-232 standard specifies that this interface should be limited to a maximum data rate of 19.2 kbps over a cable length of 50 feet.

> **NOTE**
> The CCITT V.35 standard specifies that this interface can be used with data rates above 48 kbps, and V.35 is the prevalent interface to 56 kbps common carrier digital transmission facilities.

2. The Network Port pin and signal assignments are shown in Table 2-4.

Table 2.4 Network Port RS232 Pin Assignments

Pin	Signal Name	Signal Description	Source
1	SHIELD GND		-
2	TXDOUT	Transmit data (Differential for V.35, non-differential for RS-232)	Control Computer Module
3	RXDIN	Receive data (Differential for V.35, non-differential for RS-232)	Network or DSU/CSU Module
4	RTS	Request to Send	Control Computer Module
5	CTS	Clear to Send	Network or DSU/CSU Module
6	DSR	Data Set Ready	Network or DSU/CSU Module
7	GND		-
8	DCD	Data Carrier Detect	Network or DSU/CSU Module
9	-	-	N/C
10	TXCIN/	Inverse of TXCIN	Network or DSU/CSU Module
11	RXCIN/	Inverse of RXCIN	Network or DSU/CSU Module
12	TXCOUT/	Inverse of TXCOUT	Control Computer Module
13	GND		-
14	TXDOUT/	Inverse of TXDOUT	Control Computer Module
15	RXDIN/	Inverse of RXDIN	Network or DSU/CSU Module
16	-	-	N/C
17	-	-	N/C
18	-	-	N/C
19	-	-	N/C
20	DTR	Data Terminal Ready	Control Computer Module
21	-	-	N/C
22	TXCIN	Transmit data clock (Differential for V.35, non-differential for RS-232)	Network or DSU/CSU Module
23	RXCIN	Receive data clock (Differential for V.35, non-differential for RS-232)	Network or DSU/CSU Module
24	TXCOUT	Differential transmit clock from CVMDBS. (Not used by RS-232)	Control Computer Module
25	-	-	N/C

3. OPERATOR COMMAND TOOLS

3.1 CVMDBS Utility Program Tools

ADC has developed the MDBS Utility Program (MUP) software for downloading and initializing the CVMDBS.

3.1.1 CVMDBS Utility Program Tools Capabilities

Downloading CVMDBS program code, initialization and management are performed by using the following MUP Tools:

3.1.1.1 MUP Tools for PC

Disk Management Utilities

f_copy	Makes copies of a file on the CC hard drive.
f_create	Created a new file on the CC's hard drive.
f_del	Deletes a file on the CC hard drive.
f_dir	List files on CC hard drive.
f_get	Retrieves a file from CC hard drive to PC hard drive.
f_list	List the contents of a selected file from the CC hard drive.
f_put	Move a file from PC hard drive to CC hard drive.
f_rename	Renames a file on the CC hard drive.

Statusing Utilities

hs_poll	Executes a health and status poll command.

Control & Initialization Utilities

dnld	Downloads code to the CC or MX Module.
reset	Executes a reset on the CC and / or MX module(s).

4. CVMDBS POWER-UP, PROGRAM LOAD, AND CONFIGURATION

4.1 Overview

The CVMDBS initializes itself upon power from on-board ROM software. After initialization, the waits for download of software to RAM from an external source. Details about the process are provided in the following sections:

- Section 4.2, entitled "CVMDBS Power On"
- Section 4.3, entitled "CVMDBS Program Code Download"

In addition, the CVMDBS can be enabled to automatically load its program code and configure itself in the event of data loss caused by a reset or power failure. To use these options, the CC module must have a formatted hard disk that contains specific files required to perform these functions. The specific files can be transferred to and stored on the CC Module's hard disk. For more information about these options, refer to the following sections:

- Section 4.4, entitled "CVMDBS Program Code on Disk Feature"
- Section 4.5, entitled "CVMDBS Configuration File on Disk Feature"

4.2 CVMDBS Power-on

The following procedure describes how to apply power to the CVMDBS:

1. To power-on the CVMDBS, the following CVMDBS switches must be set at the cell site:
   - CVMDBS Chassis Assembly Power switch pushed in (see Figure 1-2),
   - The MX Transmit switch to its 1 setting (see Figure 1-6).
2. If the automatic download option is not used, in about 30 seconds the CC and MX modules' LEDs display a pattern (shown below) that indicates the CVMDBS is operating from ROM (no code loaded).

   CC module LED status when operating from ROM:

LED	Status
Power	On
Fault	On
Stat0	Slow Blinking Pattern
Stat1	Off
Stat2	Slow Blinking Pattern
Stat3	Off

MX module LED status when operating from ROM:

LED	Status
Power	On
Fault	On
Code	Slow Blinking Pattern
Online	Off

After the LEDs are illuminated as above, wait one minute, then continue to the Section 4.3, entitled "CVMDBS Program Code Download"

4.2.1 Initialization Failure after a Power-on

If the CVMDBS fails to initialize properly after it is powered-on, use the following procedure to restore the program code:

1. Power-off the CVMDBS and slightly pull out the PC / Rx SIM.
2. After one minute, re-seat the PC/Rx SIM and power-on the CVMDBS.

4.2.2 CVMDBS Reset Procedure

2. To reset the MX Module, enter the following commands:

   A. For a Hard Reset to erase MX RAM code: Use the utility port and MUP Tool "reset" and type:

   reset 2 -y <Enter>

   B. For a Soft Reset to only erase the MX configuration information: Use the utility port and MUP Tool "reset":

   reset 2 <Enter>

> **NOTE**
> A Hard Reset command clears all data stored in the Module's RAM; this includes the CVMDBS program code and its configuration data. A Soft Reset command clears the configuration data only and maintains the CVMDBS program code.

1. To reset the CC Module in slot 0, enter the following commands:

   A. For a Hard Reset to erase CC RAM code: Use the utility port and MUP Tool "reset":

   reset 0 -y <Enter>

   B. For a Soft Reset to only erase the configuration information: Use the utility port and MUP Tool "reset"

   reset 0 <Enter>

> **NOTE**
> Wait at least two minutes before proceeding further.

4.3 CVMDBS Program Code Download

The CVMDBS program code can be downloaded at the local cell site from an external source. Local downloads use the CVMDBS Utility port (RS-232 interface), as defined in Section 2.1.1, entitled "Utility Port".

4.3.1 Downloading Program Code at the Cell Site

To download the CVMDBS program code at the cell site, an 80386-based PC or better is required. A serial connection must be made between the CVMDBS Utility port and the PC COM1 serial port. The operational code is downloaded to RAM in the Control Computer and Modem/Transceiver modules.

The CVMDBS program code is downloaded to RAM in the CC and MX module; each board must be individually downloaded. (See Section 4.3.3, entitled "Software Download Procedure" in this chapter.) A local download uses the Utility port which operates at 38.4 kbps, requiring approximately two-to-three minutes to download code to a CC module and approximately one minute to download code to an MX module.

4.3.2 Facts to Know Before Downloading CVMDBS Program Code

Before starting a program code download, it is important to note the following:

- Data transfer across both the Network and Utility port is performed by the CC Module. At system start-up, the CC Module performs self-testing during which time the CC Module cannot interface to either of these ports; it is dedicated to its own internal start-up process.

> **NOTE**
>
> If you attempt to download to a MX Module while the CC Module is in the start-up process, the MX Module download will fail. If a failure occurs, refer to the Section 4.2.1, entitled "Initialization Failure After a Power-on."

4.3.3 Software Download Procedure

The following software download procedure needs to be performed while the CVMDBS is operating from ROM: (following a power-on or Hard Reset)

1. Enter the following software commands to download CC RAM program code to the CC Module:

   A. For a *local* download using the utility port and MUP Tool "dnld", type:
   dnld 0 cc_f0xxx.dll <Enter>.

NOTE

- Code is now being downloaded to the CC Module in slot 0. Wait two minutes before proceeding further.

When the download is complete the CC Module's LEDs will behave as follows:

CC module LED status when operating from RAM:

LED	Status
Power	On
Fault	Off
Stat0	Fast Blinking Pattern
Stat1	Off
Stat2	Fast Blinking Pattern
Stat3	Off

2 Enter the following software commands to download MX RAM program code to the MX module:

A. For a *local* download using the utility port, type: **dnld 2 sm_f0xxx.dll** <Enter>.

NOTE

- Code is now being downloaded to the MX module in the slot 2. Wait two minutes before proceeding further.

When the download is complete, the MX Module's LEDs will behave as follows:

MX module LED status when operating from RAM, but not configured:

LED	Status
Power	On
Fault	Off
Code	Fast Blinking Pattern
Online	Off

4.4 CVMDBS Program Code on Disk

The CVMDBS Program Code on Disk feature enables the CVMDBS to automatically load the program code, stored on the CC Module's hard disk, to RAM. This event is initiated by an CVMDBS reset (specifically a Hard Reset) or caused by a power failure recovery.

The CVMDBS Program Code on Disk operation is executed only from the CC Module. This feature allows the CVMDBS to automatically download its program code to RAM without intervention from a Network Management System.

To prepare the CVMDBS to run the CVMDBS Program Code on Disk option, three files must be present on the CC Module's hard disk:

- AUTOLOAD.SYS — Used as a semaphore to indicate the Program Code on Disk option will be used. The file contents are ignored.
- BOOT.SYS — Lists the CVMDBS Program Files (e.g. V2_20.SYS, V2_21.SYS)
- *<software version>*.SYS — Indicates which program code file (.DLL) to load for each module. These specific (.DLL) files, as well as the program code files, must be stored in the root directory.

NOTE

The *<software version>*.SYS file contains the following configuration data:

Chassis Number	(0)
Slot Number	(0-2)
.dll Object	(DEFAULT_CC or SM)
.dll file name	(*<file name>*.dll)

4.4.1 Preparing the Hard Disk to Automatically Load Program Code

To prepare the CC Module's hard disk to automatically download program code, three files must reside on the CC Module's hard disk: AUTOLOAD.SYS, BOOT.SYS, and *<software version>*.SYS. Using Software Release Version 2.2 as an example, follow the procedure below to prepare the hard disk to automatically load program code to the CVMDBS.

1. Create the BOOT.SYS file using a standard text editor (see Figure 4-1).

```
#CVMDBS BOOT.SYS file for Software Release V2.20
V2_20.SYS
#End of BOOT.SYS file
```

Figure 4-1. Example of BOOT.SYS File

NOTE
Comments are denoted by any text preceeded by "#."

2. Create the V2_20.SYS file using a standard text editor (see Figure 4-2).

```
#CVMDBS Software Version 2.20
* *    DEFAULT_CC      CC_F0220.DLL     #Default CC RAM dll code
* *    SM              SM_F0220.DLL     #SM RAM dll code
#End of V2_20.SYS file
```

Figure 4-2. Example of <software version>.SYS File

3. Create the AUTOLOAD.SYS using a standard text editor. (The contents of the file are irrelevant, only the presence of the file is required.) Figure 4-3 below shows an example AUTOCFG.SYS file.

```
#AUTOLOAD.SYS file for Software Release Version 2.20
#End of AUTOLOAD.SYS file
```

Figure 4-3. Example of AUTOLOAD.SYS File

4. If required, power-on the CVMDBS (see section entitled "CVMDBS Power-On" below).

5. Check the current files on the hard disk by using MUP Tool "f_dir".

6. Remove any unwanted files using the MUP Tool "f_del".

7. Check the amount of disk space required on the hard disk (for the files listed above).

8. Verify enough space is available on the hard disk by using MUP Tool "f_dir".

> **NOTE**
> The CC_F0xxx.DLL file requires approximately 800 Kbytes of disk space; the SM_F0xxx.DLL file requires approximately 200 Kbytes of disk space.

9. Use the MUP Tool "f_put" to transfer the V2_20.SYS, AUTOLOAD.SYS, BOOT.SYS, CC_FO220.DLL and SM_F0220.DLL files.

10. Verify all files are transferred by using MUP Tool "f_dir".

11. To initialize the CVMDBS with the new program code: a) power-off the CVMDBS, wait 5 to 10 seconds, and reapply power or b) use the MUP Tool "reset 0 -Y" to issue a Hard Reset that deletes code. The new code will be loaded automatically.

4.4.2 CVMDBS Automatic Program Code Load Process

After the CC Module hard disk is set up to support the CVMDBS Program Code on Disk option, the sequence of events listed in the steps below occur pursuant to a Reset Target Yes or a power failure recovery.

1. At power-on, the CVMDBS searches the CC Module's hard disk for the AUTOLOAD.SYS file.

   a. If the AUTOLOAD.SYS file is found, the CVMDBS performs the action in Step 2.

   b. If AUTOLOAD.SYS file is not found, the CVMDBS downloads the CC_IOP code from ROM. This enables communication between the CVMDBS and external tools. After the CC_IOP code is downloaded, the CVMDBS enters a **wait for download** state. The program code must now be downloaded manually via the Utility Port. Refer to the Section 4.3, entitled "CVMDBS Program Code Download Procedures".

2. The CVMDBS then searches for the BOOT.SYS file.

   a. If BOOT.SYS file is found, the CVMDBS performs the action in Step 4.

   b. If the BOOT.SYS file is not found, the CVMDBS looks for a backup BOOT.BAK file by performing the action in Step 3.

3. The CVMDBS searches for the BOOT.BAK file.

   a. If the BOOT.BAK file is found, the CVMDBS performs the action in Step 4 using the BOOT.BAK file as a BOOT.SYS file.

   b. If BOOT.BAK is not found, the CVMDBS downloads the CC_IOP code from ROM. This enables communications between the CVMDBS and external tools. After the CC_IOP code is downloaded, the CVMDBS enters a **wait for download** state. The program code must now be downloaded manually via the Utility Port. Refer to the Section 4.3, entitled "CVMDBS Program Code Download Procedures".

4. The CVMDBS searches for the *<software version>*.SYS file called out in the BOOT.SYS file.

   a. If the *<software version>*.SYS file is found, the CVMDBS performs the action in Step 5.

   b. If the *<software version>*.SYS file is not found, the CVMDBS downloads the CC_IOP code from ROM. This enables communications between the CVMDBS and external tools. After the CC_IOP code is downloaded, the CVMDBS enters a **wait for download** state. The program code must now be downloaded manually via the Utility Port. Refer to the Section 4.3, entitled "CVMDBS Program Code Download Procedures".

5. The CVMDBS searches for a file named <default cc>.dll (see Note below).

   a. If the <default cc>.dll file is found, the CVMDBS loads the program code from the CC Module's hard disk to RAM. The CVMDBS then performs the action in Step 6.

   b. If the <default cc>.dll file is not found or cannot be loaded successfully, the CVMDBS downloads the CC_IOP code from ROM. This enables communications between the CVMDBS and external tools. After the CC_IOP code is downloaded, the CVMDBS enters a **wait for download** state. The program code must now be downloaded manually via the Utility Port. Refer to the Section 4.3, entitled "CVMDBS Program Code Download Procedures".

NOTE

- It is not required that <default cc>.dll be the first **.dll** object specified, but <default cc>.dll overrides any other **.dll** object listed for the current address. If multiple <default cc>.dll files exist, only the first-specified is used.

- If a <default cc>.dll is found and downloaded successfully to the CC RAM, the CVMDBS loads the *<software version>*.SYS file name into the ROM-RAM communication block. This is used by the CC RAM to determine which version of code, or which *<software version>*.SYS file to use. The CC RAM code reads the *<software version>*.SYS file each time a module requests a download. If a module requesting a download is not listed, or covered in the *<software version>*.SYS file, a minor alarm is issued without disrupting normal operations.

6. If the SM.dll file is found, the CVMDBS loads the program code from the CC Module's hard disk to the CC RAM and subsequently to the MX RAM.

NOTE

When a new version of CVMDBS program code is released, the upgrade may not effect both the Control Computer (CC_F0xxx.DLL) and Modem/Transceiver (SM_F0xxx.DLL) program code files. For example, suppose the new CVMDBS software program version 2.21 is released and replaces the previous version 2.20. If the CC Module's program code did not change with this release but the M/X program code did change, the Software Release V2.21 module code update files would appear as:

CC_F0220.DLL (previous version)
SM_F0221.DLL (new version).

4.5 CVMDBS Configuration File on Disk Option

The CVMDBS Configuration File on Disk (CFD) option enables you to automatically download the CVMDBS configuration data stored in a file on the Control Computer's hard disk to RAM. This operation is activated by an CVMDBS reset (either a Hard Reset or Soft Reset), or a power failure recovery. The CVMDBS self-configuration operation is performed by the CC Module which is responsible for configuring the CVMDBS. The CFD option enables the CVMDBS to auto-configure without intervention from a Network Management System (NMS).

NOTE

- A Hard Reset command clears all data stored in the CC Module's RAM; this includes the CVMDBS program code and its configuration data. A Soft Reset command clears the configuration data only and maintains the CVMDBS program code.
- The CVMDBS has three external states that indicate configuration status: Unconfigured state indicates the CVMDBS program code is loaded but it is not configured to forward or receive CDPD traffic. On-Line and Off-Line states both indicate the CVMDBS is configured and operational.
- This feature does not permit dynamic changes to configuration file after it has been loaded onto the hard disk. When the CVMDBS CFD option is activated by a Hard Reset or Soft Reset, the CVMDBS configures itself based on the information in the configuration file at the time it was loaded onto the hard disk (not based on the CVMDBS memory resident configuration at the time of the reset).

To prepare the CVMDBS to run the CVMDBS Configuration File on Disk option, three files must be present on the CC Module's hard disk:

• AUTOCFG.SYS	Used as a semaphore to indicate the Configuration File on Disk option will be used. The file contents are ignored.
• MDBS_CFG.SYS	Contains the name of the Configuration file that will be used to auto-configure the CVMDBS after a reset.
• <Configuration File>	Contains the CVMDBS configuration data that is used to auto-configure the CVMDBS after a reset. This filename must conform to the DOS file naming convention as described in Section 4.5.2 entitled "Preparing the Hard Disk to Automatically Configure the CVMDBS."

4.5.1 Enabling and Disabling the Configuration File on Disk Feature

The Configuration File on Disk feature can be controlled by the using the MUP Tools "f_create" to create the AUTOCFG.SYS file and "f_del" to delete the AUTOCFG.SYS file.

4.5.2 Preparing the Hard Disk to Automatically Configure the CVMDBS

To prepare the CC Module's hard disk to automatically download program code, three files must reside on the CC Module's hard drive: AUTOCFG.SYS, MDBS_CFG.SYS, and *<configuration file>*.

Follow the procedure below to install and activate the CVMDBS Configuration File on Disk option.

1. Create the AUTOCFG.SYS file by using a standard text editor. The contents of the file are irrelevant; only the presence of the file is required. Figure 4-4 below shows an example AUTOCFG.SYS file.

```
#AUTOCFG.SYS file for Software Release Version 2.20
#End of AUTOCFG.SYS file
```

Figure 4-4. Example of AUTOCFG.SYS File

2. Create the MDBS_CFG.SYS file by using a standard text editor. The file must contain the *name of the configuration file* to be downloaded. Figure 4-5 shows an example MDBS_CFG.SYS file.

NOTE

The configuration file name must adhere to the following DOS file naming convention:

- Up to eight alphanumeric characters optionally followed by a period (".") and up to three additional alphanumeric characters. (Lower case letters are automatically converted to upper case.)
- Use of the underscore character ("_") is permitted.
- Embedded white space characters are not allowed.

```
#CVMDBS Configuration Version File for MDBS 2.20
#Date of creation:  August 22, 1998
#Created by John Baker
#
mdbs220.cfg #CVMDBS configuration file to be used
#
#End of CVMDBS Version Configuration File
```

Figure 4-5. Example of MDBS_CFG.SYS File

3. If required, power-on the CVMDBS (see Section 4.1, entitled "CVMDBS Power-On").

4. Check the current files on the hard disk by using MUP Tool "f_dir".

5. Remove any unwanted files using the MUP Tool "f_del".

6. Verify enough space is available on the hard disk by using the MUP Tool "f_dir".

NOTE
The configuration files can be as large as 20 Kbytes of disk space.

7. Use the MUP Tool "f_put" to transfer the AUTOCFG.SYS, MDBS_CFG.SYS, and <*configuration file*> files.

8. Verify all files are transferred by using the MUP Tool "f_dir".

9. To initialize the CVMDBS with the new configuration file, use the MUP Tools "reset 0 -Y" to issue a Hard Reset or "reset" to issue a Soft Reset. The new configuration data is downloaded automatically.

NOTE
A Hard Reset command clears all data stored in the CC Module's RAM; this includes the CVMDBS program code and its configuration data. A Soft Reset command clears the configuration data only and maintains the CVMDBS program code.

4.5.3 CVMDBS Auto-Configuration Process

After the CC Module hard disk is set up to support the CVMDBS Configuration File on Disk option, the sequence of events listed in Table 4-1 occur following any CVMDBS reset or a power failure recovery. If one of the events listed below fails to meet the validation criteria, an error is generated and the CVMDBS remains in an *unconfigured* state.

Table 4-1. Configuration File on Disk Download

Configuration File on Disk Download Process	*Corresponding Alarm Conditions that Cause the CVMDBS to Remain Unconfigured
1. CVMDBS software program looks at the Control Computer's hard disk for the AUTOCFG.SYS file.	• An AUTOCFG.SYS file is not found on the hard disk. Alarm Name: No AUTOCFG File on Disk
2. Once the AUTOCFG.SYS file is found, the CVMDBS continues to search the hard disk for the MDBS_CFG.SYS file.	• An MDBS_CFG.SYS file is not found on the hard disk. Alarm Name: No MDBS_CFG File on Disk • The MDBS_CFG.SYS file is found but does not adhere to the required file format as shown in Figure 2-5 or does not adhere to the DOS file naming convention as described in Section 4.2.2.2, Step 2, entitled: "Preparing the Hard Disk to Automatically Configure the CVMDBS." Alarm Name: MDBS_CFG File Format Failure
3. Once the MDBS_CFG.SYS file is found and the name is validated, the CVMDBS checks to see if it contains a valid *configuration filename.*	• The *configuration filename* is not found in the MDBS_CFG.SYS file. Alarm Name: Specified Configuration File Not on Disk
4. Once the Configuration filename is validated the CVMDBS validates the configurable *network attributes** (see Table 2-2); following validation the CVMDBS downloads the *network attributes** from the Control Computer Module's hard disk to memory resident RAM.	• The configurable *network attributes* failed to meet the parameter validation rules. Alarm Name: Network Provisioning Parameter Failure
5. Once the *network attributes* are down-loaded, the CVMDBS opens the Configuration file and validates the software revision level and the remaining *CVMDBS configurable attributes** (see Table 2-2). Following validation the CVMDBS downloads the *CVMDBS configurable attributes** from the Master Control Computer's hard disk to memory resident RAM.	• The Configuration File was built with an version number prior to Version 3.0. Alarm Name: Unacceptable Configuration File Revision Number • The configurable *CVMDBS attributes* failed to meet the parameter validation rules. Alarm Name: Full Configuration Failure

* Network attributes are those listed in Table 4-2, CVMDBS configurable attributes are all other configurable parameter.

Table 4-2. CVMDBS Configurable Network Attributes

Network Attribute*	Description	Defaults
Data Link Connection Identifier (DLCI)	Uniquely identifies the frame relay permanent virtual circuit (PVC) used between the CVMDBS and MD-IS	16
MDBS IP Address	CVMDBS's IP Address as it is seen by the Network Manager via the DS0 interface.	127.0.0.1
IP Subnet Mask	IP parameter that routes external packets; must be supplied by the CDPD network administrator.	255.255.255.0
Frame Relay Protocol	Type of MD-IS connected to the CVMDBS (ESI or RETIX).	0
DS0 Fault Detection	Turns ON and OFF the "DS0 Fault Detection" feature.	0
Frame Relay N1	Number of retries when changing from XON to XOFF and vice versa.	3
Frame Relay T1	Time between each N1 retry.	10
Frame Relay T2	Time between status messages for a given channel stream.	10
Frame Relay T3	Amount of time, when no data or flow control indication is received, before a channel stream goes out-of-service.	30
LMI Operational State	Activates the LMI protocol. Applicable only to MDLP over UDP.	0
LMI T391	Time between LMI heartbeat messages.	10
LMI N391	Polling cycle for full status messages.	6
LMI N392	Number of errors allowed in N393 events before LMI considers the DS0 link to the CVMDBS to be out-of-service.	3
LMI N393	Number of error-free consecutive events that must occur for the CVMDBS to DS0 connection to be considered in-service.	4
MDBS Utility Protocol Rx UDP Port Number	Constant Value is 16448 - do not change. This parameter allows the internal router to determine which software feature requires the message as transmitted from the MD-IS.	16448
MDBS Utility Protocol Tx UDP Port Number	Constant Value is 16448 - do not change. This parameter identifies the port number used by the task handling all utility interface commands at the MD-IS.	16448
SNMP Read Community String	When the SNMP Agent receives a get request, it compares the request's read authentication field to this parameter.	public
SNMP Write Community String	When the SNMP Agent receives a set request it compares the request's wrote authentication field to this parameter.	private
Trap List	Trap Managers' IP Addresses; this attribute will accept 0 through 12 entries.	N/A

* If the network port is not used, the CVMDBS Configurable Network Attributes should be left at their defaults

4.5.4 Configuration File on Hard Disk Completion

Before the configuration file (specified in MDBS_CFG.SYS) is written to RAM, the AUTOCFG.SYS file is deleted from the CC Module's hard disk. This prevents a looping condition whereby the CVMDBS experiences a reset during the self-configuration process. When the self-configuration operation successfully completes, all configurables are written to the CC Module's RAM, and the AUTOCFG.SYS file is re-created on the CC Module's hard disk.

The CVMDBS then attempts to enable the Channel Streams and transitions to an *on-line* or *off-line* state.

5. OPERATION NOTES

5.1 Chassis Grounding

The CVMDBS unit provides an external ground point to tie the CVMDBS to earth ground. A ground hole and 10-32 screw are located in the rear of the CVMDBS.

5.2 Power Circuit Breaker

The CVMDBS unit provides a circuit breaker as a means of power control (on / off) and power safety (current draw).

> **NOTE**
> The circuit breaker is rated at 10 Amps @ 115 VAC.

5.3 Thermal Cutoff Switch

The CVMDBS unit provides automatic shutdown when the internal operating temperature is in the range of 60°C.

1. The thermal switch is self-resetting when the temperature drops below a nominal temperature of 55°C.

5.4 Clock Reference

For CVMDBS frequency synthesis, the CVMDBS unit uses the internal clock reference Ovenized Crystal Oscillator (OCXO).

1. The OCXO provides a stable clock signal to all clocks residing within the CC Module and to the backplane.
2. In turn, the backplane clock provides a clock source for the MX Module.

The CC Module phase-locks all clocks to the Clock Reference. The CC Module's 15.36 MHz master clock locks onto the clock source within two minutes from power-on or reset, at which time the CC Module indicates *master lock* to the MX Module.

> **NOTE**
> A warm-up time must be satisfied before the CC Module indicates *master lock* to the MX Module (see "OCXO Warm-Up Period" below).

5.4.1 OCXO Warm-Up Period

The CVMDBS unit requires that the OCXO warm-up period be met before the CC Module can indicate master lock to the MX Modules. The OCXO warm-up period within the configuration file should be set to 20 minutes to ensure the OCXO reaches its specified accuracy.

1. The OCXO accuracy requirement is ± 0.01 ppm.
2. The MX Module software frequency-tracking-loop ensures that the TCVCXO tracks the backplane clock. The MX TCVCXO frequency locks to the backplane clock providing transmitter stability to ±0.02 ppm over the operating temperature range. (Provided that the OCXO accuracy is ± 0.01 ppm).
3. The RF output signal stability is a function of the MX TCVCXO reference stability. The MX Module synthesizer generates 851 to 869 MHz Local Oscillator frequencies for the TX and RX modules by using a VCO that is frequency and phase-locked to the MX TCVCXO master clock reference.

If desired, the transmit output on time can be shortened to two minutes by bypassing the warm-up period in the configuration file. (The system default bypasses the warm-up period). In this situation, the transmit output accuracy will not be within specification limits until 20 minutes have passed.