System Manual

EDACS® Jessica
PBX Gateway

ERICSSON

NOTICE!

This manual covers Ericsson and General Electric products manufactured and sold by Ericsson Inc.

NOTICE!

Repairs to this equipment should be made only by an authorized service technician or facility designated by the supplier. Any repairs, alterations or substitution of recommended parts made by the user to this equipment not approved by the manufacturer could void the user's authority to operate the equipment in addition to the manufacturer's warranty.

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1. OVERVIEW

This manual contains installation and maintenance information for the Enhanced Digital Access Communications System (EDACS) Jessica Private Branch Exchange (PBX) Gateway, known simply as Jessica. Jessica works as a centralized subsystem within an EDACS Multisite Network to allow interconnect calls to the Public Switched Telephone Network (PSTN) or PBX by EDACS users, as well as calls to EDACS users from the PSTN/PBX. For calls originating from a telephone, Jessica represents a single point of entry to every site in an EDACS network.

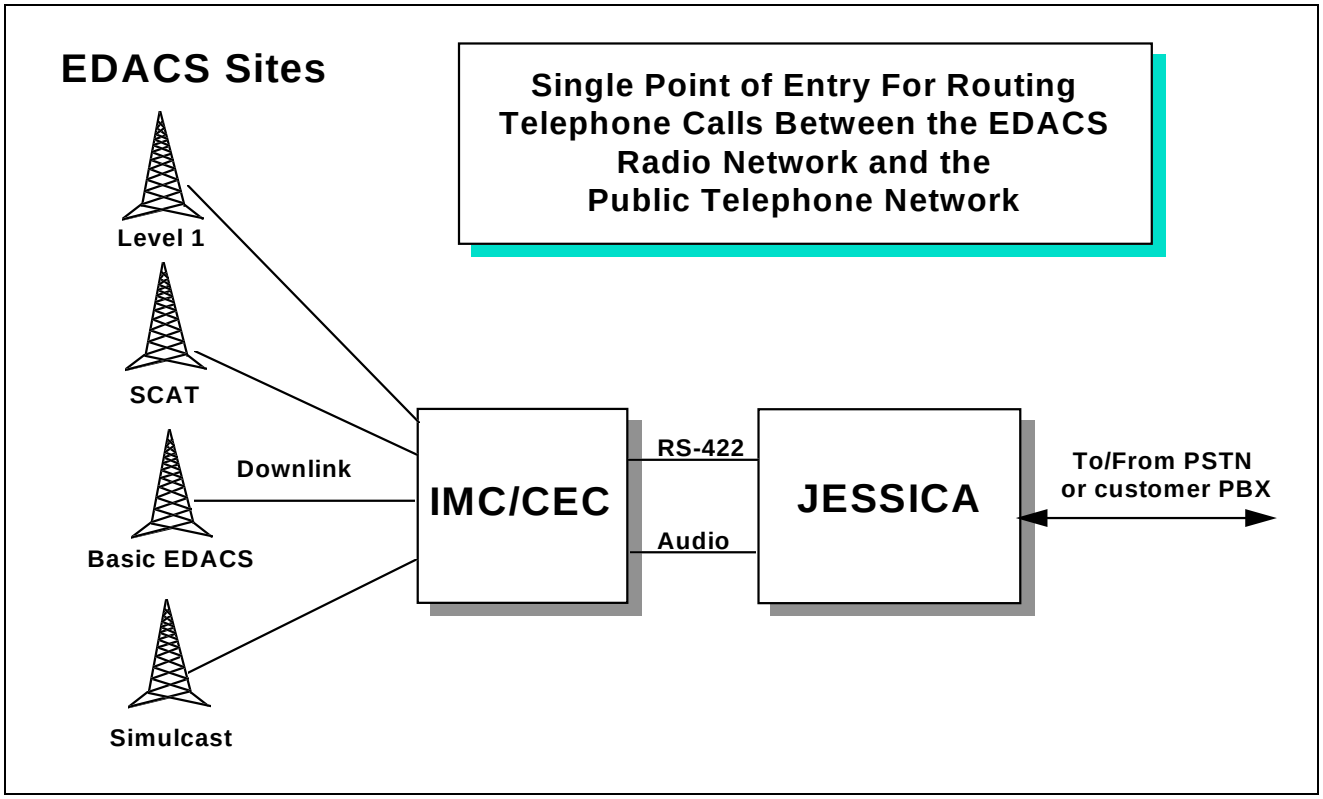


Figure 1 - Jessica PBX Gateway Functionality

Jessica incorporates the Ericsson MD110 PBX. A default or "standard" configuration for the MD110 tailored for Jessica is provided; however, those installing Jessica must modify the MD110 configuration to meet the customer-specific MD110 requirements. A questionnaire on the MD110 configuration (refer to Appendix A of LBI-39039) should be completed by the customer and provided to the installer of the MD110 minimally 2 weeks in advance of the MD110 installation.

Jessica provides common telephone features (such as common speed dialing) to EDACS radio users and those persons calling into EDACS from the PSTN. Standard ringing and busy tones are incorporated on both inbound (telephone-originated) and outbound (radio-originated) calls.

The Jessica subsystem is shown below.

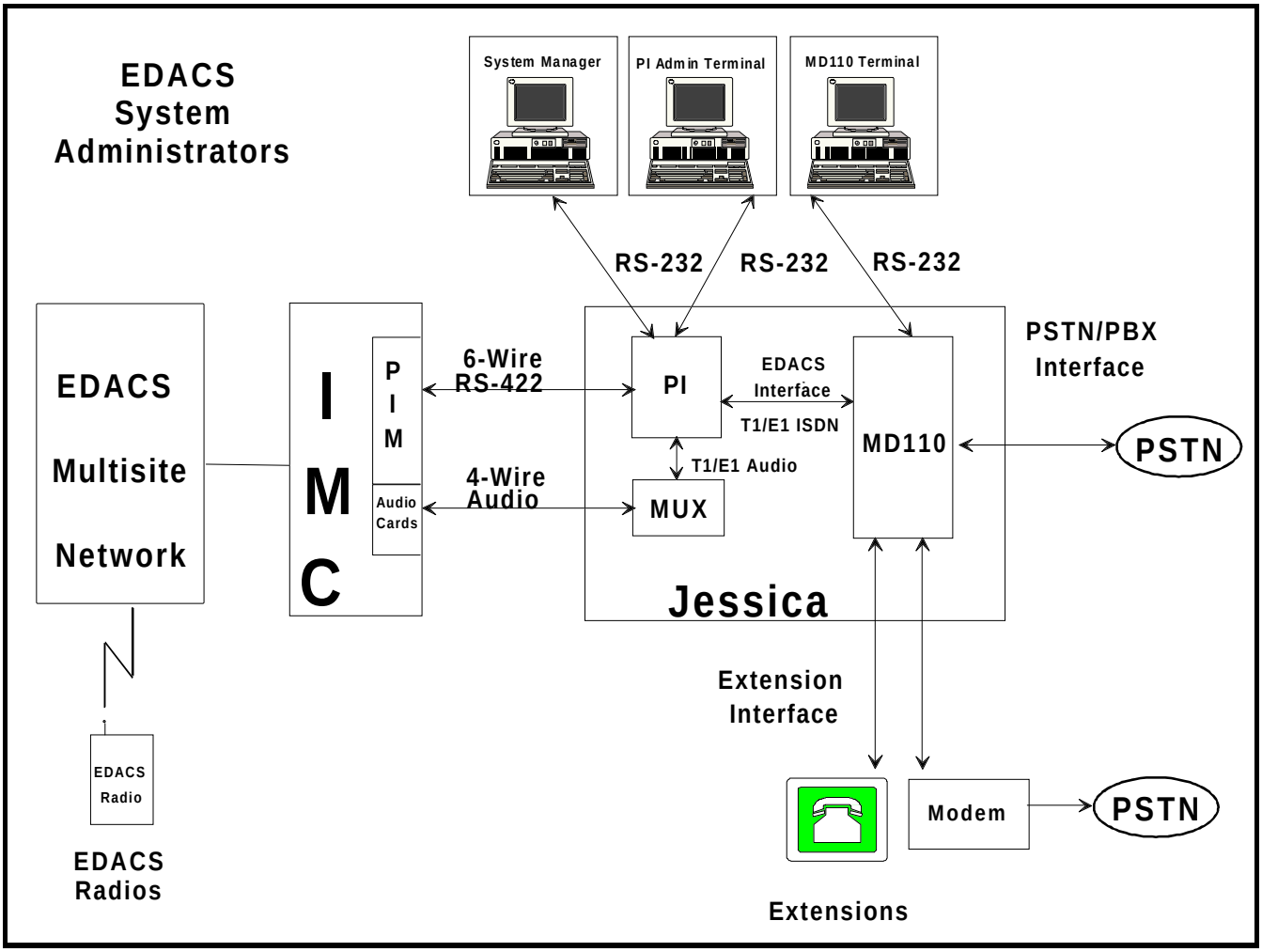


Figure 2 - Block Diagram of Jessica

This manual includes instructions for installing Jessica around the world, so it will contain references to both T1 and E1 (digital multiplexed interface standard) installation procedures. In some places the notation 23/30 is used; the 23 indicates the number of T1 voice channels and the 30 indicates the number of E1 voice channels. The configuration and installation of the MD110 are covered in the Ericsson documentation shown in the list that follows (documents with the BC number). A section on configuring the MD110 is provided in LBI-39039, and a sample configuration disk is also supplied. Jessica is not a local interconnect system associated with EDACS single-site systems. For information on local interconnect, refer to LBI-38513.

The manuals listed below are referenced throughout this document. Some provide additional background information and others may be useful for solving technical difficulties.

- LBI-38703, System Manager Installation, Setup and Troubleshooting
- LBI-38894, GETC Maintenance Manual
- LBI-38938, CEC/IMC Installation, Set-up and Troubleshooting
- LBI-38939, CEC/IMC Customer-Specific System Documentation Overview
- LBI-38984, System Manager User's Manual
- LBI-38985, EDACS Site Controller Maintenance Manual
- LBI-39001, EDACS Jessica PBX Gateway Operator's Manual
- LBI-39039, EDACS Jessica PBX Gateway MD110 Configuration Manual
- LBI-39040, EDACS Jessica PBX Gateway PBX Interface User's Manual
- LZTU 106 1250, MD110 Technical Product Description, BC6
- LZBU 106 100, MD110 Customer Library -- Small Basic, BC 6
- EN/LZB 103 866, Installation MD110/50
- 62.6929.000.00, Equipment System PCM 30 FXM (ANT BOSCH MUX Manual)
- NECA 365-454-000, Equipment Manual for ND4 Enhanced Digital Channel Bank Equipment

This manual presents system installation and maintenance information for the Jessica PBX Gateway. Section 2 describes the Jessica components, and section 3 covers the processes that occur when a telephone call is placed. Section 4 presents features of the system and section 5 discusses EDACS software and hardware requirements for Jessica. Section 6 covers configuration considerations and preparations that must be completed prior to installing the Jessica equipment. Section 7 details the configuration, installation, and verification procedures to be performed when installing or adding Jessica to the EDACS Multisite Radio Network. Section 8 presents various methods for troubleshooting technical difficulties. Section 9 contains a glossary of terms. Appendix A contains documentation on internal cable connections. Appendix B provides a condensed listing of information applicable to the T1 Multiplexer. Appendix C includes spare parts information for the PBX Interface, Multiplexer, and MD110. Appendix D has a LAN Network Survey that should be completed before Jessica is installed if network connectivity is desired. Appendix E presents information on integrating the functions of the PI administrative terminal and the MD110 configuration terminal into one management station. Appendix F contains drawings for maintenance and reference purposes.

2. COMPONENTS

The primary components of Jessica are as follows:

- PBX Interface (PI)
  - VMEbus architecture
  - PI Controller (PIC) provides interconnect call management
  - Multisite Interface Controller (MIC) HDLC link to IMC Controller card
  - Primary Rate Interface (PRI) T1/E1 audio to ISDN primary rate interface translation
- MUX Channel Bank
  - Combines 4-wire audio into single digitized audio stream
  - Either T1 (23 audio channels) or E1 (30 audio channels) multiplexer
- Ericsson MD110 Private Branch Exchange (PBX)
  - Jessica external interface to PSTN or another PBX
  - Provides full PBX functionality
  - Supports a variety of both analog and digital trunk terminations
- IMC PBX Interface Module (PIM)
  - Provides EDACS audio path and control signaling interface to Jessica
  - 1 controller card and up to 8 audio cards (4 channels per card)

Jessica system architecture is shown below.

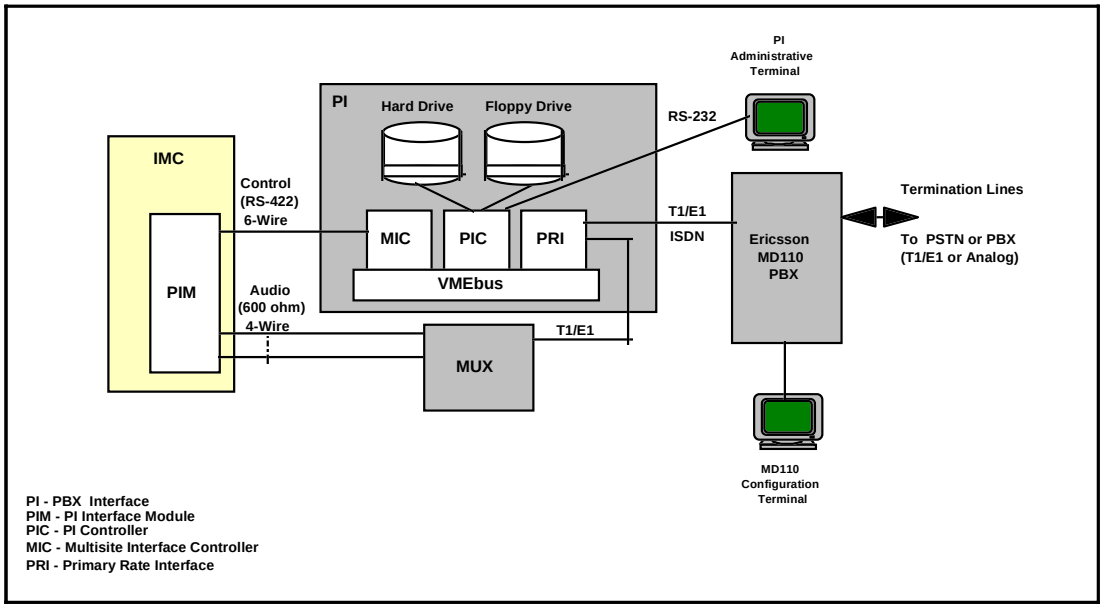


Figure 3 - Jessica System Architecture

2.1. PBX INTERFACE (PI)

The PI provides the interface between the IMC and the MD110. It is responsible for telephone interconnect call management. The PI has a VMEbus architecture that includes three primary boards and the miscellaneous equipment below.

- PI Controller (PIC) Board -- a single-board computer that utilizes a CISC 32-bit microprocessor. The PIC is responsible for processing all interconnect calls. It also controls the interfaces to the floppy and hard drives through a small computer systems interface (SCSI) port.
- PI Multisite Interface Controller (MIC) Board -- a wide-area network (WAN) server board that provides a high-level data link control (HDLC) link to the PIM controller board within the IMC.
- Primary Rate Interface (PRI) Board -- provides the E1/T1 ISDN interface to the MD110 as well as the E1/T1 audio interface to the IMC/MUX. If a T1 link is specified, a PRI-48 is used. If an E1 link is specified, a PRI-64 is used.
- Hard Drive -- drive used for storing the application code, configuration parameters, and call activity.
- Floppy Drive -- a 1.44 Mbyte, 3-1/2" drive for configuration parameter updates and application code upgrades.
- VT100 administrative field terminal -- used to manipulate files on the PI via a pSOS (UNIX-like shell) terminal interface running on the PIC.

NOTE

The functions of the PI administrative terminal and the MD110 configuration terminal may be combined into one management station. One management station does not imply that there will be an integrated PI/MD110 entity manageable from the Network Manager. Please see Appendix E for more information on integrating the management station.

Please refer to LBI-39040, EDACS Jessica PBX Gateway PBX Interface User's Manual, for a detailed description of the PI components.

2.1.1. Mechanical Package

The horizontally oriented VME chassis occupies 4 rack units (RU).

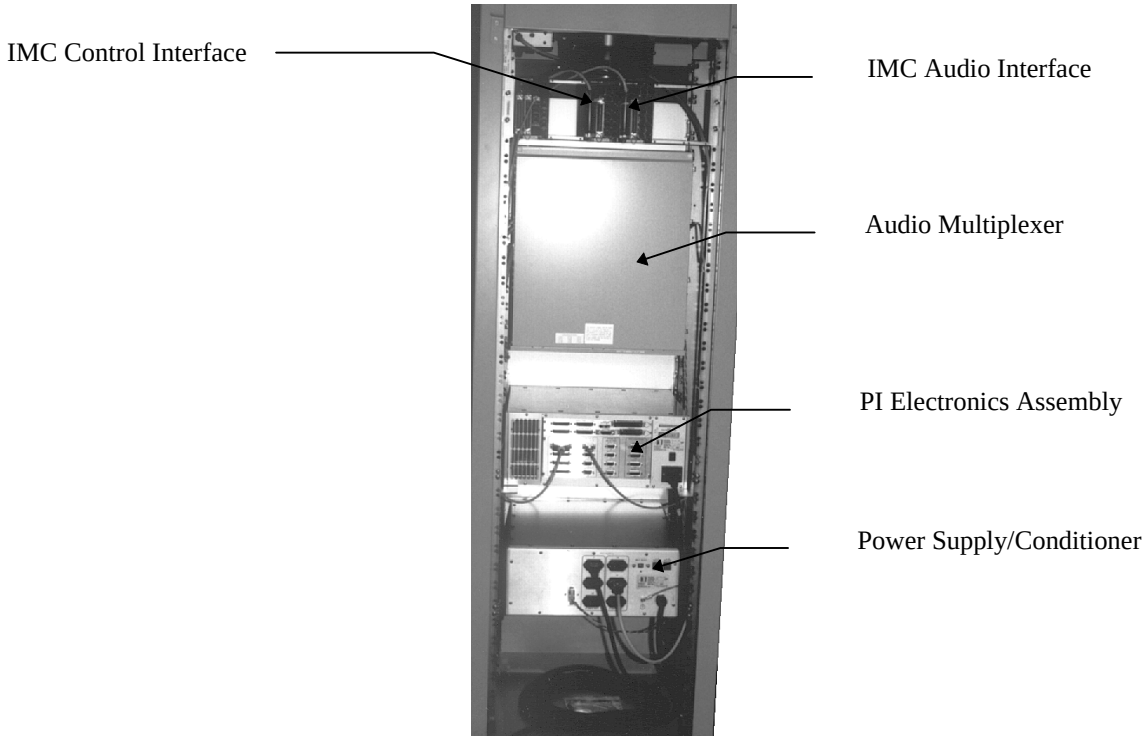


Figure 4 - Rear View of the PI/MUX Cabinet

2.1.2. Hardware Specifications

General Specifications

Interface Types	Centronics parallel printer interface RS-232 serial interface supporting VT100 type terminals
Drives	245 or 290 Mbyte Maxtor fixed disk drive with SCSI 1.44 Mbyte, 3.5" removable diskette DOS drive with SCSI
FCC Regulations	Conforms to FCC Rules Part 15 Class A and EN 55022 Class B

Power Supply

Input Voltage (Autosensing)	90-132 VAC, 47-63 Hz 180-264 VAC, 47- 63 Hz
Over Voltage Protection	120 to 130% of nominal output on all channels
Reverse Voltage Protection	
Short Circuit Protection	
Thermal Protection	
Status Indicators	AC "POWER ON" indicator
Duty Cycle	
Redundancy	None

Status Inputs and Outputs

Board LEDs	
General Purpose CPU	FAIL, STATUS, RUN, and SCON
MIC	RUN, FAIL, and STATUS
PRI-48	RUN, FAIL, TRUNK A alarm, and Trunk B alarm
PRI-64	RUN, FAIL, TRUNK A alarm, Trunk B alarm, and 7-Segment Self-Test Display
Drive LEDs	Disk activity lamps on both drives
Fan LED	12 VDC power indicator lamp
Remote Reset Input Connector	Shorting two pins forces a system RESET

Environmental

The operating environment must be free of corrosives or contaminants such as salt water or excessive dust. The following environmental specifications should be met:

Temperature	
Operating	0 to +40°C
Non-Operating	-20 to 85°C
Humidity	20 to 90% noncondensing (except for removable diskette drive)
Storage Temperature	-40 to +85°C
Operating Altitude	< 15,000'
Shipping Altitude	< 50,000'

Diagnostics

Error Detection	Run-time errors logged in a file for viewing or printing
System Configuration	Configuration files can be viewed from the VT100 terminal interface using ***config -f***
Controlled Shutdown	Using the ***shutdn*** command, the system operator can produce a graceful system shutdown so that calls in progress are completed.

2.2. AUDIO MULTIPLEXER

The Multiplexer (MUX), also called a Channel Bank, is used to combine 4-wire balanced audio inputs from the IMC into a single digitized stream. In North America, Japan, and Korea, the standard is a T1 multiplexer, and in Europe, Asia, and South America the standard is an E1 multiplexer.

A single T1 allows up to 23 voice circuits to be multiplexed together. A single E1 allows up to 30 voice circuits to be multiplexed together. Each voice circuit has its own channel unit within the MUX.

2.2.1. T1 MUX Specifications

The NEC MUX is used for T1 applications. Its specifications are as follows:

T1 - 23 B+D		
Configured w/ 4...23 cards*		
Mechanical Construction		
	19.2" x 19" x 12"	
Weight		
	<59.6 lb	
Power Requirements		
	Voltage	-44 to -56V DC (-48V nominal)
	Power Consumption	34W (0.7A)
Environmental Requirements		
	Temperature	4.4 to 38°C
	Humidity	20 to 55% (without condensations)
*Must have card for each audio line		

2.2.2. E1 MUX Specifications

The ANT BOSCH MUX is used for E1 applications. Its specifications are shown below.

E1 - 30 B+D		
Configured w/ 4...30 cards*		
Mechanical Construction		
	10.51" x 19" x 12.2"	
Weight		
	<26.4 lb	
Power Requirements		
	Voltage	-19 to -75V
	Power Consumption	23W
Environmental Requirements		
	Temperature	5 to 40°C
*Must have card for each audio line		

2.3. POWER DISTRIBUTION UNIT AND -48V POWER SUPPLY

Power Distribution Unit Specifications

The Power Distribution Unit (PDU) operates within the same environmental specifications as shown for the PI. The operating environment must be free of corrosives or contaminants such as salt water or excessive dust. The following environmental specifications should be met:

Temperature	
Operating	0 to +40°C
Non-Operating	-20 to 85°C
Humidity	20 to 90% noncondensing (except for removable diskette drive)
Storage Temperature	-40 to +85°C
Operating Altitude	< 15,000'
Shipping Altitude	< 50,000'

-48V Power Supply Specifications

Specifications for the -48V power supply are shown below.

AC Input	100/120/220/240 VAC +10%, -13%, 47 to 63 Hz Tolerance for 230 VAC operation is +15%, -10% Derate output current is 10% for 50 Hz operation
DC Output	-48 VDC, adjustment range is ±5% minimum
Line Regulation	±0.05% for a 10% change
Load Regulation	±0.05% for a 50% load change
Output Ripple	3mV +0.05% of output voltage, peak-to-peak maximum, all "3-terminal regulator" outputs: 3mV +0.2% peak-to-peak maximum
Short Circuit Protection	Automatic current limit/foldback
Temperature Rating	0°C full rated, derated linearly to 40% at 70°C

2.4. PI/MUX CABINET

Specifications for the PI/MUX cabinet are shown below.

Height:	69-1/6”
Width:	24”
Depth:	24”
Weight:	~350 lb

PI Cabinet Rack Units (RU):	PI	4 RU		4RU
	T1 MUX	11 RU	or E1 MUX	6 RU
	Power Supply	4 RU		4RU
		19 RU	or	13 RU

2.5. MD110 LIM

The MD110 is an Ericsson Private Branch Exchange (PBX). Its primary building block is the line interface module (LIM). The LIM performs all call processing functions. One LIM interfaces to the PI and either the Public Switched Telephone Network (PSTN) or another PBX. It contains two to four primary switching cards which connect to a common backplane. The backplane includes a processor bus and a device bus. The processor bus carries control data between the device processors on the individual boards. The device bus carries voice or data to and from device boards.

In addition to the LIM, the standard MD110 has an alarm unit, an Ericsson dial-back modem for remote configuration, a two-hour battery back-up, and up to eight on-premises extensions that allow a telephone to be directly connected to the MD110 for testing purposes. A 386 PC for configuring the MD110 is optional.

The MD110 also has one or more termination lines to the PSTN or another PBX. All types of digital and analog trunks and tie lines are available based on customer needs. In addition, the MD110 always has one digital ISDN T1 or E1 trunk for connecting to the PI.

The MD110 system requires specific environmental conditions to ensure proper operation. The MD110 should not be installed in a location where water sprinklers are present. As an alternative, Halon is the recommended fire protection system. If static electricity is generated by the floor covering, the floor should be covered with suitable antistatic material to reduce the risk of disturbances to the MD110.

The following normal operating and storage limits must be maintained to ensure proper MD110 operation:

Temperature range:	41 to 104°F (5 to 40°C)
Recommended state:	72 ± 2°F (22.2 ± 1.1°C)
Relative humidity range:	20 to 80%
Recommended state:	50 ± 10%

Before power is applied to an MD110 system, the equipment and the ambient room temperature/humidity must be stable within the operating ranges. Measurements should be taken at least 60 inches above the floor and at least 20 inches from any heat dissipating object. Typical heat dissipation for MD110 cabinets is 300W. This value recognizes that some of the power supplied to the system rectifiers is actually dissipated over cabling and external station equipment.

The type of air filtration required for proper operation depends upon the dust and other particulate matter concentrated in the equipment room. In a high particle-count atmosphere, use of a prefilter and a main filter in the room ventilation intake is required. If salt air, corrosive gases, or other degrading pollutants are present, special filtering is required. Air in the equipment room should circulate to prevent hot spots and to exhaust heated air. To be safe, circulation equipment should change the equipment room air every 5 minutes. The circulating air should contain from 5 to 25% filtered fresh air.

Dimensions of MD110 equipment cabinets are as follows:

Height:	62.1"
Width:	27.1"
Depth:	13.4"

Floor loading is based on a 36-inch deep aisle working space in front of each cabinet and is derived from total cabinet weight. The maximum weight of a fully loaded LIM cabinet is 440 lb. The cabinet floor loading for MD110/50 cabinets is approximately 47.3 lb/sq ft.

2.6. PBX INTERFACE MODULE (PIM)

Within the IMC, a PBX Interface Module (PIM) handles signaling and audio for Jessica. The PBX Interface Module controller card can control up to eight audio cards.

3. OPERATION

Telephone interconnect calls can be initiated from an EDACS radio or from a telephone. This section describes the processes that occur when a telephone call is placed. How a call is processed depends on whether or not B-answer supervision is provided on the telephone lines coming into the MD110 from the PSTN or customer PBX.

3.1. RADIO-ORIGINATED (OUTBOUND) CALLS

Outbound call setup is covered in Figure 5 for an MD110 configured with B-answer and Figure 6 for an MD110 not configured for B-answer. The operation difference between MD110s with respect to B-answer is displayed in the table below.

With B-Answer	Without B-Answer
The MD110 sends alerting to the PI. The PI requests the IMC to generate ringing tones that are sent to the initiating radio.	The MD110 generates its own connect to the PI and the user listens to network ringing, rather than IMC-generated ringing tones.

When the telephone is answered, the PSTN indicates to the MD110, which then indicates to the PI, that the party being called has answered. The connection is now established between the originating radio and the telephone terminal, and the conversation proceeds.

Either the telephone user or the radio user can terminate the call. If the telephone user hangs up first, the PSTN notifies the MD110, which indicates to the Jessica PI that the telephone party has disconnected. The PI sends a drop message to the IMC, and the message is passed to the site where the radio has been assigned a channel.

Alternately, the radio user can terminate a call by pressing the SPC or Clear key. In this case, EDACS sends the call drop message to the IMC, which passes the drop message to the Jessica PI. On receiving the drop message, the PI disconnects the telephone call connection to the MD110.

3.2. TELEPHONE-ORIGINATED (INBOUND) CALLS

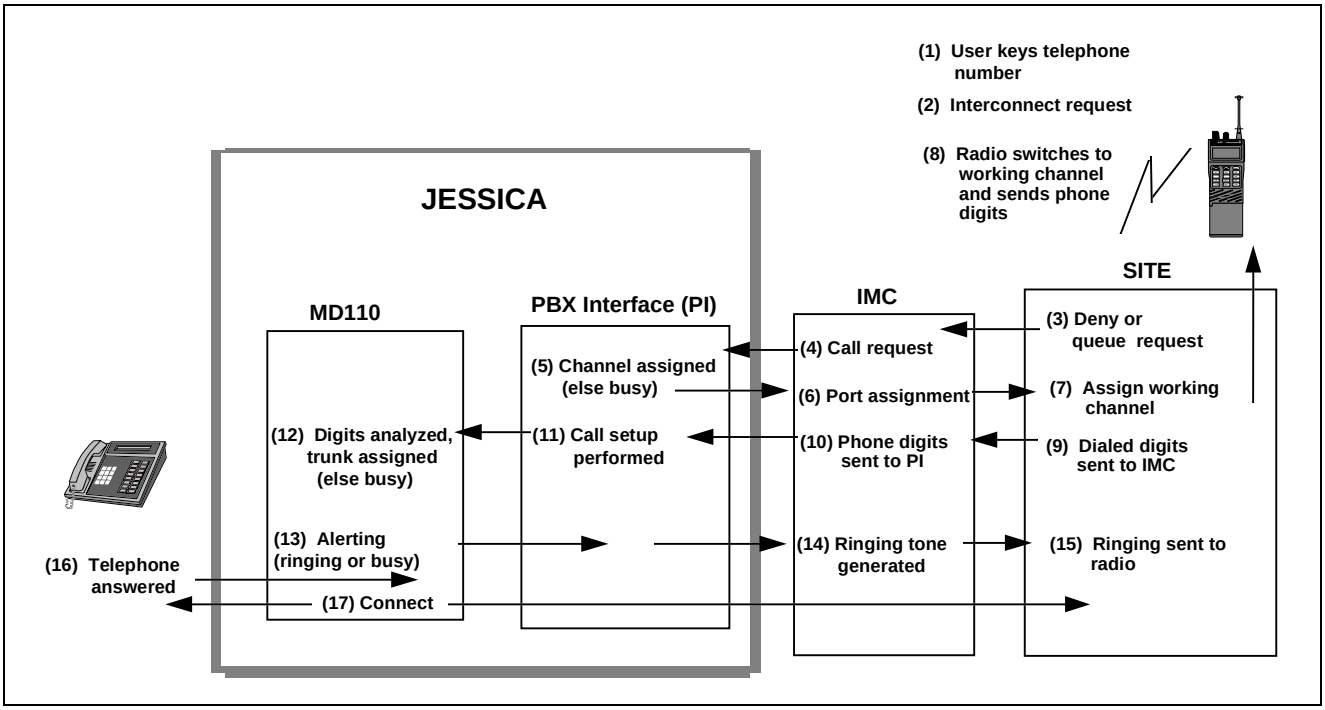
Inbound call setup is covered in Figure 7. The EDACS number plan is listed below and contains the actual digits entered at the MD110.

Table 1 - EDACS Number Plan

00001-16382	LID (individual call)	
20000-22047	GID (group call)	"2" prefix indicates GID
300001-316382	Digital LID (individual call)	"3" prefix indicates digital
320000-322047	Digital GID (group call)	"3" prefix indicates digital "2" prefix indicates GID

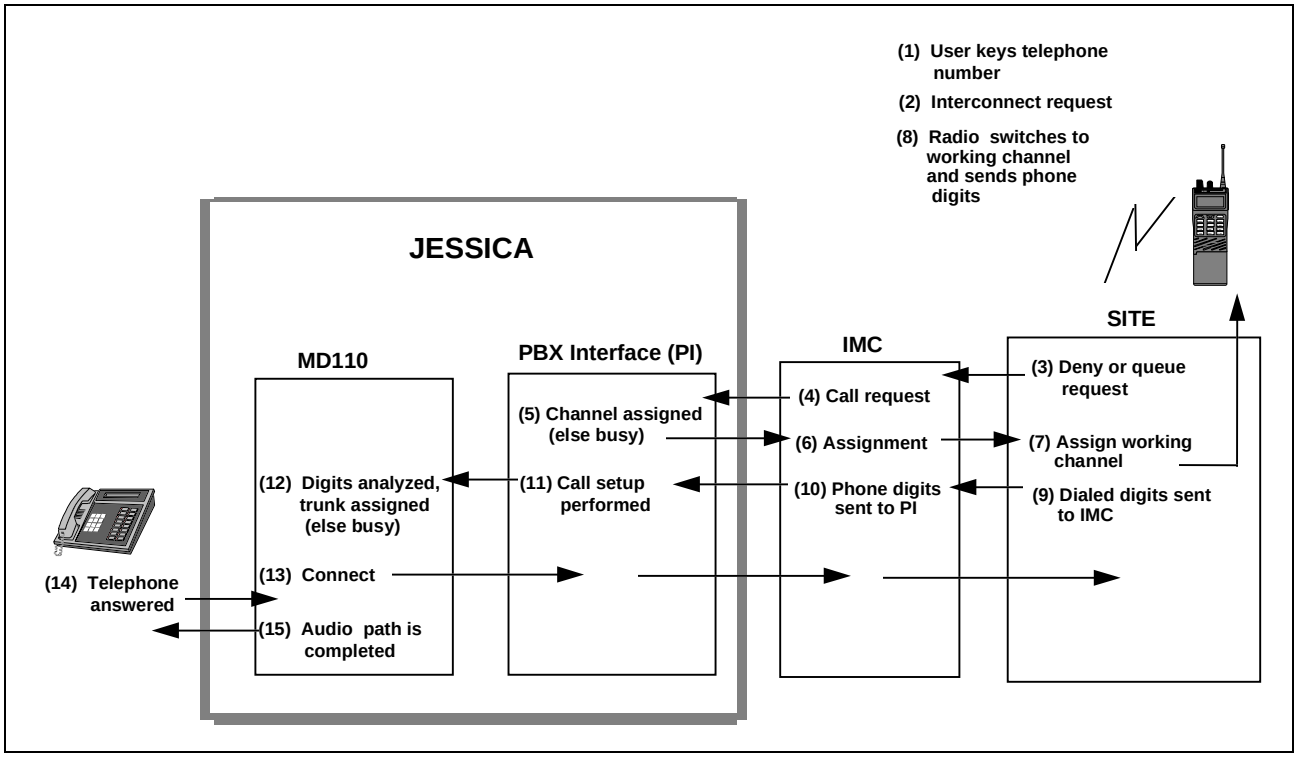
A LID has 5 digits (xxxxx), a GID has the number “2” + 4 digits (2 + xxxx), and a digital call has the number “3” + 5 digits (3 + xxxxx).

The call termination is identical to the process described for radio-originated calls.



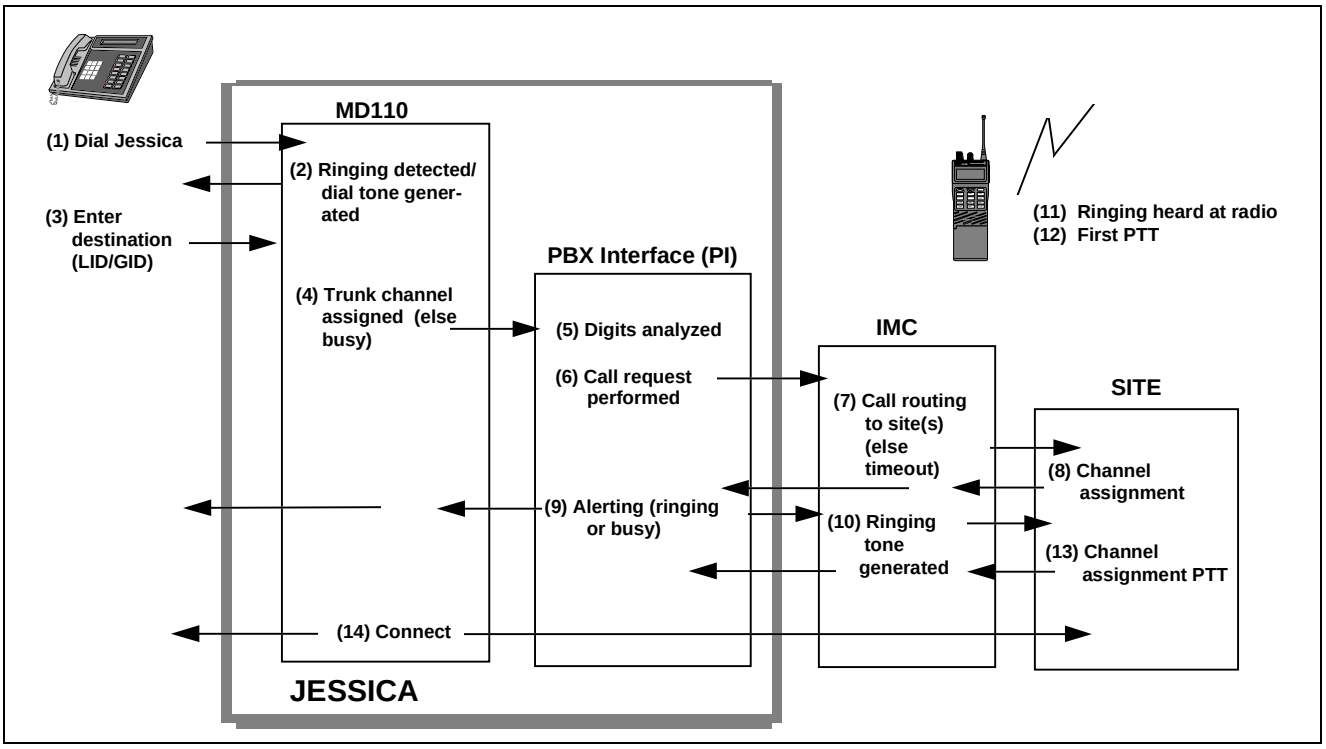
1. Radio user enters a telephone number then briefly presses the push-to-talk (PTT) button.
2. A telephone interconnect request is sent to the site on the control channel.
3. The site denies or queues the request in the trunked system.
4. The IMC sends a call request to the Jessica PI.
5. The PI assigns a line between itself and the IMC.
6. The IMC assigns a port to the call.
7. The site sends the working channel assignment to the radio over the control channel.
8. The radio switches to the working channel and sends the telephone digits over the working channel.
9. The site sends the phone digits to the IMC.
10. The IMC sends the phone digits to the PI.
11. The PI analyzes the call request and phone digits then requests a trunk line between itself and the MD110.
12. The MD110 analyzes the digits and routes the call to the PSTN or customer-owned PBX.
13. If the MD110 is set up for B-answer, it sends alerting to the PI, and the PI sends a ringing request to the IMC.
14. Ringing tone is generated at the IMC.
15. The site sends the ringing to the radio.
16. The telephone is answered and an off-hook is received by the MD110.
17. The audio path is enabled in the MD110, PI, and IMC and the call proceeds.

Figure 5 - Radio-Originated Jessica Call (Outbound, With B-Answer)



1. Radio user enters a telephone number then briefly presses the push-to-talk (PTT) button.
2. A telephone interconnect request is sent to the site on the control channel.
3. The site denies or queues the request in the trunked system.
4. The IMC sends a call request to the Jessica PI.
5. The PI assigns a line between itself and the IMC.
6. The IMC assigns a port to the call.
7. The site sends the working channel assignment to the radio over the control channel.
8. The radio switches to the working channel and sends the telephone digits over the working channel.
9. The site sends the phone digits to the IMC.
10. The IMC sends the phone digits to the PI.
11. The PI analyzes the call request and phone digits then requests a trunk line between itself and the MD110.
12. The MD110 analyzes the digits and routes the call to the PSTN or customer-owned PBX.
13. If the MD110 is not set up for B-answer, the MD110 generates its own connect to the PI, the audio path is enabled, and the radio user listens to network ringing, rather than IMC-generated ringing tones.
14. The telephone is answered and an off-hook is received by the MD110.
15. The audio path is completed and the call proceeds.

Figure 6 - Radio-Originated Jessica Call (Outbound, Without B-Answer)



1. Telephone user dials one of the Jessica telephone numbers.
2. The Jessica MD110 receives the call and sends dial tone back to the telephone.
3. The telephone user enters the logical ID (LID) or group ID (GID) of the radio(s) being called. See the EDACS number plan in Table 1. Note: The MD110 may require routing codes before the LID is entered.
4. The MD110 receives the dialed digits and assigns a trunk line to the PI.
5. The PI analyzes the 5 or 6 digits to determine the call type and whether it needs to strip off any numbers. See the EDACS number plan in Table 1.
6. The PI sends a call request to the IMC.
7. The IMC identifies the site or sites that the individual or group members are logged on to and initiates a working channel assignment at those sites.
8. Using the control channel, the site directs the radio(s) to the assigned working channel and the channel confirmation is passed back to the PI via the IMC.
9. The PI generates alerting to the IMC and MD110.
10. When the IMC receives alerting, it generates ringing which is sent to the radio(s) of the LID or GID being called.
11. The radio starts to ring.
12. A radio users responds by depressing the push-to-talk (PTT) button.
13. The channel assignment PTT is received by the site and sent to the IMC and the PI.
14. The audio path is enabled in the IMC, PI, and MD110, and the call proceeds.

Figure 7 - Telephone-Originated Jessica Call (Inbound)

4. FEATURES

The features of Jessica can be grouped into two classes: system features and radio user features. A list of the features in each class is given below.

System Features

- Basic centralized telephone interconnect, with inbound and outbound calls supported.
- Up to 30 simultaneous calls for European, Asian, and South American systems with a digital E1 link. Up to 23 simultaneous calls for North American, Japanese, and Korean systems with a digital T1 link.
- Encrypted voice calls.
- Full duplex telephone calls.
- MD110 allowance of multiple interfaces to the PSTN/PBX.
- Automatic line clearing.
- Authorization code disable for inbound calls (optional).
- Activity Reports showing operational PI call activity. These reports are recorded to disk and can be redirected to debug port 2 of the PI. Since flow control is not possible on the debug port, information will be dropped if the PI's port 2 buffer fills up.
- Remote debug/code upgrades over LAN connection.
- LAN Connectivity -- FTP, NFS, and Telnet can be used to access the PI activity reports and configuration information.
- Direct inward dialing (DID).
- Common speed dialing (MD110 feature).
- Least-cost routing (LCR).
- Optional Voice Mail.
- System Manager Interface (individual call restrictions, no site activity monitor).
- Priority Service Channels (dedicated lines/priority lines).
- Site-Based Call Routing: Call routing based on originating site.
- Rotating/First Available PI-IMC channel assignment.
- Caller ID on outbound calls.

Radio User Features

- Call Forwarding (Busy/No Answer).
- Last Number Redial.
- Do Not Disturb on inbound calls.

Jessica supports:

- Full 16382 EDACS Users (1...16382)
- Full 2048 EDACS Groups (0...2047)
- Failsoft and Site Controller modes
- Up to 30 simultaneous conversations (23 maximum in North America, Japan, and Korea)

Jessica is purchased as: 4,8,12,...,23-channel T1
or
4,.....,28,30-channel E1

An example Jessica system, including the new System Manager Interface and Voice Mail System, is shown below.

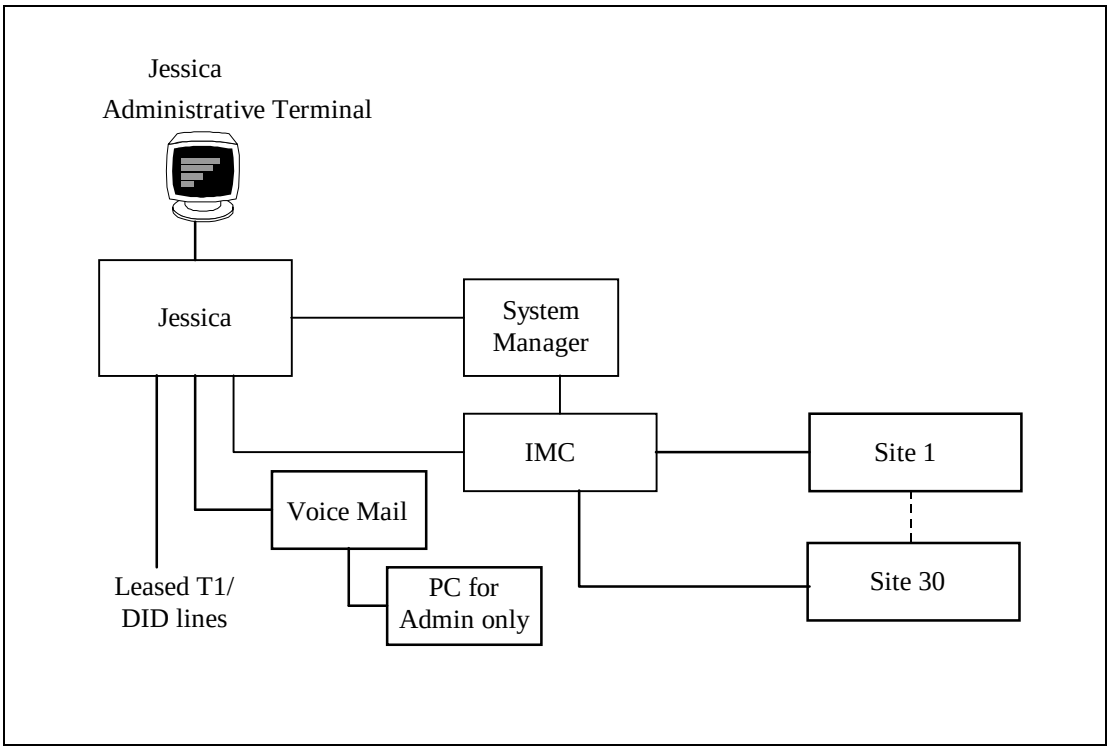


Figure 8 - Jessica with System Manager Interface and Voice Mail System

4.1. MULTINODE JESSICA SYSTEM

An example of a multinode Jessica System is shown below.

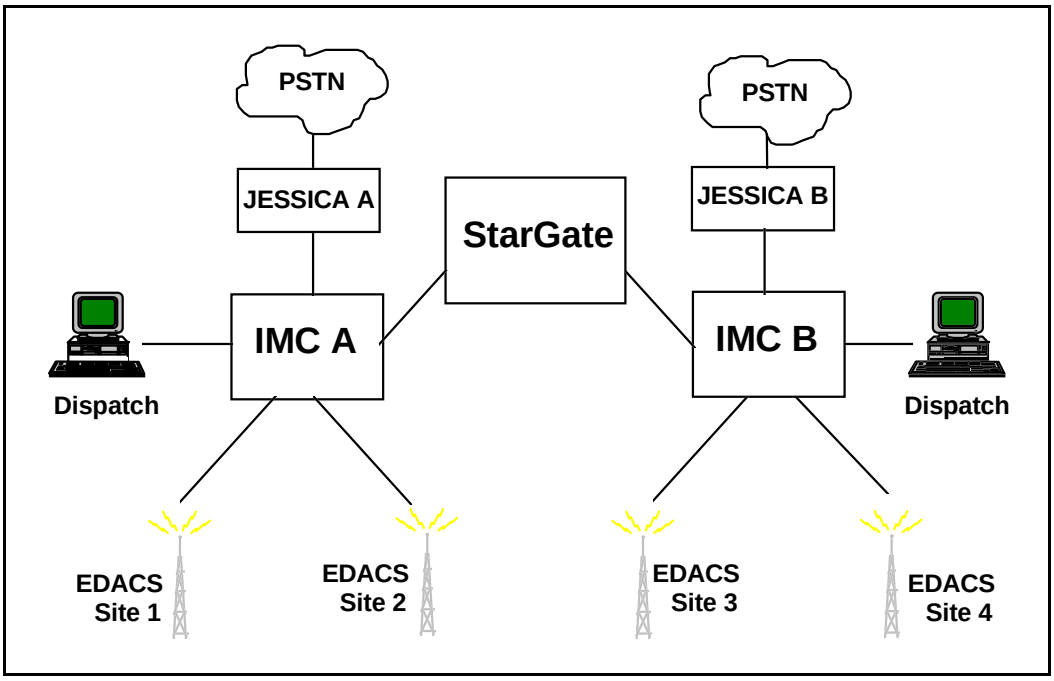


Figure 9 - Multinode Jessica System

Outbound calls go through the local IMC only. For example as shown in Figure 9, an outbound call placed from a radio on site 1 goes out Jessica A. An outbound call placed from a radio on site 4 goes out Jessica B. If Jessica B is down, an outbound call from site 4 will not be routed to Jessica A. However, inbound calls can be routed to remote IMCs. In Figure 9 above, an inbound call through Jessica A will reach a radio on site 4.

Systems with multiple Jessicas require each Jessica to have unique channel numbers to correctly track calls to the same LID/GID placed on different Jessicas. Therefore, the channel numbers which used to be in the range 1 to 30 will be mapped to valid LIDs. LIDs in the range 1 to 511 are recommended for BCU/CAL compatibility. To support multiple Jessicas, a unique LID is assigned per PI-IMC channel. The Line Definition screen of the System Manager (shown in Table 5) is used to assign and upload unique PI-IMC channel LIDs. Valid LIDs are added into the Line Definition screen (line 1 in the Line Definition screen corresponds to PI-IMC channel 1). Each PI must have unique PI-IMC channel LIDs.

Radio-enabled features are on a per PI basis. If the radio roams to territory covered by a different PI, then the radio user must initiate desired features from that PI as well.

4.2. PI FEATURES

The telephone interconnect features below are controlled by the PI. Some features also require System Manager, MD110, or radio configuration. The features are discussed in detail in the subsections that follow.

- Call forwarding.
- Do not disturb.
- Last number redial.
- Priority service channels/dedicated lines.
- Rotating/first available PI-IMC channel assignment.
- Site-based call routing (includes PI and MD110 configuration modifications).
- Call validation (toll call restrictions).
- Caller ID provided to the MD110 on outbound calls.
- Remote connectivity administration.

4.2.1. Call Forwarding

Call forwarding allows individual radios to forward inbound interconnect calls to a telephone or to another radio. Call forwarding must be enacted from a radio by entering a feature code at the radio. See section 4.3 for specifics on enabling this feature.

NOTE

All input from the radio to the Jessica System requires that the "*" button be pressed according to the requirements specified in the radio user's manual. If the feature code sequence is accepted, a short burst of ringing tone is heard. If the feature code sequence is rejected, a short burst of busy tone is heard. (A short burst is defined as 5 seconds.)

Call forwarding functions according to the following rules:

- Call forwarding to a radio causes the radio frequency (RF) channel to the first radio to be released and an RF channel to the forwarded radio to be requested.
- Call forwarding to a phone requires that second PI-to-MD110 channel be allocated.
- Call forwarding loops are checked as the forwarding chain is followed and disallowed by the PI. (If the user has a car radio and a portable radio, the user could forward each to the other and receive calls without the caller needing to know which unit is in use.)
- In call forwarding chains, the first radio in the chain is billed for the call, and the first radio's call restrictions are used if the last radio in the chain forwards to a phone.
- A call can be forwarded a maximum of five radios in a chain.
- Individual call forward and common call forward may be enabled at the same time.
- Call forward setup survives reboot.
- The call forwarding status of LIDs/GIDs is viewable via the ***dbv*** command.
- Forwards between full and half duplex radios and between analog and digital radios with clear voice modes are acceptable.
- The forwarding phone number is limited to 15 digits.

Please refer to Figure 10 and Figure 11 for forwarding hierarchy diagrams.

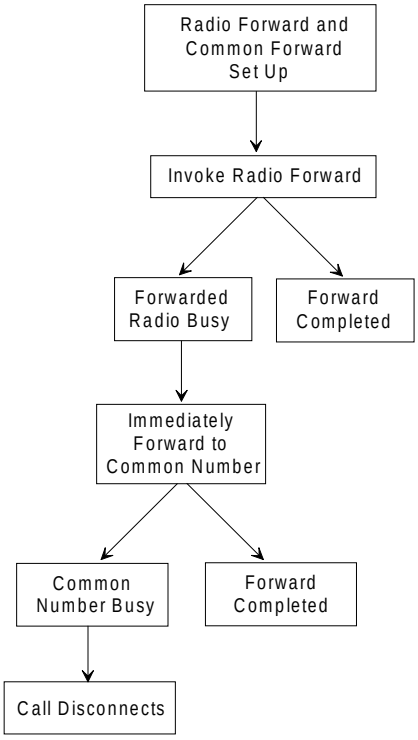
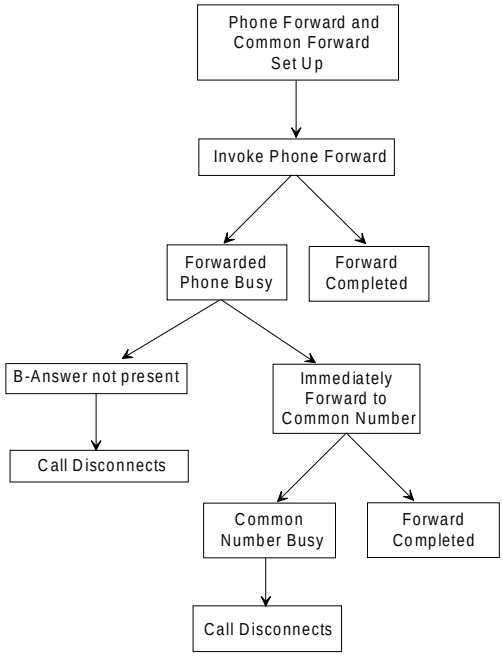


Figure 10 - Radio Forwarding Hierarchy



Note: If the MD110 trunk that the call is routed on does not have B-Answer, the MD110 will generate a connect when it sends the phone digits along the trunk. The common number cannot be forwarded to after the connect is generated.

Figure 11 - Phone Forwarding Hierarchy

The user can select one of two forms of call forwarding: busy/no answer or do not disturb (DND). The table below shows the results of the two forms.

Table 2 - Call Forwarding Results

Condition	Results
Busy/No Answer	Calls are forwarded if the called party is busy or does not answer within a specified timeout. The timeout is specified via the parameter FORWARD_NO_ANSWER_TIME in CONFIG.DAT.
Do Not Disturb	Calls are immediately forwarded without ringing the radio.

NOTE

If the System Manager interface is present, LIDs should be inbound enabled, outbound enabled, and valid at the Jessica site.

4.2.1.1. Call Forwarding Radio

Call forwarding radio allows radio users to forward inbound interconnect calls to another radio. This feature is enabled by a feature code sequence issued at the radio. See section 4.3 for specifics on enabling this feature. If the feature code sequence is accepted, the user hears a short burst of ringing tone. If the feature code sequence is rejected, the user hears a short burst of busy tone.

4.2.1.2. Call Forwarding Telephone

Call forwarding telephone allows radio users to forward inbound interconnect calls to the MD110 extension or to the PSTN. This feature is enabled by a feature code sequence issued at the radio. See section 4.3 for specifics on enabling this feature. If the feature code sequence is accepted, the user hears a short burst of ringing tone. If the feature code sequence is rejected, the user hears a short burst of busy tone.

4.2.1.3. Call Forwarding Common

Call forwarding common allows radio users to forward inbound interconnect calls to an MD110 extension or to the PSTN. This feature is enabled by a feature code sequence issued at the radio. See section 4.3 for specifics on enabling this feature. If the feature code is accepted, the user hears a short burst of ringing tone. If the feature code is rejected, the user hears a short burst of busy tone. An example of common forwarding numbers might be a secretary, an answering service, or a voice mail system; up to three common forwarding numbers may be defined by the system administrator using a configuration file on the PI.

The three common forwarding numbers are specified in file PBXFEAT.DAT which is read at system boot. See LBI-39040 for the creation format of PBXFEAT.DAT and set the following parameters:

```
COMMON_FORWARD_1    PHONEA
COMMON_FORWARD_2    PHONEB
COMMON_FORWARD_3    PHONEC
```

4.2.2. Do Not Disturb and Busy/No Answer

The do not disturb feature allows a radio to disable inbound interconnect individual calls. Do not disturb does not prevent inbound interconnect group calls. If call forwarding is enabled, inbound calls will be forwarded immediately. If call forwarding is not enabled, calls will be terminated and the caller will hear busy tone. See section 4.3 for radio-based enabling of features.

There is a single feature code to toggle between do not disturb and busy/no answer. This feature code is unique because the tones heard by the user have a different meaning from those in the other feature codes. If do not disturb is enabled, the user hears a short burst of ringing tone. If busy/no answer is enabled, the user hears a short burst of busy tone. See section 4.3 for radio-based enabling of features.

4.2.3. Last Number Redial

This feature makes it possible for a radio user to reach the last phone number dialed by entering the appropriate feature code. The last number dialed is saved in volatile RAM and does not survive a reboot. If there is no last phone number dialed stored in RAM, an error tone is sent to the radio user. See section 4.3 for radio-based enabling of features.

4.2.4. Priority Service Channels

The optional priority service channels feature is used to reserve PI-IMC channels for high priority users. These reserved channels make it more likely that high priority users will be able to place an interconnect call. However, high priority users must still contend for RF channels, PI-MD110 channels, and PSTN lines to successfully place or receive an interconnect call. Dedicated lines are achieved by reserving one line per dedicated user at the highest priority level. See section 4.2.4.3 for enabling of priority service channels at the System Manager.

4.2.4.1. Priority Lines

Channel priority is implemented in the PI by assigning a priority level to LIDs/GIDs. Up to eight priority levels (0-7) are supported, with 0 having the lowest priority. The LID/GID priority level is assigned at the System Manager. On powerup/restart, the disk file PRIORITY.DAT assigns the number of channels per priority level. Each priority level may have different numbers of channels. Interconnect calls are allocated channels designated for their priority, if available. If no channels are available in their priority level, the next lower priority level is checked.

Priority channels functions according to the following rules:

- The algorithms below are used by the priority service channels code.

  If LID/GID Database Present
  Use priority level of LID/GID as sent in the priority level field from the System Manager as the requested priority.
  else
  Use highest LID/GID priority level for the request priority.

  Channels_Pool = (MUX_CHANNELS_MASK & IMC_CHANNELS_MASK)

- If the number of channels in Channels_Pool is not equal to the number of channels specified in PRIORITY.DAT, the channels will be added/subtracted from the lowest available priority level.

- If PRIORITY.DAT does not exist, all channels will be allocated to the lowest priority level. See LBI-39040 for PRIORITY.DAT format.

- Inbound group calls are allocated according to the priority level assigned to the group.

4.2.4.2. Dedicated Lines

Dedicated channels are implemented by the system administrator, ensuring that the number of users assigned to the highest class does not exceed the number of channels allocated to the class.

NOTE

This dedicated channel arrangement only guarantees the PI-IMC link. Since the MD110 handles the PI-MD110 link and call redirection can use two PI-MD110 channels, there is still the possibility of being blocked even at the highest priority level.

4.2.4.3. Priority Level Setup

Use the System Manager Logical Unit Definition, menu item 11, Radio Features screen 2:3 Call Priority: Interconnect field to set the priority level of radios.

Use the System Manager Group Identification, menu item 12, Group Parameters screen 2:3 Call Priority: Interconnect field to set the priority level of inbound interconnect group calls. Outbound interconnect group calls are not possible. Inbound interconnect group calls are possible.

4.2.5. Rotating/First Available Channel Assignment

This feature allows the user to select either rotating (balanced loading) of IMC PIM audio channels or first available. Descending channel assignments are available only with rotating assignments enabled. Ascending channel assignments are available with both rotating and first available assignments available.

Channel assign usage may be specified from either the System Manager or the PI administrative terminal. In the System Manager (screen 2:4 Site Parameters), changes are made by modifying the Rotate Assignments and Assign Channel Ascending parameters. From the PI terminal, changes are made by using the ***config -s*** command to edit the CONFIG.DAT parameters ROTATING_ASSIGNMENTS and ASSIGNMENT_ORDER (shown in LBI-39040) and then using the ***savecfg*** command to save the changes. The System Manager method does not write the parameter changes to the PI hard drive; thus, on each reboot the user must obtain the parameters from the System Manager, otherwise Jessica uses the default parameters stored in the PI.

4.2.5.1. First Available Channel Ascending Assignment

Change the settings using one of the two methods below.

1. In the System Manager, set the following parameters:
   Rotate Assignments N
   Assign Channel Ascending Y

2. Using the ***config -s*** command at the PI terminal, set the following CONFIG.DAT parameters:
   ROTATING_ASSIGNMENTS FALSE
   ASSIGNMENT_ORDER ASCENDING
   and then use ***savecfg*** to save the changes.

4.2.5.2. First Available Channel Descending Assignment

Not an option. This is consistent with sites.

4.2.5.3. Rotating Channel Ascending Assignment

Change the settings using one of the two methods below.

1. In the System Manager, set the following parameters:
   Rotate Assignments Y
   Assign Channel Ascending Y

2. Using the ***config -s*** command at the PI terminal, set the following CONFIG.DAT parameters:
   ROTATING_ASSIGNMENTS TRUE
   ASSIGNMENT_ORDER ASCENDING
   and then use ***savecfg*** to save the changes.

4.2.5.4. Rotating Channel Descending Assignment

Change the settings using one of the two methods below.

1. In the System Manager, set the following parameters:
   Rotate Assignments Y
   Assign Channel Ascending N

2. Using the ***config -s*** command at the PI terminal, set the following CONFIG.DAT parameters:
   ROTATING_ASSIGNMENTS TRUE
   ASSIGNMENT_ORDER DESCENDING
   and then use ***savecfg*** to save the changes.

4.2.6. Site-Based Call Routing

The MD110 and the PI both control portions of site-based call routing. The PI controls site-based call routing via the configuration parameter SITE_ROUTING_ENABLE (this parameter is enabled when set to TRUE), and prepends 3 routing digits used by the MD110, but the MD110 performs the actual call routing (see LBI-39040). The MD110 removes the prepended digits and routes the call to the appropriate trunk using Route Destination Codes (DEST). There are limitations in the MD110 as to how discriminating the routing based on the called number can be since the tables used were designed for one or a few codes, and are now divided for 32 sites.

NOTE

The PI hardware limits the maximum number of digits to 17. If site-based routing is enabled, then the maximum number that can be entered at the radio is 14 digits since 3 digits are prepended for the total of 17 digits.

Outbound calls contain information about the originating EDACS site. The PI prepends a user-defined routing digit (0-9) (SITE_ROUTING_PREFIX parameter defined in CONFIG.DAT -- default of 6) followed by a 2-digit originating EDACS site ID (01-32). The MD110 can use up to five digits of the incoming number to determine call routing. Since three of these digits are prepended by the PI (one digit to indicate the routing tables and two digits to indicate the originating site), two digits of the incoming number are analyzed.

To allow the greatest flexibility in programming the MD110, the PI algorithm allows flexibility in prepending digits when 3-digit numbers are encountered.

The algorithm for prepending digits is as follows:

```
switch (num digits in number)
{
      case 4: /*possible MD110 extensions*/
      case 5:
            break;
      case >5:
      case <3:
            prepend digits;
            break;
      case 3: /*possibly 911 etc*/
            if (SBR_FOR_3_DIGITS config param)
                  prepend digits;
            break;
}
```

4.2.7. Toll Call Restriction (Call Validation)

NOTE

ALLOW.DAT, DISALLOW.DAT, LID.DAT, and GID.DAT must be present in the PI for the PI to perform toll call restrictions.

Jessica allows 16 classes of interconnect users (0-15). Users in class 15 are permitted to call any number. Users in classes 0-14 must first be routed through the allow table and the disallow table to determine whether their class is permitted to make a call. When the call restrictions feature is enabled by the CALL_NUM_RESTRICTIONS parameter (see LBI-39040), any number called by the user must be explicitly permitted in the allow file and must not be denied in the disallow file.

The following algorithm is used for call validation:

```
if (LID/GID database present)
      if (LID/GID valid and inbound/outbound enabled)
            case OUTBOUND:
                  if ((CALL_NUM_RESTRICTIONS == TRUE) && (! class == 15))
                        if (ALLOW.DAT missing)
                              Deny all calls
                        else
                              Deny/allow calls as specified in ALLOW.DAT and DISALLOW.DAT
                  else
                        Allow call
            case INBOUND:
                        Allow call
      else
            Deny call
else
      if (CALL_NUM_RESTRICTIONS == TRUE)
            Deny all calls
      else
            Allow all calls.
```

The allow table is read from ALLOW.DAT (see LBI-39040 for details), while the disallow table is read from DISALLOW.DAT (see LBI-39040 for more information).

NOTE

If a file contains syntax errors, the entire file will not be used. The error will be flagged to the PI administrative terminal. The ***callres*** command may be used to check ALLOW.DAT and DISALLOW.DAT for syntax errors and may be used to test the validity of individual numbers.

4.2.8. Radio Caller Identification

On outbound interconnect calls, if the CALLER_ID CONFIG.DAT parameter is TRUE (see LBI-39040), the LID of the radio originating the call will be passed to the MD110 in the call setup signaling and may be displayed on phones with a digital display. The connection from the MD110 to an external phone must support caller ID.

4.2.9. Remote Connectivity Administration

Jessica provides local area network (LAN) connectivity by allowing computers with Transmission Control Protocol/Internet Protocol (TCP/IP) facilities. The PI may be completely configured remotely via the LAN connection supporting FTP, Telnet, and Network File Server (NFS). For FTP and Telnet to function, IP.DAT must be set up correctly. In LBI-39040, Appendix A covers Telnet usage, and Appendix B describes FTP usage. Appendix D herein contains a LAN Network Survey that should be completed before Jessica is installed if network connectivity is desired.

NFS allows users to mount file systems located across the network and use them as part of their own file system. To use NFS, EXPORTS.DAT (see LBI-39040) and ROUTES.DAT (see LBI-39040) must be set up correctly. Directories must be explicitly exported by the host computer to the client. Jessica will be able to act as a host (i.e., export its file system to other computers) but shall not be able to act as a client and mount file systems from other computers.

From a UNIX workstation on the same network as the Jessica system, execute the ***mount/umount*** commands with super-user privilege enabled.

```
mkdir local_mount_dir
mount jessica_host_name: / path/local_mount_dir
```

where jessica_host_name refers to the IP name of the Jessica connection and / refers to the root directory on the Jessica system.

```
cd local_mount_dir
```

4.3. RADIO-ENABLING OF FEATURES

This section discusses the settings necessary to activate those features that may be enabled from a radio. In the table below, FCP is used for the CONFIG.DAT parameter FEATURE_CODE_PREFIX.

Table 3 - Radio-Enabled Features

Feature	From LIDA, enter FCP	Result
Busy/no answer toggle to do not disturb	FCP-04	Toggles between busy/no answer and do not disturb. The user hears a short burst of ringing when do not disturb is enabled, and a short burst of busy tone when busy/no answer is enabled (and do not disturb is not enabled).
Call forwarding radio	FCP-03-LIDB	Forwards LIDA's radio to LIDB. The LID must be a 5-digit number.
Call forwarding telephone	FCP-02-PHONEA	Forwards LIDA's radio to PHONEA.
Call forwarding common	FCP-01-1	Forwards LIDA's radio to COMMON NUMBER 1, which was defined as PHONEA in PBXFEAT.DAT.
Last number redial	FCP-05	Calls the last phone number dialed.

To disable a feature, enter the FCP and the two digits that immediately follow it, but do not enter the arguments. For example, to disable call forwarding common, enter FCP-01.

4.4. MD110 FEATURES

The MD110 provides the following features:

- Voice mail.
- Caller identification.
- Site-based call routing (PI and MD110 both control portions).
- Analog or digital interfaces to the PSTN or another PBX.
- Routing of PSTN-originated calls to EDACS or to MD110 extensions.
- Routing of EDACS-originated calls to the PSTN or to MD110 extensions.
- Least-cost routing.
- The ability to dial any radio ID from the PSTN with analog end-to-end signaling.
- Dialing restrictions on calls from EDACS or MD110 extensions.
- Direct inward dialing to radios.

4.4.1. Voice Mail

Ericsson Business Networks can provide VMX Systems Inc. voice mail equipment with the MD110. A VMX100 6-port system is presented here as an example. Each port is equivalent to an analog phone line. The VMX100 also requires one MD110 control connection.

Voice mail is accessed either by a direct call to the group hunt MD110 extension (2100 in the example) or by an individual or common call forward from a radio (to 2100). The user enters the top level of the voice mail system and is prompted to enter the mailbox number. The LID must be entered without the leading zeros. (The text string from VMX can state "Please enter the LID without the leading zeros.")

The MD110 requires three new cards for voice mail: Information Computer Unit (ICU), Extension Line Unit (ELU) 24, and Serial Filter Unit (SFU). The ICU connects the RS-232 control data channel from the VMX system to the MD110. The ELU24 is a 7-analog-channel card. The SFU is a line filter card. The VMX100 is connected to 6 of the 7 analog ports. The TRS9010405/1100 is a generic cable. The three cables between the LFU and the Punch Block are distributed as follows: two for voice mail and one for Caller ID phone. These cables may be run from the same LFU or different LFUs, depending on the number of lines required. Please refer to Figure 12.

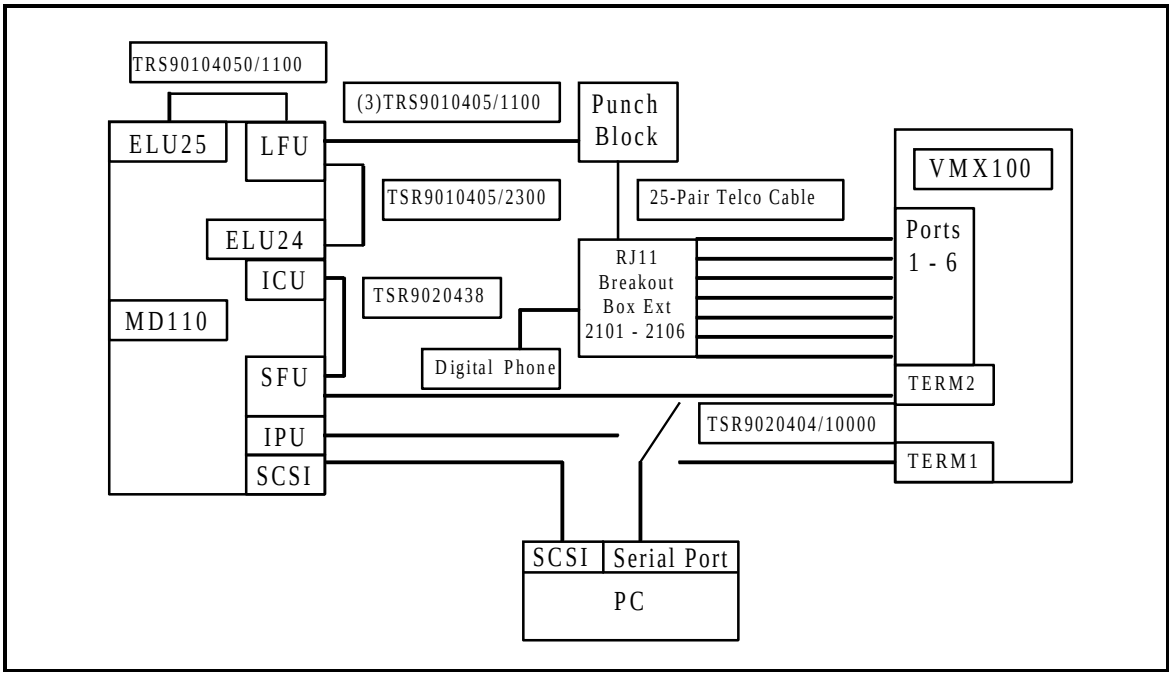


Figure 12 - Voice Mail Setup

The suggested LID range for VMX mailboxes is 2000 to 16382 However, the algorithm for mailbox allocation is flexible and is outlined as follows. The first mailbox defined casts the number width of all mailboxes starting with the same first digit. Therefore, if mailbox number 16000 is defined, then mailbox 1000 is not possible -- all mailboxes starting with 1 must be 5 digits wide. Likewise, if mailbox 300 is defined, then mailbox 3005 is not possible because all mailboxes starting with 3 are 3 digits wide. The minimum mailbox number width is 2 digits.

4.4.2. Caller ID on Outbound ISDN Calls

See LBI-39040 for information on enabling this feature. If the feature is desired on a local MD110 extension, the following hardware may be installed in/on the MD110 as shown in Figure 12.

1 digital telephone (DBC 661 002/001)
1 digital extension board (ELU25 ROF1375306/2)

4.4.3. Site-Based Call Routing

Outbound calls can be routed based on the originating radio site. The MD110 and the PI both control portions of site-based call routing. The PI controls site-based call routing via a new configuration parameter (SITE_ROUTING_ENABLE, which is enabled when set to TRUE), but the MD110 performs the actual call routing.

The MD110 can use up to five digits of the incoming number to determine call routing. Three of these digits are prepended by the PI (1 to indicate the routing tables and 2 to indicate the originating site). Two digits of the incoming number are analyzed. Outbound calls contain information about the originating EDACS site. The PI prepends a user-defined routing digit (0-9) (SITE_ROUTING_PREFIX parameter defined in CONFIG.DAT -- default of 6) followed by a 2-digit originating EDACS site ID (01-32).

The MD110 removes the prepended digits and routes the call to the appropriate trunk using Route Destination Codes (DEST). There are limitations in the MD110 as to how discriminating the routing based on the called number can be since the tables used were designed for one or a few codes, and are now divided for 32 sites. The DEST routing table can support 500 entries. Please refer to LBI-39039 for an example of site-based routing.

4.4.4. Call Validation MD110 Modifications

Early Jessica installations with no System Manager interface that are being upgraded to include a System Manager interface require that global toll call restrictions be removed. Many early Jessica MD110 installations were configured to prevent long distance numbers by limiting the digit length of outgoing numbers in their least-cost routing tables. Other MD110s may have least-cost routing tables to restrict calls. Refer to actual MD110 programming to determine how to remove toll call restrictions.

4.4.5. Enabling Inbound Phone Digits from the MD110

Please refer to LBI-39039 for specifics on MD110 programming.

5. SYSTEM REQUIREMENTS

5.1. EDACS SOFTWARE REQUIREMENTS

Minimum EDACS software revision levels compatible with Jessica are shown below. All features may not be available with the software versions shown below. Refer to Jessica Release Notes for feature compatibility.

Table 4 - EDACS Component Software Version Requirements

Platform	Minimum Software Version
PBX Interface (PI)	1. Networks/Data VME Controller 349A9983Gx 2. PI Application 349A9982Gx See Release Notes 349A9982Px for features available per release.
MD110	1. MD110 Software BC 6.2.1G 2. Configuration File 349A9986G1
CEC/IMC	1. IMC Controller Board U3 344A3565G10 U58 344A3567G10 U59 344A3568G10 U3 344A3565G7, C3 XLTR only U58 344A3569G4, C3 XLTR only U59 344A3570G4,C3 XLTR only 2. IMC Audio Board U99 344A3564G10 3. Conventional Interface Audio Board 19D903324P1 U13 344A3694G10 4. CEC/IMC Manager Disk 344A3630G10 Multinode Jessica Systems require IMC Version 5.x.
C3 Maestro	1. Disk 344A3922G10 2. CLB U4 344A4245G10
VAX System Manager	344A4583G3
GETC-1E CC/WC Main Board	U2 349A9607G2
Link[1] GETC UL/DL Main Board	U2 344A4895G1
GETC Turbo Board	Disk 344A4414G3
GETC Turbo Loader (PC)	Disk 344A4414G3
SCAT GETC and SCAT/DL	U2 344A3835G1

[1] Uplink does not use the Turbo board.

Table 4 - EDACS Component Software Version Requirements (Cont.)

Platform	Minimum Software Version
DVIU VGE	1. 344A4516G4 2. Voice Guard 344A3000P91 Aegis 344A3000P290 Unencrypted Aegis 344A3000P490
DVIU DES	1. 344A4513G3 2. Voice Guard 344A3000P41 Aegis 344A3000P240 Unencrypted Aegis 344A3000P440
M-PA radio	EDACS 344A4614G12 EDACS 19A149863G12 EDACS DES 344A3703G12 EDACS VGE 344A3705G12 EDACS Aegis 344A4415G12 EDACS Aegis DES 344A4419G12 EDACS Aegis VGE 344A4421G12
M-RK radio	M-RK 1 Version 1 hardware 344A4862G11 M-RK 1 Version 3 hardware 349A9842G11 M-RK 2 Version 2 hardware 344A4716G10 M-RK 2 Version 3 hardware 349A9845G10
Orion radio	344A4893G10

5.2. EDACS HARDWARE REQUIREMENTS

Jessica requires the EDACS hardware revision levels shown below to support the software revision levels presented in the preceding section.

5.2.1. System Manager Requirements

Hardware	Hardware Revision
VAX System Manager	See Software Release Notes 349A9942.
Cable for System Manager	149575P18 (10 ft) 149575P19 (25 ft) 149575P20 (50 ft)

5.2.2. Site Controller Requirements

Hardware	Hardware Revision
VAX Site Controller	19A149302P8 for Europe 19A149302P5 for US

The PDP Site Controller and PDP System Manager do not support Jessica.

5.2.3. IMC Requirements

Hardware	Hardware Revision
Controller Board	Rev. G or later for 19D903299P1 on all but the PIM or any rev. for 19D903299P3 on all including the PIM
Audio Board	Rev. H or later for 19D903302P1 or any rev. for 19D903302P3
Clock Board	Rev. E or later N. America may use Rev. D or later
MOM PC	NA

5.2.4. GETC Requirements

The following three GETC categories differ in that not all use the Turbo option, and the three do not share common software.

5.2.4.1. GETC 1-E Control/Working Channel Requirements

Hardware	Turbo	Hardware Revision
Control/Working Channel	Yes	Rev. F or later for 19D902104 or any rev. of 19D904266

5.2.4.2. Link GETC Uplink/Downlink Requirements

Hardware	Turbo	Hardware Revision
Downlink	Yes	Rev. F or later for 19D902104 or any rev. of 19D904266
Uplink	No	Rev. F or later for 19D902104 or any rev. of 19D904266

5.2.4.3. SCAT GETC Requirements

Hardware	Turbo	Hardware Revision
SCAT	Yes	Rev. F or later for 19D902104 or any rev. of 19D904266

5.2.5. Jessica Requirements

5.2.5.1. MD110 Requirements

Please refer to LBI-39039, EDACS Jessica PBX Gateway MD110 Configuration Manual, for MD110 requirements.

5.2.5.2. PI Requirements

The PI requirements are as follows:

T1

- MUX and MD110 connection ports are 100 ohm balanced.

E1

- MUX and MD110 connection ports are 120 ohm balanced.

5.2.5.3. MUX Requirements

The MUX provided with Jessica meets the following requirements:

T1

- 23 channels of balanced 600 ohm 4-wire audio (no signaling required).
- 1.544 Mb/s 100 ohm aggregate interface.
- T1 framing is extended superframe (ESF).
- T1 line coding is B8ZS.
- 120 VAC 50/60 Hz or 240 VAC 50/60 Hz is preferred.
- The unit will mount in a 19-inch rack.
- CCITT: G.703, G.704, G.711 (u-Law), G.733, G.734, and G.824.
- FCC Part 15 Class B approval is required.
- CSA and UL approval are required.

E1

- 30 channels of 4-wire balanced 600 ohm audio (no signaling required).
- 2.048 Mb/s 120 ohm impedance aggregate interface.
- HDB3 line coding.
- CCITT: G703, G704, G711 (A-Law), G732, G736, and G823.
- CISPR22: EN 55022.
- IEC: 801-2, 801-3, 801-5; EN 60950 per 950.
- The unit will mount in a 19-inch rack.

5.2.6. RF Repeater Requirements

The equipment may be EDACS MASTR II, MASTR IIe, or MASTR III.

5.2.7. Radio Requirements

A radio must support digital interconnect dialing. Interconnect must be enabled on each particular radio.

5.2.8. Radio Requirements for DTMF

Dual tone multi-frequency (DTMF) tone sending capability, while connected to a called party, is necessary for special functions, such as voice mail access.

The radio must be programmed with the settings below (minimal values) for the MD110 to detect the DTMF digits generated by the radio.

Option	Minimum Range
0-9 (tone length)	70 ±5 ms
*,# length	70 ±5 ms
Interdigit delay	70 ±5 ms

5.2.9. Power Requirements for Jessica

AC power (adequate to meet system requirements, environmental control, and digital or voice grade lines) must be available to the site prior to the installation. An unterminated power cord and a standard three-prong ground plug are furnished for the PI cabinet power supply. **Check to be sure that the power outlet complies with local ordinances.**

The equipment should be connected to a good earth ground wire of adequate size. A ground stud is provided for a separate cabinet ground.

	Voltage Requirements	Power Requirements	Power Source
PI	110 VAC 50/60 Hz or 220 VAC 50/60 Hz	150-200W	Cabinet Power Supply
Terminal for PI	110 VAC	70W (estimated)	110 VAC outlet
MD110 (model /10 or /50)	110 VAC 50/60 Hz or 220 VAC 50/60 Hz	300W (typical)	110 VAC or 220 VAC outlet
Optional PC and printer for MD110	110 VAC outlet	500W (estimated)	110 VAC outlet
MUX	-48 VDC	<35W	Cabinet Power Supply

5.2.10. Jessica Space Requirements

Two separate cabinets are required for the three main components of Jessica: PI, MUX, and the MD110.

The PI and MUX are in a deep cabinet with the dimensions 69" x 24" x 24".

The MD110/50 cabinet has the dimensions 62.1" x 27.1" x 13.4".

6. CONFIGURATION DEFINITION

This section covers configuration considerations and preparations which must be completed prior to installing the Jessica PBX Gateway equipment.

6.1. JESSICA EXTERNAL INTERFACE

Jessica interfaces with the PSTN or PBX switching equipment through several configurations: directly to the PSTN, directly to the customer PBX, or directly to the PSTN and the customer PBX. These interface configurations are shown below.

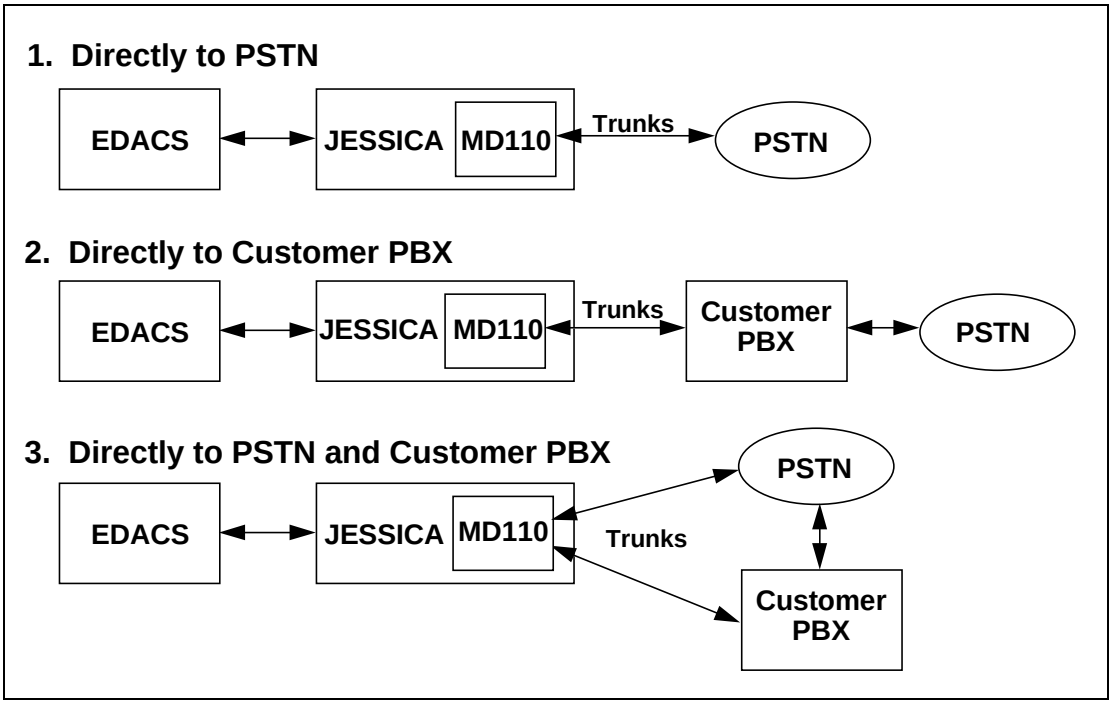


Figure 13 - Jessica PBX Gateway Configuration

6.2. TRUNK LINE CONNECTIONS AND CHARACTERISTICS

A variety of trunk line connections may be used to connect the Jessica MD110 and the external switching equipment. The MD110 supports the following types of analog and digital trunk line connections for both E1 and T1:

- CO Trunk
  - the most common variety of trunk used to interconnect to/from the PSTN
  - supports bothway traffic
- DID Trunk
  - special type of CO trunk used to interconnect from PSTN
  - supports only inbound traffic
  - used for direct inward dialing of an EDACS radio; overdialing of radio is not required
- TIE Trunk
  - used to interconnect to/from another PBX
  - supports bothway traffic

The MD110 supports the following trunk line characteristics:

- Loop Start - commonly used with PBX systems
  - problems occur when used to carry bothway traffic. The trunk can be seized in both directions at once and the calls collide. The MD110 questionnaire recommends that loop start trunks be converted to ground start.
- Ground Start - minimizes call collision
  - preferred type of trunk

The figure below shows an example of trunk line configurations used to connect Jessica to the external switching equipment.

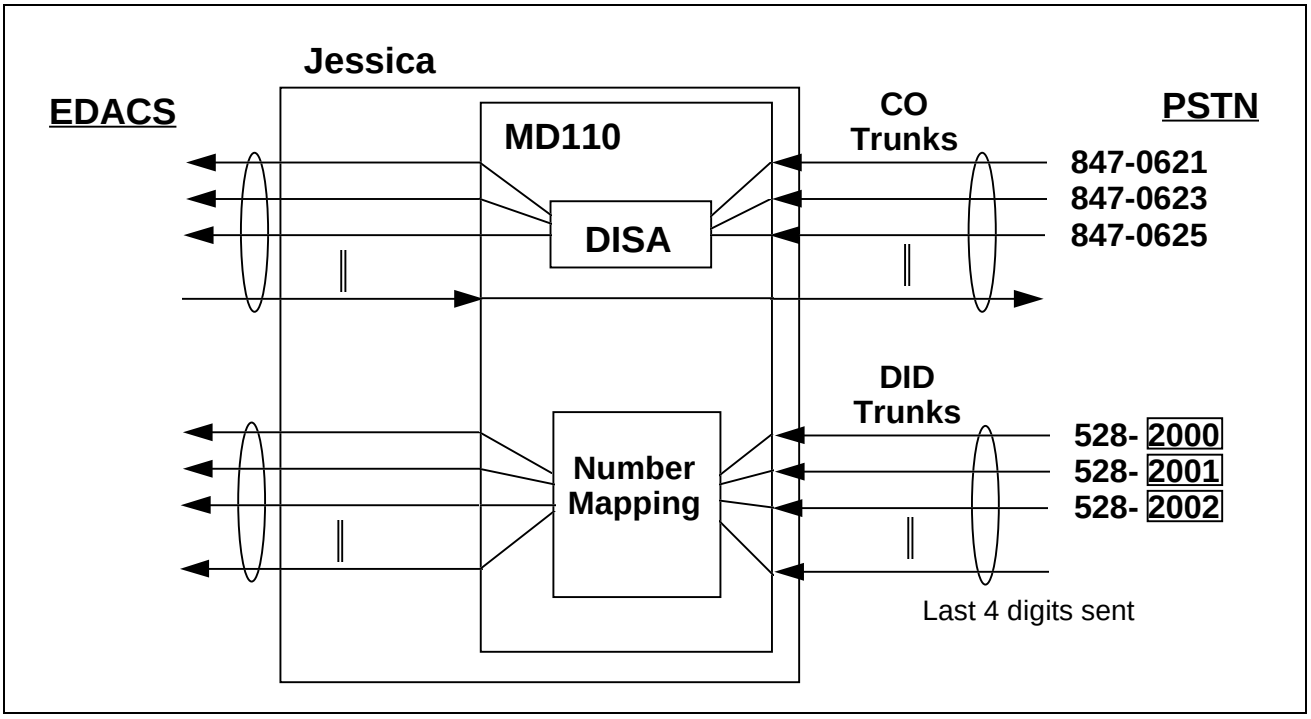


Figure 14 - Example Jessica Trunk Line Configurations

6.3. PI-TO-MD110 INTERNAL INTERFACE

Either a T1 or an E1 ISDN trunk is used to provide the Jessica internal interface connection between the PI and the MD110. The type of digital trunk to be used depends on the digital interface standards followed by the country of installation. Use of a T1 line allows up to a maximum of 23 simultaneous interconnect calls to be handled by Jessica. Use of an E1 line allows up to a maximum of 30 simultaneous interconnect calls to be handled by Jessica. The number of audio channels provided between the IMC and Jessica, and the number of termination lines provided between Jessica and the external switching equipment must be sized with the limitation above in mind. Consideration must also be given to maintaining an equal balance between the number of audio channels and termination lines provided. It is highly recommended that an equal number of audio channels (between the IMC and Jessica) and termination lines (between Jessica and the external switching equipment) be used. Failure to implement a balanced configuration may result in interconnect call blocking within Jessica.

6.4. IMC-JESSICA INTERNAL INTERFACE

The number of audio channels between the IMC and Jessica must be less than or equal to 23/30 (T1/E1). Audio channels are available in increments of 4 channels (4 audio channels per IMC PIM audio board) up to the maximum allowed.

The MUX Channel Bank combines the 4-wire balanced audio inputs from the IMC into a single digitized audio stream. Each audio channel or circuit must have its own channel unit within the MUX.

6.5. PI-PBX ISDN INTERFACE SPECIFICATION

As the interface between the PI and the MD110 is a standard ISDN interface, it is theoretically possible to connect the ISDN interface directly to the PSTN or existing customer PBX if the benefits afforded by the MD110 are not desired. However, direct connection to the PSTN is not advised because it would require special certification by the FCC. Connection to a PBX other than the MD110 could be achieved. In this case, the demarcation of responsibility is between the PI and the non-standard PBX. Ericsson Inc. is responsible for the PI, and the customer is responsible for the PBX, including its operation as part of Jessica telephone interconnect.

Only the ATT5ESS_USER ISDN messaging required by the MD110 has been tested. The configuration parameter Q931_CONNECTION_TYPE specified in the LBI-39040 (PI trunk parameters table) allows other possibilities that have not been tested by Ericsson Inc.

7. INSTALLATION

This section details the configuration, installation, and verification procedures to be performed when installing or adding the Jessica PBX Gateway subsystem to the EDACS Multisite Radio Network. Installation of Jessica can be divided into three parts: 1) configuration and installation of Jessica components, 2) configuration and installation of equipment at the IMC, and 3) configuration of equipment at the sites. Please refer to section 7.1.8 for software and hardware upgrades.

Installation at Jessica

- Add/modify parameters in CONFIG.DAT to enable features.
- Connect and program the System Manager.
- Configure and run cables for the PI.
- Configure and connect cables for the MUX.
- Install and configure the MD110.
- Install the interconnect cables from the MD110 to the PI.
- Set up LAN-related configuration files based on the questionnaire in Appendix A of LBI-39039.

Installation at IMC

- Install and connect cables for the PIM Controller and Audio Boards.
- Set up the CEC/IMC Manager.
- Install the interconnect cabling from the IMC to the PI/MUX.

Installation at Sites

- Configure the Site Controller personality.
- Configure the GETC personality.

CAUTION

All PI, MUX, and MD110 boards are static-sensitive. ESD handling procedures must be followed when replacing or installing boards. Failure to do so may result in board failure or shortened board life.

The following additional documents are referenced in performing steps of the Jessica installation:

- LBI-38938, CEC/IMC Installation, Set-Up and Troubleshooting
- LBI-38939, CEC/IMC Customer-Specific System Documentation Overview
- LBI-39040, PBX Interface User's Manual
- EN/LZB 103 866, Installation MD110/50
- LBI-39039, MD110 Configuration Manual
- LZBU 106 100, MD110 Customer Library -- Small Basic, BC 6

7.1. INSTALLATION AT JESSICA

7.1.1. PI Configuration and Cabling

CAUTION

Turn off the power to the PI before removing or installing any PBX interface VMEbus boards. Removing or reinstalling the boards while the power is on will damage the boards.

The PBX Interface (PI) will be delivered with all hardware elements installed and configured in the VME chassis. Appendix A contains documentation on internal cable connections and is included for maintenance and reference purposes.

The remaining PI installation involves Jessica application software and configuration loading, and interface cabling. Refer to LBI-39040, PBX User's Interface Manual, for information on loading Jessica application software and configuration data.

PI interface cabling involves the following concentrator panel installation and cabling steps:

1. Install the concentrator panel for the PI control interface to the IMC on the PI/MUX cabinet interface panel mounting frame. (Note: An 852327G1 concentrator board is used for the PI control interface.)

2. Connect one end of the RS-422 control cable (see RS-422 Cable Assembly, Drawing 2203710) to the J1 PI control port labeled "Port 0," and connect the other end to the J1 connector at the PI control interface concentrator board.

7.1.2. MUX Configuration and Cabling

The following documents provide additional information on the T1 MUX and the E1 MUX. Either the T1 MUX or the E1 MUX is used depending on the country of installation.

- 365-454-000, Equipment Manual for ND4 Enhanced Digital Channel Bank Equipment (NEC ND4E T1 MUX Manual. Refer to Appendix B herein for a condensed listing of information applicable to the T1 MUX.)
- 62.6929.000.00, ANT Equipment System PCM 30 FXM (ANT BOSCH E1 MUX Manual)

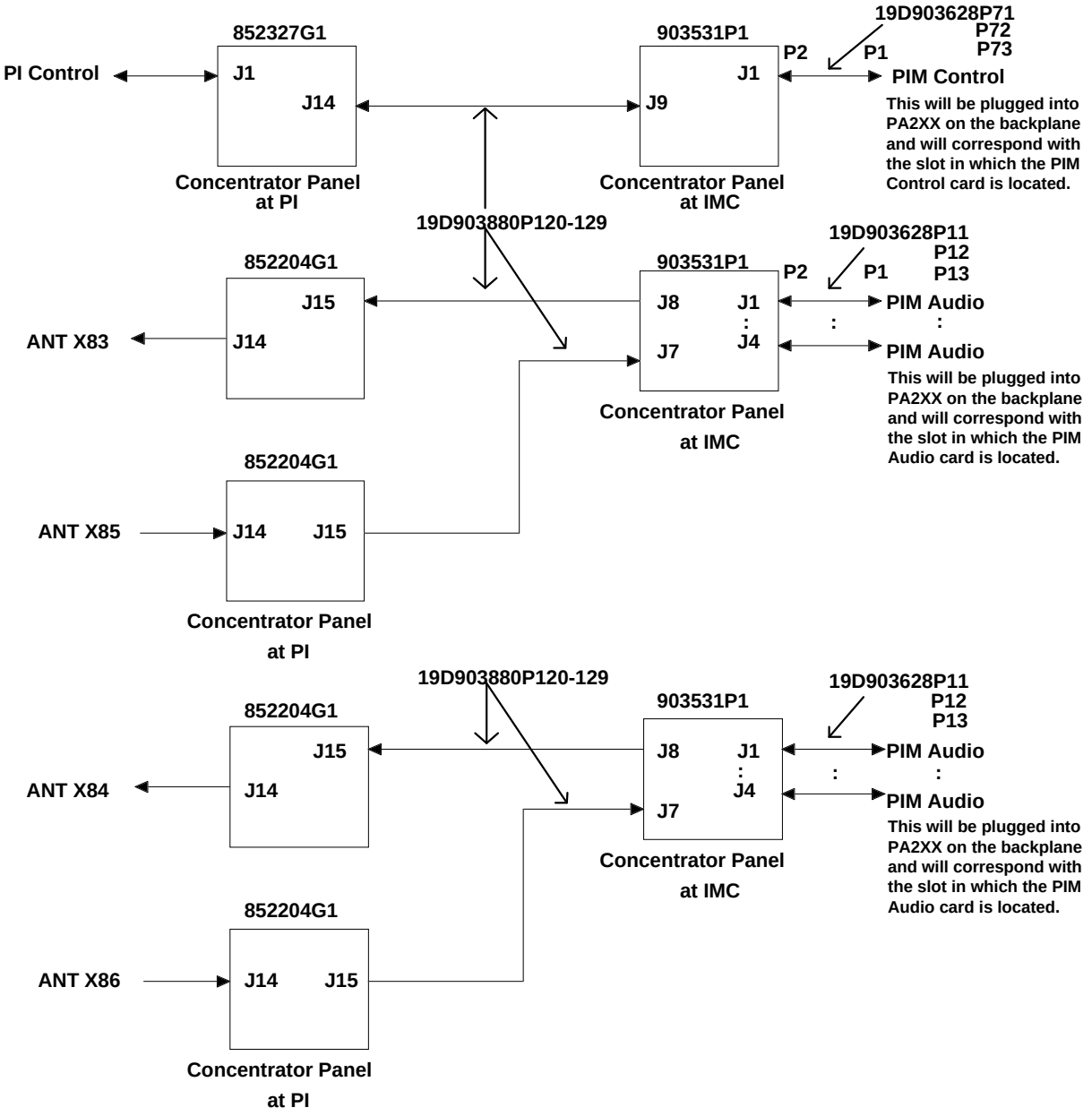
7.1.2.1. E1 MUX Configuration and Cabling

The ANT BOSCH E1 MUX requires no configuring; however, the interface cabling steps below must be performed. (Refer to Jessica E1 System Rack Data I/O Wiring Diagram, Drawing 4503706, and Figure 15.)

1. Install the concentrator panels for the MUX audio interface to the IMC on the PI/MUX cabinet interface panel mounting frame. (Note: 852204G1 concentrator boards are used for the MUX audio interface.)

2. Cable up audio in with respect to the MUX using the E1 MUX audio cable (see E1 MUX Audio Cable Assembly, Drawing 4203716). For audio channels 1-16, connect the P1 connector to J14 of the audio concentrator panel (for channels 1-16), and the P2 connector to X83 of the MUX. For audio channels 17-30, connect the P3 connector to J14 of the audio concentrator panel (for channels 17-30), and the P4 connector to X84 of the MUX.

3. Cable up audio out with respect to the MUX using the E1 MUX audio cable. For audio channels 1-16, connect the P1 connector to J14 of the audio concentrator panel (for channels 1-16), and the P2 connector to X85 of the MUX. For audio channels 17-30, connect the P3 connector to J14 of the audio concentrator panel (for channels 17-30), and the P4 connector to X86 of the MUX.



19D903628	Length	19D903628	Length	19D903880	Length
P71	20'	P11	20'	P120	5'
P72	40'	P12	40'	P121	15'
P73	52'	P13	52'	P122	7'
				P123	10'
				P124	20'
				P125	25'
				P126	30'
				P127	35'
				P128	40'
				P129	50'

Figure 15 - E1 with ANT BOSCH MUX

4. For the E1 audio link to the PI, connect one end of the E1 Trunk A MUX cable (see E1 Trunk A MUX Cable Assembly, Drawing 2203713) to the PI port labeled "Trunk A -- E1/T1," starting with the lowest numbered port, and connect the other end to X87 of the MUX.

5. For the -48V Power E1 ANT BOSCH MUX, connect one end of the power cable (see 48V Power -- E1 MUX Cable Assembly, Drawing 2203715) to J7 of the 4U Power Control Chassis, and the other end to X89 of the MUX.

Connections Between the MUX and Concentrator Panels (See Figure 15)

1. X83 is audio in with respect to the MUX (channels 1-16) and connects to 852204G1 concentrator card J14.
2. X84 is audio in with respect to the MUX (channels 17-30) and connects to 852204G1 concentrator card J14.
3. X85 is audio out with respect to the MUX (channels 1-16) and connects to 852204G1 concentrator card J14.
4. X86 is audio out with respect to the MUX (channels 17-30) and connects to 852204G1 concentrator card J14.
5. X87 is the E1 link to the PI (data cable).
6. X89 ties to -48V for power from the 4U Power Control Chassis.

There are two visual indications that the MUX is operating properly:

1. The LED on the front of the MUX is not illuminated (the LED illuminates when the MUX is not working properly).

2. The PI terminal does not display the message "MUX trunk alarm" on the screen. This message is only displayed when the MUX is working improperly.

7.1.2.2. T1 MUX Configuration and Cabling

The T1 MUX has two digroups: Digroup A (DG-A) and Digroup B (DG-B). Either digroup may be connected, depending on the application and the site.

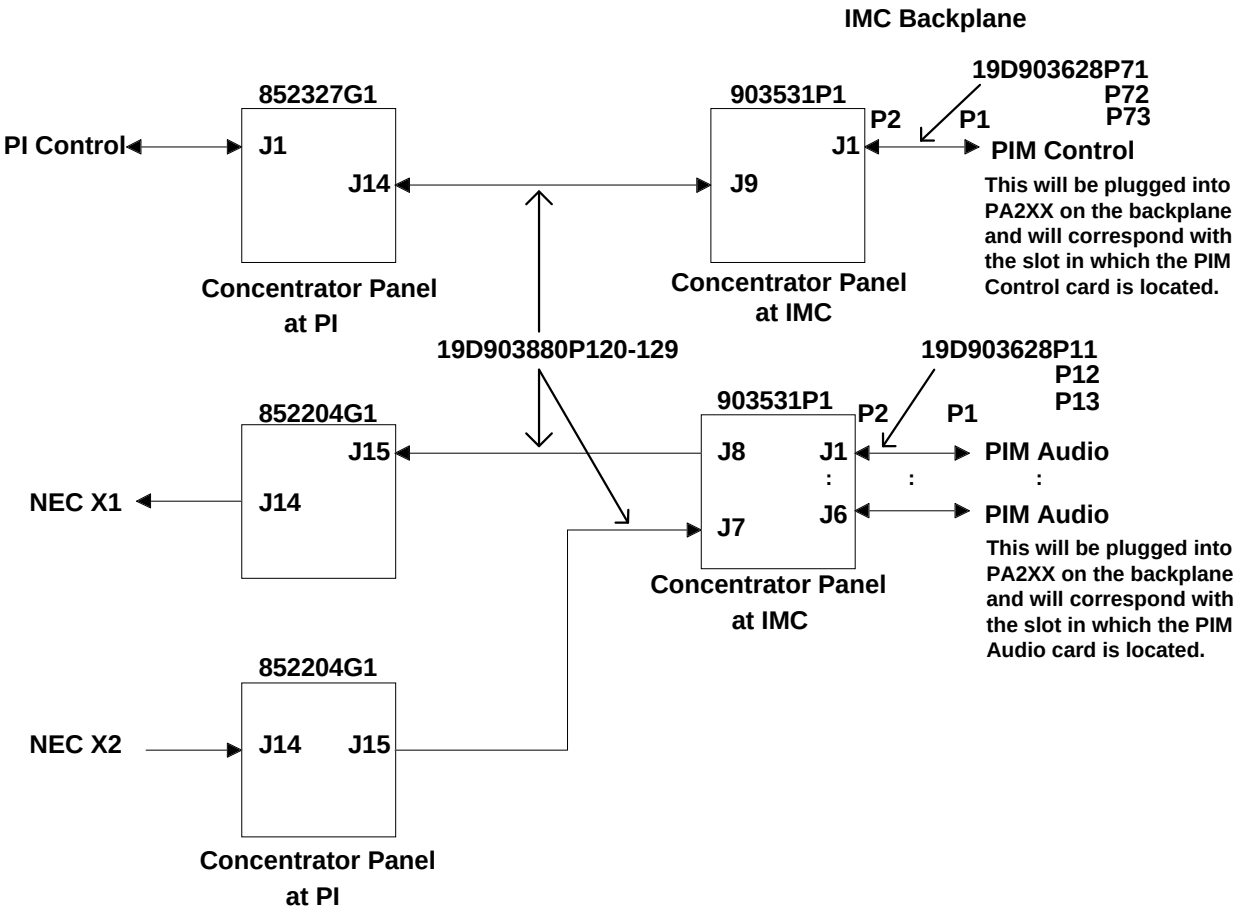
To connect Digroup A, the interface cabling steps below must be performed. (Refer to Jessica T1 System Rack Data I/O Wiring Diagram, Drawing 4503702, and Figure 16.)

1. Install the concentrator panels for the MUX audio interface to the IMC on the PI/MUX cabinet interface panel mounting frame. (Note: 852204G1 concentrator boards are used for the MUX audio interface.)

2. Cable up audio in with respect to the MUX using T1 MUX audio cable (cable 19D903880P120-129). For audio channels 1-23, connect the P2 connector to J14 of the audio concentrator panel, and the P1 connector to X1 of the MUX.

3. Cable up audio out with respect to the MUX using T1 MUX audio cable (cable 19D903880P120-129). For audio channels 1-23, connect the P2 connector to J14 of the audio concentrator panel, and the P1 connector to X2 of the MUX.

4. For the T1 audio link to the PI, connect one end of the T1 Trunk A MUX cable (see T1 Trunk A MUX Cable Assembly, Drawing 2203711) to the PI port labeled "Trunk A -- E1/T1," starting with the lowest numbered port, and connect the other end to the Y4 DG-A pins of the MUX.



19D903628	Length	19D903628	Length	19D903880	Length
P71	20'	P11	20'	P120	5'
P72	40'	P12	40'	P121	15'
P73	52'	P13	52'	P122	7'
				P123	10'
				P124	20'
				P125	25'
				P126	30'
				P127	35'
				P128	40'
				P129	50'

Figure 16 - T1 with NEC ND4E MUX

To connect Digroup B, the interface cabling steps below must be performed.

1. Install the concentrator panels for the MUX audio interface to the IMC on the PI/MUX cabinet interface panel mounting frame. (Note: 852204G1 concentrator boards are used for the MUX audio interface.)

2. Cable up audio in with respect to the MUX using T1 MUX audio cable (cable 19D903880P120-129). For audio channels 1-23, connect the P2 connector to J14 of the audio concentrator panel, and the P1 connector to Z1 of the MUX.

3. Cable up audio out with respect to the MUX using T1 MUX audio cable (cable 19D903880P120-129). For audio channels 1-23, connect the P2 connector to J14 of the audio concentrator panel, and the P1 connector to Z2 of the MUX.

4. For the T1 audio link to the PI, connect one end of the T1 Trunk A MUX cable (see T1 Trunk A MUX Cable Assembly, Drawing 2203711) to the PI port labeled "Trunk A -- E1/T1," starting with the lowest numbered port, and connect the other end to the Y4 DG-B pins of the MUX.

For power to the T1 MUX the step below must be performed.

1. Connect one end of the power cable (see 48V Power -- T1 MUX Cable Assembly, Drawing 2203714) to J7 of the 4U Power Control Chassis. Connect the other end of the power cable to Y1 of the MUX, with -48V to MAIN 1 and GND to BAG (see Jessica T1 System Rack AC/DC Wiring Diagram, Drawing 4503703).

If the MUX was not delivered correctly configured by the manufacturer or if the MUX and/or cards are being replaced, then the MUX should be reconfigured as shown below. The ACU module of the MUX is used to complete work on the first five items. The last three items are performed with switches on the MUX channel cards.

NEC ND4E FPA

- DG-A is enabled.
- DG-B is disabled.
- Framing is ESF.
- Line Coding is B8ZS.
- CLKA is NDDS and LOOP.
- E&M VF channel card TX Attenuation is 16 dBm.
- E&M VF channel card RX Attenuation is 0 dBm.
- E&M VF channel card switch is in BUSY position.

There are two visual indications that the MUX is operating properly:

1. The MAJ and MIN alarm LEDs and the various "Fail" LEDs on the front of the MUX are not illuminated (these LEDs illuminate when the MUX is not working properly).

2. The PI terminal does not display the message "MUX trunk alarm" on the screen. This message is only displayed when the MUX is working improperly.

7.1.2.2.1. Trunk Processing Memory Clear (ND4E only)

This procedure is performed whenever power is cycled to extinguish the blinking green ALM LED on the ACU board. Data stored previously are cleared in order of the occurrence of CGA in the TP memory.

1. Verify that the display on ACU(DS1) indicates either ND4E or SYS:
   If ND4E is indicated, go to step 2.
   If SYS is indicated, go to step 5.
2. Press the right or left arrow key to indicate SYS.
3. Verify that the display on ACU(DS1) indicates SYS:
   If YES, go to step 5.
   If NO, go to step 4.
4. Press the RTN key until SYS is indicated, and go to step 5.
5. Press the ENTR key.
6. Verify that the display on ACU(DS1) indicates EQPT.
7. Press the right arrow key to indicate CONT, and press the ENTR key.
8. Verify that the display on ACU(DS1) indicates TPMC, and press the ENTR key.
9. Verify that the display on ACU(DS1) indicates DG-A or DG-B.
10. Note: DG-A is Digroup A and DG-B is Digroup B.
    Select DG-A or DG-B by using the left or right arrow keys and press the ENTR key.
11. Verify that the display on ACU(DS1) indicates CONT.
12. Press the RTN key to return to SYS.
13. The procedure is completed.

7.1.2.2.2. Carrier Group Alarm (CGA) Counter Reset (ND4E only)

This procedure is used to reset the CGA counter for each digroup. It should be performed after a MUX power cycle.

1. Verify that the display on ACU(DS1) indicates either ND4E or SYS.
   If ND4E is indicated, go to step 2.
   If SYS is indicated, go to step 5.
2. Press the right or left arrow key to indicate SYS.
3. Verify that the display on ACU(DS1) indicates SYS:
   If YES, go to step 5.
   If NO, go to step 4.
4. Press the RTN key until SYS is indicated, and go to step 5.
5. Press the ENTR key.
6. Verify that the display on ACU(DS1) indicates EQPT.
7. Press the right arrow key to indicate CONT, and press the ENTR key.
8. Verify that the display on ACU(DS1) indicates TPMC.
9. Press the right arrow key to indicate RST, and press the ENTR key.
10. Verify that the display on ACU(DS1) indicates CGAA or CGAB.
11. Note: CGAA resets the CGA counter for DG-A and CGAB resets the counter for DG-B. The factory default setting is CGAA.
    Select CGAA or CGAB by using the right or left arrow key, and press the ENTR key.
12. Verify that the display on ACU(DS1) indicates CONT.
13. Press the RTN key to return to SYS.
14. The procedure is completed.

7.1.2.2.3. Enabling Digroup Alarm

The T1 multiplexer contains two independent multiplexers: Digroup A (DG-A) and Digroup B (DG-B).

This procedure describes how to enable each digroup used in the system.

1. Verify that the display on ACU(DS1) indicates either ND4E or SYS:
   If ND4E is indicated, go to step 2.
   If SYS is indicated, go to step 5.
2. Press the left or right arrow to indicate SYS.
3. Verify that the display on ACU(DS1) indicates SYS.
   If YES, go to step 5.
   If NO, go to step 4.
4. Press the RTN key until SYS is indicated, and go to step 5.
5. Press the ENTR key.
6. Verify that the display on ACU(DS1) indicates EQPT, and press the ENTR key.
7. Verify that the display on ACU(DS1) indicates DS1, and press the ENTR key.
8. Verify that the display on ACU(DS1) indicates DG-A or DG-B.
9. Note: DG-A is Digroup A and DG-B is Digroup B.
   Select DG-A or DG-B by using the left or right arrow keys and press the ENTR key.
10. Verify that the display on ACU(DS1) indicates ENBL or DSBL.
11. Note: ENBL enables the alarm monitor in the appropriate digroup and DSBL disables it in the appropriate digroup. The factory default setting is ENBL.
    Select ENBL or DSBL by using the left or right key, and press the ENTR key.
12. Verify that the display ACU(DS1) indicates EQPT.
13. Press the RTN key to return to SYS.
14. The procedure is completed.

7.1.2.2.4. Frame Format

This procedure describes how to set the frame format on the DS1 signal for DG-A or DG-B.

1. Verify that the display on ACU(DS1) indicates either ND4E or LINE.
   If ND4E is indicated, go to step 2.
   If LINE is indicated, go to step 4.
2. Press the right or left arrow key to indicate LINE.
3. Verify that the display on ACU(DS1) indicates LINE, and go to step 4.
4. Press the ENTR key.
5. Verify that the display on ACU(DS1) indicates CLK.
6. Note: DG-A is Digroup A and DG-B is Digroup B.
   Press the right arrow key to indicate DG-A or press the right arrow key twice to indicate DG-B, and press the ENTR key.
7. Verify that the display on ACU(DS1) indicates FRAM, and press the ENTR key.
8. Verify that the display on ACU(DS1) indicates SF or ESF.
9. Note: Super Frame (SF) mode or Extended Super Frame (ESF) mode is selected as the frame format on the DS1 signal. In the SF mode, 1 multi-frame consists of 12 frames. In the ESF mode, 1 multi-frame consists of 24 frames. The factory default setting is SF.
   Select SF or ESF by using the right or left arrow key and press the ENTR key.
10. For Digroup A, DG-A is indicated. For Digroup-B, DG-B is indicated.
    Verify that the display on ACU(DS1) indicates DG-A or DG-B, and press the ENTR key.
11. Verify that the display on ACU(DS1) indicates CODE.
12. Return to LINE using the RTN key.
13. The procedure is completed.

7.1.2.2.5. Line Coding

This procedure describes how to set the line code on the DS1 signal for DG-A or DG-B.

1. Verify that the display on ACU(DS1) indicates either ND4E or LINE.
   If ND4E is indicated, go to step 2.
   If LINE is indicated, go to step 4.
2. Press the right or left arrow key to indicate LINE.
3. Verify that the display on ACU(DS1) indicates LINE, and go to step 4.
4. Press the ENTR key.
5. Verify that the display on ACU(DS1) indicates CLK.
6. Note: DG-A is Digroup A and DG-B is Digroup B.
   Press the right arrow key to indicate DG-A or DG-B, and press the ENTR key.
7. Verify that the display on ACU(DS1) indicates FRAM.
8. Press the right arrow key to indicate CODE, and press the ENTR key.
9. Verify that the display on ACU(DS1) indicates ZCS or B8ZS.
10. Note: Zero Code Suppression (ZCS) or Bipolar with 8 Zeroes Substitution (B8ZS) is selected as the line code on the DS1 signal. ZCS suppresses all zeroes by transforming the seventh bit of a channel to 1 when all of the 8-bit data assigned to each channel have changed to zero. B8ZS changes all consecutive zeroes of 8-bit data to the pattern and restores the pattern to all consecutive zeroes of 8-bit data at the receiving side. The factory default setting is ZCS.
    Select ZCS or B8ZS by using the left or right arrow key and press the ENTR key.
11. Note: For Digroup A, DG-A is indicated. For Digroup B, DG-B is indicated.
    Verify that the display on ACU(DS1) indicates DG-A or DG-B, and press the ENTR key.
12. Verify that the display on ACU(DS1) indicates EQL.
13. Return to LINE using the RTN key.

7.1.2.2.6. Clock Source

This procedure describes how to set the clock source for the DS1 signal for DG-A or DG-B.

1. Verify that the display on ACU(DS1) indicates either ND4E or LINE.
   If ND4E is indicated, go to step 2.
   If LINE is indicated, go to step 4.
2. Press the → or ← key to indicate LINE.
3. Verify that the display on ACU(DS1) indicates LINE, and go to step 4.
4. Press the ENTR key.
5. Verify that the display on ACU(DS1) indicates CLK, and press the ENTR key.
6. Verify that the display on ACU(DS1) indicates EXTI.
7. Press the → key twice to indicate CLKA, and press the ENTR key.
8. Verify that the display on ACU(DS1) indicates NDDS or DDS.
9. Select NDDS or DDS by using the → or ← key, and press the ENTR key.
   If NDDS is selected, go to step 10.
   If DDS is selected, to step 12.
10. Verify that the display on ACU(DS1) indicates EXT, LOOP, or INT.
11. Note: EXT is applied to use the external clock as the non-DDS clock. LOOP is applied to use the DS1 receive clock as the non-DDS clock. INT is applied to use the internal clock generated by ND4E as the non-DDS clock. The factory default setting is INT.
    Set one clock out of EXT, LOOP, or INT by using the → or ← key, press the ENTR key, and then go to step 12.
12. Verify that the display on ACU(DS1) indicates CLK, and press the ENTR key.
13. Verify that the display on ACU(DS1) indicates CLKB.
14. Return to LINE using the RTN key.
15. The procedure is completed.

7.1.3. MD110 Installation and Configuration

The Ericsson MD110 PBX must be installed and configured for the Jessica customer-specific application. Advance planning and coordination with Ericsson Business Network (EBN) is required before an MD110 installation. The MD110 installation is performed by EBN or other in-country Ericsson sales office Typically, the MD110 installation will be performed by a certified MD110 technician. Refer to EN/LZB 103 866, Installation MD110/50, for instructions on MD110 installation.

MD110 installation includes MD110 software and customer data base loading. A “standard” MD110 configuration file tailored for Jessica is provided; however, those installing Jessica must modify this configuration to meet the customer-specific MD110 requirements. Refer to LBI-39039, MD110 Configuration Manual, and the MD110 Customer Library for information on properly configuring the MD110.

Ericsson Inc. is responsible for working with the customer to provide MD110 configuration definition. This is performed by completing the MD110 configuration questionnaire contained in LBI-39039 before the MD110 installation. Several areas that must be defined are listed below.

- Specification of trunk line connections.
- Definition of trunk characteristics.
- Definition of MD110 numbering plan.
- Specification of least-cost routing requirements.
- Identification of toll call restrictions.

7.1.4. MD110-to-PI Interconnect Cabling

Either a T1 or an E1 ISDN trunk line is used to connect the MD110 to the PI.

1. Connect one end of the cable labeled TSR 252 0111/20000 (see E1/T1 Trunk B MD110 Cable Assembly, Drawing 2203712, on how to put together cable) directly to the PI port labeled "Trunk B -- MD110," starting with the lowest numbered port, and connect the other end to the LFU7 filter board within the MD110. The LFU7 filter board will be located in the filter magazine, which is the top magazine or card cage in the MD110 cabinet.

   The correct connection point at the LFU7 is found as follows: Find the TLU-63/1 or TLU-64/1 ISDN trunk board in the MD110 that is used for connection to the PI. This board will be located in one of the lower magazines in the MD110 cabinet. The cable connector that plugs into the front of the board is labeled. It will be labeled similar to the example that follows:

   29A*4R

   This indicates where the cable connects in the filter magazine. The filter magazine contains boards primarily of the LFU type along with SFU and PFU boards. The cable number labeling indicates the following:

29	The position the LFU7 occupies in the filter magazine. Each slot in the magazine is numbered.
A	The top half of the LFU7 board. The LFU7 has two connector sections, the top is A and the bottom is B.
4R	The quarter-connector position at the rear of the LFU7 where the cable connects. Each connector section A and B is divided into four quarter-connectors. Connector 1 is at the top and 4 is the lowest or last quarter-connector.

   The TSR 252 0111/20000 cable plugs into the front of the LFU7 in slot 29 in the top connector section at the lowest quarter-connector position. This is only an example; verify the label on the cable connector at the TLU-63/1 or TLU-64/1 board to determine the correct connection point.

7.1.5. System Manager-to-PI Interface Cabling

Plug one end of the cable (refer to section 5.2.1 for the cable part number) into Jessica port 4 and the other end into the System Manager port that is specified in the System Manager Communication Parameters screen in the parameter Communication Parameters: Prim Line Port Name (see Table 5). Refer to Drawing 2603732, MVME712M Transition Module.

7.1.6. System Manager Database Programming

The System Manager interfaces with Jessica over a serial connection and provides individual call restrictions with no site activity monitor. Jessica supports a direct connection. If dialup modem capability is desired, an external modem setup is required. The Jessica system initializes itself with the parameter values found in CONFIG.DAT or with the default if not specified (correctly) in CONFIG.DAT. When the System Manager link is established, new parameter values may be sent to Jessica at any time, but will not be written to CONFIG.DAT. Jessica is regarded as a site by the System Manager. However, some of the screens in System Manager are misnamed/not used. System Manager parameters referenced within this document are underlined to preclude confusion with Jessica parameters.

7.1.6.1. Initialization of System Manager Link

Set System Manager communication parameters Device Password (Jessica) and Prim Line Baud Rate (19200) to the Jessica defaults. See LBI-38703, System Manager Installation, Setup and Troubleshooting, for the procedure to change the System Manager baud rate. To change the baud rate on Jessica, set SM_BAUD_RATE to the desired value (9600 or 19200) and reboot Jessica.

7.1.6.2. Configuration of Jessica Site

Perform the steps below to configure Jessica as a site in the System Manager. Refer to LBI-38984, System Manager User's Manual, and Table 5 for more information.

1. Select System Manager menu item 10 Site Definition.
   a. Set RF and Allowed CC according to Table 5.
   b. Set Message Conv Limit (suggested setting is 5 minutes).
   c. Set Interconnect Hang Time (suggested setting is 30 seconds).
   d. Set Rotate Assignments and Assign Chan Ascending as desired.
2. Select System Manager menu item 11 Logical Unit Definition.
   a. For each LID on the interconnect system, set the parameters according to Table 6.
3. Select System Manager menu item 12 Group Definition.
   a. For each GID on the interconnect system, set the parameters according to Table 7.
4. Select System Manager menu item 14 Line Definition. (This step is required only for multinode Jessica systems. Please refer to section 4.1.)
   a. Set Line Active and Dedicated To Unit columns according to Table 5.

These settings will not take effect until Jessica is rebooted or the database is uploaded according to LBI-38984, System Manager User's Manual.

7.1.6.3. System Manager Screens Defined for Jessica

Refer to LBI-38984, System Manager User's Manual, for information on logging into the System Manager and general screen format.

NOTE

The RF: field in the System Manager Channel Config screen is not used because it can operate on only 24 of the 32 bit positions. The Toll Call Restrictions screens are also not used because they can support 4-digit restrictions only.

The table below enumerates the defined System Manager screens directly interfacing with Jessica. Screens not explicitly listed here have no effect on Jessica. Only Device Number, Communication Parameters: Device Password, and Communication Parameters: Prim Line Baud Rate must be set both at the System Manager and at the PI (corresponding PI CONFIG.DAT parameters are SITE_ID, SM_PASSWORD, and SM_BAUD_RATE, respectively). The remaining parameters in the table may be set at either the PI or the System Manager.

NOTE

In Table 5, the associated PI parameters are indicated as an aid in debugging to verify that PI parameters were correctly received.

Table 5 - System Manager Screens Interfacing with Jessica

Selected Menu Item	Screen	Parameter Initialization
10 Site Definition	Selected Device	Device Number = SITE_ID parameter from Jessica CONFIG.DAT or default (16) Device Type = SITE Device Name = JESSICA (arbitrary name)
	1:4 Channel Config	RF: CNNNNNNNNNN (Sys Man requires one to be C) Allowed CC: YNNNNNNNNN All other parameters are unused.
	2:4 Site Parameters	Message Conv Limit: (corresponds to CONVERSATION_LIMIT configuration parameter in CONFIG.DAT. Note that unit conversion is required.) Interconnect Hang Time: (corresponds to HANG_TIME configuration parameter in CONFIG.DAT.) Rotate Assignments: (corresponds to ROTATING_ASSIGNMENTS configuration parameter in CONFIG.DAT). Assign Chan Ascending: (corresponds to ASSIGNMENT_ORDER configuration parameter in CONFIG.DAT.) All other parameters are unused.
	4:4 System Manager Communication Parameters	Communication Parameters:Device Password: (must equal SM_PASSWORD parameter from CONFIG.DAT also set at the PI or default) Device Internal ID: (corresponds to SITE_ID from CONFIG.DAT.) Communication Parameters: Prim Line Port Name: (corresponds to physical VAX port to which Jessica PI is tied) Communication Parameters: Prim Line Baud Rate: (must equal SM_BAUD_RATE in CONFIG.DAT also set at the PI or its default)

Table 5 - System Manager Screens Interfacing with Jessica (Cont.)

Selected Menu Item	Screen	Parameter Initialization
11 Logical Unit Definition	Selected Unit	Unit Number: (LID)
	2:3 Radio Parameters	Call Priority:Interconnect: (range 0-7) Radio Features: Inb Interconnect: (Y or N) Interconnect: Toll Call Restrictions: (class level 0-15) Interconnect: Rotary Number: (Either Rotary Number or Dedicated Line field nonzero means outbound interconnect is enabled. Both fields zero means outbound interconnect is disabled.) Interconnect: Dedicated Line: (Either Rotary Number or Dedicated Line field nonzero means outbound interconnect is enabled. Both fields zero means outbound interconnect is disabled.)
	3:3 Wide Area	Valid Site (for unit): (Y means valid LID; N means invalid LID. Must be Y for Jessica.)
12 Group Definition	Selected Group	Group Id: (GID)
	2:3 Group Parameters	Call Priority: Interconnect: (range from 0-7) Features: Inb Interconnect: (Y or N) Note that outbound group calls cannot be made.
	3:3 Wide Area	Valid Site: (Y means valid GID; N means invalid GID.)
14 Line Definition	Interconnect Line Definition	Line Active and Dedicated To Unit columns filled in. Each PI MUX channel must have a LID dedicated for the MUX channel (Line) for **Multinode** Jessica Systems. LID must be valid in system and not assigned to a radio. (Refer to section 4 for a discussion of Multinode Jessica Systems.)
21 Site Reconfig Call Parameters	Selected Device	Site Number: (corresponds to SITE_ID parameter from Jessica CONFIG.DAT also set at the PI or default.)
	2:5 Channel Assignment Parameters	Message Conv Limit: (corresponds to CONVERSATION_LIMIT configuration parameter. Note that unit conversion is required.) Interconnect Hang Time: (corresponds to HANG_TIME configuration parameter.***)*** Rotate Assignments: (corresponds to ROTATING_ASSIGNMENTS configuration parameter.***)*** Assign Chan Ascending: (corresponds to ASSIGNMENT_ORDER configuration parameter.) All other parameters are unused.
30 Device Communication	Database Upload	Full Logical ID Database: (Y or N) Full Group ID Database: (Y or N) Logical ID Changes: (Y or N) Group ID Changes: (Y or N) Current Time: (Y or N) Line Database: (Y or N)

7.1.6.4. System Manager LID/GID Database Initialization

The LID/GID database initialization algorithm shown below is executed upon Jessica reboot.

If (LID.DAT and GID.DAT present on hard disk)
    Read in files
else
    Request database from System Manager

If (System Manager driver on Jessica does not receive the database when requested)
    An error message is logged stating database must be UPLOADED from the System Manager terminal.

Unlike a site, Jessica does not request the database periodically until it receives it.

7.1.6.5. System Manager-PI Site Parameters

The channel assignment parameters listed in screen 2:5 may be loaded from the System Manager. Upon reboot, the PI loads the parameters from CONFIG.DAT if correctly specified or else the PI loads the default values. To block the reception of the channel assignment parameters listed in Screen 2:5, modify the PI SYS_MGR_UPDATES parameter from CONFIG.DAT. There is no configuration parameter to prevent the System Manager LID/GID updates (the System Manager cable would have to be physically removed).

7.1.6.6. System Manager Setup

SYSTEM MANAGER CONFIGURATION FOR JESSICA

- LID/GID must be wide-area enabled to place or receive multisite interconnect calls.
- Site Channels must be wide-area enabled to allow multisite interconnect calls.
- Site Channels should not be interconnect enabled. This is for local interconnect only. Enabling this field for Jessica could result in false alarms.
- The Maximum Interconnect Calls for a site is set based on the maximum number of concurrent interconnect calls appropriate for the site. If the sum of the Maximum Interconnect Calls for all sites on the Multisite Network exceeds the number of Jessica audio channels available, interconnect calls may be blocked.
- A site must be created for Jessica.
- The default for the Jessica site ID is 16, but can be changed to any number under 32 that is not being used.

If the System Manager interface is present, LIDs must be inbound enabled, outbound enabled, and valid at the Jessica site regardless of whether individual toll call restrictions will be used.

Table 6 presents fields from the System Manager Logical Unit Definition (menu item 11) used for LID configuration. Table 7 presents System Manager Group Identification (menu item 12) used for GID configuration.

Table 6 - Description of Fields Jessica Uses from LID Database

System Manager Field	Application in Jessica
Interconnect: Toll Call Restrictions	Defines the user's toll call class. See section 4 herein for details on call validation.
Radio Features: Inb Interconnect	If set to Y, then the user is allowed to receive inbound interconnect calls. If set to N, then the user is not allowed to receive inbound interconnect calls.
Interconnect: Rotary Number or Interconnect: Dedicated Line	Together these fields define whether outbound interconnect calls are allowed. If either field is nonzero, then outbound is allowed. If both fields are zero, then outbound is not allowed.
Call Priority: Interconnect	Defines the user's interconnect priority for priority service channels/dedicated lines.
Wide Area: Valid Site	Defines whether the user is allowed access to Jessica. If the Jessica site field is set to N, the user will not be allowed to place or receive any interconnect calls. If the Jessica site field is set to Y, the user is allowed to access Jessica, subject to the restrictions above.

Table 7 - Description of Fields Jessica Uses from GID Database

System Manager Field	Application in Jessica
Radio Features: Inb Interconnect	If set to Y, then the group is allowed to receive inbound interconnect calls. If set to N, then the group is not allowed to receive inbound interconnect calls.
Call Priority: Interconnect	Defines the group's interconnect priority for priority service channels/dedicated lines.
Wide Area: Valid Site	Defines whether the group is allowed access to Jessica. If the Jessica site field is set to N, the group will not be allowed to receive interconnect calls. If the Jessica site field is set to Y, the group is allowed to access Jessica, subject to the restrictions above.

7.1.7. Jessica Proper Shutdown

For the MD110:

1. If changes to the configuration have been made since the last ***save***, execute the following command from the MD110 terminal: DUSYI:DUMP=CHANGES. Wait for the save to complete; this can last up to 40 minutes. Do not remove power while the save is in progress!

2. Remove MD110 power.

For the PI:

1. Execute ***shutdn*** or ***shutdn -i*** from the PI terminal. This will prevent new calls from beginning. The ***shutdn -i*** causes immediate termination of active calls, while ***shutdn*** allows active calls to terminate normally.

2. After all calls have ended, execute ***sync*** from the PI terminal.

3. Remove power.

7.1.8. Software and Hardware Upgrades

Upgrading Jessica involves changes to both the software and the hardware. The steps to perform these upgrades are presented in the subsections below.

7.1.8.1. Software Upgrades

To install application software upgrades, follow the steps below.

1. This portion of the upgrade physically connects the System Manager and the PI, and adds the Jessica site to the System Manager (with the SITE_ID as specified in CONFIG.DAT). The LIDs/GIDs must be valid, inbound enabled, outbound enabled, and have their toll call class initialized. Please see section 7.1.5 for instructions on connecting the System Manager and the PI and section 7.1.6 to set up the System Manager database programming.

2. The next portion of the upgrade loads the applications. Take care regarding Disk 4, which has CONFIG.DAT, ALLOW.DAT, DISALLOW.DAT, PRIORITY.DAT, IP.DAT, ROUTES.DAT, PBXFEAT.DAT, and EXPORTS.DAT, or you may overwrite the files that have been tailored for the customer site. Unless the software release notes specify to use Disk 4, skip steps involving Disk 4. If Disk 4 is installed, there is an automatic backup procedure which copies the old configuration files to the backup directory. You may recover the customer site-specific information from this backup directory. Please refer to the application loading section of LBI-39040 and follow the steps presented.

7.1.8.2. Hardware Upgrades

1. Please make the jumper changes described below.
   a. Refer to Drawing 2603732, MVME712M Transition Module. The System Manager (port 4) requires that the jumpers be moved from J19 to J18.
   b. Refer to Drawing 3603735, sheet 2, fv5310 WAN Server Mezzanine Card. Ensure that jumpers are as indicated.

2. Instructions for physically connecting the System Manager and the PI are presented in section 7.1.5.

3. For ROM operating system software upgrades, follow the steps below.

   a. Execute ***shutdn*** with the PI terminal.
   b. Execute ***status*** until no calls are active.
   c. Execute ***sync*** with the PI terminal.
   d. Remove power to the PI.
   e. Remove the PIC board and use proper ESD protection.
   f. Install new ROM U22 and ROM U30.
   g. Replace PIC board.
   h. Reapply power.

7.2. INSTALLATION AT IMC

The following additional documents are referenced in performing steps of the Jessica installation at the IMC:

- LBI-38938, CEC/IMC Installation, Set-Up and Troubleshooting
- LBI-38939, CEC/IMC Customer-Specific System Documentation Overview
- LBI-39040, PBX Interface User's Manual
- EN/LZB 103 866, Installation MD110/50
- LBI-39039, MD110 Configuration Manual
- LZBU 106 100, MD110 Customer Library -- Small Basic, BC 6

The steps below must be performed to connect Jessica to an IMC for the first time.

7.2.1. PIM Controller and Audio Boards Installation and Cabling

PBX Interface Module (PIM) controller and audio boards must be configured correctly and installed in the IMC.

1. Set the dip switches on a control board for operation as a PIM with the correct site ID (must agree with PI site ID), and insert the PIM control board into the IMC. Dip switches should be set as indicated below. Open indicates the "up" or "on" position.

SW1

1	2	3	4	5	6	7	8
open	closed	closed	closed	MSB	closed	closed	open

Switch 5 is the MSB of the site ID.

SW2

1	2	3	4	5	6	7	8
open	closed	open	-	-	-	-	LSB

Switches 4 to 8 are used to define the site ID in binary, with switch 8 as the LSB.

2. Insert the appropriate number of audio boards, with the dip switches set to reflect the number of the card. (See IMC LBI-38938, Drawing 19D903515, Sheet 3.)

3. Insert the parallel I/O cable (Part No. 344A3728P1) on the IMC backplane (JP1xx or JP2xx) from:
   Control board to first audio board
   First audio board to second audio board
   Continuing through the daisy chain until finished

4. Install the concentrator panel for the PIM control card on the IMC interface panel mounting frame. (Note: A 903531P1 audio concentrator is used for the PIM control card and the audio cards. Refer to Figure 16.)

5. Install the concentrator panels for the PIM audio cards on the IMC interface panel mounting frame.

6. Install Cable 19D903628P7x from the IMC backplane to the PIM control concentrator panel at the IMC. (See Figure 15 or Figure 16 herein for T1 or E1, respectively.) THIS CABLE IS UNIDIRECTIONAL. (See Figure 17.)

7. Install Cables 19D903628P1x from the IMC backplane to the PIM audio concentrator panel at the IMC. (See Figure 15 or Figure 16 herein for T1 or E1, respectively.)

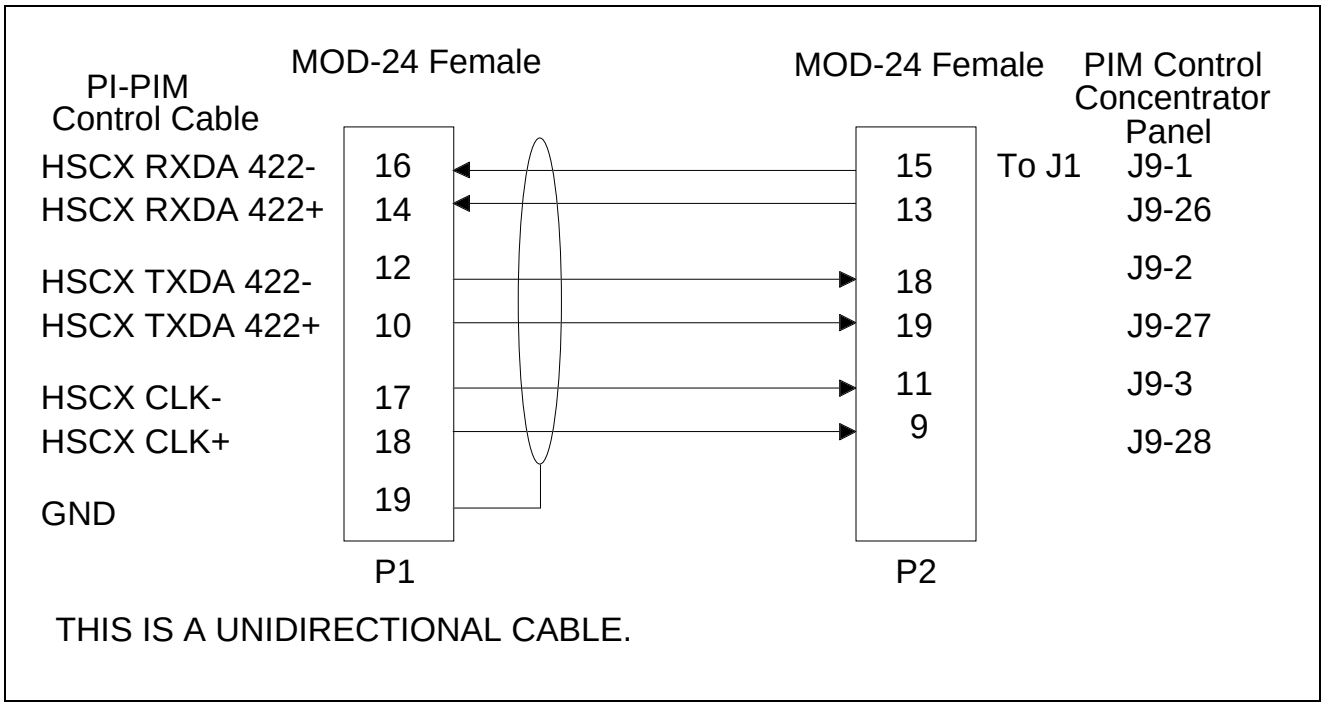


Figure 17 - IMC Backplane to Concentrator Panel -- 19D903628P (-71, -72, or -73)

7.2.2. CEC/IMC Manager Setup

The following steps must be performed at the CEC/IMC Manager (MOM PC) to configure the CEC/IMC switch for Jessica. Both the TDM Bus slots and audio levels must be set up correctly.

1. To set the number of slots:
   a. Log in to the MOM PC.
   b. Select System Audio Configuration.
   c. Select TDM Bus and Slot Configuration.
   d. Select System Slot Configuration.
   e. Select Configure Slots.
   f. Select Site Slots.
   g. Scroll to the site for Jessica.
   h. Set the number of slots to the number of audio channels.
   i. Press Escape twice.
   j. Select Send Slots.
   k. The screen should display the message "Slot Allocation successfully sent to MOM controller".
   l. Press Escape until reaching the main menu.

2. To set the audio levels:
   a. From the main menu select System Audio Configuration.
   b. Select Trunked Channel Configuration.
   c. Select Site ID.
   d. Pg Dn to Site ID field and enter the Jessica site number, then press Return.
   e. Enter the EDACS IMC configuration for the PIM input and output audio settings with these values.
      PIM Audio (T1 NEC MUX) Audio Out 0 dBm; Audio In 0 dBm.
      PIM Audio (E1 ANT MUX) Audio Out -14 dBm; Audio In 0 dBm.
   f. Press F7 to send values.
   g. The screen should display the message "Trunked Channel Configuration received by site <#>".
   h. Press any key.
   i. Press F5 to save the values to disk.

j. The screen should display the message "Trunked Channel Configuration Changed. Save to Disk?".
k. Select Yes.
l. The screen should display the message "Site # Trunked Channel Configuration Data Saved To Disk! --Press <Esc> to Continue--".
m. Press Escape until reaching the main menu.

7.2.3. IMC-to-PI/MUX Interconnect Cabling

The steps below must be performed to complete the IMC-to-PI/MUX control and audio interconnect cabling.

1. Install Cable 19D903880P12x from the PIM control concentrator panel at the IMC to the control concentrator panel at the PI. (See Figure 15 and Figure 16 herein for T1 and E1, respectively. This cable is the control link, and there is only 1 cable to be installed.) **A 6-wire control signal link is used which requires that an audio concentrator panel be used for the control link, instead of the typical data concentrator panel.**

2. Install Cables 19D903880P12x from the PIM audio concentrator panel at the IMC to the audio concentrator panels at the PI. (See Figure 15 or Figure 16 herein for T1 or E1, respectively.) These cables are the audio link, and there are 2 to 4 cables to be installed.)

7.3. INSTALLATION AT SITES

The following additional documents are referenced in performing steps of the Jessica installation at the sites:

- LBI-38985, EDACS Site Controller Maintenance Manual
- LBI-38894, GETC Maintenance Manual

7.3.1. Site Controller Personality Configuration

The Site Controller personality must be configured correctly for Jessica telephone interconnect operation. Follow the normal installation procedures found in LBI-38985, EDACS Site Controller Maintenance Manual.

The configuration below is required for the EDACS equipment.

SITE CONTROLLER CONFIGURATION
Personality PROM
With System Manager

- Interconnect is set to centralized.
- Confirmed CTIS calls.
- Start up wide-area table specifies LID 16383 and each GID allowed to receive inbound interconnect calls (limit 60 GIDs).
- Site channels are wide-area enabled.
- The Maximum Interconnect Calls for a site is set based on the maximum number of concurrent interconnect calls appropriate for the site.

7.3.2. GETC Personality Configuration

GETC personalities must be configured correctly for Jessica telephone interconnect operation. Follow the normal installation procedures found in LBI-38894, GETC Maintenance Manual.

The configuration required for use with the EDACS equipment is shown below.

GETC CONFIGURATION
Control Channel/Working Channel, Downlink, and SCAT
Personality PROM

- Enable CONFIRMED CALL for all GETCs except SCAT. If the GETC programmer does not allow for this, it is accomplished by a hex edit of the personality per feature programming instructions 349A9945P1.
- CTIS is set to YES.
- Multisite System is set to YES.
- Individual channels are enabled for interconnect.
- Individual channels are enabled for External CIU (digital interconnect) only.
- Maximum Interconnect Calls is set to the appropriate number for the site.
- Recommended Special Call Hang Time is 30 seconds.
- Recommended Message Trunked Timer is 5 minutes.
- SCAT is set to YES **for SCAT GETC only!**

PI hang time and conversation limit should be set greater than those of the site so that the site GETC will generate alerting tones to the radio before dropping a call. This setup provides the radio user the options of pushing the PTT button to continue the call or simply allowing the call to be dropped due to expiration of the hang time or conversation limit.

7.4. INSTALLATION VERIFICATION

This section provides information on how to verify that the IMC, PI, MUX, and MD110 ISDN subsystems are working correctly.

7.4.1. Subsystem Verification at Sites/IMC

This section discusses how to verify that the site IMC subsystems are working correctly. Please consult your radio user's manual for instructions on making the calls listed below. This section does not verify Jessica, the Jessica interface, or the IMC PIM. This section may point out a problem with the GETC or site controller programming.

Test	Results
Make a single-site individual call.	**Called LID unconfirmed call** Hear channel access alert tone, then audio is transmitted to the receiving radio. **Called LID confirmed call** Hear queue tone. Hear channel access alert tone, then audio is transmitted to the receiving radio.
Make a multisite individual call.	**Called LID unconfirmed call** Hear channel access alert tone, then audio is transmitted to the receiving radio. **Called LID confirmed call** Hear queue tone. Hear channel access alert tone, then audio is transmitted to the receiving radio.
Make a single-site group call.	**Called GID unconfirmed call** Hear channel access alert tone, then audio is transmitted to the receiving radio. **Called GID confirmed call** Hear queue tone. Hear channel access alert tone, then audio is transmitted to the receiving radio.
Make a multisite group call.	**Called GID unconfirmed call** Hear channel access alert tone, then audio is transmitted to the receiving radio. **Called GID confirmed call** Hear queue tone. Hear channel access alert tone, then audio is transmitted to the receiving radio.

7.4.2. Verification Test at the MOM PC

At the MOM PC:
Log in to MOM.
Select View System/Diagnostics.
At the System Display, check to ensure that "P" is not blinking.
At the Site Display (use function keys to switch between displays), check to ensure that the Jessica site number is not blinking.
At the Link Status Display (F9), check for "LU," which stands for Link Up.

7.4.3. Verification Test at the PI

At the PI:
Ensure that the power is on.
Log in at the terminal.
At the pSOS prompt (pSH+>), check the system status by typing "Status".
Verify the following:
ISDN Comm Status has Comm Enabled and No Trunk Alarms.
IMC Comm Status has Comm Enabled and Link Up.
Total Channels has the proper number of channels.

7.4.4. Jessica Installation Verification

This section provides information on how to verify that Jessica is functioning properly.

The following tests are performed for clear voice and digital voice unless the system does not support both. Consult your radio user's manual for instructions on making the calls below. If any calls fail, consult section 8 for information on troubleshooting.

Table 8 - Installation Verification

Test	Results
Make an inbound individual call from an MD110 extension.	Hear ringing at the phone followed by audio after the radio answers. The call will terminate when the radio clears it or when the phone hangs up provided line clearing from the telephone reaches the PI.
Make an inbound single-site group call from an MD110 extension.	Hear ringing at the phone followed by audio after a radio answers. The call will terminate when the phone hangs up provided line clearing from the telephone reaches the PI.
Make an inbound multisite group call from an MD110 extension.	Hear ringing at the phone followed by audio after a radio answers. The call will terminate when the phone hangs up provided line clearing from the telephone reaches the PI.
Make an outbound call to an MD110 extension.	Hear queue tone at the radio, then ringing followed by audio when the telephone answers. The call will terminate when the radio clears it or when the phone hangs up provided line clearing from the telephone reaches the PI.

Table 8 - Installation Verification (Cont.)

Test	Results
Make an inbound individual call with an outside line from each external trunk/line installed.	Hear ringing at the phone followed by audio after the radio answers. The call will terminate when the radio clears it or when the phone hangs up provided line clearing from the telephone reaches the PI.
Make an inbound single-site group call with an outside line from each external trunk/line installed.	Hear ringing at the phone followed by audio after a radio answers. The call will terminate when the phone hangs up provided line clearing from the telephone reaches the PI.
Make an inbound multisite group call with an outside line from each external trunk/line installed.	Hear ringing at the phone followed by audio after a radio answers. The call will terminate when the phone hangs up provided line clearing from the telephone reaches the PI.
Make an outbound call to an outside line from each external trunk/line installed.	Hear queue tone at the radio, then ringing followed by audio when the telephone answers. The call will terminate when the radio clears it or when the phone hangs up provided line clearing from the telephone reaches the PI.

8. TROUBLESHOOTING

This section presents various methods for troubleshooting technical difficulties with Jessica.

8.1. TRUNK ALARM

Three levels of trunk alarms are detectable at the PI: yellow, blue, and red. These events are recorded on the Jessica administrative terminal and in the isdn.log.

Red alarms cause active calls to be torn down. The PBX interface is capable of detecting PBX/MD110 trunk alarms and MUX/IMC trunk alarms. PBX trunk alarms may be caused by incorrect clock sourcing on the PI-MD110 link.

NOTE

If a trunk alarm occurs, perform the following steps: 1) Check the cable connections and the cable, and reboot. 2) Check that the PI trunk parameters are set up correctly as shown in LBI-39040 (PI trunk parameters table). The meanings of the individual alarms are presented below.

8.1.1. Yellow Alarms

No active calls are torn down on detection of any yellow alarm. The yellow alarms below are possible.

8.1.1.1. PBX Trunk Alarming -- Received Yellow

Problem: This alarm indicates that the PBX Interface is receiving a Remote Alarm Indication (RAI) signal. The RAI signal is activated when the PBX/MD110 cannot synchronize the signal sent from the PBX Interface.

8.1.1.2. PBX Trunk Clearing -- Received Yellow

Problem: This alarm indicates that the PBX Interface is no longer receiving a yellow alarm from the PBX/MD110.

8.1.1.3. MUX/IMC Trunk Alarming -- Received Yellow

Problem: This alarm indicates that the PBX Interface is receiving a Remote Alarm Indication (RAI) signal. The RAI signal is activated when the MUX/IMC cannot synchronize the signal sent from the PBX Interface.

8.1.1.4. MUX/IMC Trunk Clearing -- Received Yellow

Problem: This alarm indicates that the PBX Interface is no longer receiving a yellow alarm from the MUX/IMC.

8.1.1.5. PBX Trunk Alarming -- Sent Yellow

Problem: This alarm indicates that the PBX Interface is sending a Remote Alarm Indication (RAI) signal. The RAI signal is activated when the PBX Interface cannot synchronize the signal sent from the PBX/MD110.

8.1.1.6. PBX Trunk Clearing -- Sent Yellow

Problem: This alarm indicates that the PBX Interface is no longer sending a yellow alarm to the PBX/MD110.

8.1.1.7. MUX/IMC Trunk Alarming -- Sent Yellow

Problem: This alarm indicates that the PBX Interface is sending a Remote Alarm Indication (RAI) signal. The RAI signal is activated when the PBX Interface cannot synchronize the signal sent from the MUX/IMC.

8.1.1.8. MUX/IMC Trunk Clearing -- Sent Yellow

Problem: This alarm indicates that the PBX Interface is no longer sending a yellow alarm to the MUX/IMC.

8.1.2. Blue Alarms

No active calls are torn down on detection of any blue alarm. The blue alarms below are possible.

8.1.2.1. PBX Trunk Alarming -- Received Blue

Problem: This alarm indicates that the PBX Interface is receiving an Alarm Indication Signal (AIS). The AIS is activated when the PBX/MD110 loses its connection to its data source and is sending all "1s" (AIS) instead.

8.1.2.2. PBX Trunk Clearing -- Received Blue

Problem: This alarm indicates that the PBX Interface is no longer receiving a blue alarm from the PBX/MD110.

8.1.2.3. MUX/IMC Trunk Alarming -- Received Blue

Problem: This alarm indicates that the PBX Interface is receiving an Alarm Indication Signal (AIS). The AIS is activated when the MUX/IMC loses its connection to its data source and is sending all "1s" (AIS) instead.

8.1.2.4. MUX/IMC Trunk Clearing -- Received Blue

Problem: This alarm indicates that the PBX Interface is no longer receiving a blue alarm from the MUX/IMC.

8.1.3. Red Alarms

All active calls will be torn down on detection of any red alarm. The red alarms below are possible.

8.1.3.1. PBX Trunk Alarming -- Received Red

Problem: This alarm indicates that the PBX Interface is receiving a red alarm. The red alarm is activated when the PBX/MD110 has a Carrier Failure Alarm (loss of synchronization).

8.1.3.2. PBX Trunk Clearing -- Received Red

Problem: This alarm indicates that the PBX Interface is no longer receiving a red alarm from the PBX/MD110.

8.1.3.3. MUX/IMC Trunk Alarming -- Received Red

Problem: This alarm indicates that the PBX Interface is receiving a red alarm. The red alarm is activated when the MUX/IMC has a Carrier Failure Alarm (loss of synchronization).

8.1.3.4. MUX/IMC Trunk Clearing -- Received Red

Problem: This alarm indicates that the PBX Interface is no longer receiving a red alarm from the MUX/IMC.

8.2. UNABLE TO MAKE CALLS AFTER SYSTEM MANAGER CONNECTED

Problem: Unable to make inbound/outbound calls after connecting the System Manager.
Solution: Use the ***dbv*** command to ensure that the database is set up correctly. Please refer to LBI-39040 for a discussion of the ***dbv*** command. The LID/GID must be inbound/outbound enabled and valid.

8.3. TOLL CALL RESTRICTIONS DO NOT APPEAR TO BE CORRECT

Problem: Toll call restrictions do not appear to be correct.
Solution: Use the ***callres*** command to verify that tables are set up correctly and that there are no system errors. Phone numbers can be tested to ensure that they are allowed/disallowed in the tables. Please refer to LBI-39040 for a discussion of the ***callres*** command.

8.4. IMC-PI TRUNK IS NOT WORKING PROPERLY

Problem: The IMC-PI trunk is not working properly.
Solution: The WAN board loopback allows the user to verify whether the PI side of the link is functioning properly. Connect J1 to J4 (port 0 to port 3) with a cable that swaps transmit and receive signals and clocks. (See Appendix A for cable specifications.) Use the ***stat*** command to verify that the link is up. The link should be back up on the order of seconds. Please refer to LBI-39040 for a discussion of the ***stat*** command. If the link does not come up, either the loopback cable is incorrect or the WAN board needs to be swapped.

8.5. LOSE INTERCONNECT AFTER MD110-PI CABLE HAS BEEN RECONNECTED

Problem: Lose interconnect after the MD110-PI cable has been disconnected and reconnected. The PI detects no trunk alarms. If incoming calls occur while the cable is disconnected, the MD110 will busy 1 channel for each call. The PI disconnect reason code shown is CALLEE_BUSY_DISCONNECT. The problems presented in section 8.6 also occur.
Solution: Rebooting just the PI will not correct the problem. Restart the MD110 TLU-63/1 or TLU-64/1 using the MD110 ***RFEXI*** command. Then, reboot the PI.

8.6. CALL NOT CONNECTING CORRECTLY AND NO TRUNK ALARMS

Problem: The call is not connecting correctly and the PI detects no trunk alarms.
Solution: Enable call logging by setting the PI CONFIG.DAT parameters DISK_LOG_CALLS and DISK_LOG_STATES to true. Refer to the activity logging section in LBI-39040 for details on reading call information and reason codes.

NOTE

On installations, the problem discussed in section 8.5 has occurred at numerous customer sites.

EXAMPLE 1

```
CALL:[00022]  OUTBOUND CLEAR  LID[00090]  [CALLEE_BUSY_DISCONNECT]:PBX
IMC[01] PBX[00] PHONE[83002495] SITES: O[07] D[00]
DUR: 000.59  DATE: 10/11/94 ST: 13:49:00 CON: 00:00:00 DIS: 13:49:01
Time-> [24192]  Event-> [CONSTRUCTION  ]  From-> [IMC] State->[OUTBOUND_ACTIVE  ]
Time-> [24192]  Event-> [CHANNEL_REQ   ]  From-> [IMC] State->[OUTBOUND_ACTIVE  ]
Time-> [24194]  Event-> [OUTBOUND_SETUP]  From-> [IMC] State->[AWAITING_SETUP   ]
Time-> [24195]  Event-> [DISCONNECT    ]  From-> [PBX] State->[SETUP_IN_PROGRESS]
Time-> [24195]  Event-> [DISC_TO_ISDN  ]  From-> [PI ] State->[BUSY_DISCONNECT  ]
Time-> [24195]  Event-> [DISC_TO_IMC   ]  From-> [PI ] State->[BUSY_DISCONNECT  ]
Time-> [24195]  Event-> [DISCONNECT_ACK]  From-> [PBX] State->[BUSY_DISCONNECT  ]
Time-> [24215]  Event-> [DISCONNECT    ]  From-> [IMC] State->[BUSY_DISCONNECT  ]
Time-> [24215]  Event-> [DISC_TO_IMC   ]  From-> [PI ] State->[DISCONNECTING    ]
Time-> [24215]  Event-> [DISCONNECT_ACK]  From-> [IMC] State->[DISCONNECTING    ]
Time-> [24215]  Event-> [DISCONNECTED  ]  From-> [PI ] State->[DISCONNECTED     ]
[11] Events
```

Note in Example 1 that the PBX (MD110) returned `DISCONNECT` after the `OUTBOUND_SETUP` from the IMC. The PI had requested a PI-MD110 channel assignment due to busy as evidenced by the `BUSY_DISCONNECT` state entered by the PI. This condition is entered due to the PI-MD110 cable problem listed in section 8.5.

EXAMPLE 2

```
CALL:[00060]  INBOUND CLEAR  GID[00545]  [PROCESSING_TIMEOUT]:PI
IMC[02] PBX[22] PHONE[] SITES: O[13] D[00] PRI[0/0] TOLL[00]
DUR: 010.30  DATE: 10/06/94 ST: 16:38:41 CON: 00:00:00 DIS: 16:38:51
Time-> [8736]  Event-> [CONSTRUCTION  ]  From-> [PBX] State->[INBOUND_ACTIVE   ]
Time-> [8736]  Event-> [REF_REQUEST   ]  From-> [PBX] State->[INBOUND_ACTIVE   ]
Time-> [8736]  Event-> [INBOUND_SETUP ]  From-> [PBX] State->[AWAITING_SETUP   ]
Time-> [8736]  Event-> [PROGRESSING   ]  From-> [IMC] State->[SETUP_IN_PROGRESS]
Time-> [8777]  Event-> [PROC_TIMEOUT  ]  From-> [PI ] State->[CALL_PROGRESSING ]
Time-> [8777]  Event-> [DISC_TO_ISDN  ]  From-> [PI ] State->[DISCONNECTING    ]
Time-> [8777]  Event-> [DISC_TO_IMC   ]  From-> [PI ] State->[DISCONNECTING    ]
Time-> [8777]  Event-> [DISCONNECT_ACK]  From-> [IMC] State->[DISCONNECTING    ]
Time-> [8778]  Event-> [DISCONNECT_ACK]  From-> [PBX] State->[DISCONNECTING    ]
Time-> [8778]  Event-> [DISCONNECTED  ]  From-> [PI ] State->[DISCONNECTED     ]
[10] Events
```

Note in Example 2 that the PI has a `PROC_TIMEOUT` waiting for a channel assignment from the IMC. If the IMC does not return a channel assignment or a deny within 10 seconds, the PI will terminate. In this case, the group is logged in, but patched and inbound calls to patched groups are not a requirement of Jessica. If a group or LID is not logged into an IMC, the IMC will deny the inbound call request.

8.7. MUX INDICATORS PRESENT

Problem: MUX indicators are present.
Solution: Refer to section 7.1.2 for the procedure to remove indicators on the MUX.

8.8. MD110 NOT WORKING PROPERLY

Problem: The MD110 is not working properly.
Solution: The MD110 requires a certified MD110 technician to troubleshoot and install the equipment. Check the call state information discussed in section 8.6 to determine the nature of the MD110 problem from the perspective of the PI. Contact the Technical Assistance Center.

8.9. INBOUND GROUP CALLS NOT WORKING PROPERLY

Problem: Inbound group calls are not working properly, but inbound individual calls are working properly.
Solution: Check SITE_ID in CONFIG.DAT to ensure that it matches the site ID in the PIM.

9. GLOSSARY

AC	Authorization Code -- A number that can be dialed to enable users top access dialing privileges. The maximum number of digits in an AC is seven. Each AC provides its users with a Class of Service that overrides any restrictions associated with the station being used to make a call. The MD110 supports up to 20,000 Authorization Codes. This feature can be turned off for EDACS users. See DISA.
ACU	Alarm Control Unit.
Call Conferencing	Ability to have radio users call a common telephone number to initiate a conference.
Call Discriminator	A function of the MD110 PBX, the call discriminator verifies that the caller is allowed to call the dialed number.
Call Forwarding	Automatically forwards incoming calls to any phone number that the user can dial directly. There are a number of services that use the call forwarding feature. Plain call forwarding refers to calls that are forwarded on busy/no answer to a pre-arranged number such as a voice mail number. One may also immediately call forward on do not disturb.
CEC	Console Electronics Controller.
Channel Bank	See Multiplexer.
CO	Central Office -- Location of public telephone switching equipment.
Common Speed Dial	Allows the user to program his or her line so that frequently called numbers can be reached by dialing one or two digits. To make a speed dial call, first dial the MD110 telephone number, then enter the speed dial digits.
Console Users	Dispatch Operators using EDACS consoles.
COS	Class of Service -- Determines which types of calls and features are available to each user of the MD110 PBX system. A total of 64 common COS is available for voice terminals.
CTIS	Centralized Telephone Interconnect System.
C3	Type of Console.
DCE	Data Communications Equipment.
DID	Direct Inward Dial -- Allows callers from the public network to place an individual call to a radio by dialing a single telephone number, instead of one telephone number to call JESSICA and a second series of numbers to indicate the Logical ID. To accomplish this, the LID is mapped to a 3-, 4-, or 5-digit number. In some cases, the DID number will be the LID.
DISA	Direct Inward System Access -- A software feature of Ericsson MD110 switches that allows PSTN users to have extension-like capabilities and privileges via Authorization Codes.
DTE	Data Terminal Equipment.
DTMF	Dual Tone Multi-Frequency -- The standard tone or push button dialing scheme in which each dialed digit is represented by a pair of tones.

EDACS	Enhanced Digital Access Communications System.
EDACS System Administrator	Person(s) responsible for configuring and maintaining EDACS, including configuring the Jessica system to allow both inbound and outbound calls.
Exchange	A switching system which serves a group of telephones in the same geographical area.
Extension	A telephone line connected to a Private Branch Exchange (PBX).
GETC	General Electric Trunking Card.
GID	Group Identification -- radio group identification.
HDLC	High-Level Data Link Control -- data link layer protocol.
Inbound Calls	Phone-originated call to a radio.
ISDN	Integrated Services Digital Network -- Wide-area network service provided by public telephone companies that integrates voice and data services..
IMC	Integrated Multisite Controller.
LAPB	Link Access Procedure Balanced -- data link layer protocol.
LBI	Lynchburg Book of Instruction.
LCR	Least-Cost Routing -- A function that allows the system to automatically select the most economical route for an outgoing call. The selected route is based on trunk availability, class of service, time of day, and week.
LID	Logical Identification -- individual radio or console ID.
Line	The pair of wires connecting a telephone to its associated switch.
Loop	Synonymous with line. Refers to the fact that a line forms a completed loop circuit when the telephone is off-hook.
MD110	Ericsson PBX that provides connectivity to the PSTN.
MIC	Multisite Interface Controller board in the PI.
MUX	Multiplexer -- A device used to combine a number of 4-wire audio signals into a single, high-speed digital stream.
No-Answer Routing	After a certain number of rings, a call can be forwarded to a pre-arranged telephone number.
OPX	Off-Premises Extension -- A telephone line which exceeds the normal limits of line length, and as a result, requires special equipment. An OPX may or may not actually extend beyond the limit of the customer's premises.
Outbound Calls	Radio-originated call to a phone.
PBX	Private Branch Exchange -- A privately owned telephone switch commonly used in business applications.

PI	PBX Interface -- Jessica VMEbus chassis that provides connectivity between the IMC and the MD110.
PIC	PBX Interface Controller board in the PI.
PIM	PBX Interface Module in the IMC.
PRI	Primary Rate Interface board in the PI.
Priority Channel	Logical priority level assigned to a PI-IMC channel for the purpose of channel allocation.
pSOS	A real-time operating system.
PSTN	Public Switched Telephone Network.
PTT	Push-To-Talk button on a radio or microphone.
SCAT	Single-Channel Autonomous Trunking.
SCSI	Small Computer Systems Interface.
Station	A synonym for telephone.
Switch	A system whose primary function is to connect devices (e.g., telephones) together. Central Offices and PBXs are switches.
Tie Line	A communications link that permits calling between two PBXs without dialing through the public telephone network.
Trunk	A communications link that connects two switches.
VME	Versa Module Europa.

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Lynchburg, Virginia 24502
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Printed in U.S.A.

APPENDIX A
CABLE CONNECTIONS

PI INTERNAL WIRING

This section covers PI internal wiring, specifically the VME P2 backplate connector (of the MIC card) to the DB-25 connectors on the backplate.

Table 1 - MIC Port 0

VME P2 Connector	DB-25S Connector	Signal Name	Function
A-02	02	XMT-P	Transmit Data
C-03	14	XMT-N	
A-01	03	RCV-P	Receive Data
C-01	16	RCV-N	
C-02	15	TSET-P	Transmit Clock
C-08	12	TSET-N	
C-04	17	RSET-P	Receive Clock
A-06	09	RSET-N	
A-04	04	RTS-P	Request To Send
A-08	19	RTS-N	
A-03	05	CTS-P	Clear To Send
A-05	13	CTS-N	
C-06	06	DCEREADY-P	DCE Ready
A-07	22	DCEREADY-N	
C-05	20	DTEREADY-P	DTE Ready
C-07	23	DTEREADY-N	

Table 2 - MIC Port 1

VME P2 Connector	DB-25S Connector	Signal Name	Function
A-10	02	XMT-P	Transmit Data
C-11	14	XMT-N	
A-09	03	RCV-P	Receive Data
C-09	16	RCV-N	
C-10	15	TSET-P	Transmit Clock
C-16	12	TSET-N	
C-12	17	RSET-P	Receive Clock
A-14	09	RSET-N	
A-12	04	RTS-P	Request To Send
A-16	19	RTS-N	
A-11	05	CTS-P	Clear To Send
A-13	13	CTS-N	
C-14	06	DCEREADY-P	DCE Ready
A-15	22	DCEREADY-N	
C-13	20	DTEREADY-P	DTE Ready
C-15	23	DTEREADY-N	

Table 3 - MIC Port 2

VME P2 Connector	DB-25S Connector	Signal Name	Function
A-18	02	XMT-P	Transmit Data
C-19	14	XMT-N	
A-17	03	RCV-P	Receive Data
C-17	16	RCV-N	
C-18	15	TSET-P	Transmit Clock
C-24	12	TSET-N	
C-20	17	RSET-P	Receive Clock
A-22	09	RSET-N	
A-20	04	RTS-P	Request To Send
A-24	19	RTS-N	
A-19	05	CTS-P	Clear To Send
A-21	13	CTS-N	
C-22	06	DCEREADY-P	DCE Ready
A-23	22	DCEREADY-N	
C-21	20	DTEREADY-P	DTE Ready
C-23	23	DTEREADY-N	

Table 4 - MIC Port 3

VME P2 Connector	DB-25S Connector	Signal Name	Function
A-26	02	XMT-P	Transmit Data
C-27	14	XMT-N	
A-25	03	RCV-P	Receive Data
C-25	16	RCV-N	
C-26	15	TSET-P	Transmit Clock
C-32	12	TSET-N	
C-28	17	RSET-P	Receive Clock
A-30	09	RSET-N	
A-28	04	RTS-P	Request To Send
A-32	19	RTS-N	
A-27	05	CTS-P	Clear To Send
A-29	13	CTS-N	
C-30	06	DCEREADY-P	DCE Ready
A-31	22	DCEREADY-N	
C-29	20	DTEREADY-P	DTE Ready
C-31	23	DTEREADY-N	

Table 5 - Jessica HDLC Loopback Cable Specification

DB-25M Connector PI Port 3	DB-25M Connector PI Port 0	Signal Name	Function
02	03	XMT-P	Transmit Data
14	16	XMT-N	
03	02	RCV-P	Receive Data
16	14	RCV-N	
15	15	TSET-P	Transmit Clock
12	12	TSET-N	
17	17	RSET-P	Receive Clock
09	09	RSET-N	
04	05	RTS-P	Request To Send
19	13	RTS-N	
05	04	CTS-P	Clear To Send
13	19	CTS-N	
06	20	DCEREADY-P	DCE Ready
22	23	DCEREADY-N	
20	06	DTEREADY-P	DTE Ready
23	22	DTEREADY-N	

Table 6 - Jessica-to-System Manager Cable Specification[1]

DB-25M Connector PI Serial Port 4	DB-25F Connector System Manager Port	Signal Name with Respect to the PI
Pin 1	Pin 1	Shield
Pin 2	Pin 2	Transmit Data
Pin 3	Pin 3	Receive Data
Pin 7	Pin 7	Signal Ground

[1] This cable is Part No. 149575P18 (10 ft), P19 (25 ft), or P20 (50 ft).

APPENDIX B
APPLICABLE NEC ND4E INSTRUCTIONS

The Equipment Manual for ND4 Enhanced Digital Channel Bank Equipment, NECA 365-454-000, is not shipped standard with Jessica. This appendix is included as a reference should the user obtain a manual set (5 volumes). To aid the user, this appendix includes a condensed listing of information applicable to the T1 MUX. This information is subject to change.

Document Number	Title	Subject
365-454-000	Equipment Manual for ND4 Enhanced Digital Channel Bank Equipment	EQUIPMENT MANUAL TITLE
365-454-001	ND4 Enhanced Digital Channel Bank Equipment Documentation Guide	DOCUMENTATION GUIDE
365-454-100	ND4 Enhanced Digital Channel Bank Equipment General Description	GENERAL DESCRIPTION
365-454-200	ND4 Enhanced Digital Channel Bank Equipment Installation, Operation, and Maintenance	INSTALLATION, OPERATION, AND MAINTENANCE
INT-001	Introduction	INTRODUCTION
MIP-050	New Installation (FPA)	INSTALLATION
DLP-950	Shelf Backboard Terminal Location	
DLP-402	Inspection	
DLP-403	Shelf Installation for 19-inch Rack	
DLP-405	Rear Cover Removal	
DLP-406	PCM/EXT CLK Terminal (Y4) Signal Cable Connections	
DLP-407	Alarm Terminal (Y2) Signal Cable Connections	
DLP-410	Channel Line Terminal (X1 Through X7) Cable Connection (Discard pages 15, 16, 19, and 20)	
DLP-411	Channel Line Terminal (Z1 Through Z7) Cable Connection (Discard pages 9, 10, 13, and 14)	
DLP-412	Station Power Terminal (Y1) Cable Connections	
DLP-413	Cable Fixture	
DLP-414	Rear Cover Installation	
DLP-415	Terminal Connections for Wrapping Terminals	
DLP-416	Cable Connections of AMP CHAMP Connector	
IAP-100	New Installation (FPA)	INSPECTION
DLP-500	Shelf Installation Condition Check	
DLP-501	Shelf Outward Appearance Check	
DLP-502	Cable Connection Check for Y1 Terminal	
DLP-503	Cable Connection Check for Y2 Terminal	
DLP-505	Cable Connection Check for Y4 Terminal	
DLP-506	Cable Connection Check for X1 Through X7 Terminals	
DLP-507	Cable Connection Check for Z1 Through Z7 Terminals	
DLP-508	Input Power Voltage Check	
DLP-509	Cable Fixture Check	
EIP-150	Turn-up for Dual or Single DS1 System (FPA)	TURN-UP
DLP-980	Handling	
DLP-550	Power Voltage Measurement for BFU	
DLP-551	Output Voltage Measurement for PCU	
DLP-552	ACU Option Selection	
DLP-553	Unit Insertion	
DLP-554	Unit Removal	

Document Number	Title	Subject
SAP-200	Single DS1 System Acceptance Test (FPA)	TEST
SAP-201	Dual DS1 System Acceptance Test (FPA)	
DLP-940	Local Station Loopback Test (FPA)	
DLP-941	End-to-End Test (FPA)	
DLP-960	System Provisioning Layer (FPA)	PROVISIONING (SYSTEM)
DLP-600	Digroup Alarm Supervision (FPA)	
DLP-601	Trunk Processing (TP) Memory Clear (FPA)	
DLP-602	Carrier Group Alarm (CGA) Counter Reset (FPA)	
DLP-603	Provisioning Item Permission /Inhibitor (FPA)	
DLP-604	Data Input Provisioning (FPA)	
DLP-605	Auto Bipolar Loopback (FPA)	
DLP-961	Line Provisioning Layer (FPA)	PROVISIONING (LINE)
DLP-607	DDS Clock Source (FPA)	
DLP-606	External Clock (FPA)	
DLP-963	External Clock Setting	
DLP-964	External Clock Diagram	
DLP-608	DGA Clock Source (FPA)	
DLP-609	DGB Clock Source (FPA)	
DLP-610	Frame Format	
DLP-611	Line Code (FPA)	
DLP-612	Equalizer (FPA)	
DLP-613	Channel Sequence (FPA)	
DLP-965	Time Slot Interchange	
DLP-962	Maintenance Layer (FPA)	PROVISIONING (MAINTENANCE)
DLP-966	Loopback	
DLP-614	Bipolar Loopback (FPA)	
DLP-615	Line Terminal (FPA)	
DLP-616	Line Loop (FPA)	
DLP-617	Digital MW Output (FPA)	
DLP-618	Forced Trunk Processing (FPA)	
DLP-967	Alarm Layer (FPA)	PROVISIONING (ALARM)
DLP-968	Alarm Description	
TCP-302	Clear ALM LED on ACU (DS1) (FPA)	
DLP-710	Verify CGA Counter Value (FPA)	
DLP-711	CGA Digroup Check (FPA)	
TCP-301	When ERR1 Message is Indicated (FPA)	
TCP-300	When MAJ LED on ACU (DS1) Lights Up (FPA)	
DLP-700	Clear MAJ LED on ACU (DS1) (FPA)	
		PLUG-IN UNITS
365-454-110	Bank Fuse Unit (BFU), X5243 General Description	BANK FUSE UNIT
365-454-111	Power Converter Unit (PCU), X5244 General Description	POWER CONVERTER UNIT
365-454-112	Clock Interface Unit (CIU), X5250 General Description	CLOCK INTERFACE UNIT

Document Number	Title	Subject
365-454-113	Line Interface Unit (LIU), X5247 General Description	LINE INTERFACE UNIT
365-454-114	ND4 Enhanced Digital Channel Bank Equipment Transmitter Receiver Unit (DS1) Unit Description	TRANSMITTER RECEIVER UNIT
365-454-115	Pulse Generator Unit (PGU), X5245 General Description	PULSE GENERATOR UNIT
365-454-116	ND4 Enhanced Digital Channel Bank Equipment Alarm Control Unit (DS1) Unit Description	ALARM CONTROL UNIT
365-454-219	4-Wire E&M (4W E/M), X5260 Description, Installation, and Maintenance	4-WIRE E&M

APPENDIX C
SPARE PARTS

This appendix presents spare parts information for the PBX Interface, the Multiplexer, and the MD110. Recommended spare parts are designated by an "*" in the information herein. Call 1-800-368-3277 to order the spare parts listed in this appendix.

PBX Interface and Multiplexer Spare Parts List (T1 Version for North America, Japan, and Korea)

Number	Description	Quantity
PRI-48	Primary Rate T1 Board	1
FV5310-04	RS-422 4-Port Mezzanine Board	1
FV5310-85P	WANServer	1
MVME147SA-001*	CPU Processor	1
MVME712M	Transition Module	1
MXT7290S*	290 MB Hard Disk Drive	1
TEACFD235JS*	Floppy Drive	1
X5260B*	T1 Card for Channel Bank	1
2203710G1	RS-422 Cable Assembly	1
2203711G1	T1 Trunk Cable Assembly	1

PBX Interface and Multiplexer Spare Parts List (E1 Version for Europe, Asia, and South America)

Number	Description	Quantity
PRI-64	Primary Rate E1 Board	1
FV5310-04	RS-422 4-Port Mezzanine Board	1
FV5310-85P	WANServer	1
MVME147SA-001*	CPU Processor	1
MVME712M	Transition Module	1
MXT7290S*	290 MB Hard Disk Drive	1
TEACFD235JS*	Floppy Drive	1
PCM030CC01A*	E1 Card for Channel Bank	1
2203710G1	RS-422 Cable Assembly	1
2203713G1	E1 Trunk Cable Assembly	1

MD110 Spare Parts List

Number	Description	Quantity
ROF1375246/1	ELU23 Card	1
ROF1314309/2*	TRU3 Card	1
ROF1314414/3*	DSU Card	1
ROF1314413/3*	LSU Card	1
ROF1314505/1*	LPU4 Card	1
ROF131835/2	ALU1 Card	1
ROF1375320/1	PU4DC Card	1
ROF1375414/1*	TLU63 Card	1
ROF131708/5A	REU Card	1
ROF1314507/1	IPU Card	1
ROF1310018/1*	TLU45 Card	1
ROF131446/1*	MEU5 Card	1
ROF1375238/4*	TSUT Card	1
ROFU1310001/2	MPU Card	1
KDY20803/3	HDU Card	1

* designates recommended spare parts.

APPENDIX D
LAN NETWORK SURVEY

If the VME chassis is being connected to the Ethernet, the following survey must be completed before installation so that IP.DAT, ROUTES.DAT, and EXPORTS.DAT can be correctly configured during installation.

IP Address (147.117.37.226) : _____
Host Name (jessica01) : _____
Subnet Mask (FFFFF000) : _____

If the hosts connecting to the VME chassis are not on the same LAN i.e., are connected by routers (gateways) to the LAN, fill in the table below.

Type of Route	Description of Type
Host	If gateway specified is for individual client only
Network	If gateway specified is for all clients with same first (nonzero) digits

An example entry is provided in italics in the table below.

Type of Route (Host or Network)	IP Addresses of Host or Network	Gateway IP Address
Network	*147.200.0.0*	*147.117.32.2*

If the Network File System (NFS) features will be used, fill in the table below. You may restrict the directory access of individual clients. An example entry is provided in italics in the table below.

IP Addresses of Clients Permitted to Mount the VME System	Directories Permitted to Mount (all or activity/log only or *other* directory)
147.117.37.245	*all*

APPENDIX E
INTEGRATED PI/MD110 MANAGEMENT STATION

The functions of the PI administrative terminal and the MD110 configuration terminal may be combined so that only one PC is needed. The PI administrative terminal can be eliminated by setting up a PC with Microsoft Windows to run one window with a VT100 terminal emulator for the PI terminal and another window with FIOL for the MD110 configuration management. Please refer to Figure 1.

NOTE

One management station does not imply that there will be an integrated PI/MD110 entity manageable from the Network Manager.

To run both FIOL and the VT100 terminal emulator (for PI) simultaneously, the PC must have two serial ports.

The PC used to integrate the PI administrative terminal and the MD110 configuration terminal must meet the hardware and software requirements below.

HARDWARE REQUIREMENTS

386 PC
4MB RAM
2 serial ports
1 expansion slot for the installation of the SCSI to the MD110 PC Softdisk

SOFTWARE REQUIREMENTS

The software communication package, FIOL, can be used as the programming interface for the MD110, while Microsoft Windows provides the VT100 terminal emulation for the Jessica administrative terminal.

CONNECTIONS

One serial port on the PC will be designated for the Jessica terminal and the second serial port will be designated for the MD110 terminal.

NOTE

To provide PC Softdisk connections to the MD110, a special SCSI card must be installed in the PC; however, FIOL is sufficient to communicate and perform ***most*** basic programming of the MD110.

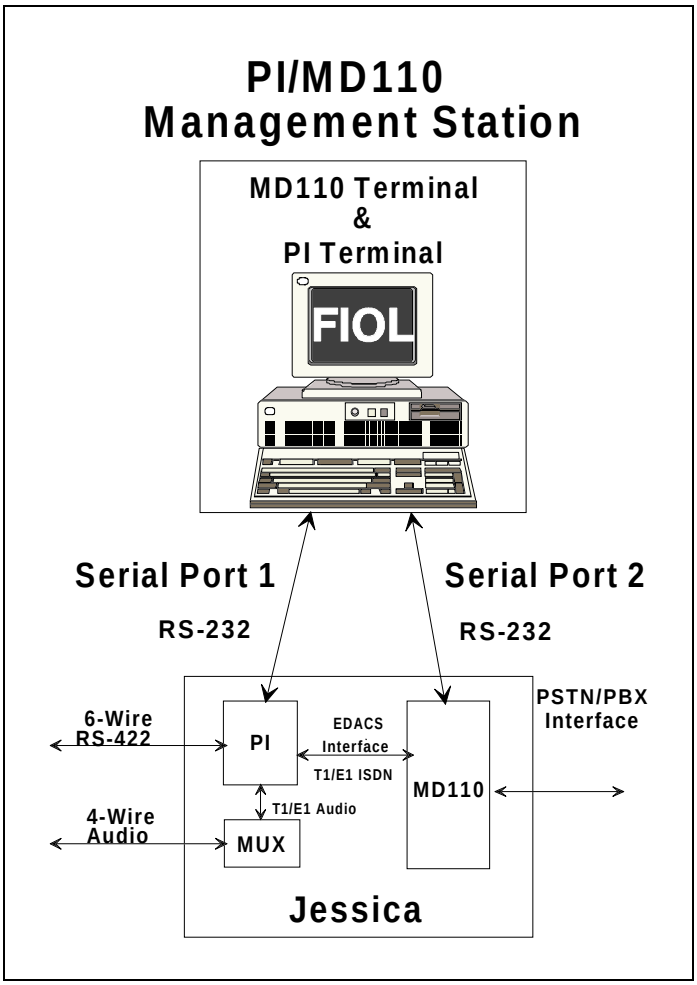


Figure 1 - PI/MD110 Management Station

Appendix F

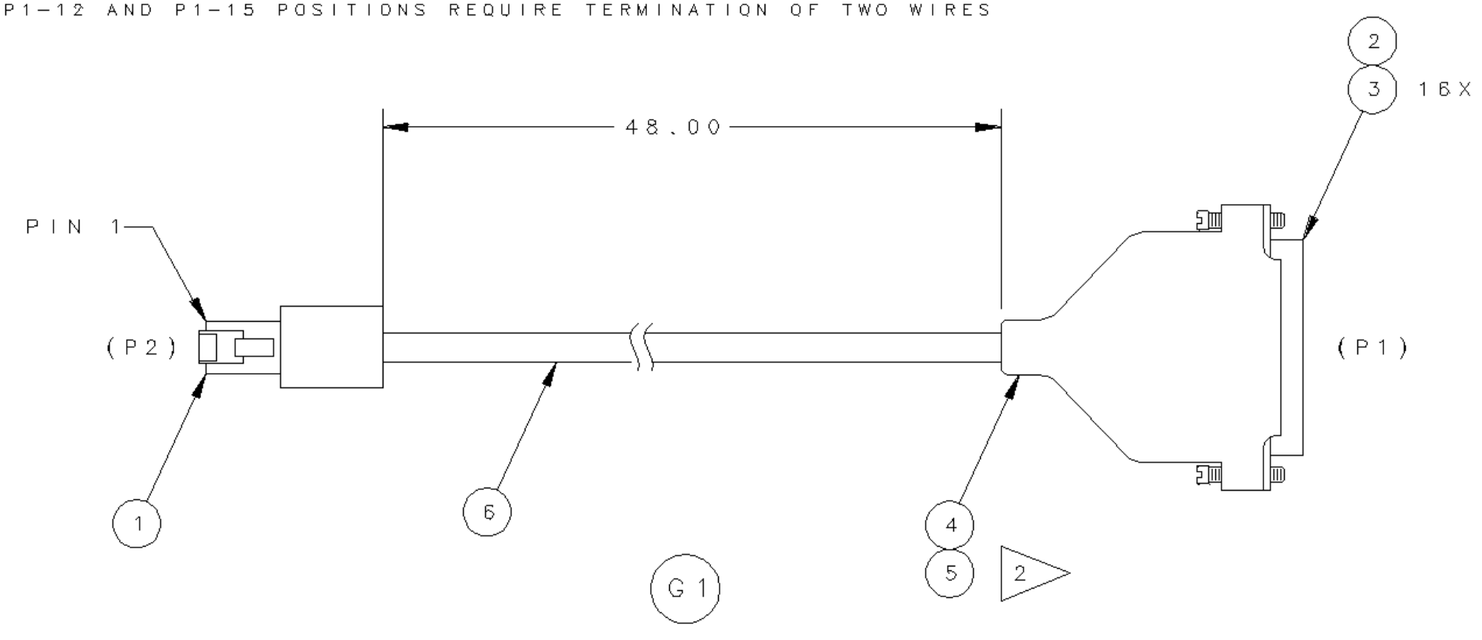
Drawings

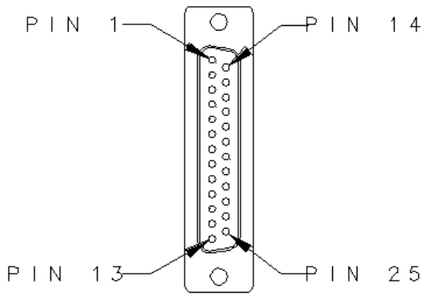
WIRING TABLE				
FROM	TO	SIGNAL	WIRE	WIRE COLOR
P1-2	P2-3	+XMT	ITEM 7	BROWN (PR-2)
P1-3	P2-1	+RCV	ITEM 7	BLACK (PR-1)
P1-4	P1-5	JUMPER	ITEM 6	WHITE
P1-6	P1-20	JUMPER	ITEM 6	WHITE
P1-9	P1-12 *	-RSET	ITEM 6	WHITE
P1-12 *	P2-6	-TSET	ITEM 7	GREEN (PR-3)
P1-13	P1-19	JUMPER	ITEM 6	WHITE
P1-14	P2-4	-XMT	ITEM 7	BLUE (PR-2)
P1-15 *	P2-5	+TSET	ITEM 7	RED (PR-3)
P1-16	P2-2	-RCV	ITEM 7	WHITE (PR-1)
P1-17	P1-15 *	+RSET	ITEM 6	WHITE
P1-22	P1-23	JUMPER	ITEM 6	WHITE

* P1-12 AND P1-15 POSITIONS REQUIRE TERMINATION OF TWO WIRES

NOTES:

1. FABRICATE CABLE TO LENGTH INDICATED. NOTE CONNECTOR ORIENTATION CAREFULLY.
2. TERMINATE CABLE SHIELD TO CONNECTOR BACKSHELL, ITEM 4

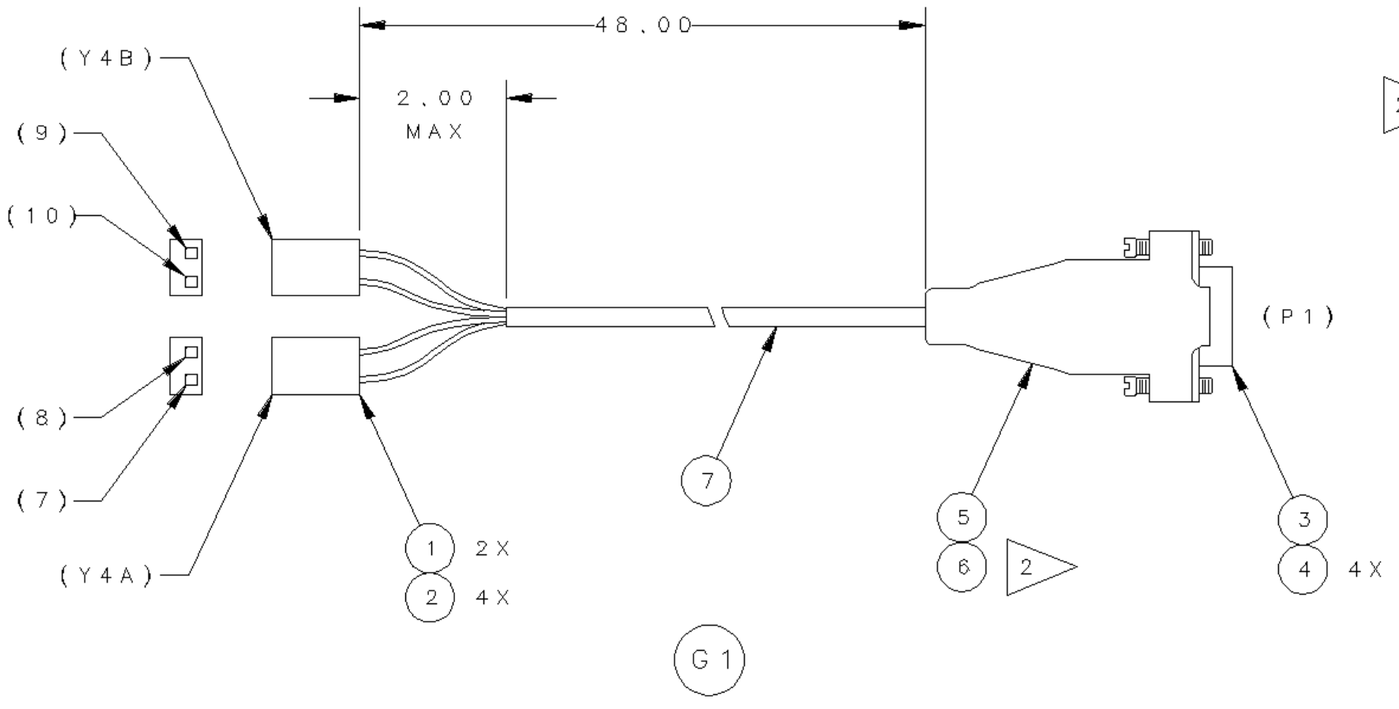




CABLE ASSEMBLY
RS422

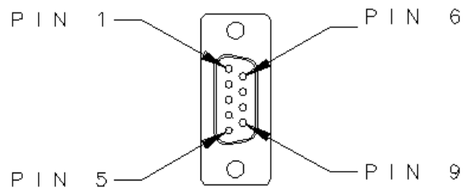
(2203710, Rev. A)

WIRING TABLE				
FROM	TO	TWISTED PAIR	SIGNAL	WIRE COLOR
Y4A (7)	P1-1	PAIR 1	RCV A TIP	BLACK
Y4A (8)	P1-6	PAIR 1	RCV A RING	WHITE
Y4B (9)	P1-5	PAIR 2	XMT A TIP	BROWN
Y4B (10)	P1-9	PAIR 2	XMT A RING	BLUE



NOTES:

1. FABRICATE CABLE TO LENGTH INDICATED. NOTE CONNECTOR ORIENTATION CAREFULLY.
2. TERMINATE CABLE SHIELD TO BACKSHELL, ITEM 5.



CABLE ASSEMBLY
T1 Trunk A MUX

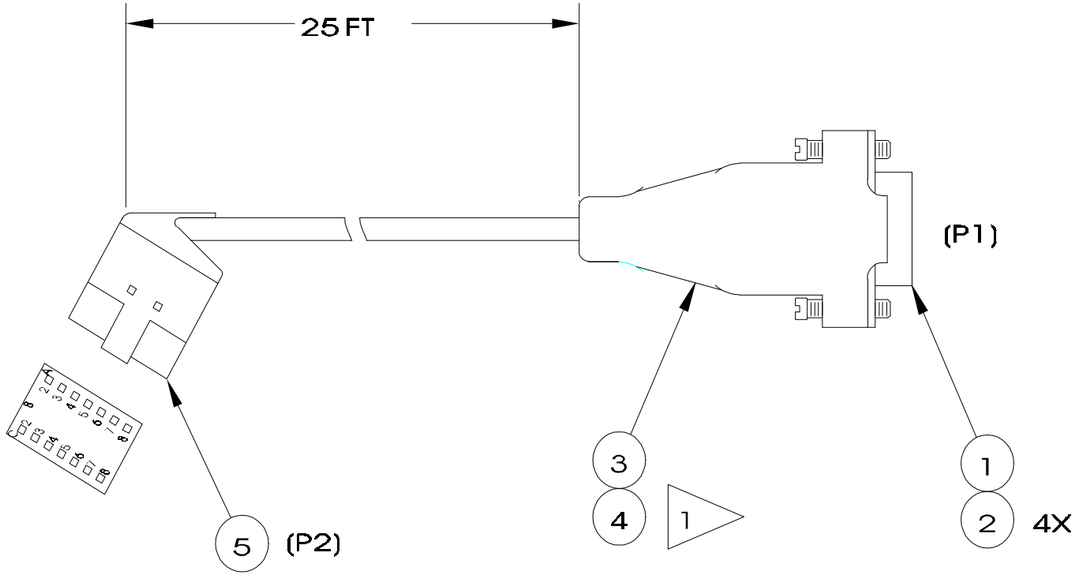
(2203711, Rev. 0)

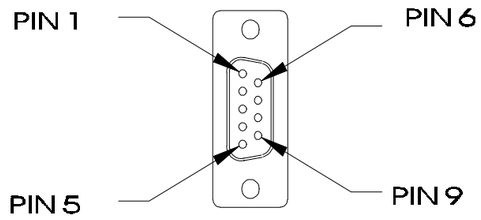
WIRING TABLE - T1 (G1 ONLY)			
24-PIN DIN-F POSITION NO.	ITEM 1 (DB9M) POSITION NO.	SIGNAL	COLOR
P2-A6	P1-1	RCV B TIP	WHITE
P2-A8	P1-6	RCV B RING	ORANGE
P2-A2	P1-5	XMT B TIP	WHITE
P2-A4	P1-9	XMT B RING	BROWN

WIRING TABLE - E1 (G2 ONLY)			
24-PIN DIN-F POSITION NO.	ITEM 1 (DB9M) POSITION NO.	SIGNAL	COLOR
P2-A2	P1-1	RCV B TIP	WHITE
P2-A4	P1-6	RCV B RING	BROWN
P2-A6	P1-5	XMT B TIP	WHITE
P2-A8	P1-9	XMT B RING	ORANGE

NOTE:

1. TERMINATE CABLE SHIELD TO BACKSHELL, ITEM 3.





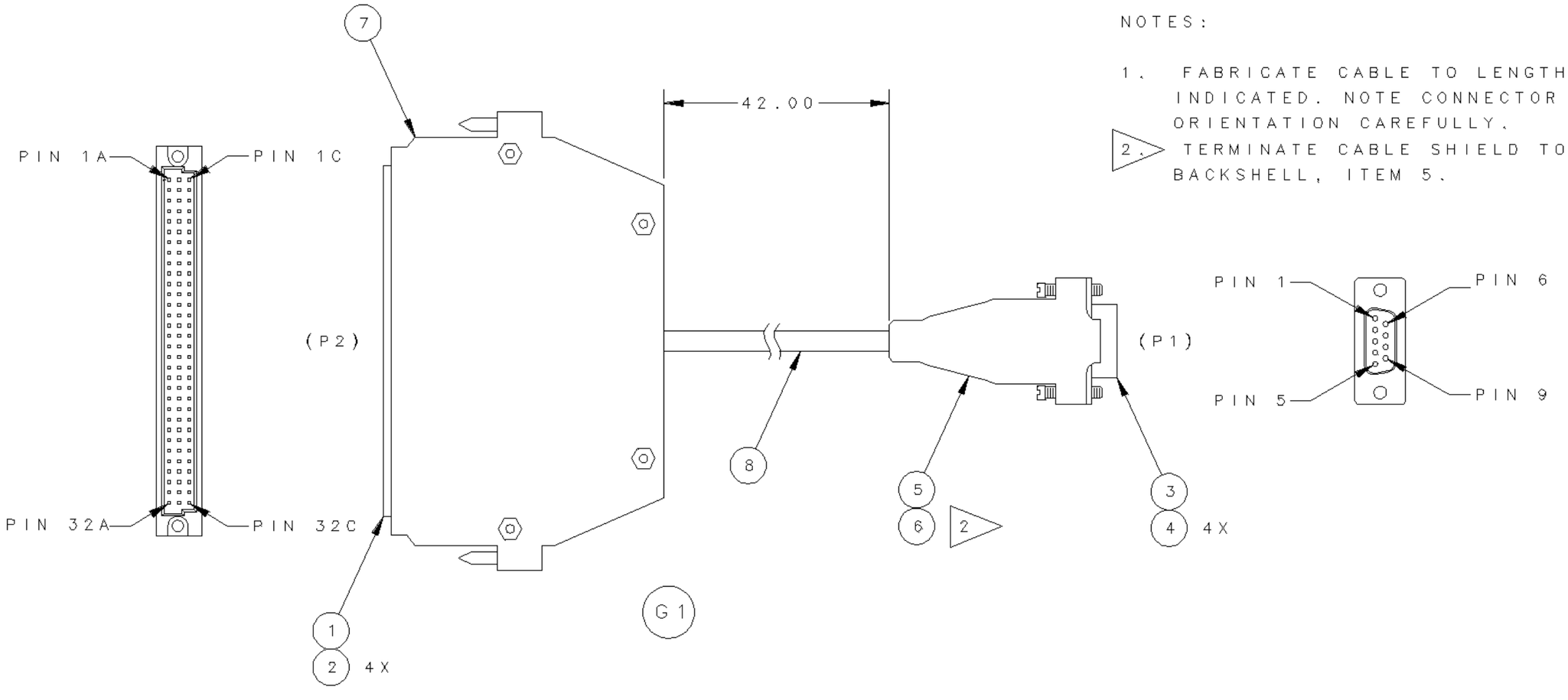
G1 T1 CONFIGURATION

G2 E1 CONFIGURATION

CABLE ASSEMBLY
E1/T1 Trunk B MUX

(2203712, Rev. B)

WIRING TABLE				
FROM	TO	TWISTED PAIR	SIGNAL	WIRE COLOR
P2-A14	P1-1	PAIR 1	RCV A TIP	BLACK
P2-C14	P1-6	PAIR 1	RCV A RING	WHITE
P2-A29	P1-5	PAIR 2	XMT A TIP	BROWN
P2-C29	P1-9	PAIR 2	XMT A RING	BLUE



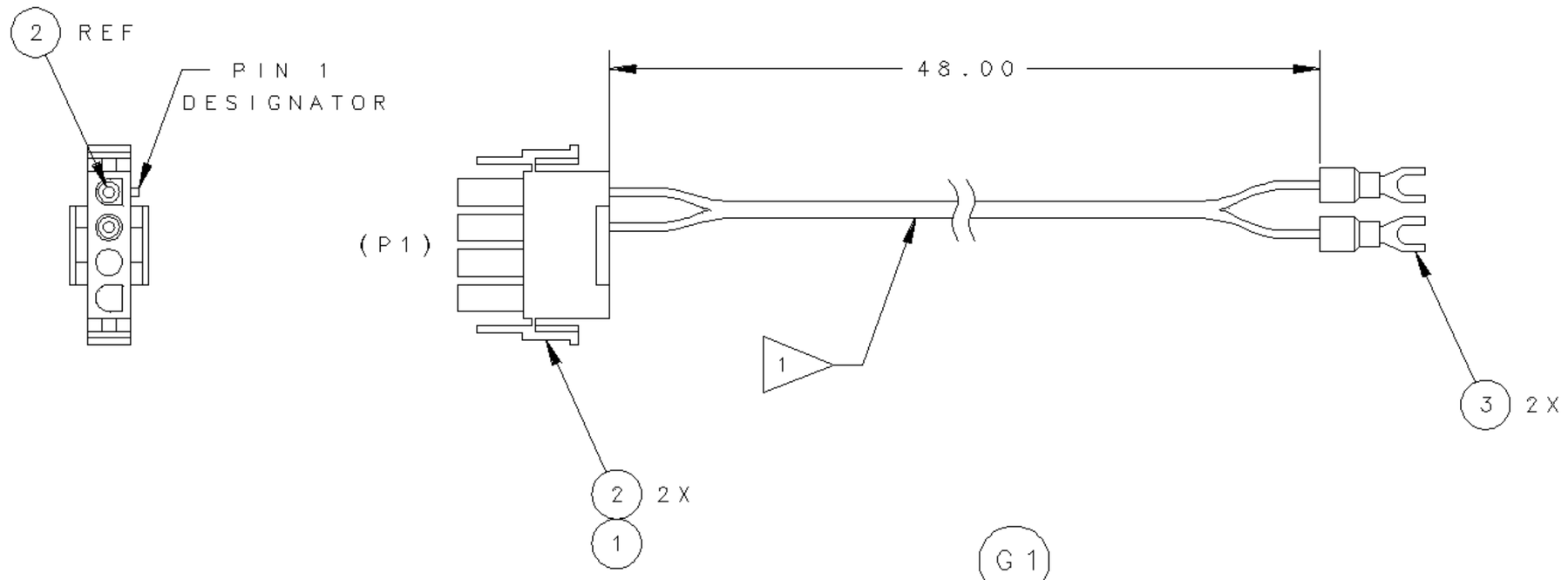
NOTES:

1. FABRICATE CABLE TO LENGTH INDICATED. NOTE CONNECTOR ORIENTATION CAREFULLY.
2. TERMINATE CABLE SHIELD TO BACKSHELL, ITEM 5.

CABLE ASSEMBLY
E1 Trunk A MUX

(2203713, Rev. 0)

WIRING TABLE				
FROM	TO	WIRE	COLOR	SIGNAL
P1-1	ITEM 3	ITEM 4	YELLOW	-48V
P1-2	ITEM 3	ITEM 5	BROWN	-48V RTN



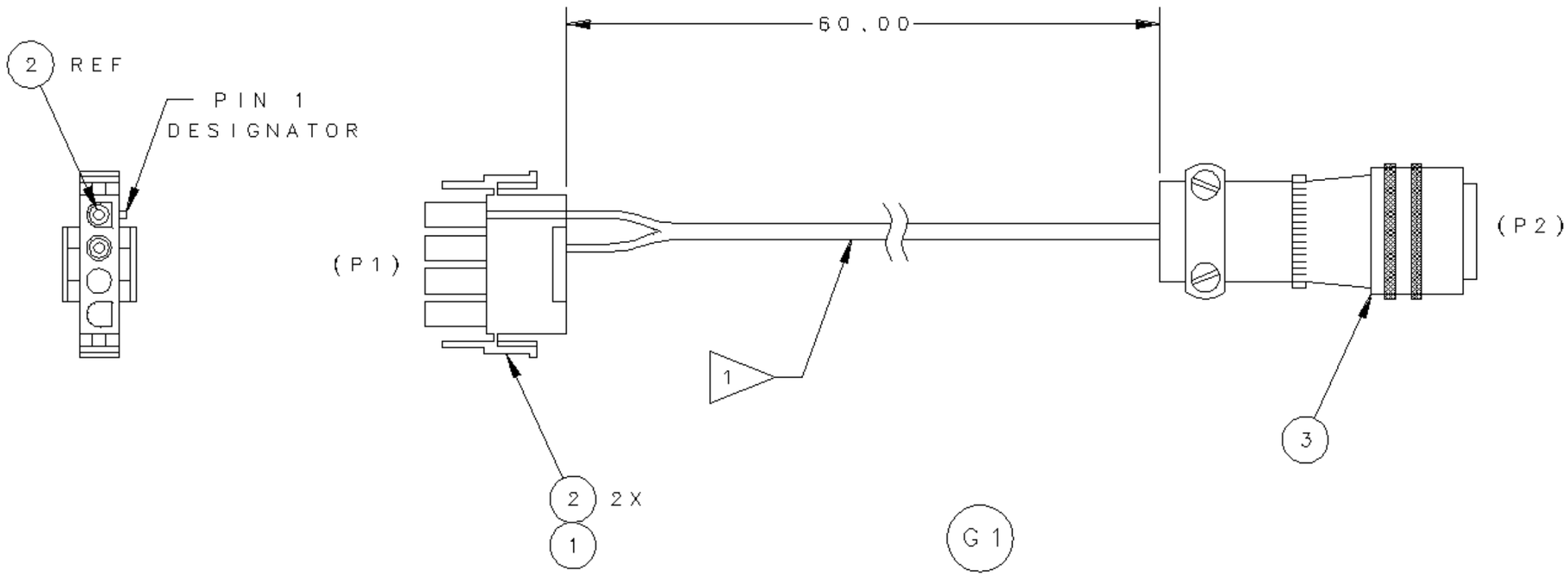
NOTES:

1. ENTIRE LENGTH OF CABLE TO BE TWISTED TIGHTLY, EXCEPT FOR BREAK OUT AREA.

CABLE ASSEMBLY
48V Power -- T1 MUX

(2203714, Rev. 0)

WIRING TABLE				
FROM	TO	WIRE	COLOR	SIGNAL
P1-1	P2-B	ITEM 4	YELLOW	-48V
P1-2	P2-A	ITEM 5	BROWN	-48V RTN



NOTES:

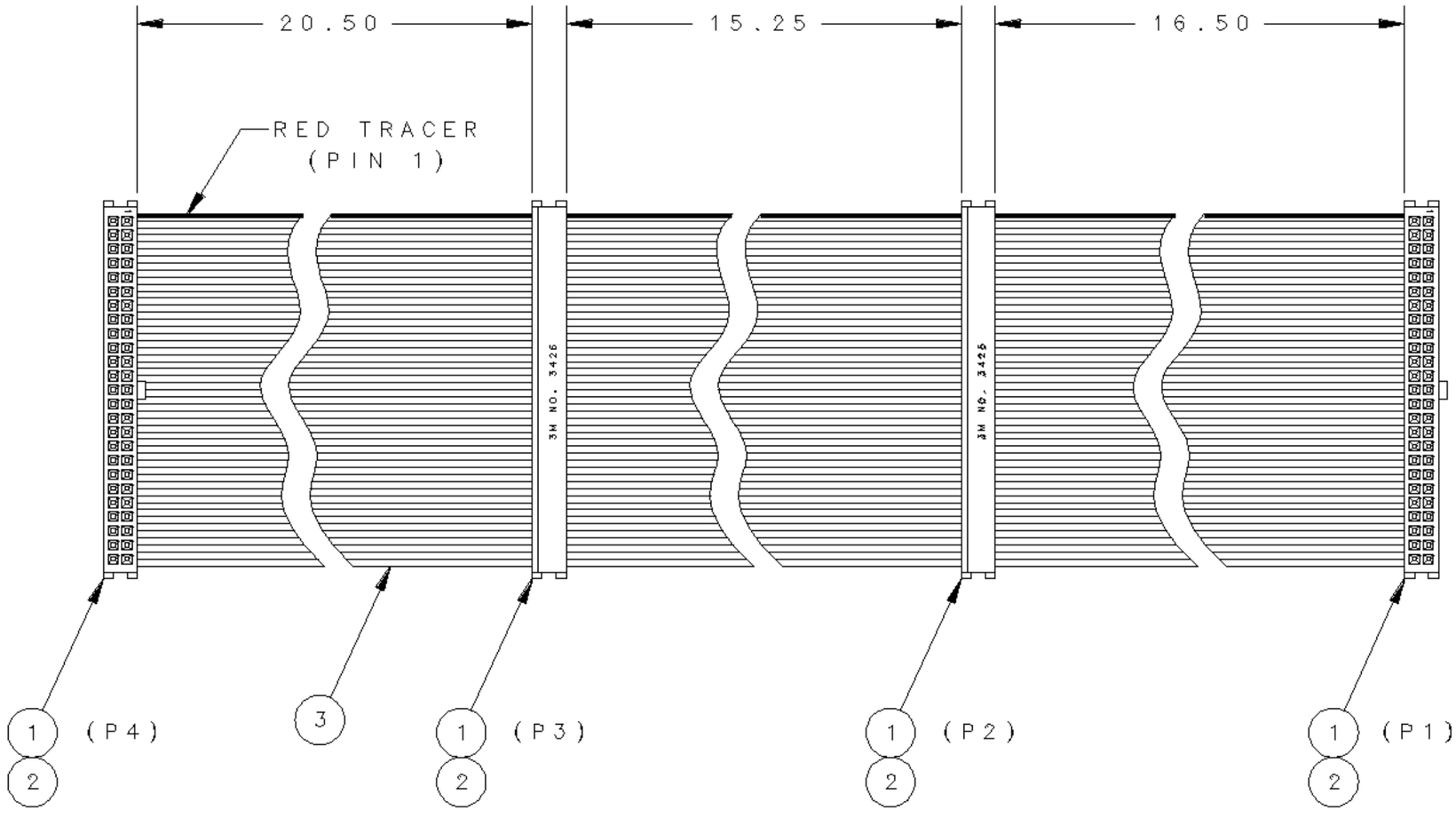
1. ENTIRE LENGTH OF CABLE TO BE TWISTED TIGHTLY, EXCEPT FOR BREAK OUT AREA.

CABLE ASSEMBLY
48V Power -- E1 MUX

(2203715, Rev. 0)

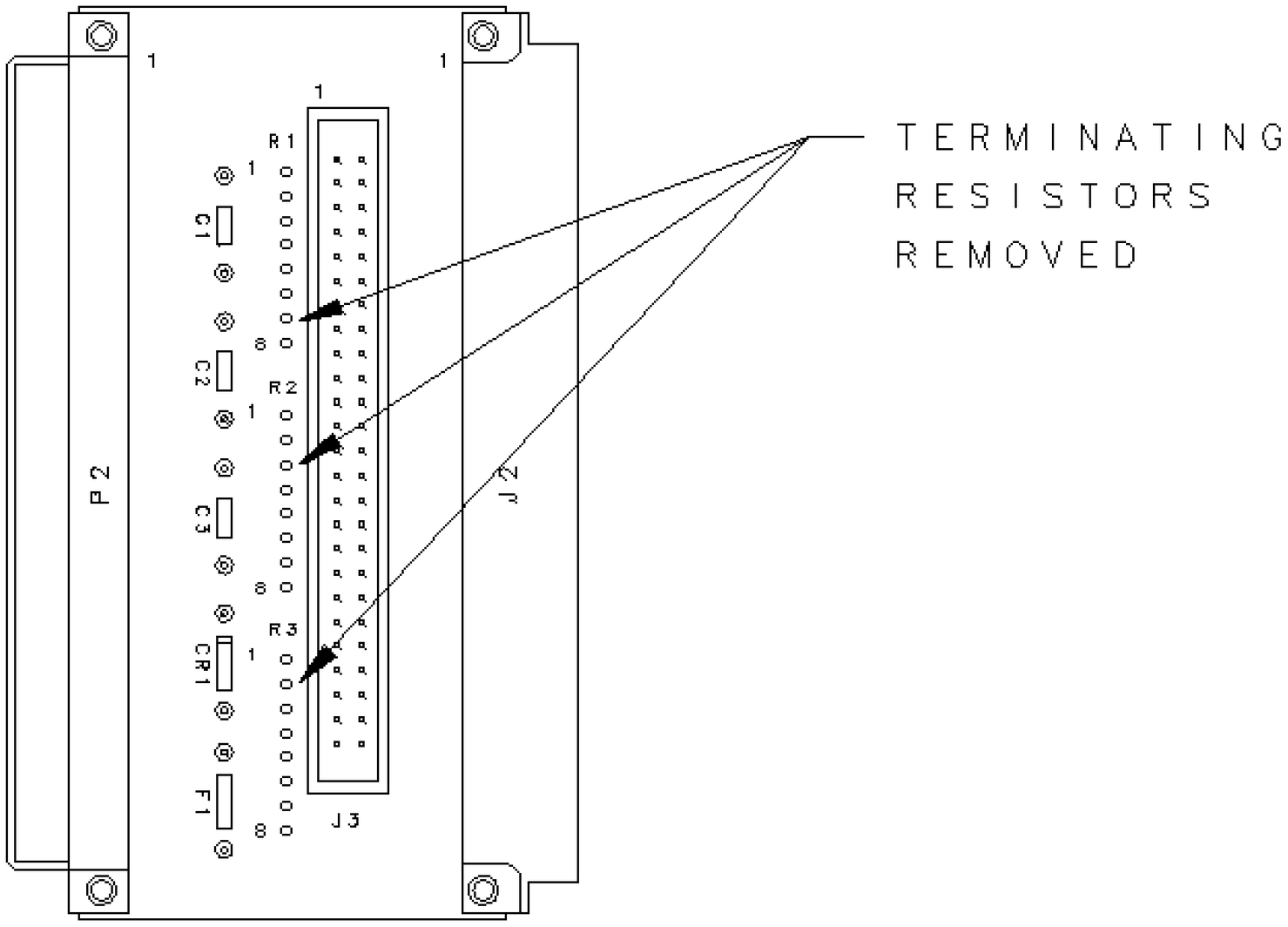
NOTES:

1. FABRICATE CABLE TO LENGTH INDICATED. NOTE CONNECTOR ORIENTATION CAREFULLY.



CABLE ASSEMBLY SCSI

(2203727, Rev. 0)



OUTLINE
MVME147P2 Adapter Board

(2603731, Rev. 0)

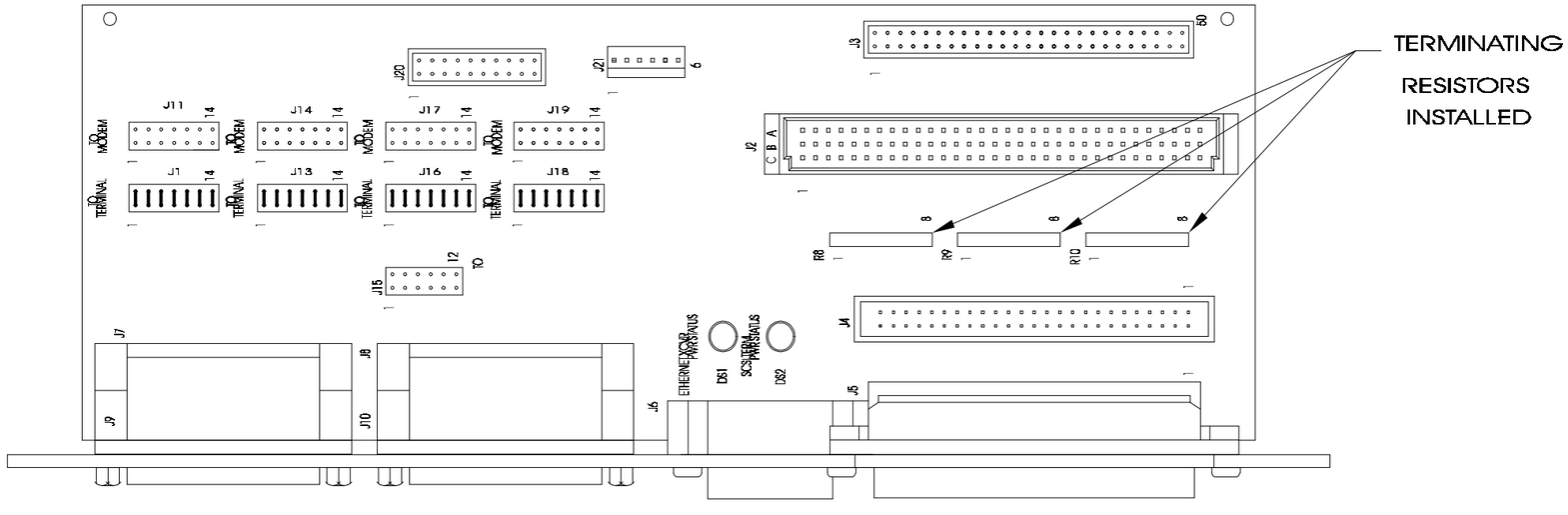
P2 ADAPTER

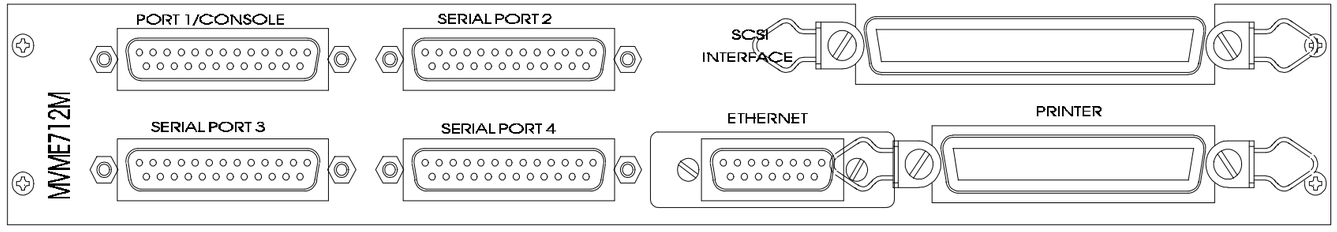
Jumpers
Not installed.

SCSI Termination Resistors Removed

R1	R2	R3

The P2 boards are supplied with the terminators removed.





712M TRANSITION MODULE

Serial ports 1-2 configured as DCE.
Serial ports 3-4 configured as DTE for modem support.

Jumpers on 712M

J1	1-2	3-4	5-6	7-8	9-10	11-12	13-14
J11	none	none	none	none	none	none	none
J13	1-2	3-4	5-6	7-8	9-10	11-12	13-14
J14	none	none	none	none	none	none	none
J16	1-2	3-4	5-6	7-8	9-10	11-12	13-14
J17	none	none	none	none	none	none	none
J18	1-2	3-4	5-6	7-8	9-10	11-12	13-14
J19	none	none	none	none	none	none	none

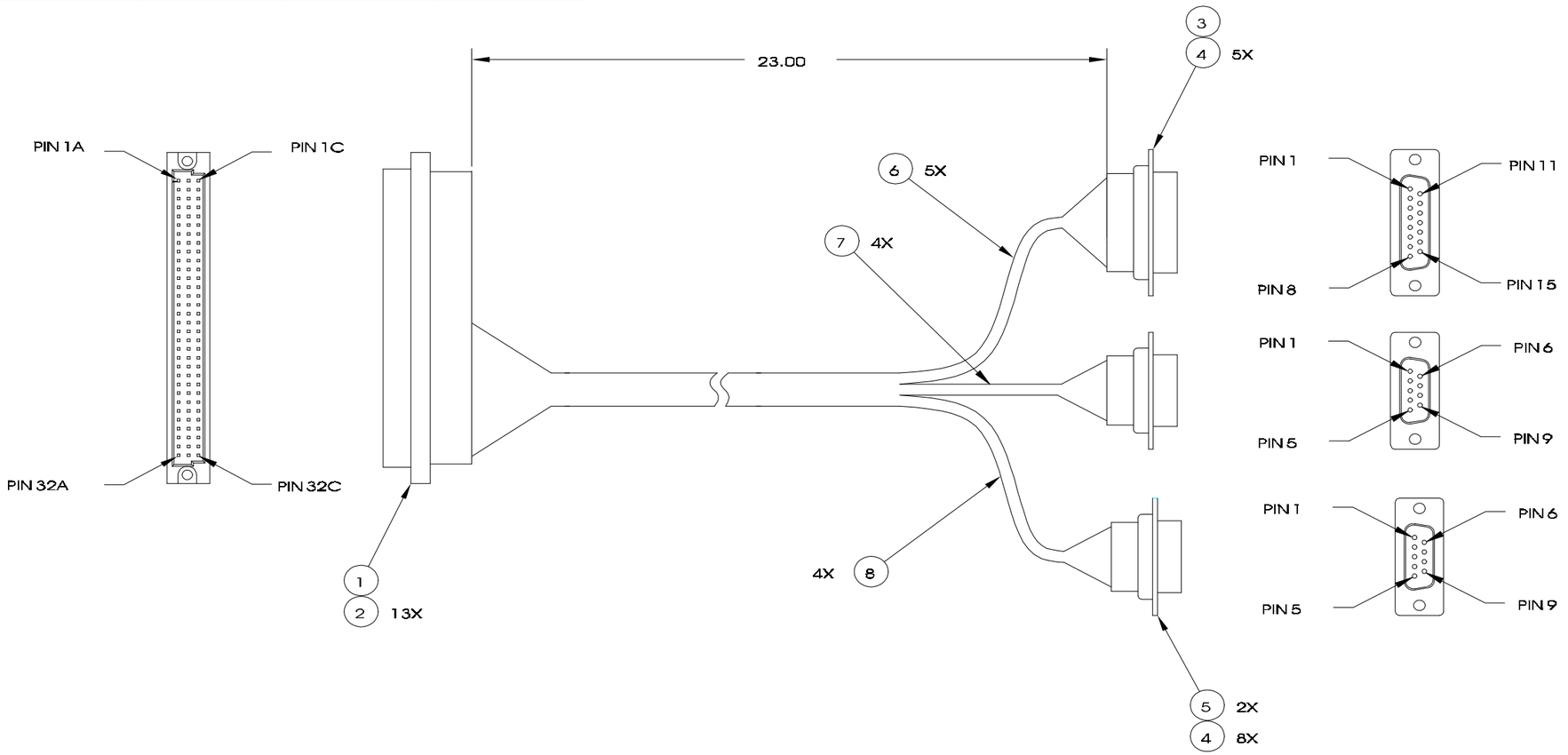
SCSI Termination Resistors Installed

R8	R9	R10

OUTLINE
MVME712M Transition Module

(2603732, Rev. A)

WIRING TABLE				
FROM	TO	WIRE TYPE	ITEM NO.	SIGNAL
DIN96-A17	DB15-2	#24 BLUE	ITEM 6	RxD
DIN96-A18	DB15-3	#24 BLUE	ITEM 6	TxD
DIN96-A19	DB15-10	#24 BLUE	ITEM 6	TxCLK
DIN96-A20	DB15-11	#24 BLUE	ITEM 6	RxCLK
DIN96-A21	DB15-7	#24 BLUE	ITEM 6	GND
DIN96-C23	DB9-1	#24 WHITE	ITEM 7	RCV A TIP
DIN96-C24	DB9-6	#24 WHITE	ITEM 7	RCV A RING
DIN96-C25	DB9-5	#24 WHITE	ITEM 7	XMT A TIP
DIN96-C26	DB9-9	#24 WHITE	ITEM 7	XMT A RING
DIN96-C29	DB9-1	#24 GREEN	ITEM 8	RCV B TIP
DIN96-C30	DB9-6	#24 GREEN	ITEM 8	RCV B RING
DIN96-C31	DB9-5	#24 GREEN	ITEM 8	XMT B TIP
DIN96-C32	DB9-9	#24 GREEN	ITEM 8	XMT B RING



CABLE ASSEMBLY
E1/T1 Console Adapter

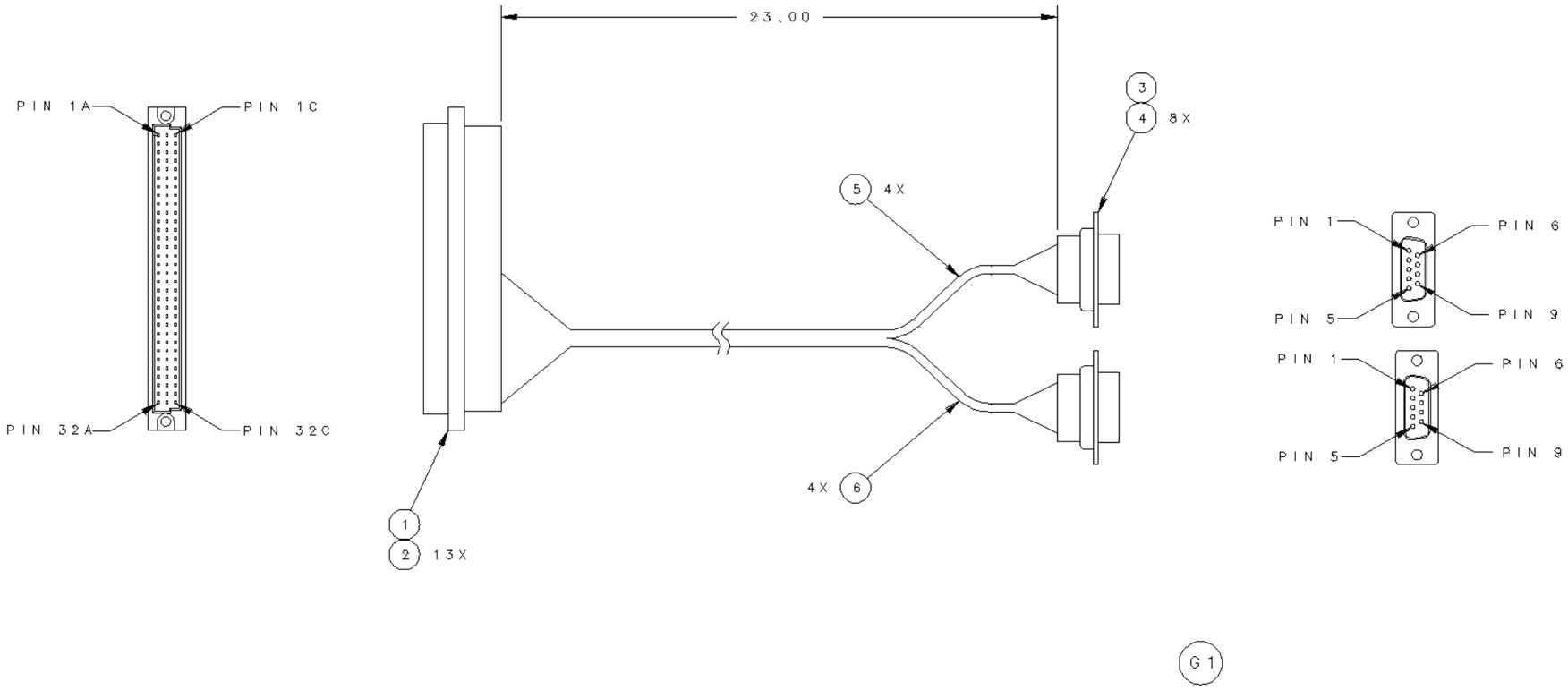
(3203726, Rev. A)

NOTES:

1. FABRICATE CABLE TO LENGTH INDICATED. NOTE CONNECTOR ORIENTATION CAREFULLY.

G1

WIRING TABLE				
FROM	TO	WIRE TYPE	ITEM NO.	SIGNAL
DIN96-C23	DB9-1	#24 WHITE	ITEM 5	RCV A TIP
DIN96-C24	DB9-6	#24 WHITE	ITEM 5	RCV A RING
DIN96-C25	DB9-5	#24 WHITE	ITEM 5	XMT A TIP
DIN96-C26	DB9-9	#24 WHITE	ITEM 5	XMT A RING
DIN96-C29	DB9-1	#24 GREEN	ITEM 6	RCV B TIP
DIN96-C30	DB9-6	#24 GREEN	ITEM 6	RCV B RING
DIN96-C31	DB9-5	#24 GREEN	ITEM 6	XMT B TIP
DIN96-C32	DB9-9	#24 GREEN	ITEM 6	XMT B RING



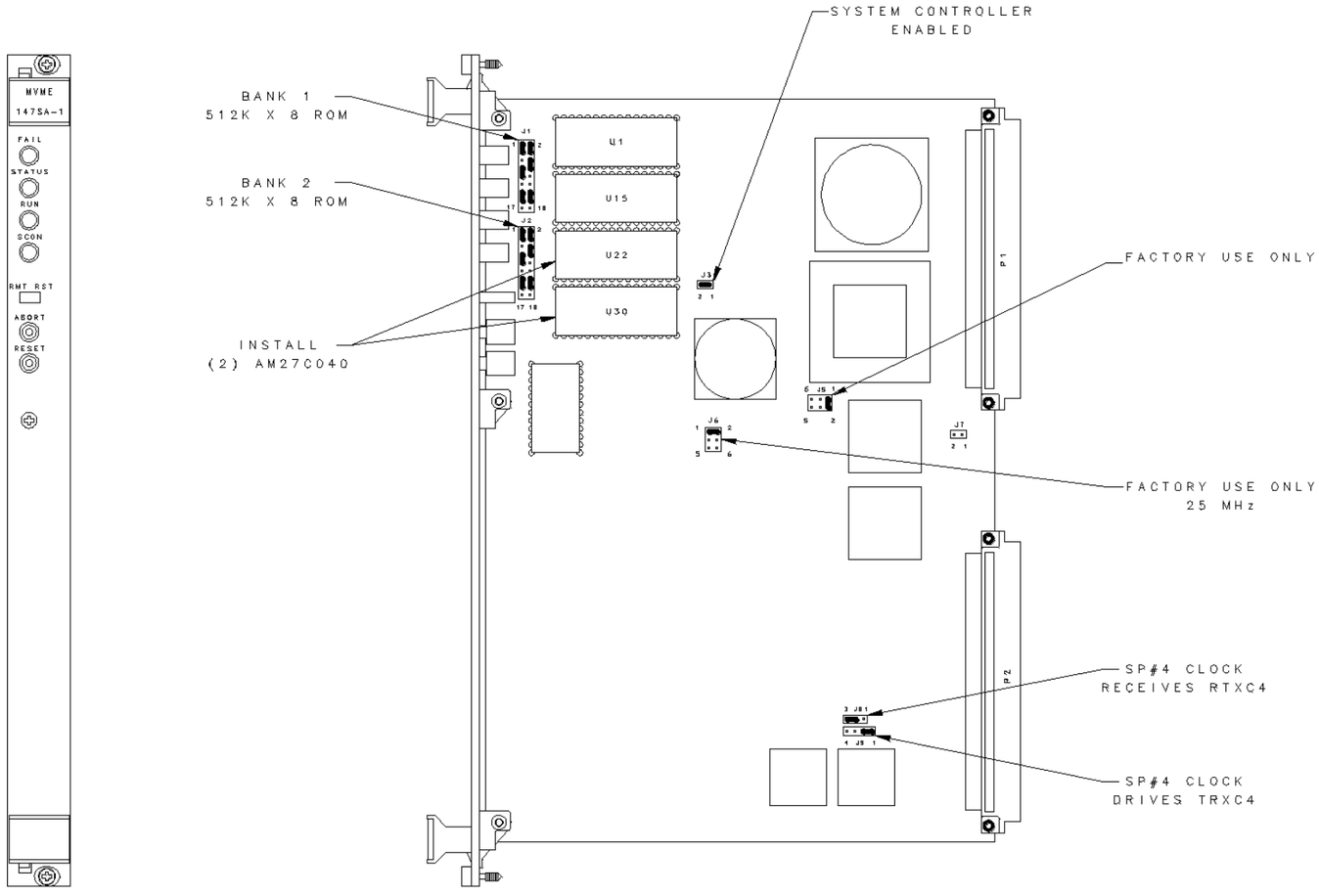
G1

NOTES:

1. FABRICATE CABLE TO LENGTH INDICATED. NOTE CONNECTOR ORIENTATION CAREFULLY.

CABLE ASSEMBLY
E1 Adapter

(3203729, Rev. 0)



PIC 147SA-1

J2 - Bank 1 EGE Operating System ROM (27C040 512Kx8)
J3 - System Controller
J5 - Factory set
J6 - Factory set
J8 - Serial port 4
J9 - Serial port 4

OUTLINE
MVME147SA-1CPU
(PIC SA1 Single-Board Computer
Jumper Settings)

(3603730, Rev. 0)

IC
U1 Empty
U15 Empty
U22 EGE Even (0) ROM
U30 EGE Odd (1) ROM

Jumpers on 147SA-1

J1	1-3	2-4	6-8	7-9	13-15	14-16
J2	1-3	2-4	6-8	7-9	13-15	14-16
J3	1-2	none	none	none	none	none
J5	1-2	none	none	none	none	none
J6	1-2	none	none	none	none	none
J8	2-3	none	none	none	none	none
J9	1-2	none	none	none	none	none

These drawings are for maintenance information only -- the PI will be delivered with these set.

PRI-48 MEMORY MAP ASSIGNMENT

The PRI-48 is an A24/D16 accessible-only device. Each PRI-48 board consumes a 1 Meg window of A24 space. The table below defines the VME bus base address and interrupt request vector numbers reserved for PRI-48 boards.

Switch S1 defines the A24 base of the board, and must be set accordingly. A switch in the ON position matches a VME bus address bit that is Low (logic 0); OFF matches one that is High (logic 1). Switch positions S1-5 through S1-8 must be set to the OFF position.

The first board will be board number 0, the second board will be board number 1, and the third board will be board number 2.

Table 1 - PRI-48 VME Bus Mapping

PRI-48 Board Number	S1-1 (A23)	S1-2 (A22)	S1-3 (A21)	S1-4 (A20)	VME Base Address
0	ON	ON	ON	ON	0000 0000
1	ON	ON	ON	OFF	0010 0000
2	ON	ON	OFF	ON	0020 0000

For Jessica, the board number is 0.

PRI-48 T1 LINE EQUALIZATION

PRI-48 dip switch S2 configures the T1/DSX-1 interface line equalization for the board. Parameters for Trunks A and B may be individually adjusted. Trunk A is dedicated to the Audio MUX interface with the IMC. Trunk B is dedicated to interface with the MD110. The table below defines the selector encoding (LENx) for S2.

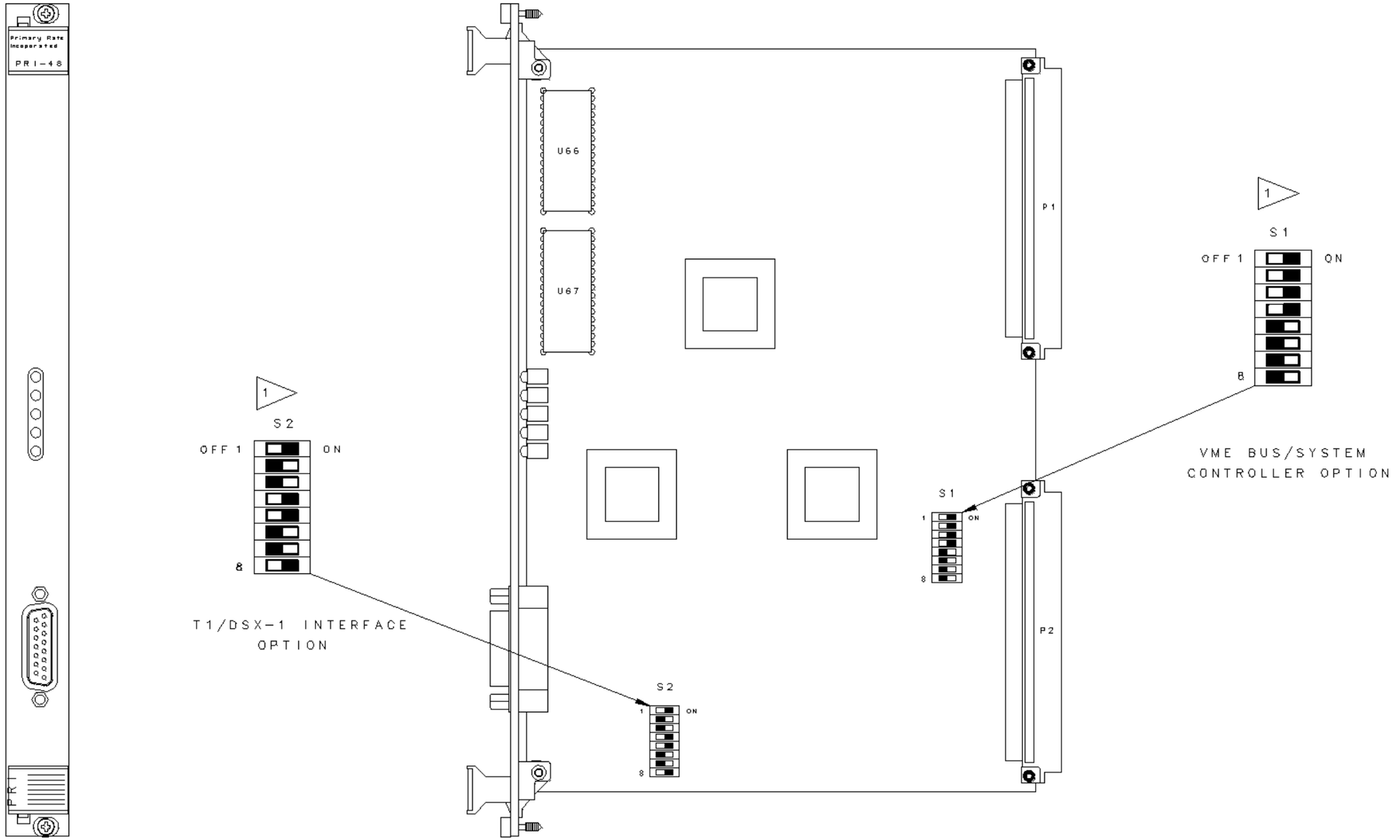
Table 2 - PRI-48 Line Equalization

Switch Position	Encoder Meaning
S2-1	Trunk A - LEN2
S2-2	Trunk A - LEN1
S2-3	Trunk A - LEN0
S2-4	ON - No effect OFF - Transmit all 1s on Trunk A
S2-5	Trunk B - LEN2
S2-6	Trunk B - LEN1
S2-7	Trunk B - LEN0
S2-8	ON - No effect OFF - Transmit all 1s on Trunk B

The table below defines the line lengths supported by the selector encoding described in the preceding section.

Table 3 - PRI-48 Line Lengths

LEN2	LEN1	LEN0	Line Length
ON	OFF	OFF	0-133’ (0-40.5 m)
OFF	ON	ON	133-266’ (40.5-81 m)
OFF	ON	OFF	266-399’ (81-121.6 m)
OFF	OFF	ON	399-533’ (121.6-162.5 m)
OFF	OFF	OFF	533-655’ (162.5-200 m)

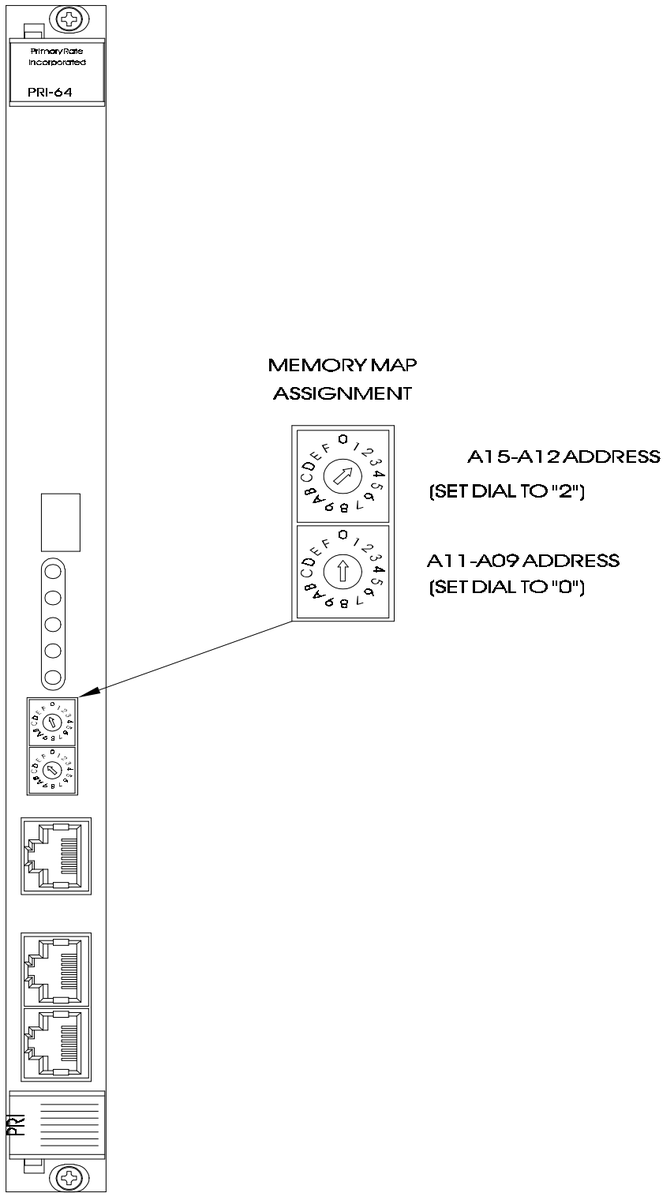


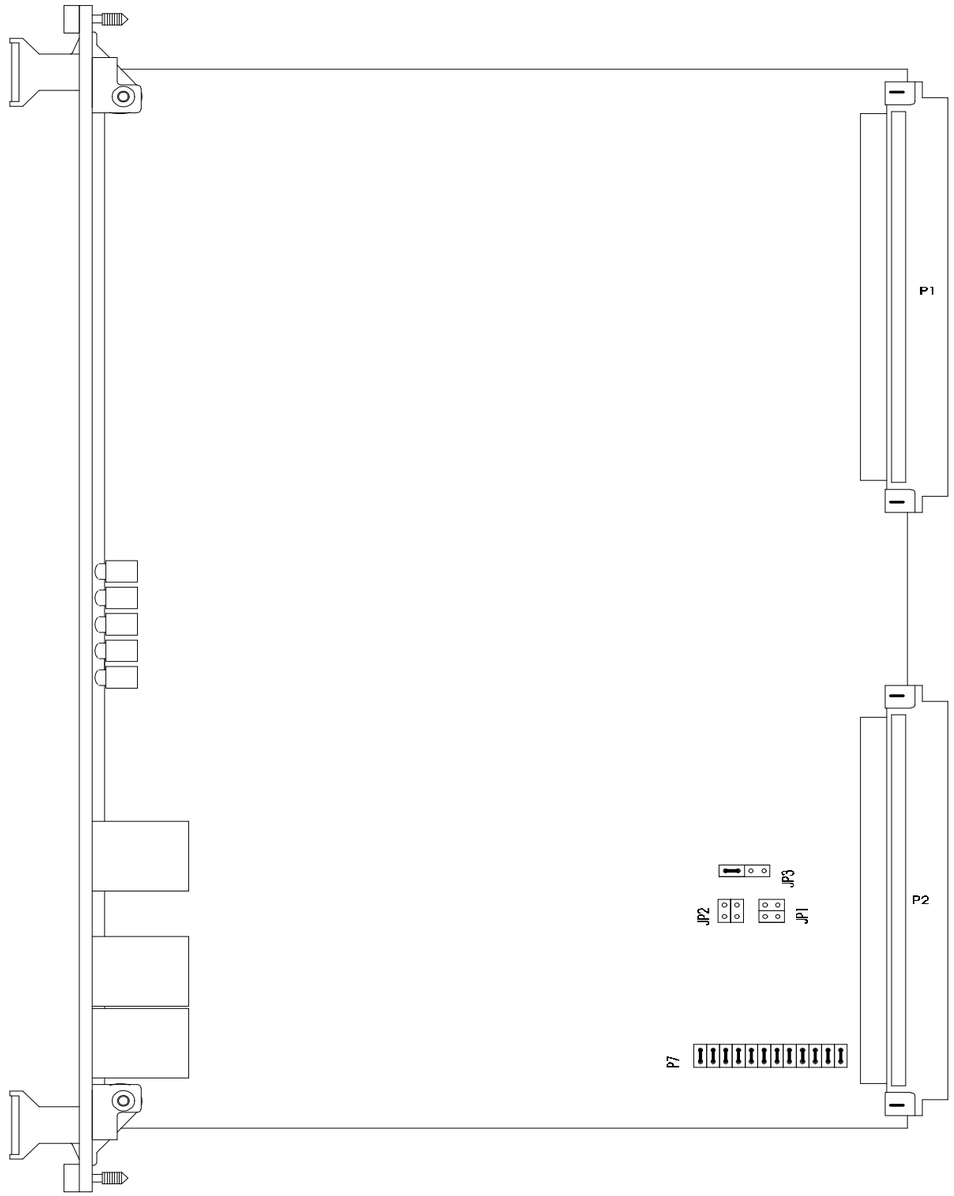
OUTLINE
PRI-48 T1/ISDN

(3603733, Rev. A)

NOTES:

1. THE BLACK PORTIONS OF THE SWITCHES DENOTE THE SWITCHED ARM.





PRI-64 MEMORY MAP ASSIGNMENT

Each PRI-64 board consumes a 512 byte window of VME bus A16 space. Each PRI-64 board consumes a 2 Meg window of VME bus A32 space. The A32 base address of the board is configured under software control during the boot procedure for the board. Specifically, the 11 MSBs of the A32 base address may be programmed.

The 7 MSBs of the PRI-64 A16 base address are specified by the two rotary dials located on the front panel. The upper dial specifies address bits A15-A12. The lower dial specifies address bits A11-A09. Note that the LSB of the lower dial is not used.

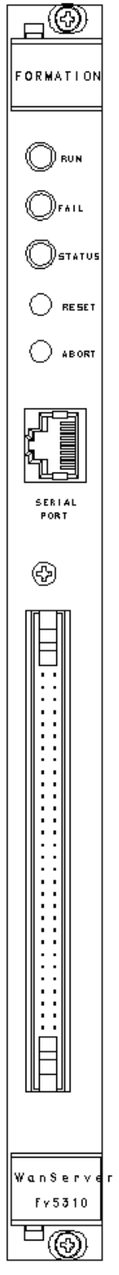
Table 4 - PRI-64 VME Bus Mapping

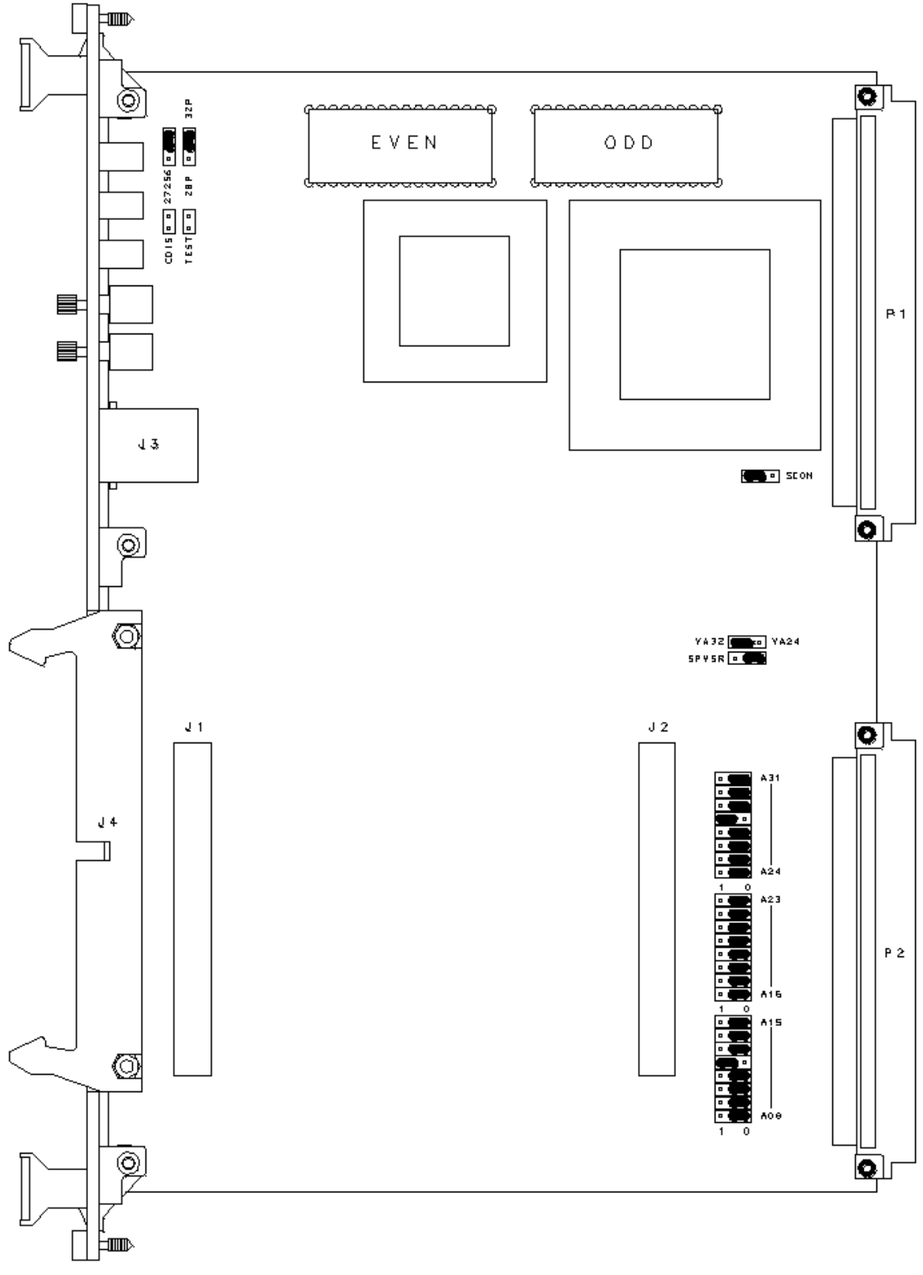
PRI-64 Board Number	VME A16 Base Address	VME A32 Base Address
0	FFFF 2000	2000 0000
1	FFFF 2200	2020 0000
2	FFFF 2400	2040 0000

A16 will be set using the two dials.
For Jessica, the board number is 0.
Set per drawing.

OUTLINE
PRI-64 E1/ISDN

(3603734, Rev. A)





OUTLINE
fv5310 WAN Server/Mezzanine
(Main Board)

(3603735, Sh. 1, Rev. 0)

FV5310 VMEBus Mapping

FV5310 Board Number	VME A16 Base Address	VME A32 Base Address
0	FFFF 1000	1000 0000

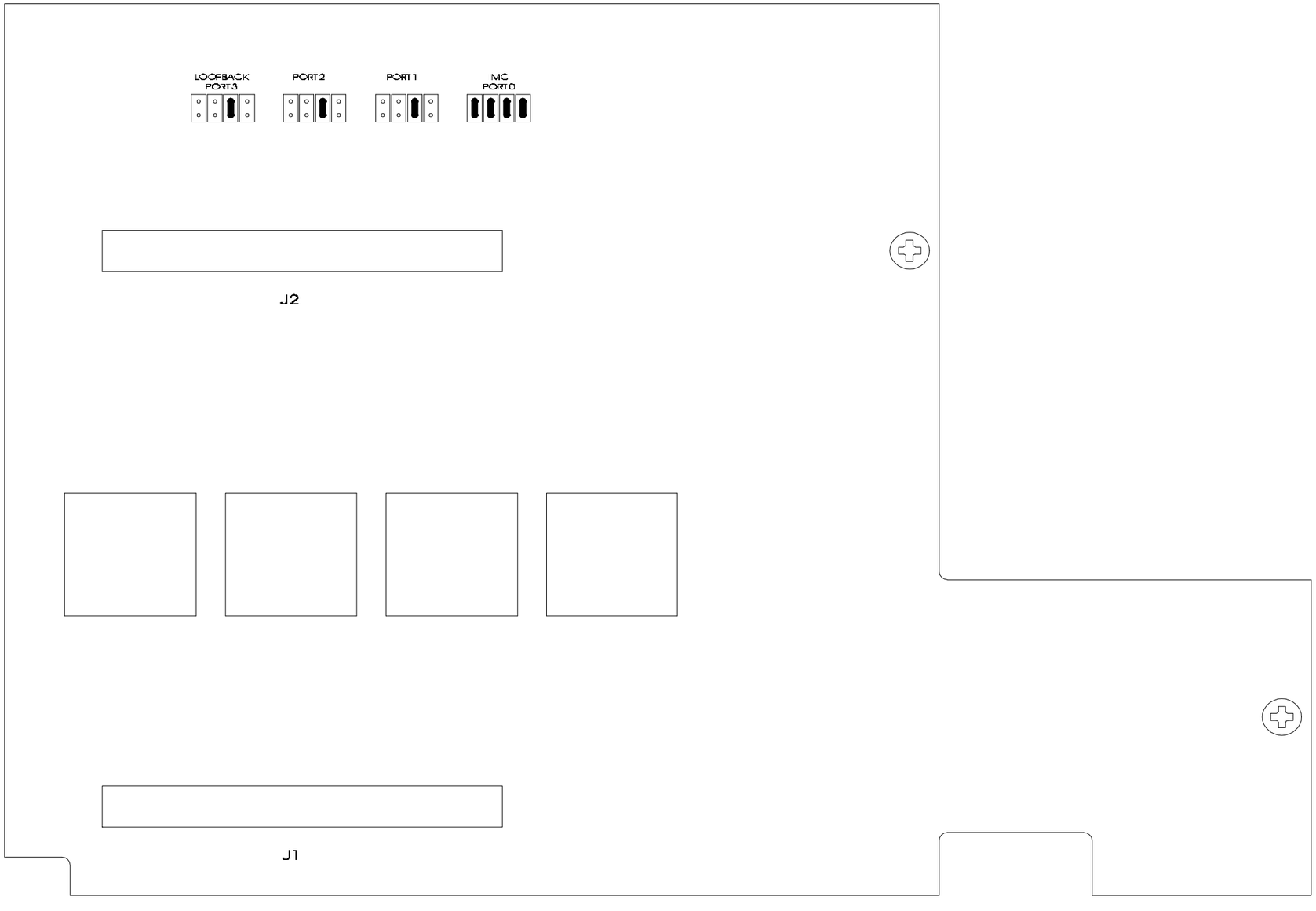
Address Jumpers

A31-0	A23-0	A15-0
A30-0	A22-0	A14-0
A29-0	A21-0	A13-0
A28-1	A20-0	A12-1
A27-0	A19-0	A11-0
A26-0	A18-0	A10-0
A25-0	A17-0	A09-0
A24-0	A16-0	A08-0

Jumpers on FV5310

VA32 - VA24	Center pin to VA32 side
SPVSR	Center pin to side opposite SPVSR
SCON Jumper	Center pin to side opposite SCON
27256	Center pin to side opposite 27256
28P - 32P	Center pin to 32P side

The MIC provides RS-422 connection to the IMC for control. The MIC will be in slot 4.



Jumpers

PORT 3	PORT 2	PORT 1	PORT 0
00I0	00I0	00I0	IIII

Port 0 - "DTE"
Port 1-3 - "DCE"

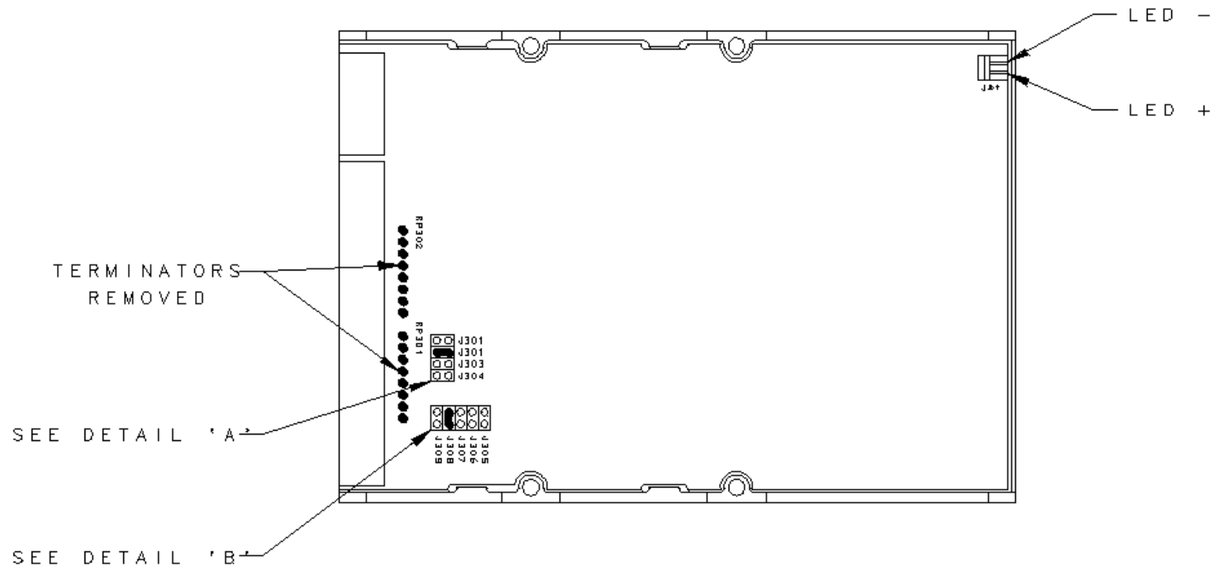
OUTLINE
fv5310 WAN Server/Mezzanine
(Mezzanine Card)

(3603735, Sh. 2, Rev. 0)

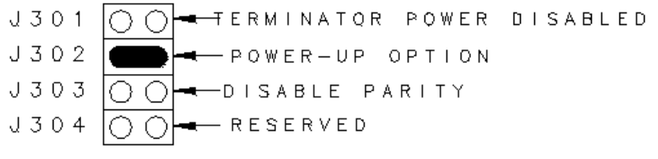
DRIVE PARAMETERS FOR MAXTOR 7290S	
CAPACITY, FORMATTED	290,024,960 Bytes
INTERNAL TRANSFER RATE	2.83 MBytes/sec
EXTERNAL TRANSFER RATE	3 MBytes/sec ASYNC
	5 MBytes/sec SYNC
AVERAGE SEEK	15 msec
MAXIMUM SEEK	27 msec
SPINDLE SPEED	3551 rpm
AVERAGE LATENCY	8.45 msec
DISKS	2
READ/WRITE HEADS	4
SECTORS PER TRACK	60-96
BYTES PER SECTOR	512
CYLINDERS	1,765
MTBF	300,000 hours
WEIGHT	1.2 lb

POWER REQUIREMENTS	
+12V 5 , READ/WRITE	140mA
+12V 5 , SPIN UP	820mA
+5V 5 , READ/WRITE	480mA
POWER DURATION	5.29 WATTS

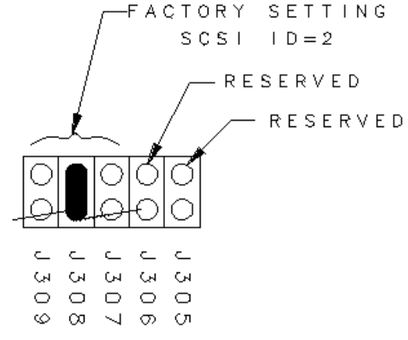
SCSI ID JUMPER DESIGNATIONS			
SCSI ID	J307	J308	J309
0	OUT	OUT	OUT
1	OUT	OUT	IN
2	OUT	IN	OUT
3	OUT	IN	IN
4	IN	OUT	OUT
5	IN	OUT	IN
6	IN	IN	OUT
SCSI ID 7 RESERVED FOR THE HOST SYSTEM			



DRIVE - BOTTOM VIEW



DETAIL 'A'
SCALE: NONE



DETAIL 'B'
SCALE: NONE

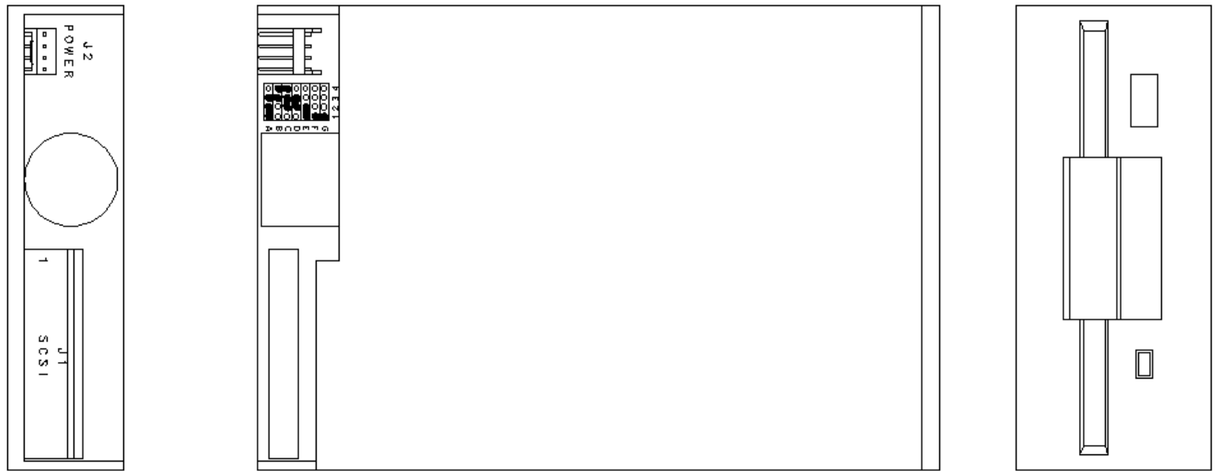
CONFIGURATION
Maxtor Hard Drive 7290S

(3603736, Rev. A)

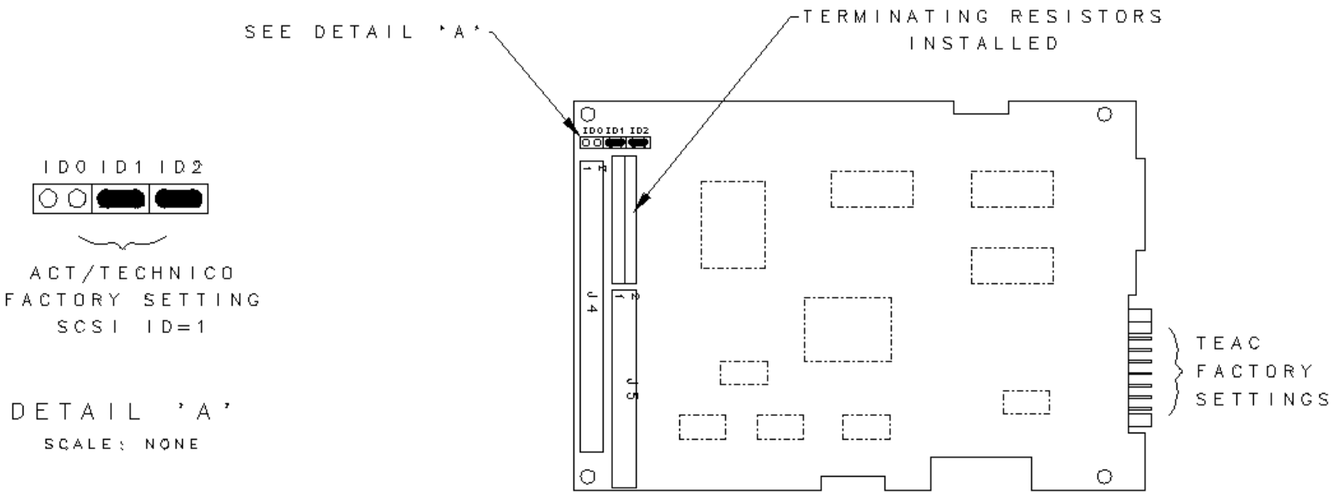
DRIVE PARAMETERS FOR TEAC FD - 235JS	
CAPACITY, FORMATTED	4 MBytes
MEDIA (3.5")	2ED, 2HD, 2DD
DATA TRANSFER RATE	250 KBits/sec (1 MB Drive)
	500 KBits/sec (2 MB Drive)
	1000 KBits/sec (4 MB Drive)
TRACKS/DISK	160
TRACK DENSITY	135 tpi
CYLINDERS	80
ROTATION	300/360 rpm
AVERAGE ACCESS TIME	94 msec
AVERAGE LATENCY TIME	100/83.3 msec
MTBF	10,000 hours
WEIGHT	1.12 lb

POWER REQUIREMENTS (+5V ONLY)	
STANDBY, TYP	.50 WATTS
READ, TYP	1.85 WATTS
WRITE, TYP	2.15 WATTS
MAXIMUM POWER	4.73 WATTS

SCSI ID JUMPER DESIGNATIONS			
SCSI ID	ID2	ID1	ID0
0	IN	IN	IN
1	IN	IN	OUT
2	IN	OUT	IN
3	IN	OUT	OUT
4	OUT	IN	IN
5	OUT	IN	OUT
6	OUT	OUT	IN
7	OUT	OUT	OUT



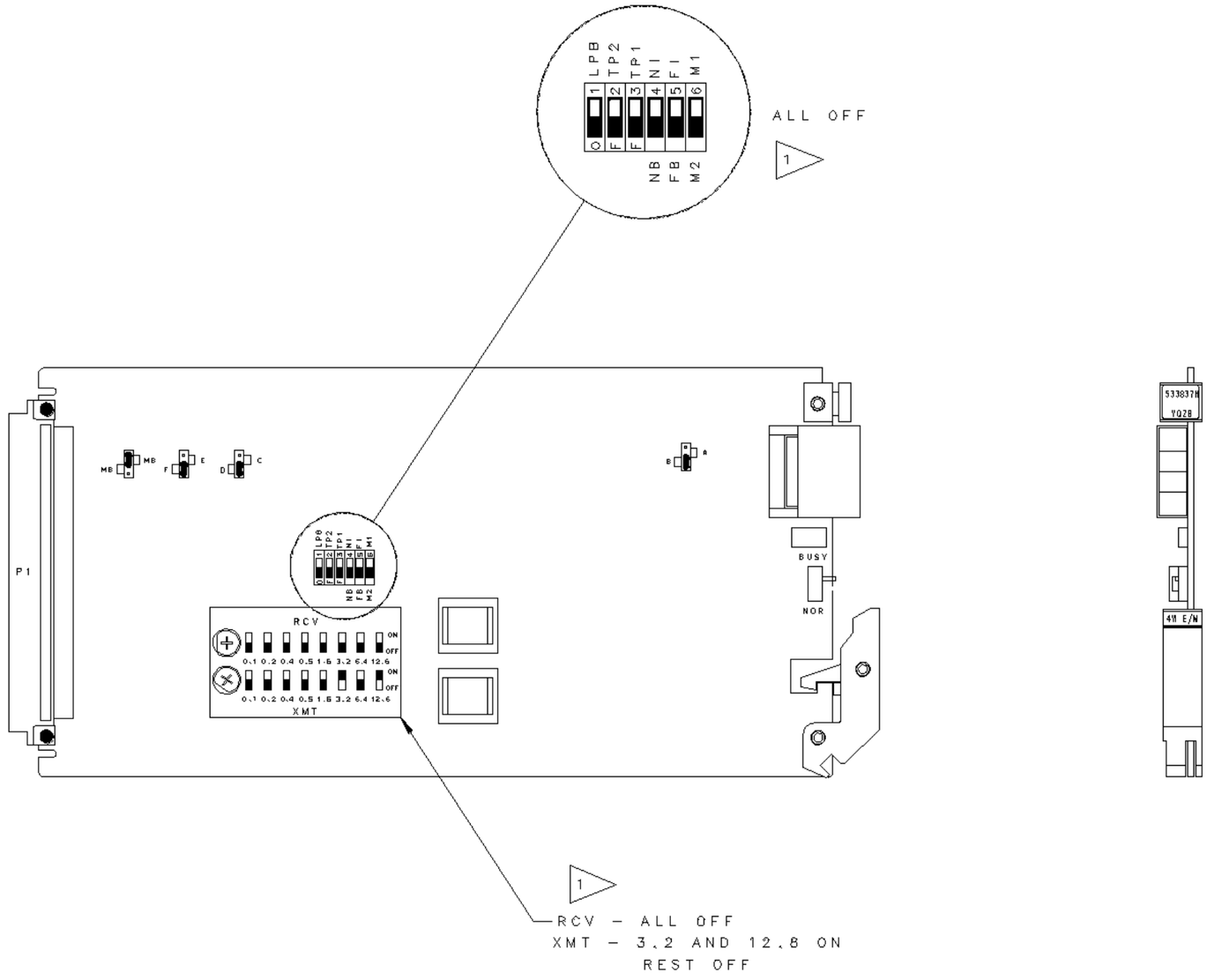
TEAC FD-235JS FLOPPY DISK DRIVE



DETAIL 'A'
SCALE: NONE

SCSI INTERFACE CONTROLLER

CONFIGURATION
Teac FD235JS-501 Floppy Disk
(3603737, Rev. 0)



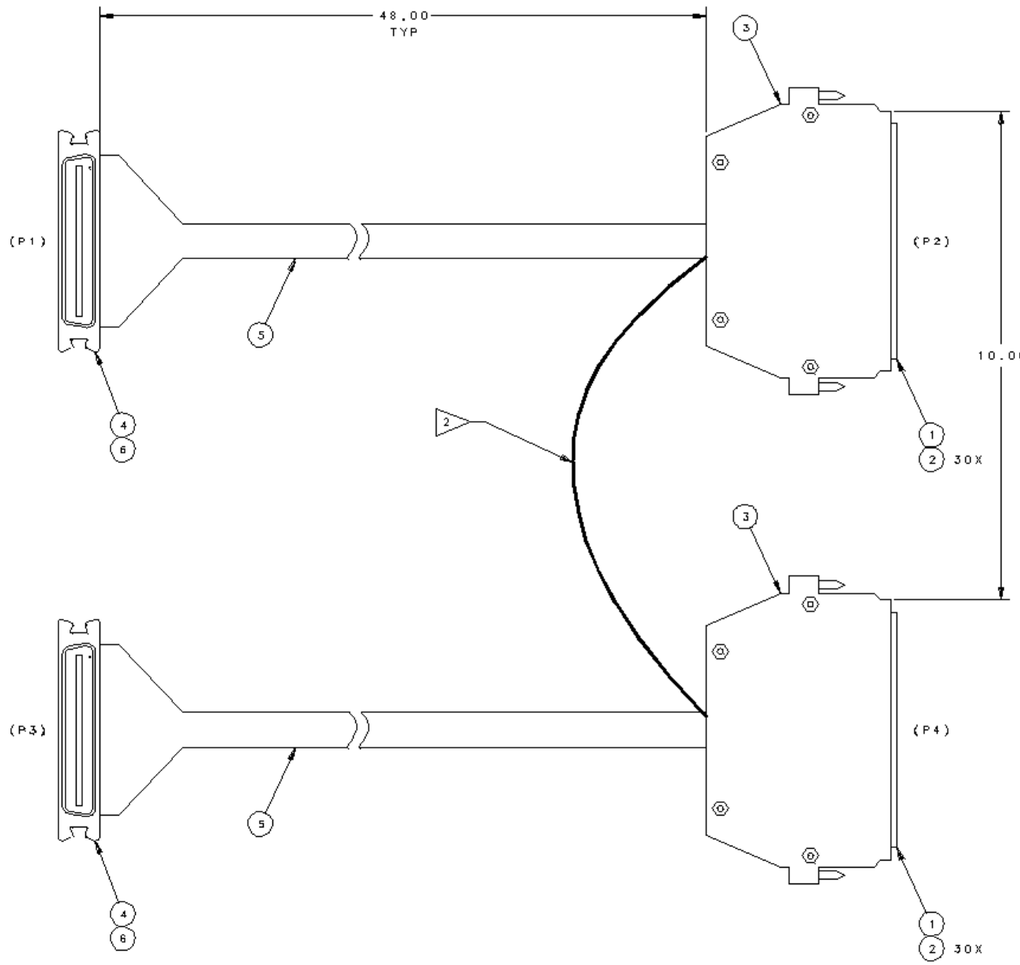
CONFIGURATION
E/M Card

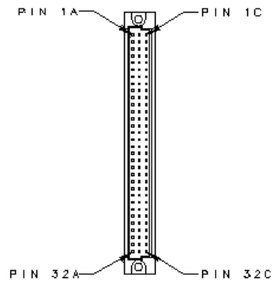
(3603742, Rev. A)

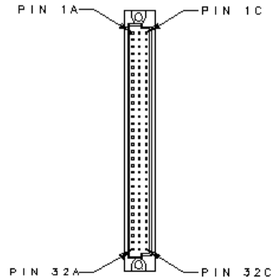
NOTES:

1. THE BLACK PORTIONS OF THE SWITCHES DENOTE THE SWITCHED ARM.

WIRING TABLE		
FROM	TO	SIGNAL
P1-1	P2-A2	CH1 HI
P1-26	P2-A3	CH1 LO
P1-2	P2-A4	CH2 HI
P1-27	P2-A5	CH2 LO
P1-3	P2-A6	CH3 HI
P1-28	P2-A7	CH3 LO
P1-4	P2-A8	CH4 HI
P1-29	P2-A9	CH4 LO
P1-5	P2-A10	CH5 HI
P1-30	P2-A11	CH5 LO
P1-6	P2-A12	CH6 HI
P1-31	P2-A13	CH6 LO
P1-7	P2-A14	CH7 HI
P1-32	P2-A15	CH7 LO
P1-8	P2-A16	CH8 HI
P1-33	P2-A17	CH8 LO
P1-9	P2-A18	CH9 HI
P1-34	P2-A19	CH9 LO
P1-10	P2-A20	CH10 HI
P1-35	P2-A21	CH10 LO
P1-11	P2-A22	CH11 HI
P1-36	P2-A23	CH11 LO
P1-12	P2-A24	CH12 HI
P1-37	P2-A25	CH12 LO
P1-13	P2-A26	CH13 HI
P1-38	P2-A27	CH13 LO
P1-14	P2-A28	CH14 HI
P1-38	P2-A29	CH14 LO
P1-15	P2-A30	CH15 HI
P1-40	P2-A31	CH15 LO
P1-16	P4-A2	CH16 HI
P1-41	P4-A3	CH16 LO
P3-1	P4-A4	CH17 HI
P3-26	P4-A5	CH17 LO
P3-2	P4-A6	CH18 HI
P3-27	P4-A7	CH18 LO
P3-3	P4-A8	CH19 HI
P3-28	P4-A9	CH19 LO
P3-4	P4-A10	CH20 HI
P3-29	P4-A11	CH20 LO
P3-5	P4-A12	CH21 HI
P3-30	P4-A13	CH21 LO
P3-6	P4-A14	CH22 HI
P3-31	P4-A15	CH22 LO
P3-7	P4-A16	CH23 HI
P3-32	P4-A17	CH23 LO
P3-8	P4-A18	CH24 HI
P3-33	P4-A19	CH24 LO
P3-9	P4-A20	CH25 HI
P3-34	P4-A21	CH25 LO
P3-10	P4-A22	CH26 HI
P3-35	P4-A23	CH26 LO
P3-11	P4-A24	CH27 HI
P3-36	P4-A25	CH27 LO
P3-12	P4-A26	CH28 HI
P3-37	P4-A27	CH28 LO
P3-13	P4-A28	CH29 HI
P3-38	P4-A29	CH29 LO
P3-14	P4-A30	CH30 HI
P3-39	P4-A31	CH30 LO







NOTES:

1. FABRICATE CABLE TO LENGTH INDICATED, NOTE CONNECTOR ORIENTATION CAREFULLY.
2. CABLE LENGTH FOR P1-P2 PORTION ASSEMBLY MUST BE CUT LONGER SO THAT TWISTED PAIR FROM P1-16 AND 41 CAN BE ROUTED OVER TO P4-A2 AND A3, RESPECTIVELY.

G1

CABLE ASSEMBLY
E1 MUX Audio

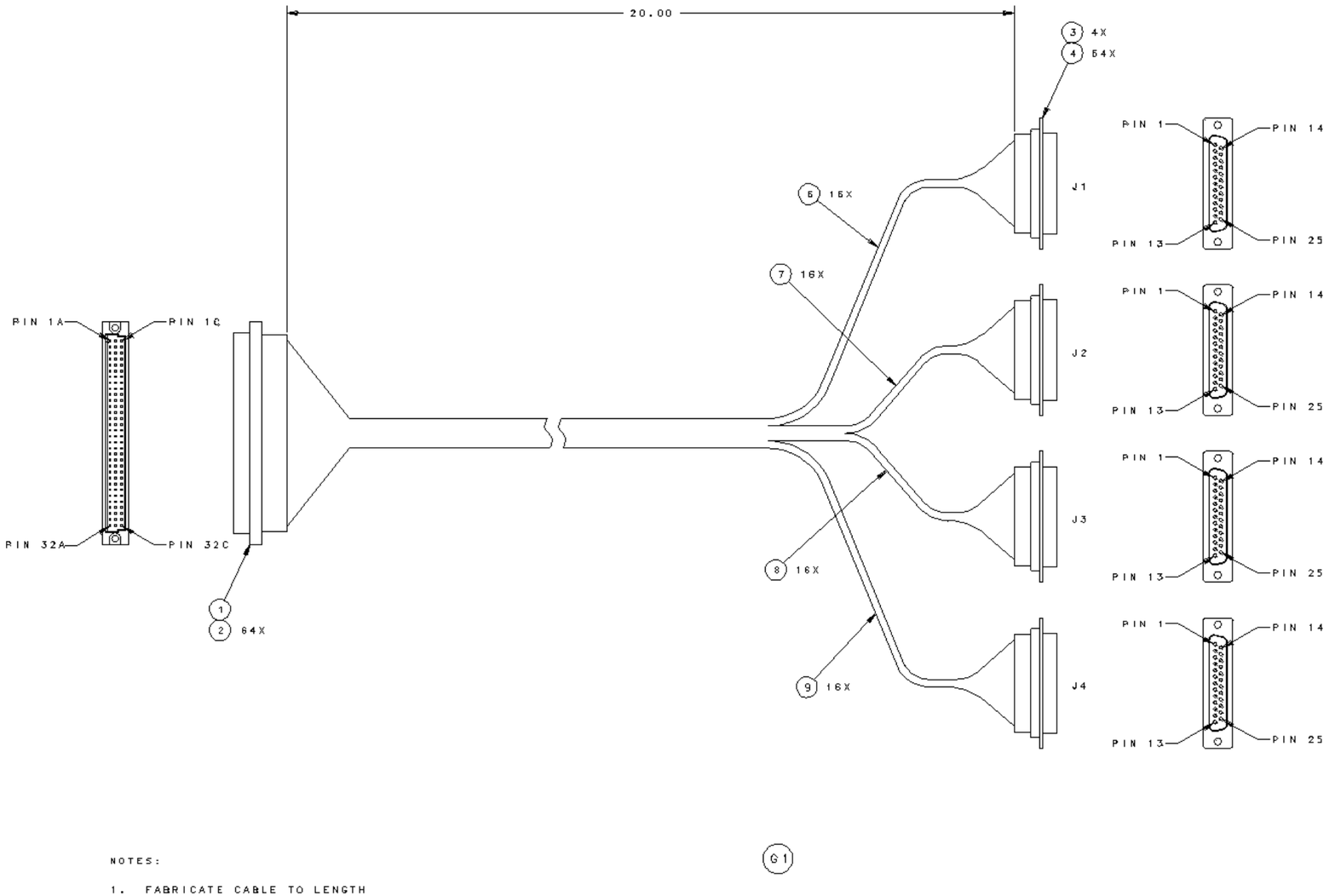
(4203716, Rev. A)

WIRING TABLE				
ITEM 1	J1	WIRE TYPE	ITEM NO.	SIGNAL
DIN96-A2	DB25-2	#24 RED	ITEM 6	XMT-P
DIN96-C3	DB25-14	#24 RED	ITEM 6	XMT-N
DIN96-A1	DB25-3	#24 RED	ITEM 6	RCV-P
DIN96-C1	DB25-14	#24 RED	ITEM 6	RCV-N
DIN96-C2	DB25-15	#24 RED	ITEM 6	TSET-P
DIN96-C8	DB25-12	#24 RED	ITEM 6	TSET-N
DIN96-C4	DB25-17	#24 RED	ITEM 6	RSET-P
DIN96-A6	DB25-9	#24 RED	ITEM 6	RSET-N
DIN96-A4	DB25-4	#24 RED	ITEM 6	RTS-P
DIN96-A8	DB25-19	#24 RED	ITEM 6	RTS-N
DIN96-A3	DB25-5	#24 RED	ITEM 6	STS-P
DIN96-A5	DB25-13	#24 RED	ITEM 6	CTS-N
DIN96-C6	DB25-6	#24 RED	ITEM 6	DCEREADY-P
DIN96-A7	DB25-22	#24 RED	ITEM 6	DCEREADY-N
DIN96-C5	DB25-20	#24 RED	ITEM 6	DTEREADY-R
DIN96-C7	DB25-23	#24 RED	ITEM 6	DTEREADY-N

WIRING TABLE				
ITEM 1	J2	WIRE TYPE	ITEM NO.	SIGNAL
DIN96-A10	DB25-2	#24 WHITE	ITEM 7	XMT-P
DIN96-C11	DB25-14	#24 WHITE	ITEM 7	XMT-N
DIN96 -A9	DB25-3	#24 WHITE	ITEM 7	RCV-P
DIN96 -C9	DB25-14	#24 WHITE	ITEM 7	RCV-N
DIN96-C10	DB25-15	#24 WHITE	ITEM 7	TSET-P
DIN96-C16	DB25-12	#24 WHITE	ITEM 7	TSET-N
DIN96-C12	DB25-17	#24 WHITE	ITEM 7	RSET-P
DIN96-A14	DB25-9	#24 WHITE	ITEM 7	RSET-N
DIN96-A12	DB25-4	#24 WHITE	ITEM 7	RTS-P
DIN96-A16	DB25-19	#24 WHITE	ITEM 7	RTS-N
DIN96-A11	DB25-5	#24 WHITE	ITEM 7	STS-P
DIN96-A13	DB25-13	#24 WHITE	ITEM 7	CTS-N
DIN96-C14	DB25-6	#24 WHITE	ITEM 7	DCEREADY-P
DIN96-A15	DB25-22	#24 WHITE	ITEM 7	DCEREADY-N
DIN96-C13	DB25-20	#24 WHITE	ITEM 7	DTEREADY-R
DIN96-C15	DB25-23	#24 WHITE	ITEM 7	DTEREADY-N

WIRING TABLE				
ITEM 1	J3	WIRE TYPE	ITEM NO.	SIGNAL
DIN96-A18	DB25-2	#24 BLUE	ITEM 8	XMT-P
DIN96-C19	DB25-14	#24 BLUE	ITEM 8	XMT-N
DIN96-A17	DB25-3	#24 BLUE	ITEM 8	RCV-P
DIN96-C17	DB25-14	#24 BLUE	ITEM 8	RCV-N
DIN96-C18	DB25-15	#24 BLUE	ITEM 8	TSET-P
DIN96-C24	DB25-12	#24 BLUE	ITEM 8	TSET-N
DIN96-C20	DB25-17	#24 BLUE	ITEM 8	RSET-P
DIN96-A22	DB25-9	#24 BLUE	ITEM 8	RSET-N
DIN96-A20	DB25-4	#24 BLUE	ITEM 8	RTS-P
DIN96-A24	DB25-19	#24 BLUE	ITEM 8	RTS-N
DIN96-A19	DB25-5	#24 BLUE	ITEM 8	STS-P
DIN96-A21	DB25-13	#24 BLUE	ITEM 8	CTS-N
DIN96-C22	DB25-6	#24 BLUE	ITEM 8	DCEREADY-P
DIN96-A23	DB25-22	#24 BLUE	ITEM 8	DCEREADY-N
DIN96-C21	DB25-20	#24 BLUE	ITEM 8	DTEREADY-R
DIN96-C23	DB25-23	#24 BLUE	ITEM 8	DTEREADY-N

WIRING TABLE				
ITEM 1	J4	WIRE TYPE	ITEM NO.	SIGNAL
DIN96-A25	DB25-2	#24 GREEN	ITEM 9	XMT-P
DIN96-C27	DB25-14	#24 GREEN	ITEM 9	XMT-N
DIN96-A25	DB25-3	#24 GREEN	ITEM 9	RCV-P
DIN96-C25	DB25-14	#24 GREEN	ITEM 9	RCV-N
DIN96-C26	DB25-15	#24 GREEN	ITEM 9	TSET-P
DIN96-C32	DB25-12	#24 GREEN	ITEM 9	TSET-N
DIN96-C28	DB25-17	#24 GREEN	ITEM 9	RSET-P
DIN96-A30	DB25-9	#24 GREEN	ITEM 9	RSET-N
DIN96-A26	DB25-4	#24 GREEN	ITEM 9	RTS-P
DIN96-A32	DB25-19	#24 GREEN	ITEM 9	RTS-N
DIN96-A27	DB25-5	#24 GREEN	ITEM 9	STS-P
DIN96-A29	DB25-13	#24 GREEN	ITEM 9	CTS-N
DIN96-C30	DB25-6	#24 GREEN	ITEM 9	DCEREADY-P
DIN96-A31	DB25-22	#24 GREEN	ITEM 9	DCEREADY-N
DIN96-C29	DB25-20	#24 GREEN	ITEM 9	DTEREADY-R
DIN96-C31	DB25-23	#24 GREEN	ITEM 9	DTEREADY-N

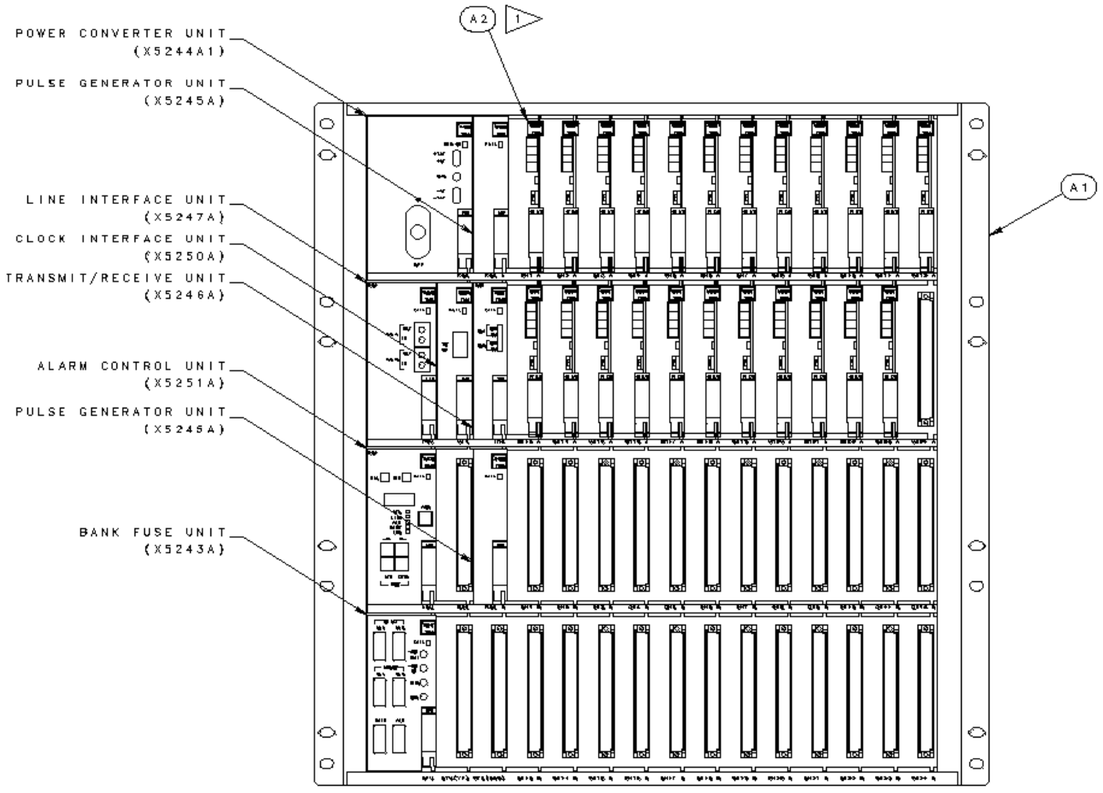


NOTES:

1. FABRICATE CABLE TO LENGTH INDICATED, NOTE CONNECTOR ORIENTATION CAREFULLY.

CABLE ASSEMBLY
RS422 WAN Server

(4203728, Rev. 0)



NOTES:

1. INSTALL CHANNEL CARDS. ITEM A2, PER TABLE 1. G6 CONFIGURATION IS SHOWN PICTORIALLY IN DRAWING.

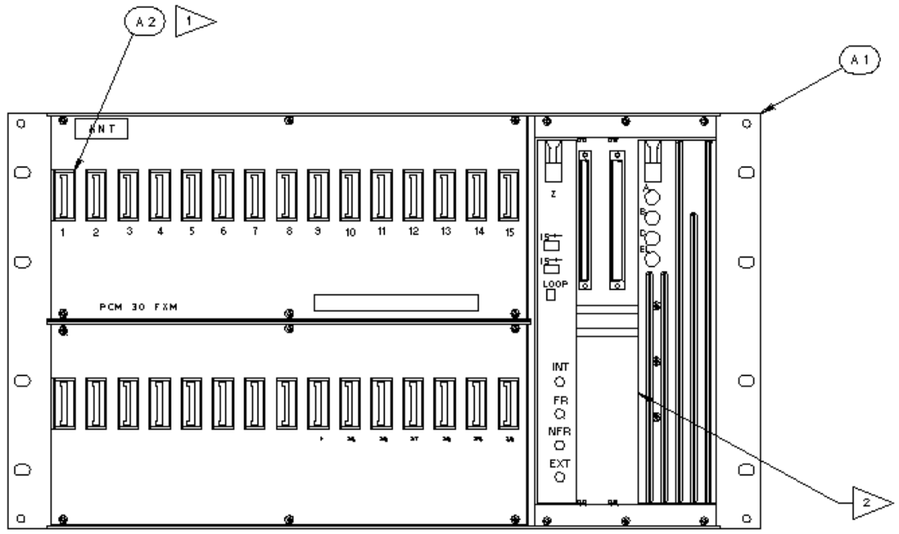
TABLE 1

GROUP NO.	CHANNELS (A2)	BANK LOCATION
G1	4	SLOTS CHA 1 – CHA 4
G2	8	SLOTS CHA 1 – CHA 8
G3	12	SLOTS CHA 1 – CHA 12
G4	16	SLOTS CHA 1 – CHA 16
G5	20	SLOTS CHA 1 – CHA 20
G6	23	SLOTS CHA 1 – CHA 24

(G1) 4 CHANNEL CONFIGURATION
(G2) 9 CHANNEL CONFIGURATION
(G3) 12 CHANNEL CONFIGURATION
(G4) 16 CHANNEL CONFIGURATION
(G5) 20 CHANNEL CONFIGURATION
(G6) 23 CHANNEL CONFIGURATION

ASSEMBLY
T1 CHANNEL BANK

(4203740, Rev. 0)



NOTES:

1. INSTALL CHANNEL CARDS, ITEM A2, PER TABLE 1. G8 CONFIGURATION IS SHOWN PICTORIALLY IN DRAWING.
2. INSTALL FUSE T2/250D IN CENTER FUSE HOLDER S12.

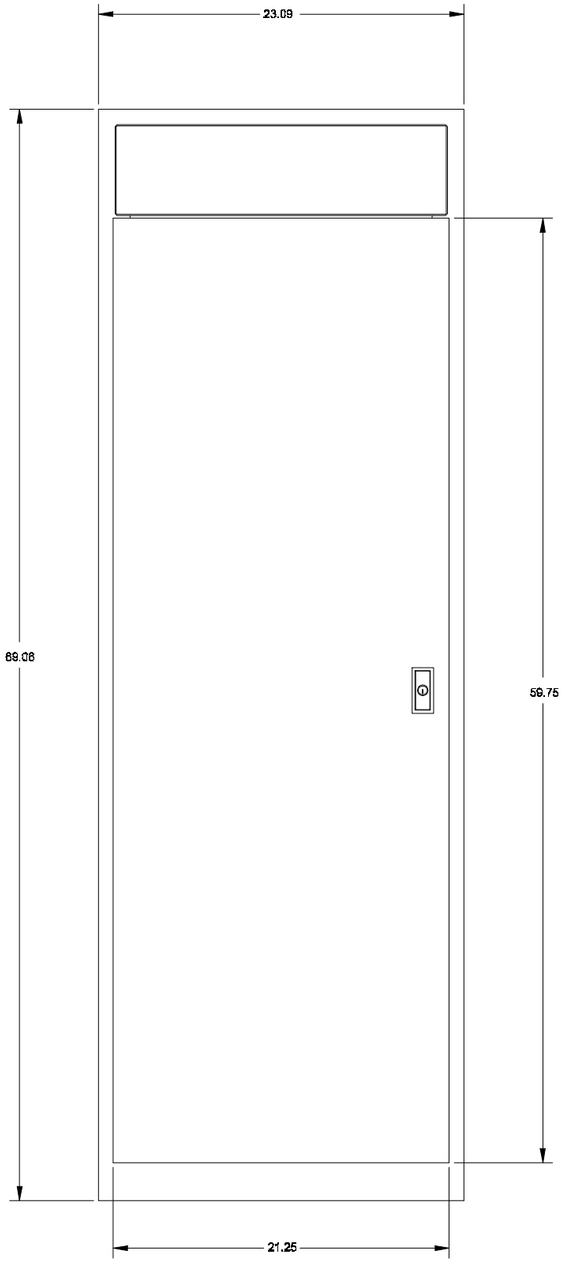
TABLE 1

GROUP NO.	CHANNELS (A2)	BANK LOCATION
G1	4	SLOTS 1 – 4
G2	8	SLOTS 1 – 8
G3	12	SLOTS 1 – 12
G4	16	SLOTS 1 – 16
G5	20	SLOTS 1 – 20
G6	24	SLOTS 1 – 24
G7	28	SLOTS 1 – 28
G8	30	SLOTS 1 – 30

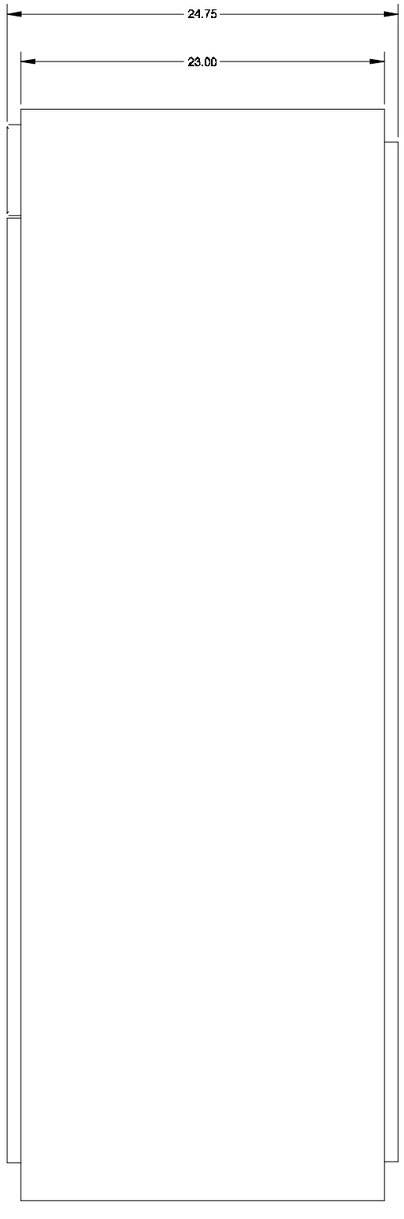
G1 4 CHANNEL CONFIGURATION
G2 8 CHANNEL CONFIGURATION
G3 12 CHANNEL CONFIGURATION
G4 16 CHANNEL CONFIGURATION
G5 20 CHANNEL CONFIGURATION
G6 24 CHANNEL CONFIGURATION
G7 28 CHANNEL CONFIGURATION
G8 30 CHANNEL CONFIGURATION

ASSEMBLY
E1 CHANNEL BANK

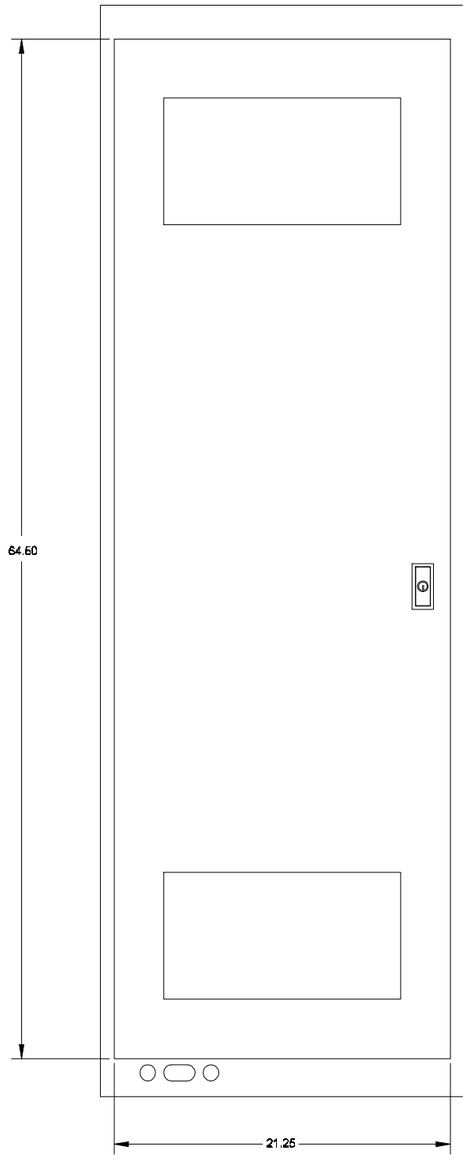
(4203745, Rev. 0)



FRONT VIEW



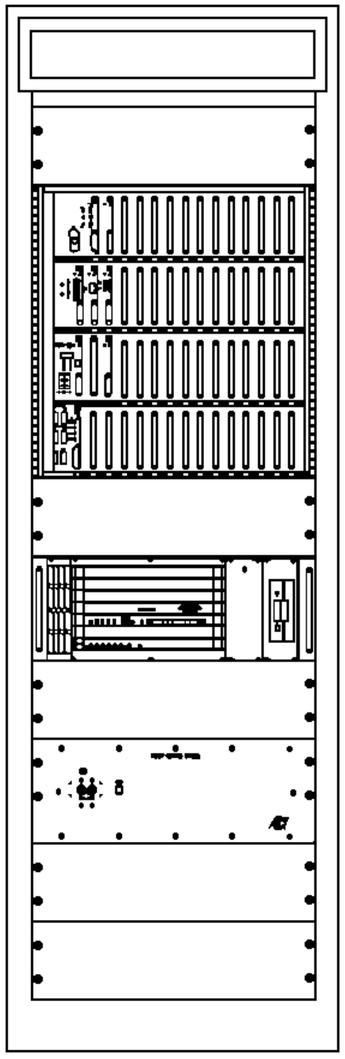
SIDE VIEW



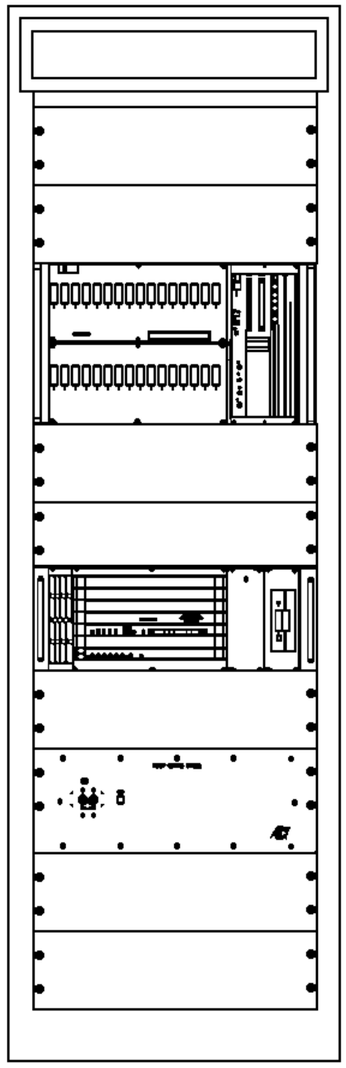
REAR VIEW

OUTLINE
Jessica System Rack
(PI/MUX Cabinet)

(4403701, Sh.1, Rev. 0)



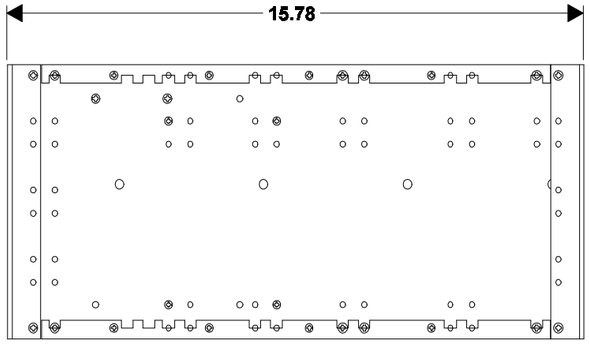
FRONT VIEW
DOOR REMOVED
T1 CONFIGURATION

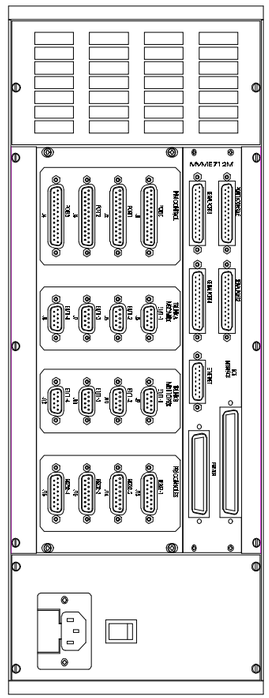


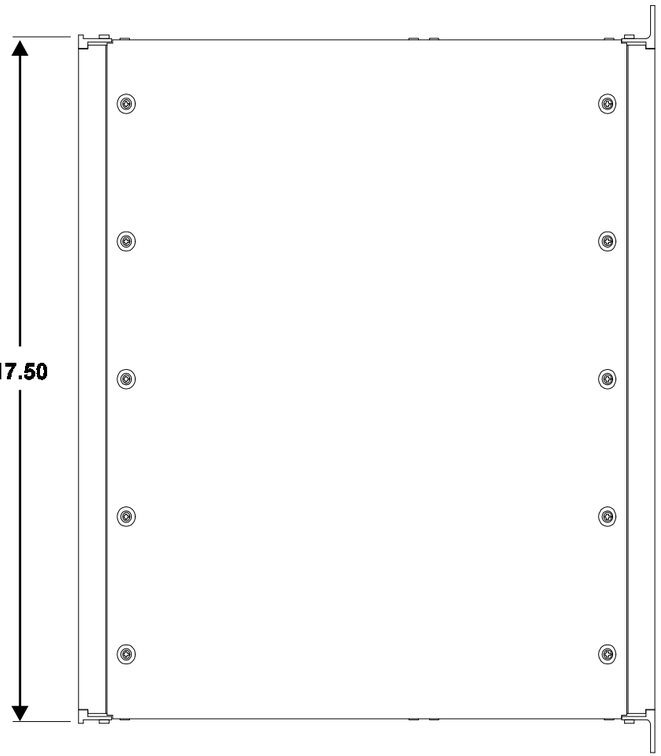
FRONT VIEW
DOOR REMOVED
E1 CONFIGURATION

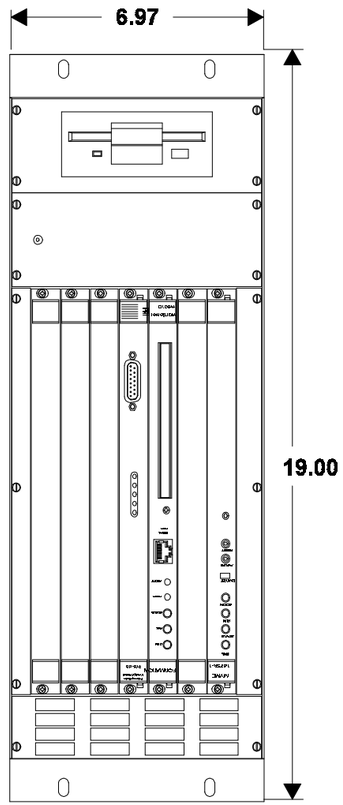
OUTLINE
Jessica System Rack
(PI/MUX Cabinet)

(4403701, Sh.2, Rev. 0)



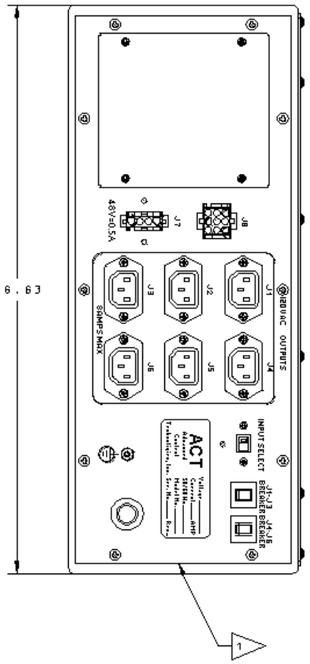


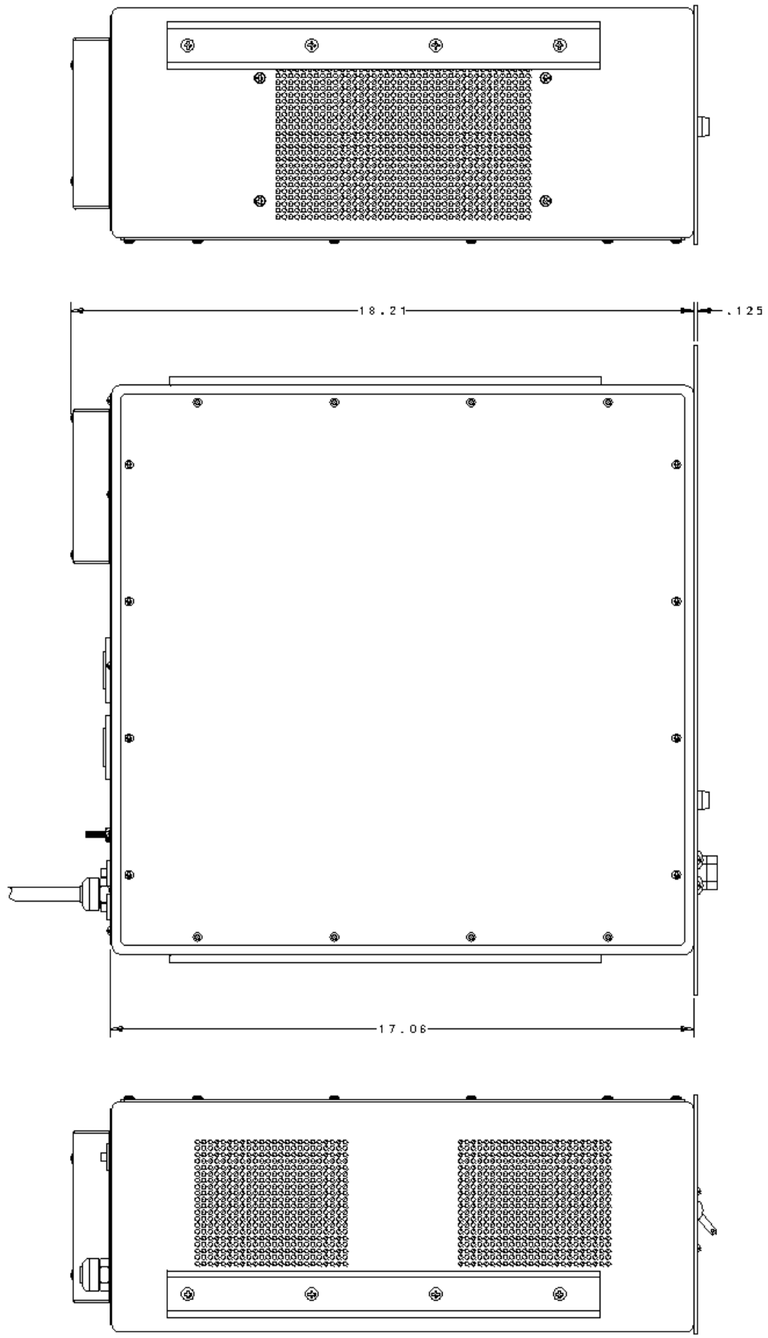


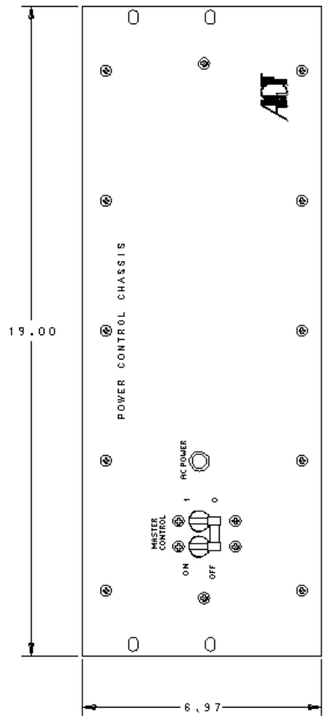


OUTLINE
4U PBX INTERFACE CHASSIS

(4403721, Rev. 0)





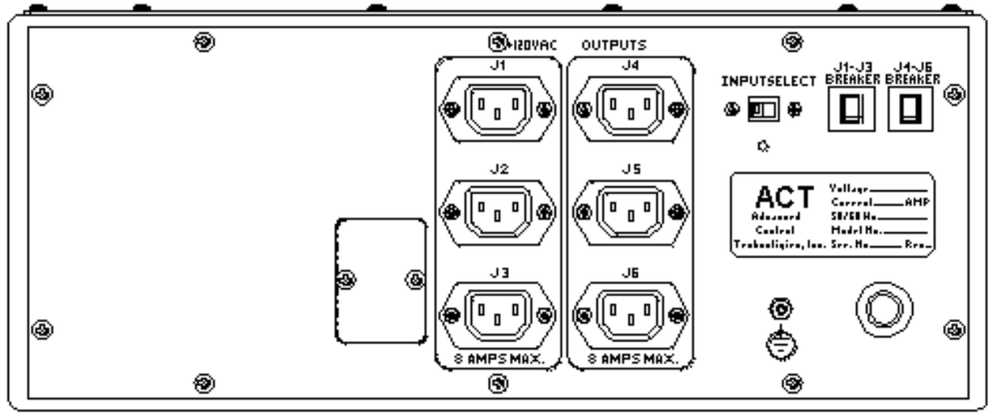


NOTES:

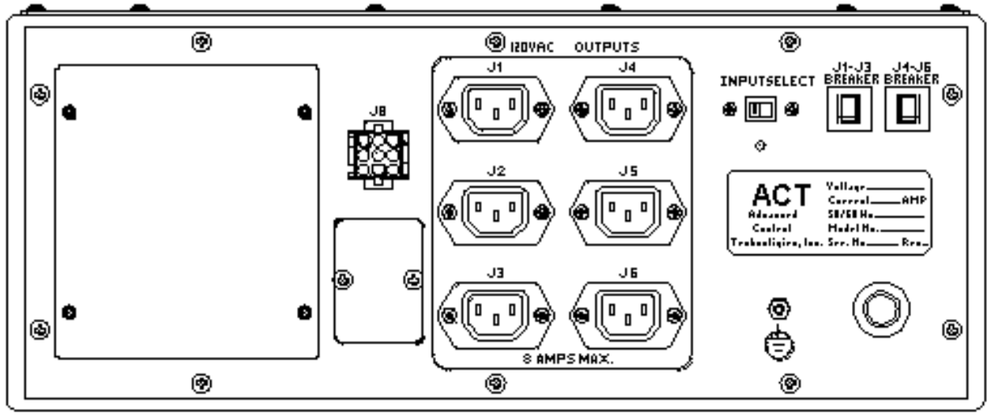
1. REAR PANEL VIEW ON SHEET 1 REPRESENTS 4203750G4 CONFIGURATION. SEE SHEET 2 FOR REAR PANEL VIEWS OF 4203750G1, G2 AND G3 CONFIGURATIONS.

OUTLINE
4U POWER CONTROL CHASSIS

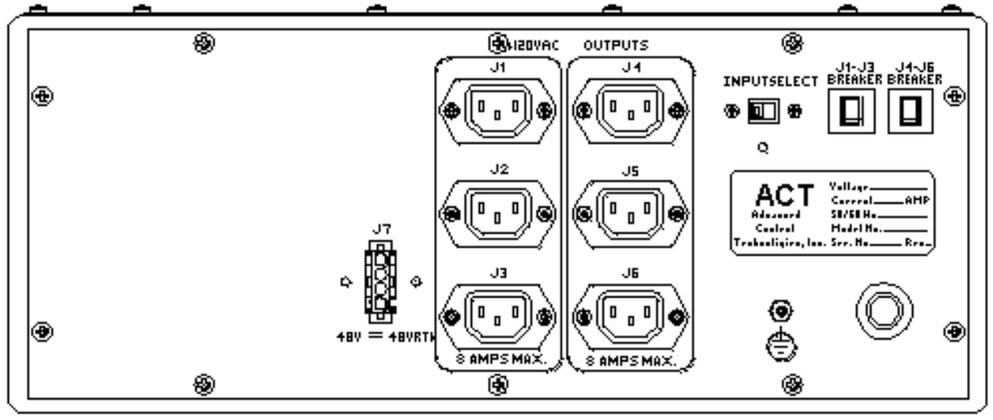
(4403751, Sh. 1, Rev. A)



4203750G1 REAR VIEW



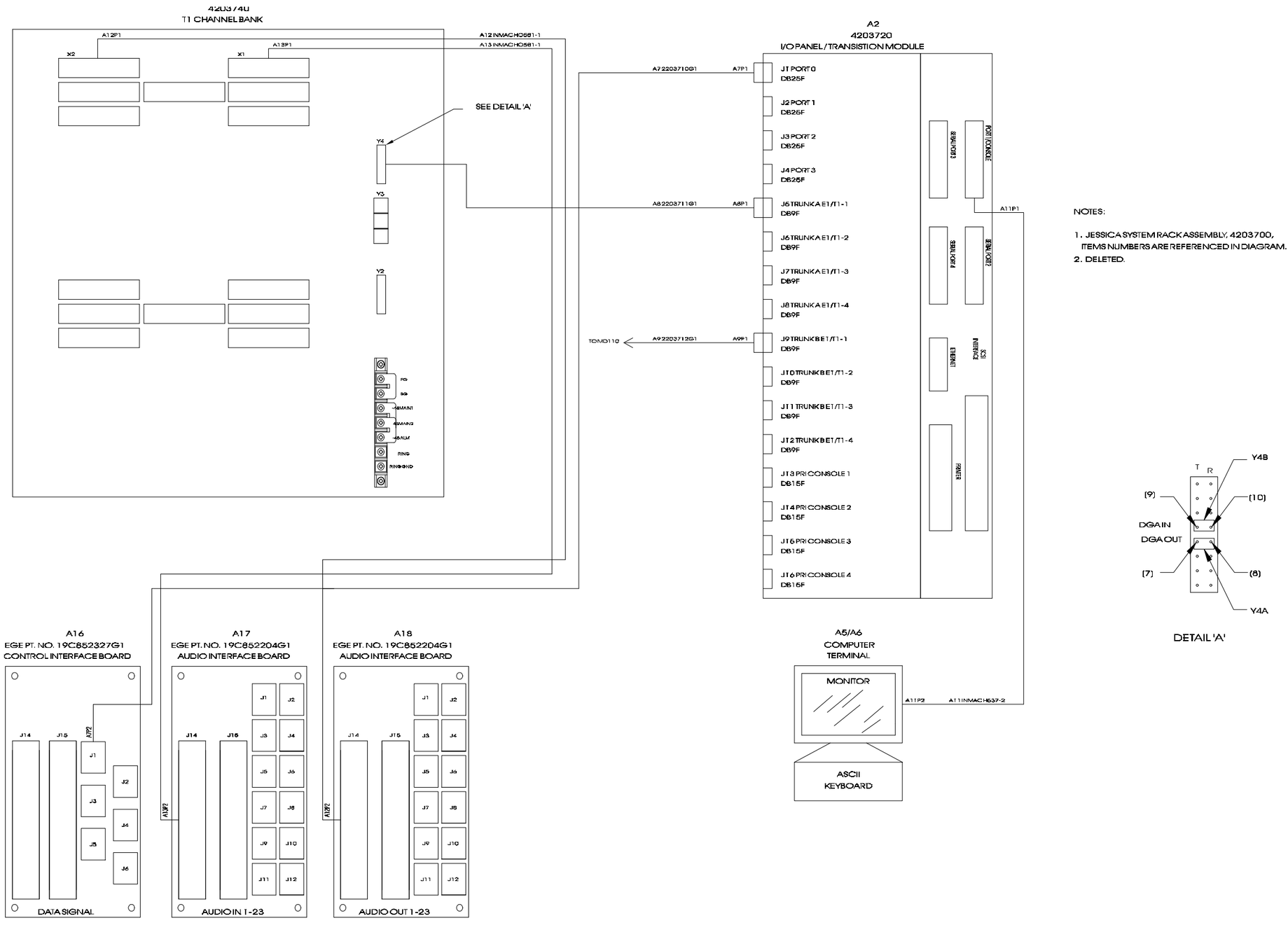
4203750G3 REAR VIEW



4203750G2 REAR VIEW

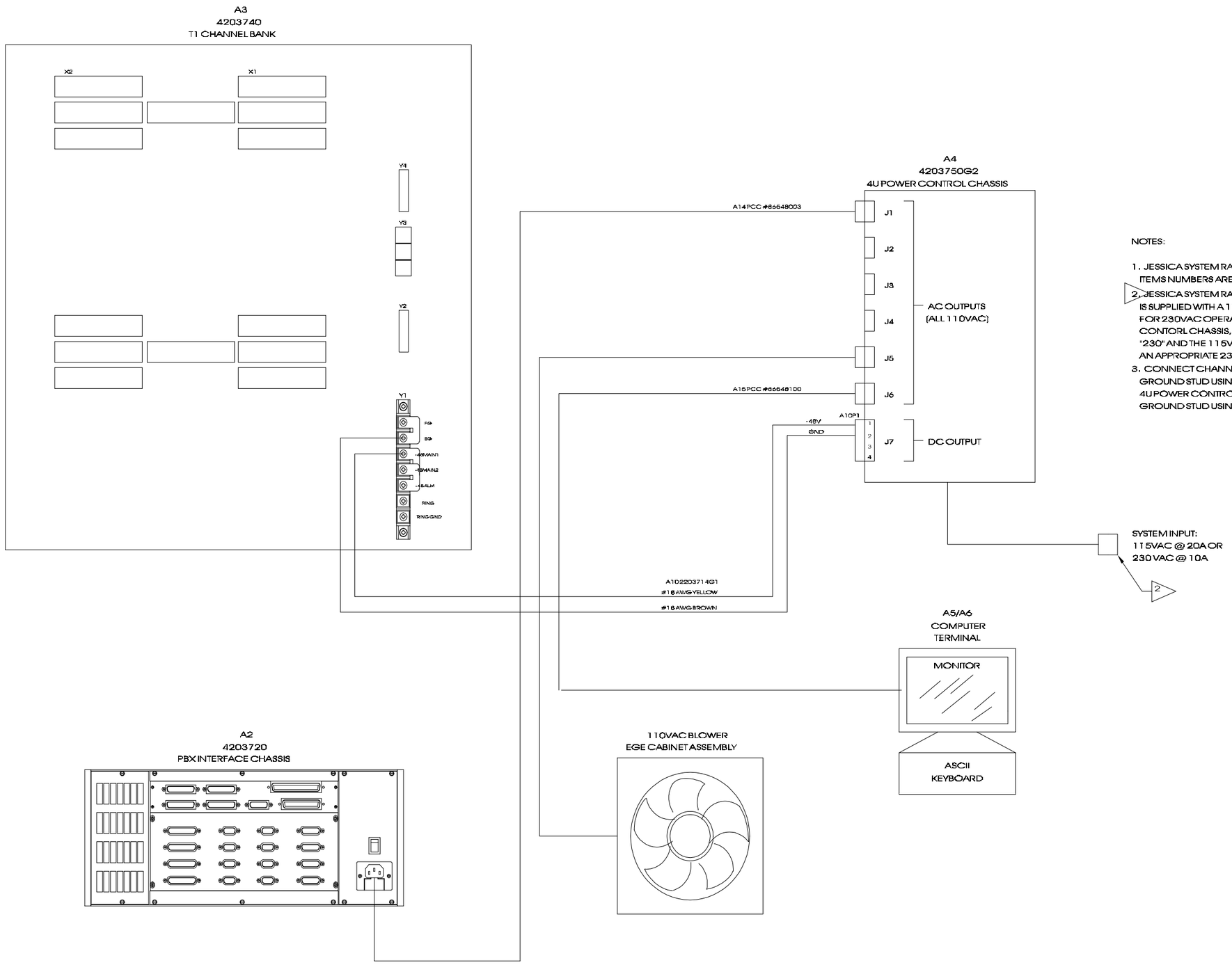
OUTLINE
4U POWER CONTROL CHASSIS

(4403751, Sh. 2, Rev. A)



DATA I/O WIRING DIAGRAM
Jessica T1 System Rack

(4503702, Rev. A)

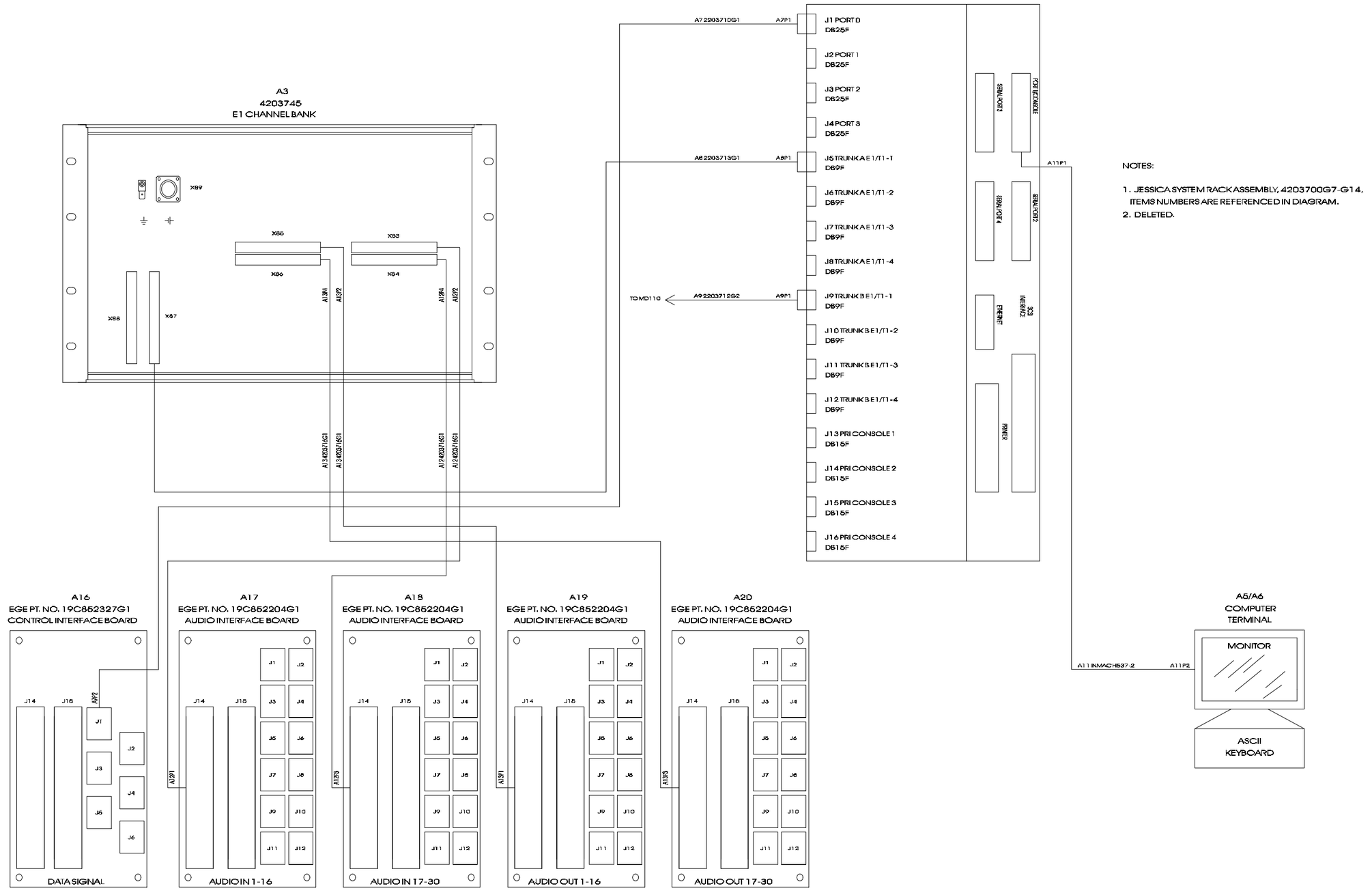


NOTES:

1. JESSICA SYSTEM RACK ASSEMBLY, 4203700G1-G6, ITEMS NUMBERS ARE REFERENCED IN DIAGRAM.
2. JESSICA SYSTEM RACK ASSEMBLY, 4203700G1-G14, IS SUPPLIED WITH A 115VAC 20A POWER CORD. FOR 230VAC OPERATION, SW1 ON THE 4U POWER CONTORL CHASSIS, 4203750, MUST BE SWITCHED TO "230" AND THE 115VAC PLUG MUST BE REPLACED WITH AN APPROPRIATE 230VAC PLUG (COUNTRY DEPENDENT).
3. CONNECT CHANNEL BANK, 4203740, TO RACK GROUND STUD USING #16 AWG GREEN WIRE. CONNECT 4U POWER CONTROL CHASSIS, 4203750, TO RACK GROUND STUD USING #12 AWG GREEN WIRE.

AC/DC WIRING DIAGRAM
Jessica T1 System Rack

(4503703, Rev. A)

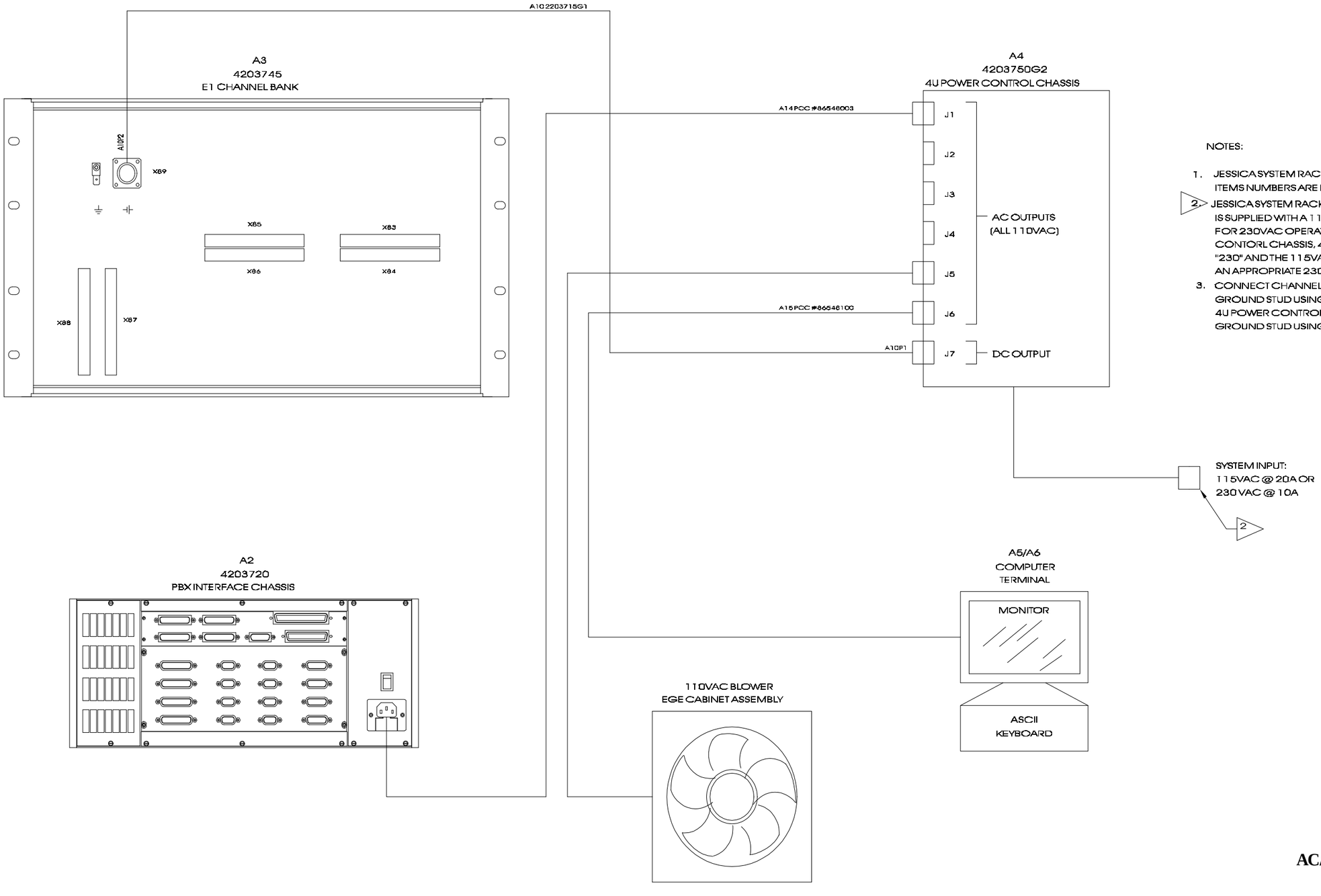


NOTES:

1. JESSICA SYSTEM RACK ASSEMBLY, 42D3700G7-G14, ITEMS NUMBERS ARE REFERENCED IN DIAGRAM.
2. DELETED.

DATA I/O WIRING DIAGRAM
Jessica E1 System Rack

(4503706, Rev. A)

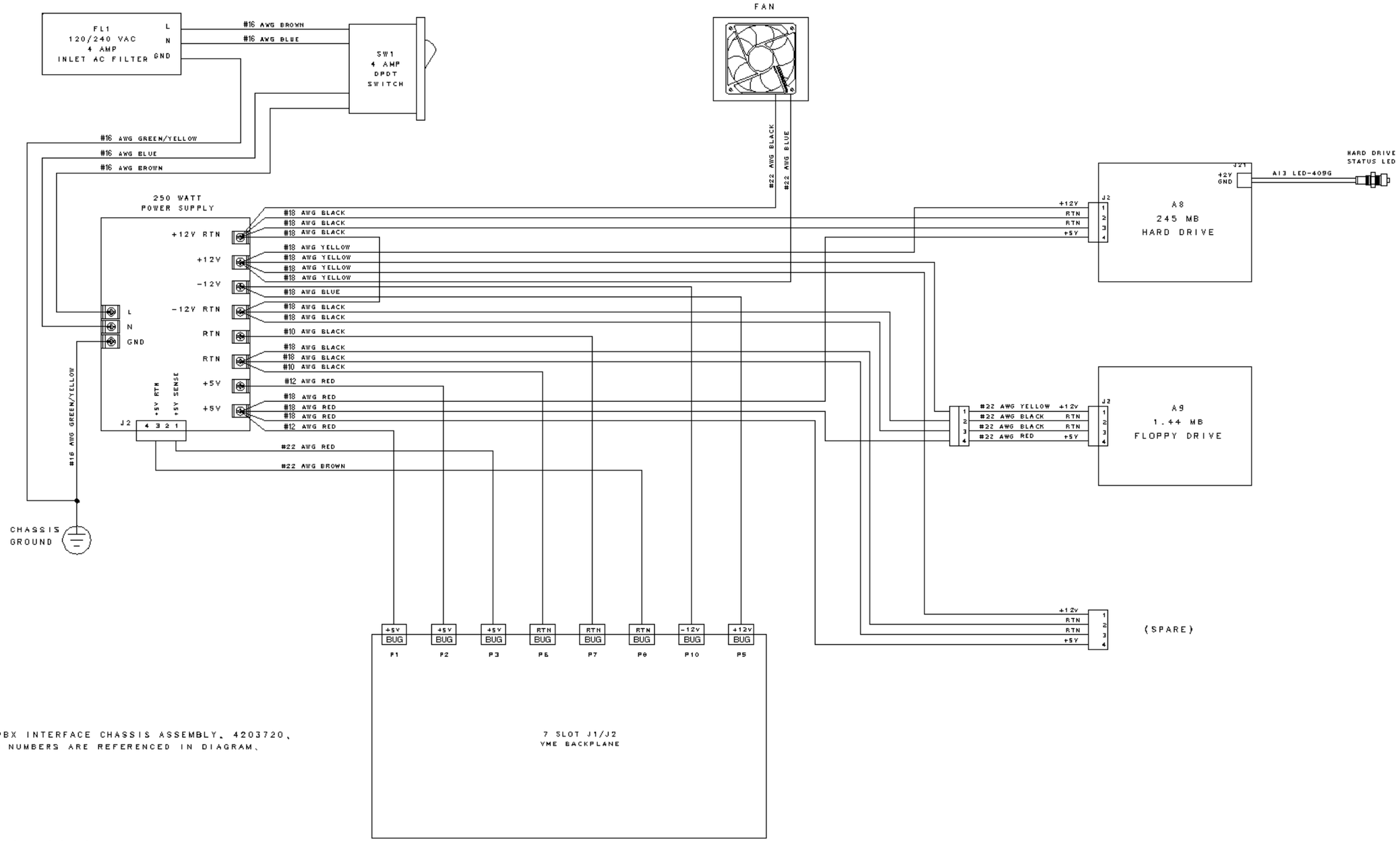


NOTES:

1. JESSICA SYSTEM RACK ASSEMBLY, 4203700G7-G14, ITEMS NUMBERS ARE REFERENCED IN DIAGRAM.
2. JESSICA SYSTEM RACK ASSEMBLY, 4203700G1-G14, IS SUPPLIED WITH A 115VAC 20A POWER CORD. FOR 230VAC OPERATION, SW1 ON THE 4U POWER CONTORL CHASSIS, 4203750, MUST BE SWITCHED TO "230" AND THE 115VAC PLUG MUST BE REPLACED WITH AN APPROPRIATE 230VAC PLUG (COUNTRY DEPENDENT).
3. CONNECT CHANNEL BANK, 4203745, TO RACK GROUND STUD USING #16 AWG GREEN WIRE. CONNECT 4U POWER CONTROL CHASSIS, 4203750, TO RACK GROUND STUD USING #12 AWG GREEN WIRE.

AC/DC WIRING DIAGRAM
Jessica E1 System Rack

(4503707, Rev. A)



NOTES:

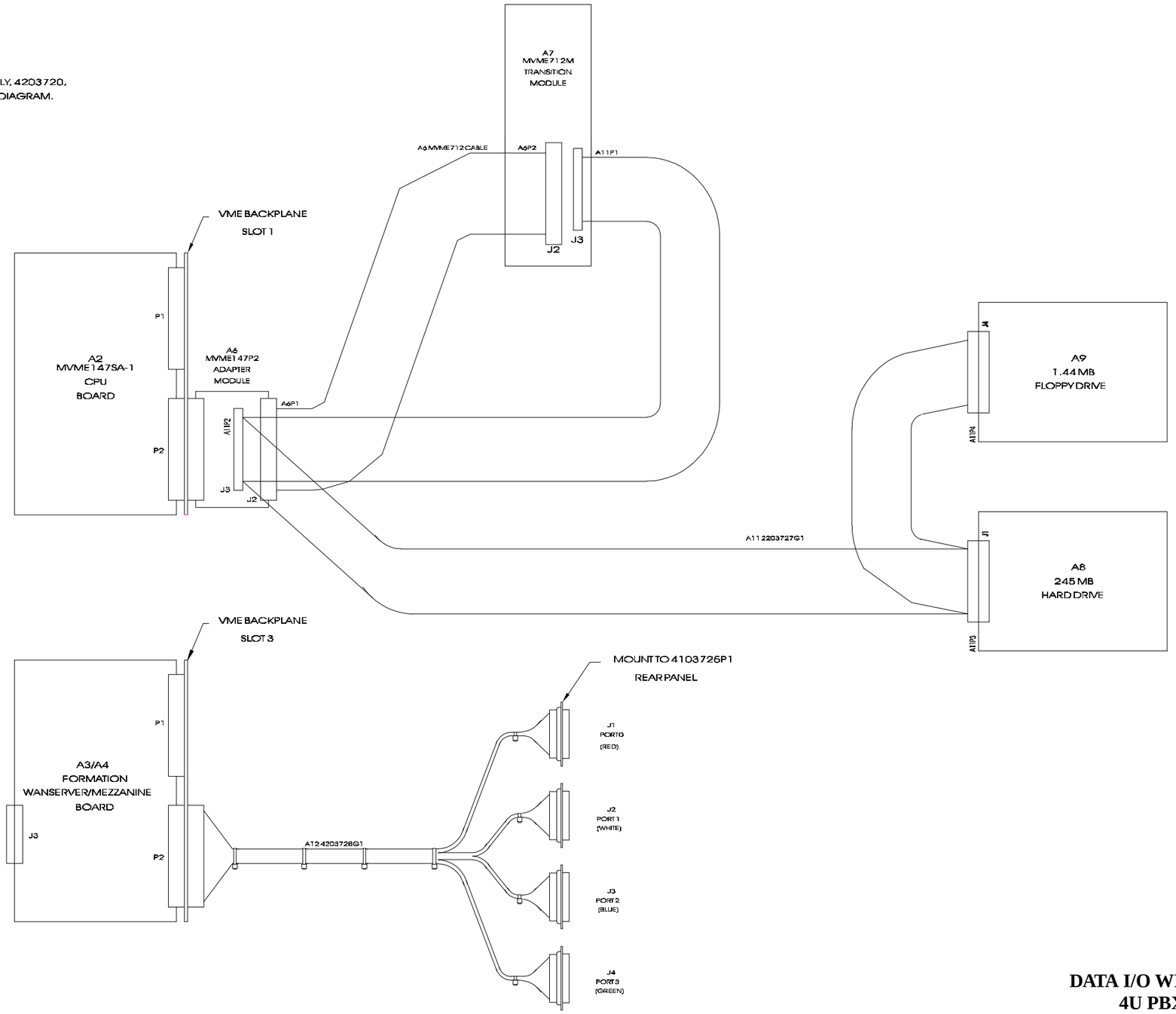
1. 4U PBX INTERFACE CHASSIS ASSEMBLY, 4203720, ITEM NUMBERS ARE REFERENCED IN DIAGRAM.

AC/DC WIRING DIAGRAM
4U PBX Interface Chassis

(4503722, Rev. 0)

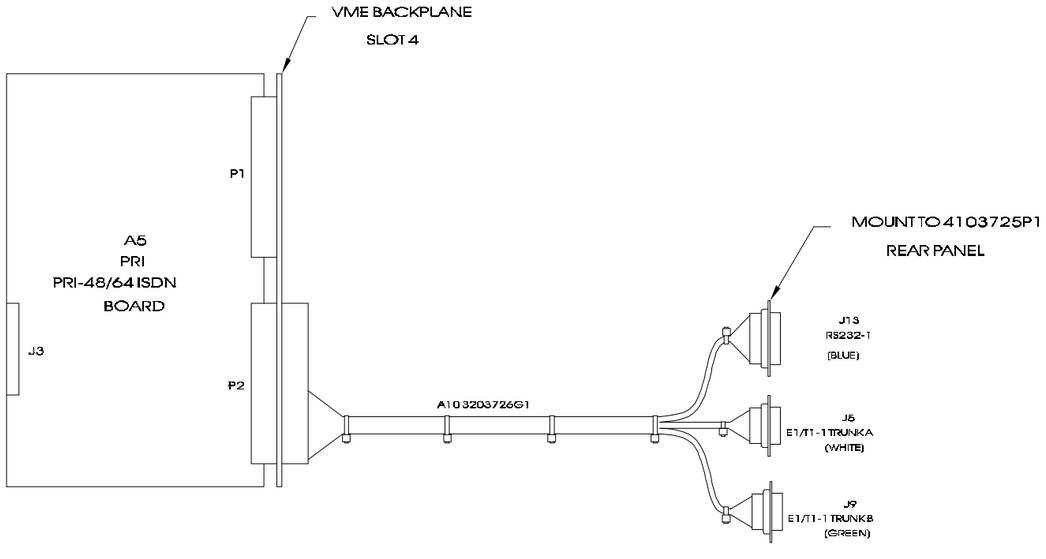
NOTES:

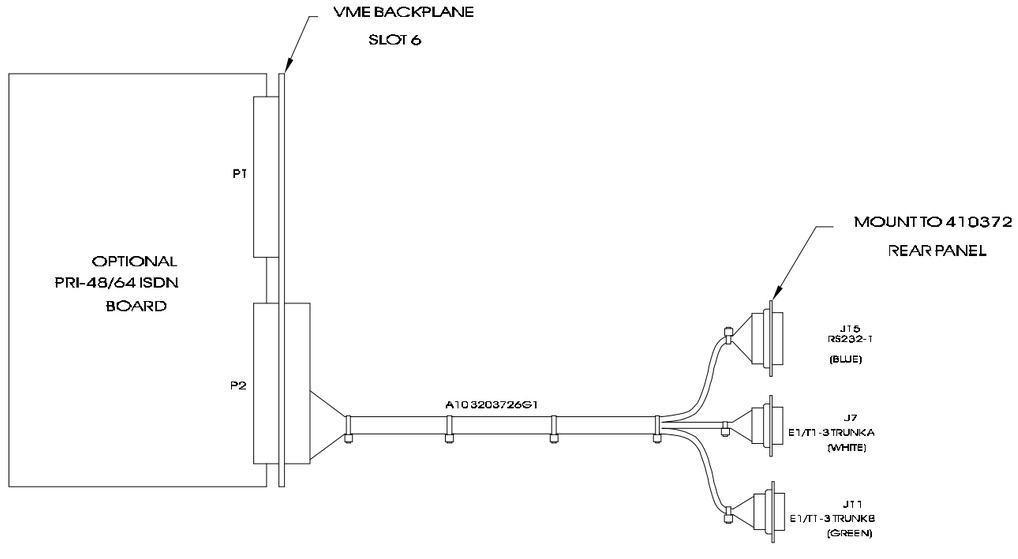
1. 4U PBX INTERFACE CHASSIS ASSEMBLY, 4203720, ITEM NUMBERS ARE REFERENCED IN DIAGRAM.

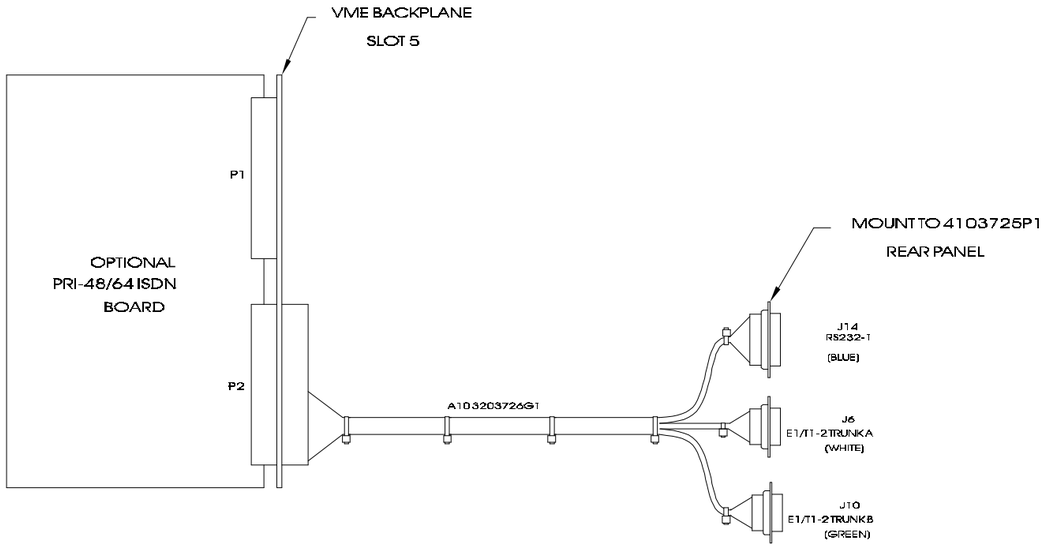


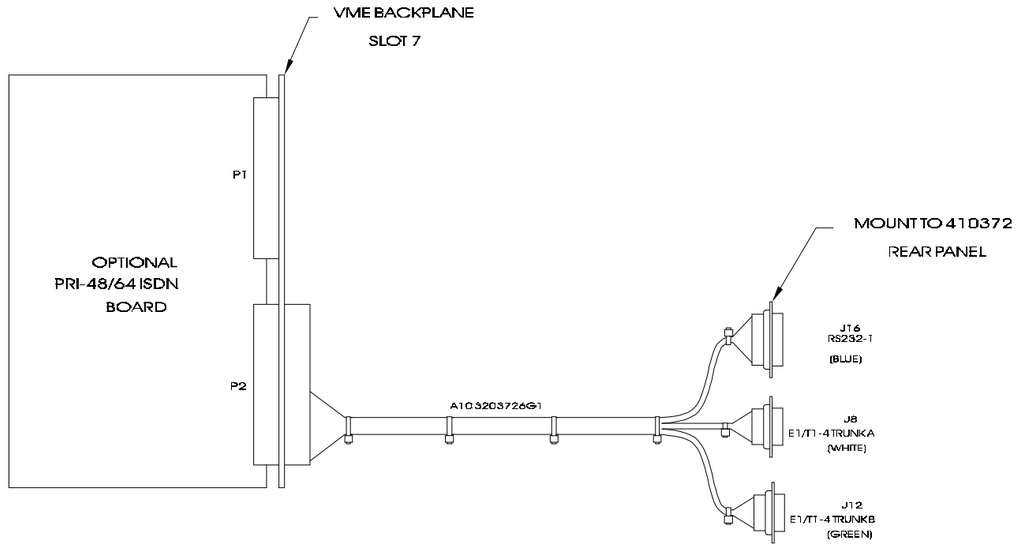
DATA I/O WIRING DIAGRAM
4U PBX Interface Chassis

(4503723,Sh. 1, Rev. A)



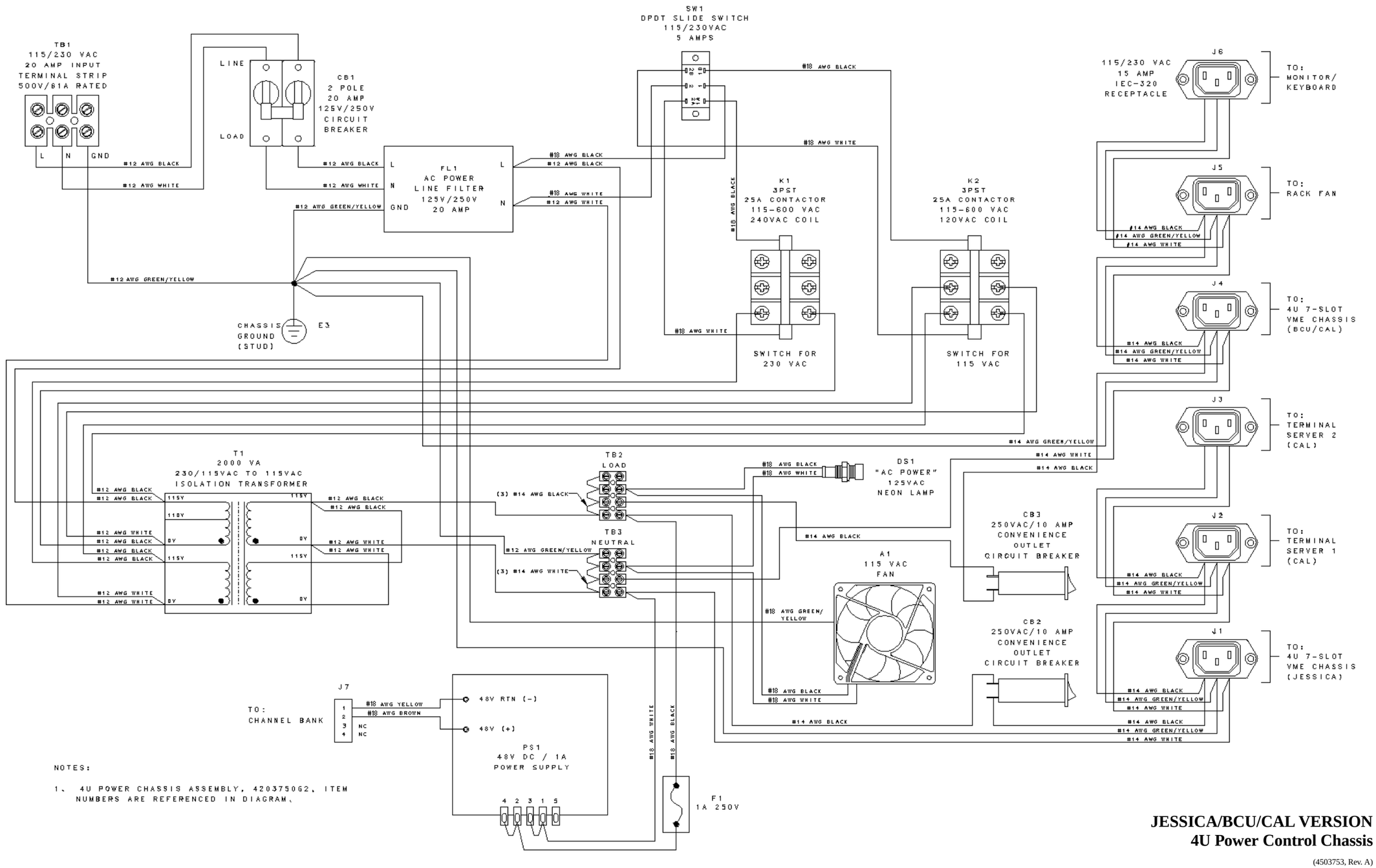






DATA I/O WIRING DIAGRAM
4U PBX Interface Chassis

(4503723,Sh. 2, Rev. A)

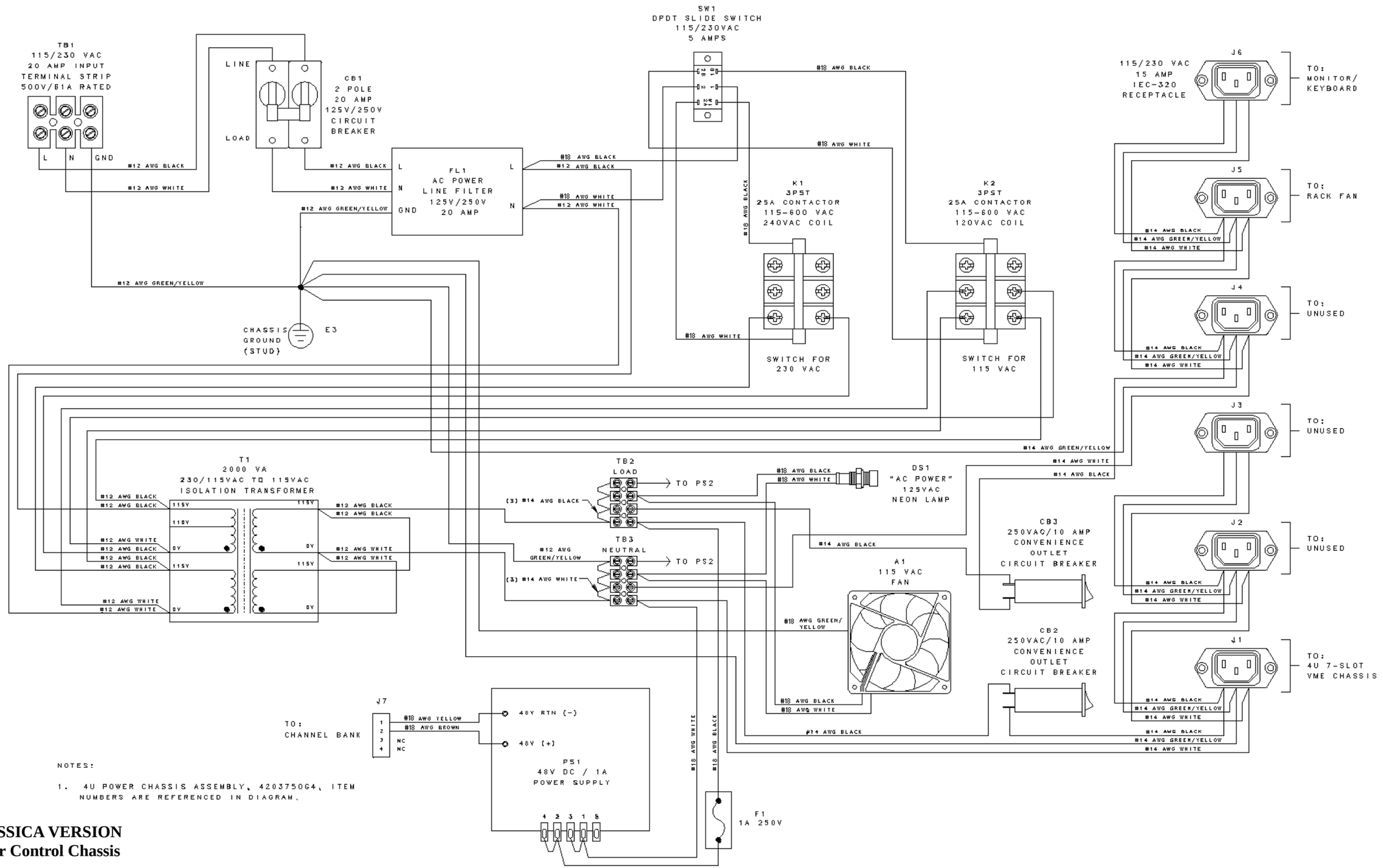


NOTES:

1. 4U POWER CHASSIS ASSEMBLY, 420375062, ITEM NUMBERS ARE REFERENCED IN DIAGRAM.

JESSICA/BCU/CAL VERSION
4U Power Control Chassis

(4503753, Rev. A)

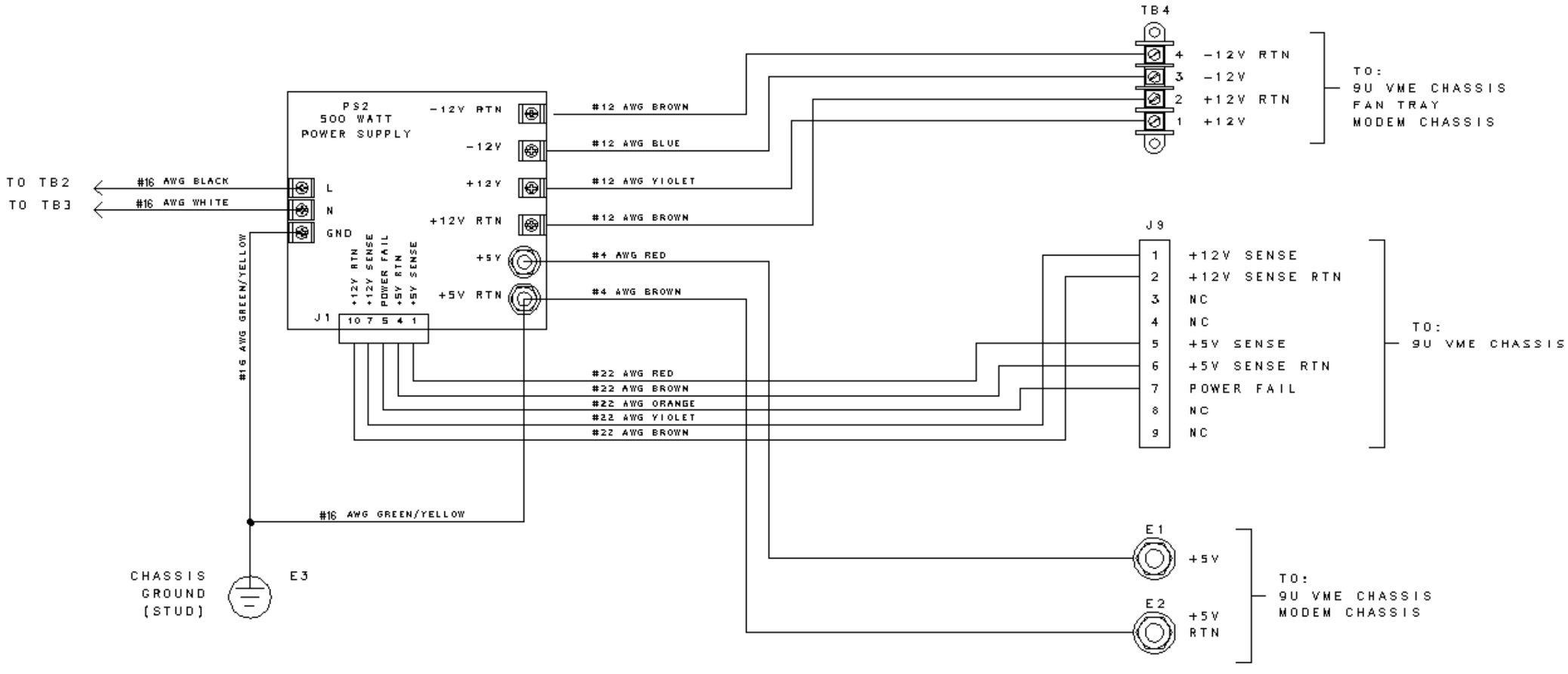


NOTES:

1. 4U POWER CHASSIS ASSEMBLY, 4203750G4, ITEM NUMBERS ARE REFERENCED IN DIAGRAM.

EDG/JESSICA VERSION
4U Power Control Chassis

(4503755, Sh. 1, Rev. A)



EDG/JESSICA VERSION
4U Power Control Chassis

(4503755, Sh. 2, Rev. A)